

Beyond Rainfall:

What the 2026 Assam Floods Reveal
About Urban Water Governance in India

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1. INTRODUCTION

There is a certain assurance in repetition. The otherwise macabre seems to dwindle beneath successive layers of (un)remembering. The eyes learn to adjust, to look away from the portrait of human misery. To live within this recurring reign of terror, to experience it not as an interruption of ordinary life but as one of its conditions, is perhaps the defining character of the flood-prone communities of Assam in general, and of the Brahmaputra Valley in particular. For the people living in this part of the world, witnessing a flood is, in turn, to be flooded. Yet, ever so often, this restless rhythm is interrupted by a rupture; loud and agonising, a rupture which showcases a certain resistance to be absorbed into memory.

I grew up in a village around seven kilometres from Sibsagar town. The river Dikhow flows past our village and, for the twenty-odd years I spent there before moving to Delhi, the sight of the river swell with the onset of the monsoon was neither unfamiliar nor unanticipated. Floods were expected. While they were feared, somewhere they also came to be integrated into the seasonal rhythm of life. However, this time around, something seemed to be different.

It is not that it was the first time that floods occurred in Assam, nor that the state never has come to experience the destructive power of the Brahmaputra and its tributaries. Even prior to the floods of July 2026, government agencies had already been mapping areas prone to flooding. They had drawn up district disaster management plans, had set up a flood forecasting network and had been issuing ever more sophisticated weather warnings. Hazard atlases had indicated vulnerable landscapes, the Master Plans had likewise recognised flood-sensitive areas. Also, in the days before the flood, the India Meteorological Department (IMD) had warned of heavy to very heavy rainfall in the Sivasagar and Charaideo districts and in the adjacent areas of Nagaland. Therefore, the hazard nor the possibility of flooding should have come as a surprise.

The question, therefore, should not simply be where and how much it rained.

What warrants our attention is the question of why a hazard that had already been forecasted, mapped and institutionally recognised; still end up translating into widespread disruption. If one can find an explanation in the physical geography of Assam regarding why floods occur in the first place, it cannot by itself explain how they end up becoming disasters of such magnitude. This distinction, somewhere, requires us to gaze beyond meteorology and towards the institutions, planning practices, and systems of water governance, notably in urban areas, that mediate the relationship between water and the city.

This article focuses on the July 2026 floods in Sivasagar district, particularly in the towns of Sibsagar and Nazira and then uses them as an analytical viewpoint to address and examine a much wider national question.

Urban flooding has come to increasingly become a recurring feature of cities all across India, in cities as diverse as Mumbai, Chennai, Bengaluru, Hyderabad and Guwahati. While there is certainly a geographical and climatic context to each of these floods, they also collectively point towards a common challenge: the growing disconnect between what institutions know about flood risk and how cities are planned, governed and managed. The floods in Assam therefore go beyond merely telling the story of a rare weather event; they show the shortcomings of present-day urban water governance in a nation where the hazard is becoming more and more foreseen but the disaster is still not adequately mitigated and therefore adapted to and prepared for.

2. METHODOLOGY

The paper selects the floods which occurred in the Sivasagar and Charaideo districts in July 2026 as a case study in order to improve its understanding of the problems relating to urban water governance in India. To carry out this analysis, it conducts a systematic review of various official documents on planning, disaster management and meteorology, including the daily weather bulletins issued by the India Meteorological Department (IMD), the flood situation reports published by the Assam State Disaster Management Authority (ASDMA), the Sivasagar District Disaster Management Plan, the Sivasagar Revised Master Plan, the Nazira–Simaluguri Master Plan, the Flood Hazard Zonation Atlas of Assam, the Sivasagar District Survey Report and the satellite-derived flood inundation maps prepared by the National Remote Sensing Centre (NRSC).

GIS mapping was used to assess the changes in Land Use Land Cover (LULC) were looked at in the Sivasagar, Charaideo districts of Assam and Nagaland's Mon district from 2017 to 2026. The district of Mon in Nagaland becomes particularly important to the analysis because the three rivers that were at the core of the flood, Dikhow, Dorika and Disang; originate in and around the hills located at Mon. The analysis made use of Google Earth Engine and Google Dynamic World VI at a spatial resolution of 10 metres, and the classification results were then used to examine changes in built-up land, cropland, tree and forest cover and in the other land-cover categories listed in the Annexure at the end of the report. The mapped results were checked against imagery derived from Sentinel, with a particular focus on the hilly area of the Mon district. The LULC analysis is combined with the flood inundation maps in order to study the evolving landscape in which the floods of July 2026 took place.

The article employs a conceptual framework focused on governance and differentiates between a hazard and a disaster. The physical hazard is primarily described in terms of heavy rainfall and river flooding, whereas the extent and effects of the disaster are assessed by taking into account exposure, land-use planning, the degree of institutional preparedness, flood forecasting, and urban water governance policies. Through triangulating evidence across these different points of references, the study has aimed to provide a clearer picture than what is generally perceived. To supplement documentary and spatial evidence, the analysis has also drawn on contemporary accounts from residents, relief workers and public officials reported by Indian media, as well as a certain number of telephonic interviews conducted for a qualitative assessment of the damage and disruption caused by floods.

2.1. LIMITATIONS OF THE STUDY

The LULC analysis must be regarded as a satellite-derived indication of general land-cover change and not as a survey-standard measurement of land use; moreover, the fact that it uses data with a spatial resolution of 10 metres means that smaller and more fragmented features cannot be identified, especially in the hilly area of Mon, where higher-resolution imagery would have been better. However, suitable 1-metre imagery was not publicly available for the study area. The difference in the total classified area between 2017 and 2026 also reflects differences in the mapped outputs and should not be interpreted as an actual change in the geographical extent of the study area. Finally, the comparison of only two years cannot establish the precise timing or causes of land-cover change. Further details on the data, classification and validation, including the GIS outputs, are provided in the Annexure.

