Government of Nepal
Ministry of Home Affairs
National Disaster Risk Reduction and Management Authority
Singhadurbar, Kathmandu

A Preliminary Loss and Damage Assessment of Flood and Landslide September 2024

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Disclaimer: This Preliminary Loss and Damage Assessment of the 2024 September floods and landslides is prepared by the National Disaster Risk Reduction and Managment Authority as tasked by the 25th executive committee chaired by Hon. Minister of Home Affairs. A task team led by by NDRRMA Disaster Risk Reduction and Management Authority (NDRRMA), with representatives from eleven ministries and agencies along with invited experts took the arduous task of preparing this report in less than two weeks. The datasets presented in the document are based on preliminary data received from sectoral ministries and local governments. A detailed account of damage and loss assessment will be produced once detailed damage and loss assessment from sectoral ministries and local governments in another one month.

All photos by: Skanda Gautam and Prabin Ranabhat

Designed and processed by: Youth Innovation Lab

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Executive Summary

This Preliminary Loss and damage Assessment of the September 2024 flood and landslides provides an initial findings of the loss and damage caused by the floods and landslides that occured during 26 to 28 September 2024, presenting an analysis of the damage across multiple sectors. The total estimated loss is **NPR 46,684,318,550** reflecting significant disruptions to physical infrastructure sector, social sectors, and the productive sector, highlighting the urgent need for recovery and rconstruction efforts.

Physical Infrastructure Losses

The assessment of physical infrastructures indicates an estimated economic loss of **NPR 38,923,435,000**. The breakdown of losses by infrastructure type is as follows:

Roads and Highways: The infrastructure damage includes 41 road sections, contributing to an estimated total complete repair and maintainence cost of NPR 27,980,000,000. Blocked or damaged roads hinder transportation and supply chains, complicating relief efforts and economic recovery.

Hydropower: Damage to 26 hydropower facilities has resulted in an estimated loss of NPR 3,018,000,000. This loss has significant implications for energy supply, impacting both residential and industrial consumers.

Telecommunications: Damage to 446 telecommunication units has resulted in a loss of NPR 152,305,000. This disruption impacts communication networks, crucial for emergency response and recovery operations.

Water Supply and Sanitation: The destruction of 1678 federal and provincial water supply and sanitation systems has led to an estimated loss of NPR 5,906,000,000. This loss not only affects access to clean water but also poses health risks, particularly in the wake of disasters that often exacerbate waterborne diseases.

Bridges: A total of 44 bridges sustained damage, resulting in an estimated financial loss of NPR 1,042,000,000. The damage to these bridges severely hampers connectivity, affecting transportation and logistics in the region.

Social Sector Impact

The social sector has experienced profound impacts, particularly in housing and human settlements. As per initial reports, 5,996 houses were fully destroyed, while 13,049 were partially destroyed. This destruction has displaced 10,807 families, impacting a total of 16,243 individuals who are now living in public shelters and facing challenges in finding basic amenities.

In the health sector 6 were fully destroyed and 43 health facilities were partially destroyed, which limits access to essential medical services during a critical time when health needs are heightened due to potential post-disaster health crises. The education sector has not been spared either, with 6 schools completely destroyed and 136 schools partially damaged, further disrupting education for countless children.

The preliminary assessment of human impact across multiple districts reveals significant casualties and widespread need for rescue operations. A total of 249 deaths, 178 injuries, and 18 missing persons have been reported, with the highest fatalities occurring in Dhading, Kavre, and Lalitpur districts. Rescue efforts have been substantial, with over 17,000 individuals rescued and more than 14,800 police personnel deployed across affected areas. Kathmandu Valley, along with several districts in the Koshi, Madhesh, Bagmati, and Gandaki provinces, saw the most extensive police operations. These figures highlight the scale of both the human toll and the mobilization of resources to address the ongoing crisis.

Productive Sector Losses

The productive sector, especially agriculture and livestock, has incurred substantial losses. The assessment indicates that 65,380 hectares of agricultural land have been affected, alongside 26,698 livestock, resulting in an estimated economic loss of NPR of 5,882,812,500. This significant impact on agriculture threatens food security and the livelihoods of farmers, who rely heavily on their land and livestock for income.