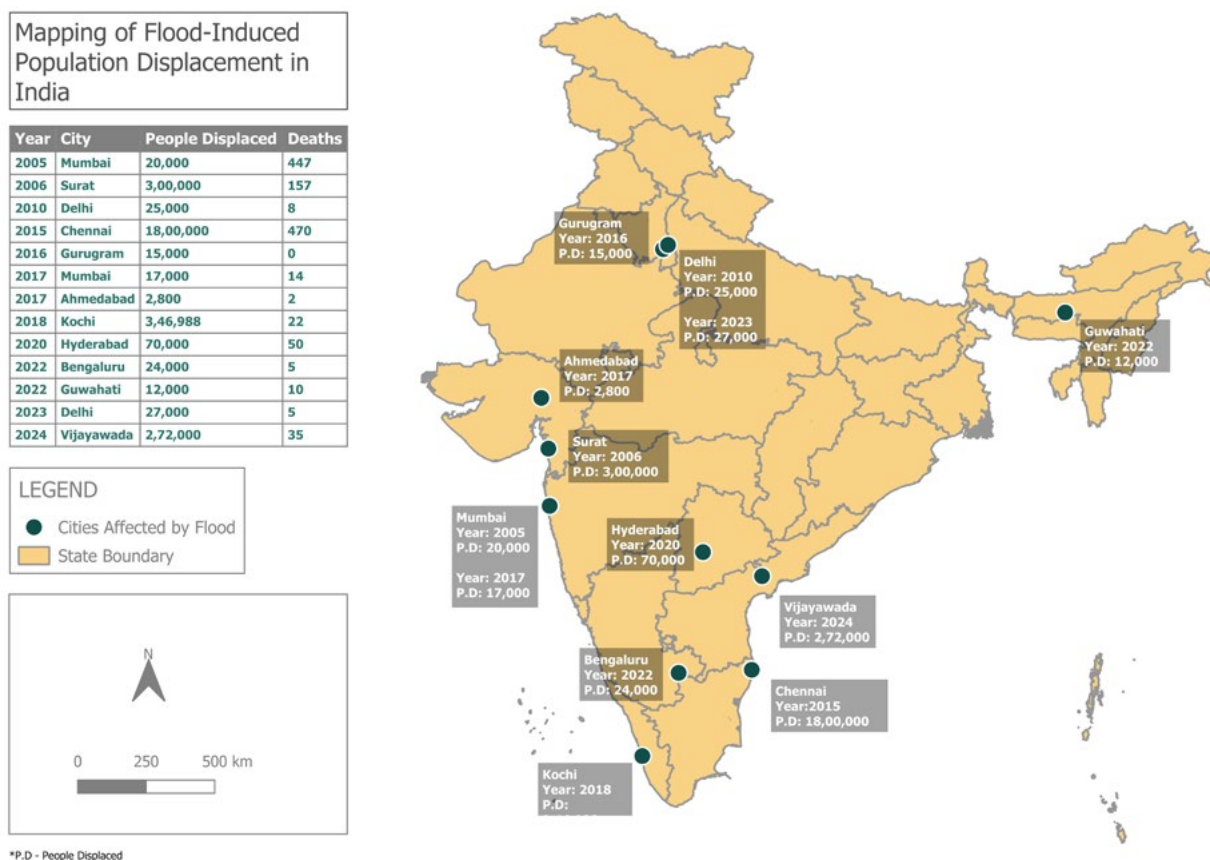
3. FLOODS BEYOND ASSAM: A NATIONAL PATTERN

There is no singular pattern when it comes to Urban flooding in India ; in large metropolitan areas it usually results from heavy rainfall which overloads the drainage systems, while in smaller towns and settlements urbanisation may combine with flooding from rivers, wetlands and catchment areas. The fact that these differences exist is important for governance, but they all have one thing in common; that land-use decisions and infrastructure systems frequently fail to take into account the hydrological processes which extend beyond administrative boundaries.

Across India, urban flooding has become an increasingly familiar feature of the monsoon, which means that the July 2026 floods in Assam were not an isolated event. These floods, in their wake, have ended up affecting cities that stretch through different geographies, climates and patterns of urbanisation. From Mumbai's record-breaking floods in 2005 and Surat in 2006 to Srinagar in 2014, Chennai in 2015, Kochi in 2018, Hyderabad in 2020 and then Bengaluru in recent years, urban floods have increasingly shifted from being distinct, one-time and exceptional disasters to recurring features of city life (National Disaster Management Authority [NDMA], 2010; World Bank, 2022).

Figure 01

Major Urban Flood Events in India (2005–2024): Population Displacement and Mortality



Source: Author's compilation based on NDMA, state disaster management authorities, government reports, and historical flood data-bases. Map by Aparna Yadav.

As shown in Figure 1, severe floods have in recent decades started to affect the cities of western, southern, northern and northeastern India. The relationship between rainfall and flooding, however, is not always as straightforward as it may first appear and in the last 20 years, close to 3 million people have been displaced by floods in India. Using four decades of observations from 173 gauging stations, a recent study of riverine floods across India has found a decreasing trend in flood magnitude at 74 percent of the stations examined, while only 26 percent showed an increasing trend (Kuntla, Saharia, & Jain, 2025). The study also found considerable regional variation in the timing and magnitude of floods.

These findings demonstrate that an increase in heavy rainfall does not automatically imply larger river floods. Instead, flood dynamics are heavily mediated by characteristics of the catchment, the soil moisture, land use changes and the river management infrastructure like dams and reservoirs. While local flash flood and urban waterlogging remains a severe hazard for cities, large-scale riverine flood volumes are declining across the country.

Flood exposure is also socially uneven. The individuals who are displaced by urban flooding are not spread evenly throughout cities, since low-income households and migrants are frequently found living in informal or poorly served settlements in low-lying and flood-prone areas. The World Bank (2025) points out that informal settlements are one of the groups most exposed to pluvial flooding in Indian cities, and studies conducted in Bengaluru have shown that migrant communities residing in informal settlements can suffer particularly severe effects from flooding, such as the loss of household assets, disruption of their livelihoods and poor access to basic services (Jennath & Singh, 2024).

These patterns show that population displacement is not just an indication of the extent of a flood; they also reveal the unequal distribution of exposure and vulnerability within cities. When there is a lack of access to affordable formal housing, the growth of urban populations can reinforce this vulnerability by causing some households to move into areas that carry greater environmental risk and have weaker infrastructure. The economic losses resulting from urban flooding which are in turn also compounded by riverine factors go well beyond deaths and the need for people to leave their homes. Such floods can destroy housing, public utilities and infrastructure while also disrupting employment, businesses and ordinary economic activity.

A study of flood-related damage in six Indian states found that India suffered economic losses exceeding US\$69 billion between 1953 and 2011, the amount being calculated at 2017 prices and covering crops, housing and utilities; Assam was among the states with the highest total damage recorded (Das et al., 2022). The World Bank (2025) more recently estimated that the annual losses from pluvial flooding in Indian cities were about US\$4 billion in 2023 and projected that these losses would increase to around US\$5.2 billion per year by 2030 if adequate corrective measures were not taken. These figures indicate that urban flooding is not merely an issue for disaster management but also a repeated economic cost of the way in which cities are planned, constructed and served. In July of 2005, when Mumbai experienced an unprecedented 944 mm of rainfall in twenty-four hours, the resulting flood exposed the effects of insufficient stormwater drainage, floodplain encroachment and institutional fragmentation (Government of Maharashtra, 2006; NDMA, 2010). Similarly in the 2006 Surat floods, it was revealed that reservoir operations at Ukai Dam and weak coordination between agencies ended up amplifying flood impacts despite pre-existing knowledge of rising water levels (Government of Gujarat, 2006). In subsequent inquiries after the 2015 Chennai floods, wetland degradation coupled with unregulated urban expansion and reservoir management practices were discovered as being significant contributing factors (Government of Tamil Nadu, 2015; World Bank, 2018).

The social and economic effects show that the problem of flood management has become more important than just focusing on emergency response; it is not merely the fact that floods happen again and again, but that their costs depend on the way urban land, infrastructure and drainage systems are managed before a flood occurs. Degradation of interconnected lakes and obstruction of natural drainage channels coupled with rapid urban expansion into low-lying areas have frequently come to be identified as causes

of Bangalore's recurrent flooding. Nagendra et al (2018) in their work concerning Bengaluru, state that the deterioration of the interconnected lakes and the natural drainage systems has led to greater vulnerability to urban flooding through disrupting the blue-green infrastructure. The fact that the Yamuna River continues to flood both along its banks and further inland shows how ongoing problems in the management of floodplains and the clash between urban development goals still influence patterns of exposure and vulnerability.

Baviskar (2011) also noted that the Yamuna floodplain in Delhi has been altered as a result of conflicting views on environmental protection and urban development, proving that floodplains are political territories and not empty land to be developed. Ghertner (2015) assessment further shows how planning decisions decide which metropolitan areas are protected, changed or made expendable. If all the literature is considered together, it becomes clear that urban flooding cannot be understood merely by referring to rainfall figures or engineering failures; it is also the result of the governance decisions on land use, infrastructure and ecological management. Although the hydrological causes lying at the heart of these floods vary considerably from one city to another, the institutional difficulties remain remarkably similar and persistent.

A major shift in India's disaster management framework has also come about in the face of these recurring experiences. Emphasis was laid on greater coordination among urban local bodies, planning authorities and disaster management authorities (NDMA, 2010). In subsequent policy initiatives, which include the National Water Policy (Government of India, 2012), the Atal Mission for Rejuvenation and Urban Transformation (Ministry of Housing and Urban Affairs, 2015a), the Smart Cities Mission (Ministry of Housing and Urban Affairs, 2015b), and the National Disaster Management Plan (NDMA, 2016), the conversation has furthered on the lines of needing to integrate urban planning along with disaster risk reduction and climate resilience.

These institutional advances have not been able to completely mitigate the urban flood disasters and they continue to recur with striking regularity. Even though the ability to predict weather using meteorology and monitoring using satellites has been improving along with the capability to respond to emergencies, these efforts have failed to result in any commensurate progress in terms of land use planning, drainage, wetland and floodplain preservation, or even coordination between planning and disaster management institutions (NDMA, 2010; World Bank, 2022). The United Nations Office for Disaster Risk Reduction (UNDRR), on this point, has noted that disasters do not happen only because of hazard occurrence, but rather because of the complex relationship between hazards, exposure, vulnerability and governance.

Taking this larger picture into account, the July 2026 Sivasagar floods take on a greater meaning than just that of a hazard event. It is widely known that Assam is prone to flooding due to the presence of the Brahmaputra river and its tributaries. However, it has to be taken into consideration that at the time of the July 2026 floods, the areas vulnerable to flooding were mapped out, hydrological limitations had been accounted for in statutory plans, and there were district disaster management plans which included the hazard of flooding and there were advance forecasts by meteorological services. The floods that occurred were not an example of urban flooding in the strict sense of waterlogging due to insufficient drainage within a city; rather, they were essentially a riverine flood impacting settlements over a broader hydrological area.

However, this distinction does not mean that the floods have nothing to do with urban water management. Both Sivasagar and Nazira are towns in which the roads, housing, public facilities and growing built-up areas are part of this wider landscape. The floods therefore pose a more general question: how should urban and spatial planning take into account hazards whose causes and effects extend well beyond classified administrative boundaries?

4. FROM FORECAST TO FLOOD: THE JULY 2026 EVENTS IN SIVASAGAR

Between 17 and 19 July 2026, the India Meteorological Department (IMD) issued a series of All India Weather Bulletins recording the persistence of an active southwest monsoon over the country together with an upper-air cyclonic circulation over Northeast India (India Meteorological Department [IMD], 2026a). Over the course of these three days the language used in the bulletins stayed remarkably consistent with “heavy to very heavy rainfall” in Assam and the possibility of “isolated extremely heavy rainfall” in certain areas of Nagaland and Meghalaya. (IMD, 2026a, p. 1). The conditions which in the end led to the floods in July were therefore not invisible or unknown; they had been well known within the scope of official knowledge long before the floodwater started to enter homes and settlements.

By 18 July 2026, the Assam State Disaster Management Authority’s (ASDMA), Disaster Reporting and Information Management System (DRIMS), had already begun issuing official flood situation reports for the state (ASDMA, 2026a). Sivasagar was among the districts officially identified as flood affected, while the revenue circles of Amguri, Sivasagar and Demow had already been listed as experiencing flood impacts (ASDMA, 2026a). In conversation to SPRF, Kaustav Bhuyan, a resident of Nazira remarked

“At first, nobody had thought that it would become this serious. We had seen the fields filling with water before, so people were waiting for the rain to stop. But once the Dikhow River started rising, the water started coming in very quickly. By the time we understood and realised what was happening, it had already entered the house.”

Assam’s CM, Himanta Biswa Sarma, as quoted by the Times of India, said “a sudden cloudburst in Nagaland has caused floods to strike even those districts of Assam where such an effect had not been seen before”. This statement was later revised to “Even though there is no official confirmation of a cloudburst, several districts of Nagaland and parts of Upper Assam adjacent to it experienced exceptionally heavy rainfall in July, with some areas recording nearly 500 per cent above-normal rainfall”.

The India Meteorological Department later made it clear that the amount of rain that fell at Aboi in Nagaland was 137 mm over a period of eight to nine hours, falling short of the meteorological criterion for a cloudburst, which is usually defined as more than 100 mm of rainfall in one hour. Another scientist from the IMD also noted that rainfall of this kind is not a new phenomenon in the Northeast and warned that “rainfall alone may not explain the floods, particularly in areas which have witnessed the deluge for the first time” (The Assam Tribune, 2026). While this does not undermine the role of extreme rainfall as a triggering factor, it does highlight the importance of distinguishing between the physical hazard and the conditions that determine the severity with which that hazard is felt.

Although the flood extended across several parts of the district, its effects became quickly visible in the urban settlements of Sibsagar and Nazira. Both towns had not been inundated under floodwaters for the last 60 odd years and most residents had no tangible memory of their houses getting flooded. The towns occupy a landscape that has for long remained closely associated with the Dikhow river and its wider floodplain. The Dikhow, Dorika and Disang, all of which are tributaries of the Brahmaputra; eventually drain into the Brahmaputra. This means that these settlements are part of a much larger fluvial system whose seasonal rhythms have historically shaped everyday life in that corner of the world.

The July 2026 floods did not unfold in a landscape whose characteristics were unknown or unrecognised. The rivers were familiar and the floodplain was known. The hazard too, had already been recognised. The

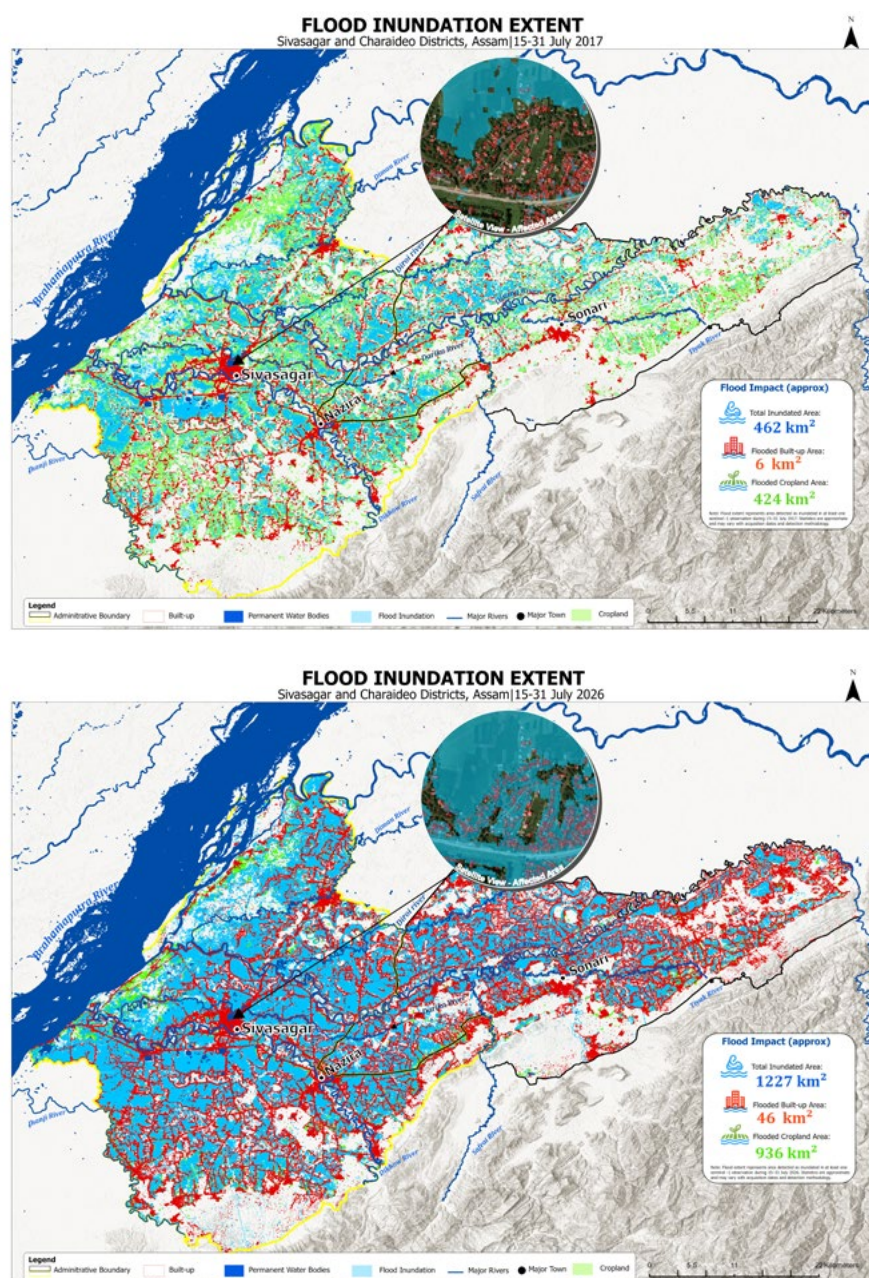
question, however, still remains the same: why did a hazard that had already entered institutional knowledge continue to translate into a disaster of such magnitude?