Additionally, 7 irrigation projects have been affected, leading to a loss of NPR 1,350,000,000. The destruction of irrigation infrastructure jeopardizes crop yields and exacerbates the agricultural crisis in the aftermath of the disasters. In summary, the cumulative economic loss from these disasters total NPR 7,150,000,000 highlighting the critical need for immediate action. Restoring infrastructure, providing support for displaced populations, and revitalizing the economy must be prioritized in recovery efforts. This assessment underscores the vulnerabilities of the affected sectors and the importance of comprehensive disaster preparedness and resilience-building measures to mitigate future risks.

Sectors	**Loss and Damage Data**				**Total Estimated Loss (NPR)**
Physical Infrastructure	**Numbers Affected**		**Estimated Loss**		**38,923,435,000**
Bridges	44		1,042,000,000		
Telecommunication	446		152,305,000		
Water Supply and Sanitation	1678		5,906,000,000		
Hydropower	26		3,018,000,000		
Roads	41		27,980,000,000		
Public Transportation	84		72,98,80,000		
Public Buildings	-		95,000,000		
Total	-		38,923,435,000		
Social Sector	**Damage**		**Affected Population**		-
	Fully Destroyed	**Partially Destroyed**	**Displaced Families**	**Affected Families**	
Housing and Human Settlements	5996	13049	10807	16241	-
Health	6	33	-	-	2,17,00,000
Education	6	136	-	-	70,250,000
Productive Sector	**Area (Hectare)**	**Number of Livestock**	**Estimated Loss**		**5,882,812,500**
Agriculture and Livestock	65,380	26,698	5,882,812,500		
Irrigation	**Number of Irrigation Projects**		**Estimated Loss**		1,350,000,000
	7		1,350,000,000.00		
Estimated Total Loss as reported in Bipad Portal					**458,071,050**
Total Economic Loss in NPR					**46,684,318,550**

TOTAL ECONOMIC LOSS IN NPR

NPR 46,684,318,550

HUMAN CASUALTIES

DEATHS

249
Total Death

113 Male
76 Female
60 Children

The total loss includes three foreign residents: two Korean and one American citizen.

MISSING

18
Total Missing

5 Male
10 Female
3 Children

INJURED

177
Total Injured

The data on injuries has not yet been fully disaggregated. Updated version will be provided once the detailed breakdown is available.

SOCIAL SECTOR

HOUSING & HUMAN SETTLEMENTS

5996 Fully Destroyed
13049 Partially Destroyed
10807 Displaced Families
16243 Affected Families

HEALTH

6 Fully Destroyed
43 Partially Destroyed
NPR 2,17,00,000 Estimated Loss

EDUCATION

6 Fully Destroyed
136 Partially Destroyed
NPR 70,250,000 Estimated Loss

PRODUCTIVE SECTOR

AGRICULTURE AND LIVESTOCK

65,380 Area (Hectare)
26,698 No. of Livestock
NPR 5,882,812,500 Estimated Loss

IRRIGATION

7 Projects
NPR 1,350,000,000 Estimated Loss

PHYSICAL INFRASTRUCTURE

BRIDGES

44 Affected
NPR 1,042,000,000 Loss

WATER SUPPLY & SANITATION

1678 Affected
NPR 5,906,000,000 Loss

ROADS AND HIGHWAYS

41 Affected
NPR 27,980,000,000 Loss

TELECOMMUNICATION

446 Affected
NPR 152,305,000 Loss

HYDROPOWER, TRANSMISSION AND DISTRIBUTION

26 Affected
NPR 3,018,000,000 Loss
11 Operational
15 Under Construction

PUBLIC TRANSPORTATION

84 Affected
NPR 72,98,80,000 Estimated Loss

The data in this report was produced by the National Disaster Risk Reduction and Management Authority (NDRRMA) in collaboration with sectoral ministries, departments, and provincial and local governments, as of October 9, 2024.

Background

In late September 2024, Nepal experienced unprecedented rainfall that led to severe flooding and landslides across the country. Continuous rainfall from September 26 to 28 resulted in widespread devastation, claiming numerous lives and causing significant infrastructure damage. This preliminary report aims to assess the loss and damage incurred from these events, providing essential insights for recovery and future disaster preparedness.