A similar sense of disbelief at the scale of the inundation was expressed by a resident of Rajapul, Nazira,

“We have seen water rise around the village before, but it had never come into the house like this. This time the water kept rising and there was very little we could do except move higher inside the house. By the time help arrived, many families had already moved onto their roofs or were trying to find somewhere safer.”

Figure 02

Spatial extent of Flood Inundation in Sivasagar, Charaideo and adjoining areas during July 2017 and July 2026. Maps by Umair Ahmad.



The figure 2 compares the extent of the floodplain during July 2017 with that observed in July 2026. It is immediately visible that there has been considerable expansion of inundated areas along the Dikhow, Disang and Dorika river systems during the 2026 floods, with floodwaters extending into areas surrounding both Sibsagar town and Nazira. Yet, what is perhaps equally noticeable is that the flood did not appear to carve out an altogether unfamiliar path. The inundated areas continued to remain closely aligned with the existing river channels and the wider floodplain through which these rivers have historically flowed. The GIS maps, however, reveal that the total inundated area in 2026 was almost 2.5 times that of 2017. Similarly flooded built-up area increased by more than 7.5 times while flooded cropland area increased by more than 2.2 times in the districts of Sivasagar and Charaideo. The numbers alone however do not reveal the full extent of the flood.

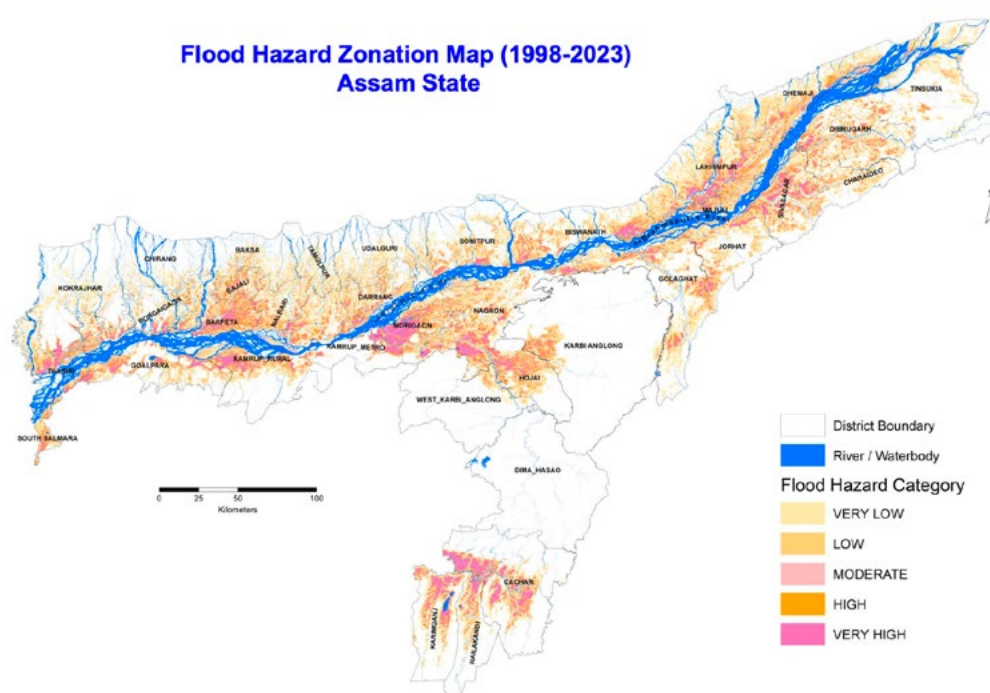
Having lived in the area for several decades, Rubul Ali called the flood unusual simply because the settlement had generally been regarded as fairly safe from direct flooding of homes and he said;

“People in this area are aware that the river rises during the monsoon and have always had to live with that possibility. But it is one thing to see the fields and roads submerged and another to ersee the water get into your own house.”

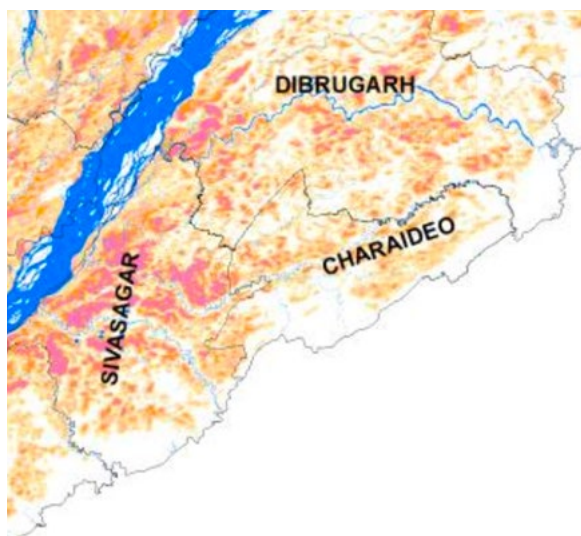
The extent of this coincidence becomes much more apparent when viewed alongside the Flood Hazard Zonation Atlas of Assam, prepared using satellite observations spanning the period from 1998 to 2023 (Fig 3), which classifies flood susceptibility across the state into five distinct hazard categories (ASDMA & NRSC, 2025). The Atlas itself states that its purpose is to “assist planners in developing mitigation strategies” (ASDMA & NRSC, 2025, Abstract). Therefore the Atlas, in this regard was never meant to be an instrument to document areas that had experienced flooding in the past but it was also to serve the purpose of guiding planning decisions in landscapes where flooding had already been recognised as a recurring possibility. The July 2026 inundation occurred in areas whose susceptibility to flooding had already found recognition through years of satellite observations and hazard mapping.

Figure 03

Flood Hazard Zonation Map of Assam, based on satellite observations from 1998–2023.

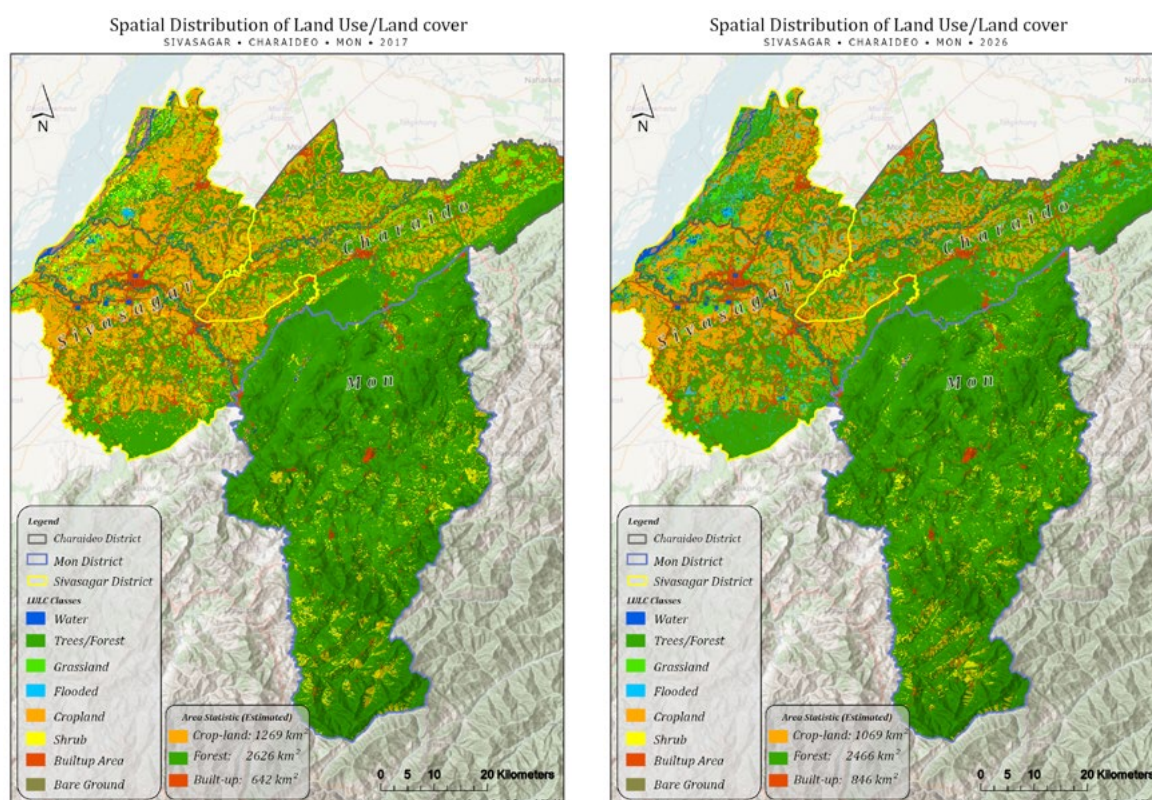


Source: Flood Hazard Zonation Atlas of Assam, ASDMA & NRSC (2025).

Figure 04**Flood hazard zonation in Sivasagar and Charaideo districts, 1998–2023.**

Source: Adapted from Flood Hazard Zonation Atlas of Assam, ASDMA & NRSC (2025)

The same recognition can also be found within local planning documents. The Sivasagar District Disaster Management Plan also identifies flooding as a recurring hazard within the district and approaches disaster risk through the interaction of hazard, vulnerability and capacity (District Disaster Management Authority [DDMA], 2025). Therefore, if one were to read these planning documents alongside the Flood Hazard Zonation Atlas and the meteorological forecasts discussed earlier, a rather similar picture begins to emerge.

Figure 05**Land Use Land Cover (LULC) classification of the Sivasagar, Charaideo and Mon study area for 2017(Left) and 2026 (Right).**

Source: GIS analysis based on Google Dynamic World V1 satellite-derived land-use and land-cover data. Maps by Umair Ahmad

A combined GIS-based land-use and land-cover analysis of Sivasagar, Charaideo and Mon districts comparing 2017 and 2026 (Fig 5) shows an overall increase in classified built-up land from 642.75 km² to 846.73 km², an increase of 31.7 per cent. Over the same period, the area classified as cropland declined by 15.7 per cent, while tree and forest cover declined by 6 per cent.

Even though the LULC analysis here cannot directly form a casual relationship between loss of crop land and forest cover and the extent of the inundation, it does provide an insight that is hard to overlook. The LULC analysis indicates that areas identified as susceptible to flooding have also undergone substantial changes in land cover between 2017 and 2026. What it implies is that in the specified study area flood susceptibility and land-cover change are not occurring independently of one another. This finding is significant for spatial planning because changes in built-up land can alter the number and distribution of people, buildings and infrastructure potentially exposed to flood hazards.

5. THE GOVERNANCE LANDSCAPE: PLANNING FOR A KNOWN HAZARD

From the data and evidence, it has been well established there was not a lack of recognition or institutional awareness in terms of the flood risk that the districts of Sivasagar and Charaideo carry. Flooding had always been considered a regular part of the district's physical environment as a result of national policy schemes, state-level hazard mapping, district disaster management plans or statutory Master Plans. The floods in July 2026 were of much significance not because they demonstrated a hazard which the appropriate institutions had not recognised; on the contrary, they proved that the recognition of such a hazard had not been properly turned into forms of resilience capable of responding to a hazard that was already known.

At the national level, this recognition can be traced back several years. The National Disaster Management Guidelines for the Preparation of State Disaster Management Plans represented a gradual shift away from an approach centred primarily on relief and rehabilitation, placing a much greater emphasis on preparedness, mitigation and disaster risk reduction (National Disaster Management Authority [NDMA], 2007). The Guidelines on the Management of Floods further argued that flood management could no longer remain confined to post-disaster response alone. Instead, they called for greater attention towards flood forecasting, floodplain zoning, drainage planning and coordination across institutions responsible for managing flood risk.

The guidelines also recognised urban flooding as a challenge in its own right, emphasising the need for planned drainage networks and greater regulation of encroachments upon natural drainage systems (NDMA, 2008). In this regard, the principles that would later come to inform state and district planning documents had already begun to find articulation within the national policy framework. The focus on preparedness was also distinguished by a continuous expansion of flood forecasting and hazard assessment.

According to the Central Water Commission's evaluation of India's flood forecasting network, there has been a steady improvement in the institutional ability to monitor floods and provide early warnings throughout the country (Central Water Commission [CWC], 2025). At the same time, the Flood Hazard Zonation Atlas of Assam, which was jointly prepared by the Assam State Disaster Management Authority and the National Remote Sensing Centre, collected the satellite-derived flood inundation data from the 26-year period covering 1998 to 2023 with a view to dividing the state into five hazard categories according to flood susceptibility (ASDMA & NRSC, 2025). The Atlas makes it clear that its aim is to assist planners in formulating risk reduction strategies; it was therefore not simply intended to record the places where floods had occurred in the past, but also to aid planning decisions in regions where flooding had already been identified as a recurring issue.

This larger policy and disaster management framework also finds its place in Local Body and district planning documents. The Sivasagar District Disaster Management Plan names flooding as one of the principal hazards affecting the district and deals with disaster risk by taking into account the interaction between hazard, vulnerability and capacity (District Disaster Management Authority [DDMA], 2025). The document also gives a strong focus on preparedness rather than depending solely on emergency relief. It says that “preparedness involves drawing up plans for responding to a disaster threat or event” and that its main aim is “to reduce the impact of a disaster through the use of suitable actions” while at the same time strengthening the community’s capacity and administrative readiness. The plan also calls for regular monitoring and revision, the DDMA being in charge of arranging the reviews every quarter and updating the plans every two years according to the most recent flood-risk maps, hazard assessments, and scientific studies.