The Department of Hydrology and Meteorology (DHM) reported that out of 222 rainfall measurement stations across Nepal, 77 recorded heavy rainfall, with some areas receiving over 200 millimeters in just 24 hours. Notably, Kathmandu experienced its highest rainfall on record, surpassing previous measurements set in 2002. The Tribhuvan International Airport station recorded 239.7 millimeters of rain, highlighting the intensity of the weather system affecting the region.

The hydrological impacts of this rainfall were profound. Twenty-three gauging stations reported water levels exceeding danger thresholds, while 14 additional stations surpassed warning levels. Particularly alarming was the water flow in the Saptakoshi River, which reached its highest level in 56 years, exacerbating the flooding situation across various regions.

The aftermath of the storms was catastrophic, with reports indicating 246 fatalities, 218individuals missing, and 178 injured. Rescue operations have been ongoing, successfully saving over 17,174 people. Local authorities and security forces are coordinating efforts to clear roads blocked by landslides to facilitate the distribution of relief supplies, prioritizing the restoration of essential services.

The economic impact of the flooding has also been significant, particularly in sectors critical to the country's infrastructure. Estimates indicate that hydropower projects have incurred losses of approximately NPR 3 billion, affecting both operational and under-construction plants. Additionally, the flooding disrupted drinking water supplies in several areas, notably in the Kathmandu Valley, with estimated damage to water supply and sanitation systems reaching NPR 1.35 billion. (This paragraph needs to be updated after compilation of all the data)

As emergency repairs and relief measures are mobilized, it is essential to understand the full extent of the loss and damage caused by this natural disaster. The findings of this preliminary report will inform recovery efforts and enhance preparedness for future climate-related events.

"...DHM reported that out of 222 rainfall measurement stations across Nepal, 77 recorded heavy rainfall, with some areas receiving over 200 millimeters in just 24 hours"

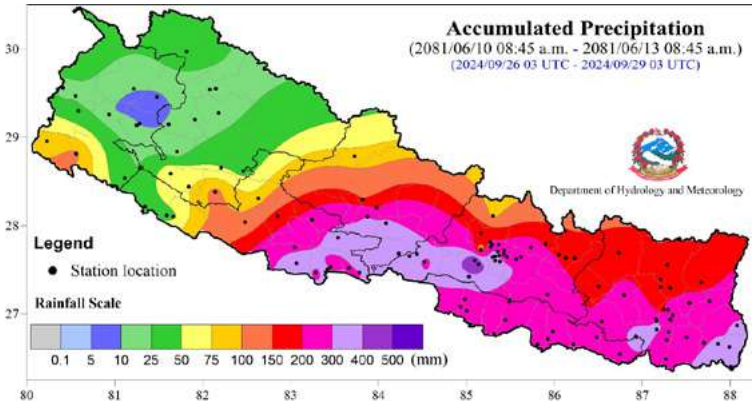


Figure: Map showing Accumulated Precipitation in Nepal from 26-28 September 2024

Emergency Response, Rescue and Relief Operations

Key Actions Taken: Cabinet Decisions

Following the floods and landslides in late September 2024, the government declared a three-day mourning period with the national flag flown at half-mast. The Cabinet directed the submission of a detailed report on the loss of lives and property, with reconstruction cost estimates by the following Tuesday, 1 October 2024. Families of the deceased will receive compensation of NPR 200,000. Similarly, if a missing person is not found within ten days, their family will receive the same compensation. Free medical treatment is to be provided for all injured individuals. Additionally, NPR 1 billion has been immediately allocated to the Disaster Management Fund for recovery efforts.

Executive Committee Decisions, NDRRMA

The 25th Executive Committee Meeting held on 30 September 2024 of the National Disaster Risk Reduction and Management Authority (NDRRMA) prioritized ongoing search and rescue operations. Relief fund distribution will follow a one-door system. Injured individuals across affected areas will receive free treatment, and Local Disaster Management Committees (LDMCs) will identify beneficiaries for temporary shelter, with NPR 50,000 provided in two installments. The Ministry of Physical Infrastructure and Transport will clear blocked roads and assist stranded passengers. Public health programs and epidemic awareness campaigns will be launched in high-risk areas, while humanitarian aid from UN agencies, Nepal Red Cross, and partner organizations will be mobilized as needed. Sectoral ministries were directed to begin reconstructing damaged infrastructure, and local and provincial disaster management committees were urged to continue post-disaster operations per their legal duties.