Figure 06

Multi-Scalar Government Framework for Urban Flood Risk Management.

Multi-scalar Government Framework for Urban Flood Risk Management			
Scale	Key Institutions	Primary Responsibilities	Key Instruments / Tools
 National Level	NDMA Line Ministries (MoHUA, MoJS, MoES, MoRD, IMD, CWC, NRSC)	- National policy and strategic direction - Risk assessment and national guidelines - Resource mobilization and capacity building - Inter-ministerial coordination - National monitoring and reporting	- National Disaster Management Plan - National Disaster Management Guidelines - National Flood Policy - Hazard Maps & National Databases - Early Warning Systems - Capacity Building Programmes
 State Level	ASDMA State Departments (Revenue, Irrigation, Urban Development, Environment, Police)	- State disaster management planning - State-level risk assessment and mapping - Policy integration across departments - State resource allocation and oversight - Coordination with districts and ULBs	- State Disaster Management Plan - State Flood Guidelines - State Flood Control Programmes - State EWS and Communication Systems - Training and Capacity Building
 District Level	DDMA District Departments (Revenue, PWD, Agriculture, Health, Police, Education, Fire Services)	- District risk assessment and micro-zonation - Preparedness and response planning - Coordination among line departments - Resource management and deployment - Community awareness and training	- District Disaster Management Plan - District Flood Plans - Incident Response Systems - Community-Based DRR Programmes - District EWS and Control Rooms
 Urban Local Level	Urban Local Bodies (ULBs) Municipal Corporations, Municipal Councils, Town Panchayats	- Urban risk assessment and hotspot mapping - Land use and building regulation - Drainage maintenance and infrastructure - Solid waste management - Local preparedness, response and recovery	- Master Plans & Land Use Plans - Drainage Master Plans - Building Codes and By-laws - City EWS and Alert Systems - Community Engagement Platforms
Source: Prepared by author based on (i) Sendai Framework for Disaster Risk Reduction 2015–2030, UNDRR, 2015; (ii) Disaster Management Act, 2005, Government of India; and (iii) National Disaster Management Plan, 2019, NDMA.			

Source: Prepared by the author based on (i) Sendai Framework for Disaster Risk Reduction 2015-2030, UNDRR 2015; (ii) Disaster Management Act, 2005, Government of India; and (iii) National Disaster Management Plan, 2019, NDMA

6. THE GOVERNANCE GAP: FROM PLANNING TO IMPLEMENTATION

The 2008 Guidelines on the Management of Floods, issued by the National Disaster Management Authority (NDMA), stated that preparedness, mitigation, flood forecasting and a coordinated response ought to be considered key elements of flood management (NDMA, 2008). Over the years, similar concerns had also arisen within the various institutions responsible for disaster management in Assam, such as the Assam State Disaster Management Authority (ASDMA), the Disaster Reporting and Information Management System (DRIMS) and the satellite-based hazard assessments carried out by the National Remote Sensing Centre (NRSC).

Nevertheless, the fact that such institutions and plans existed did not prevent the floodwaters from spreading or stop the disruption which occurred in July 2026. The question which keeps arising is at which stage the efforts to mitigate them broke down. Bijoy Hazarika, a resident of Betbari, Sivasagar district described the gap between formal preparedness and what was experienced on the ground in more practical terms.

“We knew that there were warnings and that the administration was making arrangements, but once the roads went under, it became difficult to know how or when anyone could reach us. If the road is flooded and there is no way to get a boat in, what can anyone do about it.”

The government’s response to the floods in July demonstrates that the preparedness system in question was put into operation, even though it also brings to light the flaws in the way it was carried out. The Assam government deployed the State Disaster Response Force (SDRF), the National Disaster Response Force (NDRF), the Fire and Emergency Services and the armed forces to carry out rescue and evacuation operations. As a result of these coordinated actions, hundreds of people were evacuated in Sivasagar, and NDRF teams equipped with boats were sent to both Sivasagar and the adjacent area of Charaideo (Akashvani, 2026; Indian Express, 2026). The establishment of relief camps together with the ongoing reporting of the number of affected people through DRIMS indicates that the official emergency response procedures were functioning at the time of the flood.

The situation however, became especially clear at the last mile. Mayur Buragohain, the MLA from Nazira, admitted during the floods that about 30 per cent of the constituency had remained inaccessible due to roads turning into mud and conventional vehicles being unable to get to several villages that were affected. He also mentioned the difficulties in getting drinking water and stated that the amount of relief being airdropped was not enough for the number of families impacted (India Today NE, 2026). This is important since it shows the difference between institutional preparedness and operational accessibility: the presence of rescue teams, relief camps and forecasting systems does not mean that help can actually reach households when the infrastructure upon which those systems depend becomes unusable.

Urban planning documents show the same level of awareness regarding the risk of flooding. The Revised Master Plan for Sivasagar states that the town is situated in the Brahmaputra basin and notes that the Dikhow, Disang (Dichang), and other tributaries have in the past caused the area to experience seasonal flooding. It also points out that the northern section of the town is low-lying and is susceptible to being flooded by the Darika River, which therefore restricts further development in that area. The Government of Assam has officially notified both the Sivasagar Revised Master Plan and the Nazira–Simaluguri Master Plan within the framework of the Assam Town and Country Planning scheme, introducing statutory documents meant to guide land-use decisions in settlements that have already been identified as environmentally sensitive.

It is also worth mentioning that operational flood management was also backed by an existing forecasting infrastructure. According to the Central Water Commission's Flood Forecasting Appraisal Report, there are operational forecasting stations on the Dikhow and Desang rivers which serve the Sivasagar district, showing that river monitoring facilities had for a long time been part of the national flood forecasting network. In the case of the flooding event in July 2026, the DRIMS daily reports recorded waterlogging in the Sivasagar Revenue Circle and the setting up of a number of relief camps in Amguri, the camps being able to accommodate over 1,100 people, which indicates that the response procedures were put into motion shortly after the flooding started. However as Ranjit Gurung, resident of Nepali Khuti, in Charaideo; one of the worst hit areas of the floods puts it

“Yes they (the government) put up the camps someplace, but not everyone could simply leave their house and reach one. Some people were still waiting at home because the roads were under water or because they had elderly people, children or belongings that they could not leave behind.”

The consequences of the flood however extend well beyond the period of inundation. Madhav Sharma a grocery shop owner in Sivasagar district, who lives in a village around 7kms away from Sivasagar town and commutes to the town daily for work was affected by the severely affected and said

“When the water went down, people thought the worst was over. But we had to return to houses full of mud, damaged furniture and things that could no longer be used. My shop had water inside it, and my items had started rotting. We did not empty it out because no one had expected the water to rise to that extent. We don't worry about the house so much, it can be cleaned, we worry about how to start earning again.”

Mohan Das, another farmer from around the Betbari area claimed,

“I had planted my paddy field three days before the water came in and washed everything away. Now I cannot simply wait for the next season and expect everything to return to normal. I have to find the money to replace what was lost before I can start again.”

The July 2026 floods therefore indicate less a shortage of institutional capacity and more the ongoing difficulty of bringing together planning, forecasting and implementation into a coherent system of flood governance.