Bagmati Province Executive Committee Decisions

The Bagmati Province Executive Committee meeting held on 30 September 2024, mobilized all sectoral ministries to assess damage across various sectors, including housing, health, and agriculture, and to formulate recovery plans accordingly. NPR 23 million was allocated to the Province Disaster Management Fund, which includes NPR 6 million for Kavre, NPR 5 million for Dhading, NPR 3 million for Lalitpur, and NPR 2 million each for Kathmandu and Sindhuli. An additional NPR 1 million was provided to Dolakha, Bhaktapur, Ramechhap, and Makawanpur.

Emergency Responses by Development Partners

In response to recent disasters, development partners, in coordination with NDRRMA and local governments, have provided immediate relief, including non-food items (NFIs), shelter kits, food packages, and hygiene supplies. Plan International and World Vision supported 87 households in Sindhuli, while ARE Nepal delivered food to 142 households in Kathmandu. Save the Children reached 320 households in Nawalparasi and provided NFIs to families in Madhesh, Makawanpur, and Kavre districts. Further relief, funded by START Fund Nepal/ FCDO, will reach Kavre, Lalitpur, and other areas in the next 45 days, with NPR 16 million allocated for continued support.

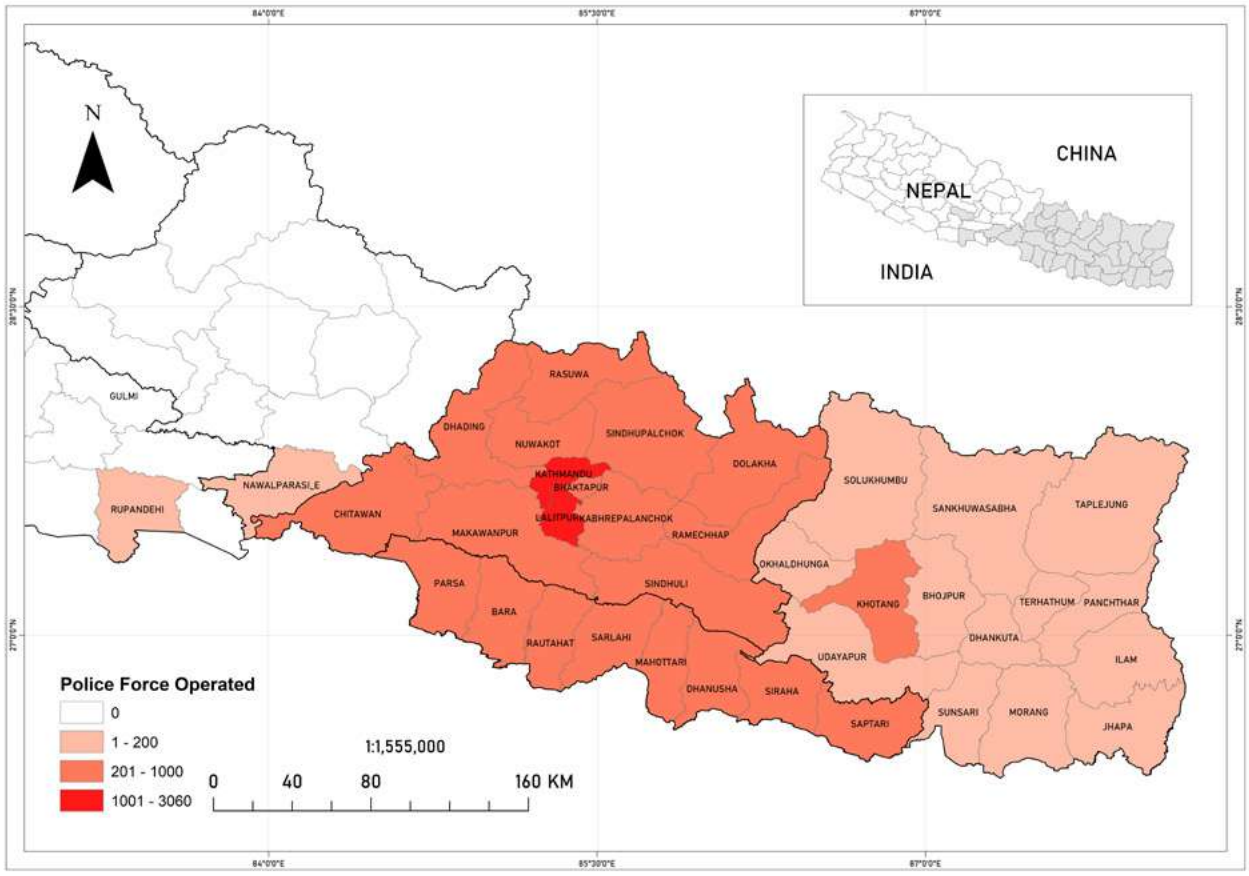


Figure: Map showing number of Police Forces Operated from 26-28 September 2024

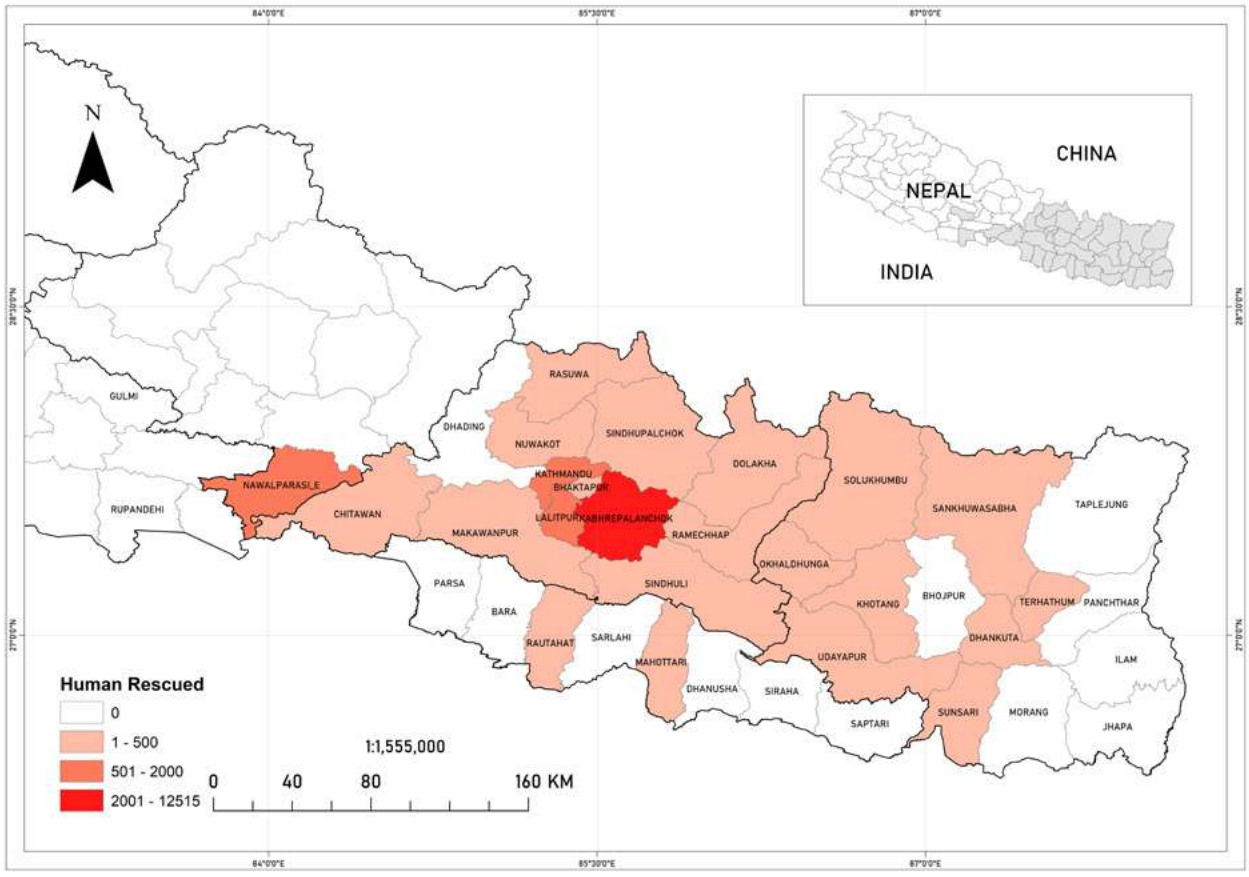


Figure: Map showing Total number of People Rescued from 26-28 September 2024

Objectives

A. **Collect and Compile Early Assessments of Loss and Damage**: Collaborate with local, district, provincial authorities, ministries to gather initial reports from municipalities , ministries and other line agencies impacted by the flood and landslide. This includes compiling quantitative data on the extent of economic loss, assessing the immediate needs of affected populations, and identifying any urgent response measures already taken.