The governance gaps were also seen to be persisting during the recovery period. Once there was a reduction in the water levels, officials were instructed to assess the damage that was caused and to extend claims for financial help to households that were eligible, this including aid for rebuilding damaged houses and for the restoration of basic services (Sentinel Assam, 2026; ANI, 2026). Yet the way in which these efforts were carried out, locals have claimed; leave much to be desired.

On August 3rd, 2026 a demonstration was held outside the office of the Deputy Commissioner of Sivasagar claiming there was a certain lag and misappropriation of funds that were meant to be directed towards flood victims, including the INR 15,000 in aid which had been promised to flood-affected families by the State Government. (Telegraph India, 2026). Sivasagar MLA Akhil Gogoi also laid out demands stating that each affected family should be paid compensation of INR 10 lakh. Gogoi claimed that INR 15,000 was simply not an adequate compensation for families who had lost their homes and possessions (Times

of India, 2026). He also asked for an inquiry into the causes of the flooding, stating that illegal sand and stone mining on the riverbed of the Dikhow as well as the upstream buffer or coffer dams linked to mining operations might have contributed to the severity of the floods. He further maintained that political patronage had allowed such activities to take place and called for a formal investigation to be launched into the issue (Times of India, 2026; India Today NE, 2026). Since these allegations could not be independently verified at the time of publication, they should be regarded as claims that need further investigation rather than as accepted explanations of the floods. Nevertheless, they do highlight broader local governance problems relating to the regulation of riverine extraction, the upkeep of protective infrastructure and the extent to which environmental risks identified upstream are taken into account in downstream flood-risk planning.

7. LESSONS FOR URBAN FLOOD GOVERNANCE IN INDIA

In the last twenty years, cities as different as Mumbai, Surat, Chennai, Gurugram, Bengaluru and Delhi have all suffered serious urban flooding even though there have been considerable improvements in weather forecasting, disaster management and urban planning. The immediate causes have varied, including extreme rainfall, the release of water from reservoirs, river overflows and insufficient drainage. In all these different cases the shortcomings in governance have obvious similarities: they include fragmented institutional responsibilities, encroachment upon floodplains and wetlands, a lack of integration between land-use planning and water governance, and the failure to take preventive action on the basis of the available risk information.

The consequences of outdated stormwater infrastructure, encroachment along the Mithi River and the lack of coordination among different planning bodies were revealed by the 2005 Mumbai floods. The 2006 Surat floods showed that even when rainfall forecasts were available, the way reservoirs were operated and the poor coordination between agencies indicated the lack of preparedness during flooding. In the instance of the 2015 Chennai floods, the record rainfall during the northeast monsoon took place at the same time as water being discharged from the Chembarambakkam Reservoir, and subsequent assessments identified the loss of wetlands, unregulated urban expansion and the lack of coordination between planning and water management agencies as the main causes of the disaster.

More recently, the repeated flooding in Bengaluru has always been linked to encroachment on the interconnected lakes and stormwater channels rather than simply the volume of rainfall. In Delhi as well, similar concerns have emerged due to encroachment on floodplains and the ongoing failure to integrate river governance with urban planning, both of which increase the region's vulnerability along the Yamuna. These examples show that urban flooding across India is increasingly becoming a governance issue rather than just a meteorological one. This is evident from India's own policy framework. However, implementation has still been uneven across the states and cities and coordination continues to lag behind policy ambitions.

The fact that flooding occurs repeatedly also leads to another policy question, namely whether it is more effective and economically efficient to invest in reducing risk before floods happen than it is to continually finance response and recovery. Evidence from India indicates that the question can be dealt with using a cost-benefit analysis rather than being considered merely as one involving emergency spending. For instance, a probabilistic cost-analytic analysis carried out in the Rohini River Basin showed that building new houses on raised plinths would yield positive returns, whereas removing the existing houses and rebuilding them on raised plinths was not found to be cost-effective (Hochrainer-Stigler et al., 2019). In the case of sanitation interventions in the Gandak River Basin, it was found that taking into account the costs avoided due to floods—such as losses of wages and treatment costs—improved the economic argument in favour of adaptation measures (Shah et al., 2020). On an urban scale, a study conducted in central Delhi on green roofs and infiltration trenches revealed that optimising these interventions could achieve reductions in runoff of about 22 to 26 per cent for the same amount of expenditure as compared with less targeted solutions (Kumar

et al., 2022). It should be noted, however, that these results do not mean that all adaptation measures are automatically cost-effective; instead, they show the importance of viewing flood mitigation as an investment in the avoidance of future losses, together with its broader social and environmental benefits.

The Sivasagar case therefore means that the way urban flooding should be understood in India needs to be broadened. It cannot be limited to drainage within municipal boundaries since towns and cities are part of larger river systems. Flood risk results from the interaction of rainfall, rivers, land-use change, infrastructure and settlement patterns, and responsibility for managing these various factors is spread among a number of institutions and administrative jurisdictions. Even prior to the floods of July 2026, the district had statutory master plans, a District Disaster Management Plan, operational flood forecasting stations on the Dikhow River, hazard mapping carried out using the NRSC Flood Hazard Zonation Atlas and institutional coordination carried out through ASDMA and DRIMS. The District Disaster Management Plan itself states that “floods in the Sivasagar district are inevitable” and contends that governance should be based on “a system of adjustment with floods” in order to reduce disruption and damage. Similarly, the Revised Master Plan for Sivasagar notes that the town is situated within the Brahmaputra basin, that the Darika River frequently floods the low-lying northern areas and that these physical limitations should influence future urban development.

The fact that severe flooding has persisted even though such institutional arrangements exist is therefore an instance of a broader trend seen in Indian cities. In every case, the flood risks were usually known prior to the disasters taking place; what varied was the extent to which this knowledge affected urban expansion, investments in infrastructure, the management of drainage and administrative coordination. As the NDMA’s guidelines on urban flooding make clear, good flood governance means integrating urban planning, drainage systems, watershed management and institutional coordination rather than treating floods as separate emergency events. The evidence from Sivasagar shows that this kind of integration is still an unfinished task.

The lessons learned from the floods of July 2026 go well beyond Sivasagar; they show that enhancing flood resilience is not simply a question of improving forecasts or building more drainage facilities, but that it is necessary to keep up continuous coordination between disaster management authorities, planning agencies, water resource departments and urban local bodies so that information on hazards can be regularly turned into decisions regarding development. Since climate variability, rapid urbanisation and the pressure on riverine areas are likely to increase even more in the future, the effectiveness of India’s flood governance system will depend less on the presence of institutions than on the extent to which those institutions are able to work together.

8. CONCLUSION

It bears asking how long a person can live with a recurring condition before it ceases to be recognised as exceptional. Floods in Assam have long occupied this uncomfortable space. They arrive with remarkable regularity, disrupt lives and livelihoods, recede, and are gradually folded back into the routines of everyday life. Over time, repetition produces familiarity. The extraordinary becomes mundane.

The *Mohabahu*, in all its glory, still shapes the physical and social scenery of the Brahmaputra valley. It nourishes, sustains and connects communities across the region, while also carrying away homes, roads, harvests and memories. Living with the river has always meant living with uncertainty. Yet uncertainty should not be mistaken for inevitability, nor should recurrence be confused with acceptance.

The article states that the floods that occurred in Sivasagar in July 2026 cannot be attributed simply to heavy rainfall. The evidence presented in the article indicates that the risks were recognised at different levels of government. The question then is not whether the hazard was known, but rather how that knowledge passed through the various institutions and whether it had an impact on planning, infrastructure and administrative actions. The broader hydrological evidence makes this distinction even more significant. Flood intensity does not increase uniformly throughout India and it does not always correspond to changes in extreme precipitation.