B. **Develop Recommendations for a Detailed Flood and Landslide Impact Assessment:** Based on initial assessments and identified data gaps, create actionable recommendations for conducting an in-depth evaluation of the flood's and landslide impacts. These recommendations should provide guidance on methodologies, stakeholder engagement, and key indicators to ensure a comprehensive understanding of both the short- and long-term consequences of the disaster, enabling more effective planning and recovery efforts.

Methodological Approach

The methodological approach for assessing the flood and landslide damages from 26-28 September 2024 involved a multi-tiered process of rapid assessments, field inspections, and data collection. Key government ministries—such as the Ministry of Energy, Water Resources, and Irrigation, the Department of Roads, Ministry of Education, Science, and Technology, and others provided early reports on damage to infrastructure like roads, bridges, hydropower projects, health facilities, and schools. Data were gathered through field surveys by technical teams, supported by local inspections, enabling early financial and physical impact estimates, where possible.

Casualty and rescue data were collected by Local Disaster Management Committees (LDMCs) and security personnel, who were critical in reporting the number of deaths, missing persons, and injuries. Over 30,000 personnel participated in rescue efforts, saving more than 17,000 people. Casualty figures were broken down by gender and age to offer insights into the disaster's demographic impacts.

Economic losses were estimated through rapid assessments of both direct physical damage and indirect effects on sectors like agriculture and infrastructure. Initial estimates indicated NPR 2.5 billion in road and bridge damages, over NPR 6 billion in agricultural losses, and NPR 4.35 billion in damage to hydropower and irrigation projects. Local authorities helped verify these estimates for accuracy.

Coordination between national, provincial, and local authorities, along with humanitarian organizations, was essential. Contributions from international agencies and local entities, including NPR 1.5 billion in relief funds, played a critical role in supporting the response. While this assessment provides a preliminary picture, further detailed assessments are recommended to fill data gaps and refine these estimates.

This preliminary report outlines the extent of damage caused by floods and landslides from **September 26 to 28, 2024**, focusing on the total number of physical infrastructures affected and the corresponding economic loss. The analysis provides an overview of the impacts across various sectors, which highlights the vulnerability of both public and private assets.

Impacts of Climate-Induced Floods and Landslides

The Bipad Portal, which houses multiple datasets related to hazards, exposure, and risk, includes a flood hazard map for the entire country. This map presents modeled water depths for flood events of various return periods, with depths shown in meters. It's important to note that not all the displayed flooding is expected to occur simultaneously; rather, the data illustrate the maximum water depth that could be expected at a given location during a flood event of the specified return period. In other words, the data indicates the probability of experiencing a specific water depth within a single year. For instance, the '1-in-100 year' layer reflects a 1-in-100 (or 1%) chance of such flooding occurring in any given year. The map below depicts the potential extent of impacts during a massive flood in the Kathmandu Valley.