Floods in Sivasagar should therefore not be seen merely as proof of a general rise in rainfall or in flood intensity. What the event does clearly show is what occurs when a known hydrological hazard meets a specific landscape, a particular pattern of development and a particular system of institutions. It is in this respect, the importance of Sivasagar extends well beyond that of one particular flood. It shows a broader conflict existing in the way urban flood management is handled in India: there is a gap between acknowledging the risk and actually governing it effectively. With climate variability growing and urban areas still expanding into ecologically delicate regions, resilience will depend not only on having stronger institutions or improved forecasting, but also on the ability of the existing institutions to operate across administrative boundaries and turn the information into actual planning decisions.

To begin again, perhaps, is to look backwards. Not because the past offers simple solutions, but because it reveals a persistent pattern. Floods have repeatedly generated reports, plans and policy recommendations, yet many of the governance challenges identified today remain remarkably familiar. The story is not new. Unfortunately, neither is it unique.

If there is one lesson that emerges from the July 2026 floods, it is that urban flood resilience cannot be built during the monsoon alone. It is produced, or undermined, through decisions made long before the first warning is issued or the first road is submerged. Recognising this shifts the conversation away from floods as isolated disasters and towards the everyday governance of rivers, cities and the landscapes that connect them. India's challenge is no longer predicting floods, it is governing the landscapes in which those predictions unfold.

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ANNEXURE

1. Purpose of the GIS Analysis

The part of the study involving GIS was carried out in order to look at the changes in land use and land cover in the Sivasagar, Charaideo and Mon districts from 2017 to 2026. The aim of the analysis was to gain a more comprehensive spatial understanding of the landscape in relation to the floods that took place in July 2026, especially concerning changes in built-up areas, cropland, tree and forest cover and the other land-cover types.

The flood inundation maps for July 2025 and July 2026 were used together with the LULC analysis, the two types of spatial evidence serving different functions. Although the flood inundation maps illustrate the geographical extent of the flooding during the relevant periods, the LULC analysis looks at changes in the landscape over a longer period.

The lulc analysis was carried out in order to gain a better understanding of the landscape and not with the aim of establishing a direct relationship between changes in lulc and flooding.

2. Data and Spatial Resolution

The LULC analysis made use of the Google Earth Engine (GEE) and the Google Dynamic Globe V1 land-cover dataset; this dataset has a spatial resolution of 10 metres and the analysis included the whole geographical area of the Sivasagar, Charaideo and Mon districts.

The analysis of land-cover patterns throughout the entire study area was carried out using a dataset which had a spatial resolution of 10 metres based on publicly available satellite-derived data. However, this resolution is **not suitable for detecting smaller and more fragmented features, particularly in the hilly area of Mon.**

3. Land-Use and Land-Cover Classification

The analysis classified the study area into nine land-cover categories:

1. Water
2. Trees/Forest
3. Grass
4. Flooded vegetation
5. Cropland
6. Shrub/Scrub
7. Built-up
8. Bare ground
9. jSnow/Ice

The classifications for 2017 and 2026 were subsequently compared to identify changes in the extent of individual land-cover categories. Particular attention was given to built-up land, cropland and tree/forest cover because of their relevance to changing patterns of settlement and the wider landscape in which flood risk is experienced.

4. Validation and Methodological considerations (Absence of local Accuracy assessment)

The Sentinel-derived satellite imagery was then used to verify the LULC outputs. This validation was especially important for Mon since the hilly and heterogeneous terrain makes it difficult to identify smaller land-cover features at a 10-metre resolution.

For example, no formal local accuracy assessment was carried out in that area, such as one based on a confusion matrix or the kappa coefficient; even though Google's Global Dynamic has published an accuracy assessment at the global level, these figures cannot be considered a direct indication of the local accuracy assessment, and it is necessary to carry out a local accuracy assessment if the reliability of the classification is to be evaluated.

The classification is likewise influenced by a mixed-up pixel effect, according to which one pixel can contain information about more than one kind of land cover. This effect is especially apparent at the boundary between built-up areas and either cropland or forest areas and shrub land. As a result, some of the classes may not be accurately represented at their boundaries.

Validation was therefore used in order to check the broad spatial patterns shown in the LULC maps; it should not be regarded as a replacement for field-based ground-truthing or as a means of achieving survey-grade accuracy.

For the flood analysis, inundation was mapped using Synthetic Aperture Radar (SAR) imagery and not optical imagery since SAR is capable of penetrating the clouds during the monsoon season, making it appropriate to use for flood mapping.

The SAR Detect detection method uses radar backscatter rather than carrying out direct optical observation of the water. The results therefore have to be interpreted in view of the limitations associated with radar detections. The observations were made over a fixed period of 15 days, from 15 July to 31 July; this means that the map shows only the extent of the flooding that took place during this period and not the maximum extent which occurred outside of these dates.

5. LULC Change Between 2017 and 2026

The figures show a significant rise in the amount of land designated as built-up in the combined Sivasagar, Charaideo and Mon study area. The area classified as built-up rose from 642.75 km² in 2017 to 846.73 km² in 2026, which is an increase of 203.98 km² or 31.7 per cent.

During the same period, classified cropland fell from 1,269.50 km² to 1,069.70 km². Tree and forest cover dropped from 2,626.88 km² to 2,469.94 km².

What the figures show is the change in the classified landscape over the two periods. They should not, nevertheless, be understood as proving that one land-cover category has been directly converted into another. Indeed, a decrease in cropland cannot on its own be taken to mean that it has been converted into built-up land.

6. Interpretation of the LULC Results

The LULC analysis is used in the article to examine the wider landscape within which flood risk is encountered. The increase in classified built-up land is particularly relevant because it suggests that the landscape within which flood vulnerability has long been recognised has also undergone considerable change.

The analysis does not, however, establish a direct causal relationship between land-cover change and the July 2026 floods. Nor does it establish that built-up expansion occurred precisely within the flood-prone areas of Sibsagar or Nazira. The LULC study covers the combined Sivasagar, Charaideo and Mon area and therefore provides evidence of wider landscape change rather than a town-level measurement of urban expansion.

7. Limitations

The limitation associated with the use of satellite data with a spatial resolution of 10 metres applies to the identification of small and fragmented land-cover features as well. This is especially important in the case of Mon, since the hilly terrain has a great deal of spatial variation over short distances. It would have been possible to carry out a more detailed mapping if higher-resolution imagery, for example 1-metre data, had been available. The problem is that such data was not publicly available for the study area, and commercially available options were beyond the scope of the present analysis.

Another limitation relates to the difference in the total area covered by the classified land-cover categories between 2017 and 2026. This difference should not be taken to mean that there has been a real change in the geographical extent of the districts. Instead, it is due to the varying degree to which the area could be represented within the respective satellite-derived classifications. Variations in the imagery, the classification process, and the ability to identify land-cover features may account for this variation.

The analysis also limits itself to a comparison of just two years, 2017 and 2026; as a result it is able to identify the differences between those two points in time but cannot determine the exact timing or path of the land-cover change that took place during the period in between.

In the end, the LULC analysis is not of survey quality. Although the results have been verified using imagery derived from Sentinel satellites, neither a field-based ground-truth survey nor an independent accuracy assessment was carried out. Hence, the findings must be regarded as satellite-based estimates of broader land-cover patterns rather than as precise measurements of land use at the level of individual plots, buildings or settlements. Detailed mapping could have been carried out if higher-resolution imagery—for instance, 1-metre data—had been available; however, such data was not publicly available for the study area and the commercially available alternatives were outside the scope of the current analysis.



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