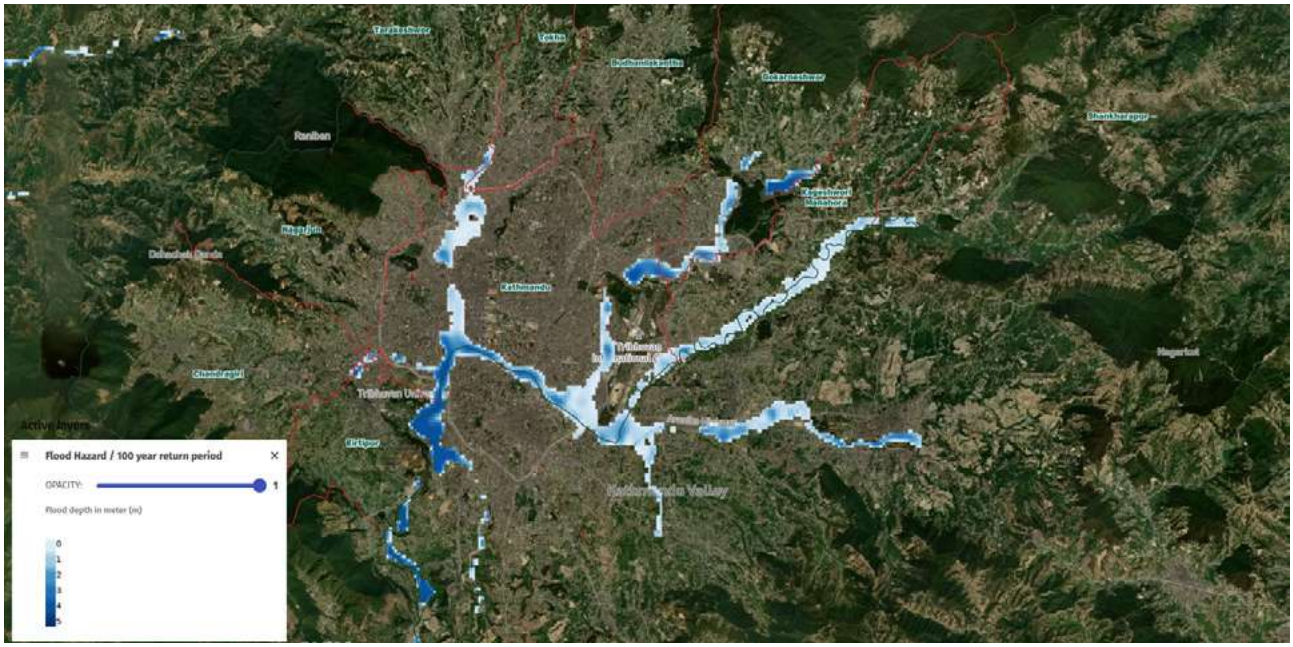
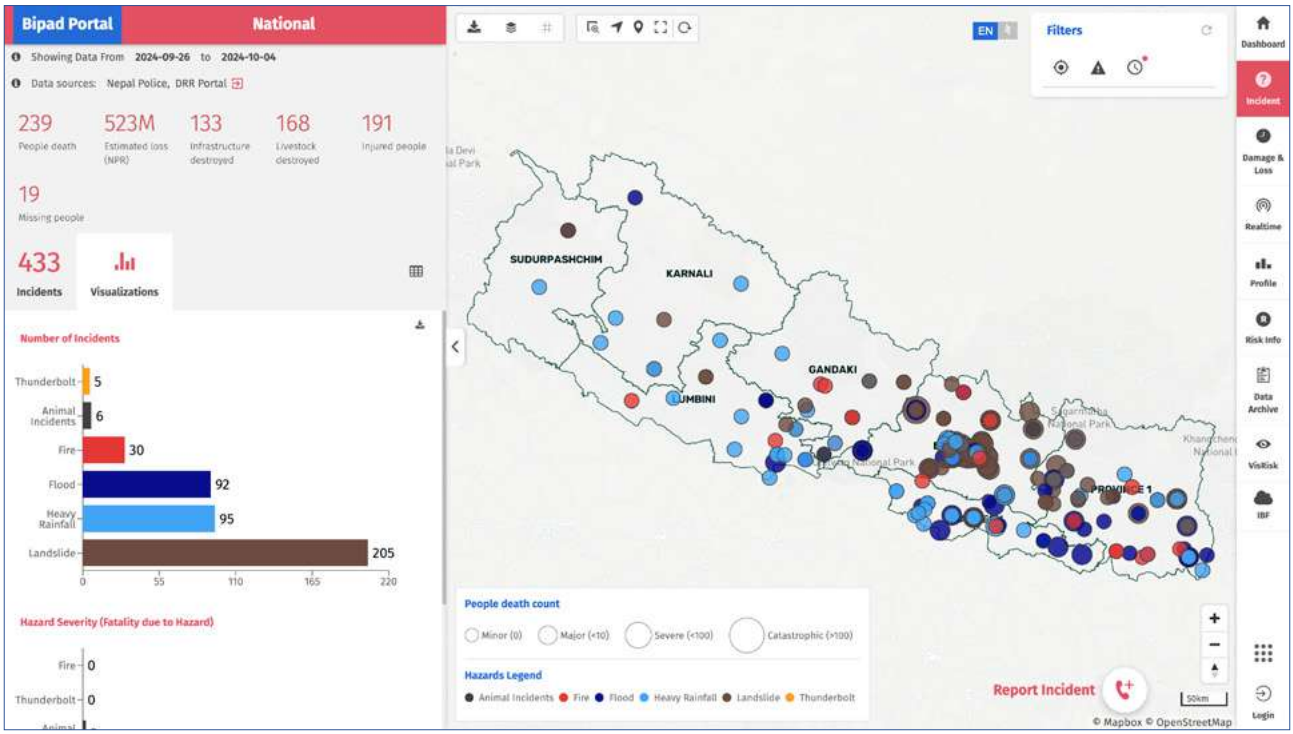


Figure: Inundation Level of Kathmandu Valley in 100 years flood return period



On September 26, 2024, the National Disaster Risk Reduction and Management Authority (NDRRMA) issued a High Alert Notice, warning the public about potential risks from heavy rainfall forecasted for September 27-28 by the Department of Hydrology and Meteorology (DHM). As a precaution, night bus services on highways in the affected districts were suspended for safety reasons.

Continuous rainfall from September 27, 2024, led to widespread incidents of flooding, inundation, and small, medium, and large-scale landslides across the country. According to DHM, out of 222 stations where rainfall was recorded, 77 stations reported heavy rainfall, with amounts exceeding 200 mm on Saturday.

Among the hydrological gauging stations installed in rivers nationwide, 23 stations recorded water levels surpassing the danger level, and an additional 14 stations reported levels exceeding the warning level. The Saptakoshi River reached its highest water flow in 56 years, with a discharge of 643,040 cusecs.

After 22 years, Kathmandu experienced record-breaking rainfall on Friday and Saturday. DHM reported that rainfall on Saturday was the highest ever recorded in the valley's history, surpassing the previous record set in 2002. The rainfall at Tribhuvan International Airport station reached 239.7 millimeters in 24 hours, compared to the previous record of 177 millimeters in 2002.

A map showing alerts in red and yellow for different parts of Nepal based on 24-hour rainfall. The bar graph below shows a comparative analysis of the highest forecasted rainfall in the past and the rainfall recorded on 09/29/2024.

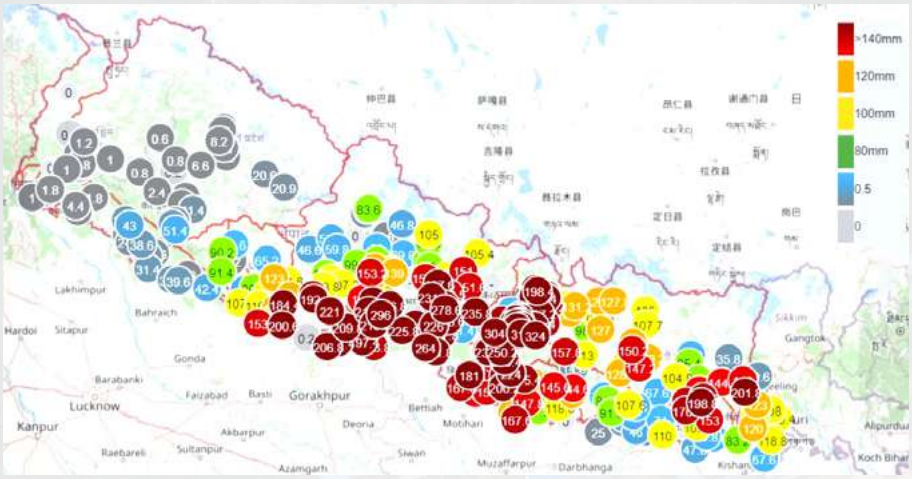
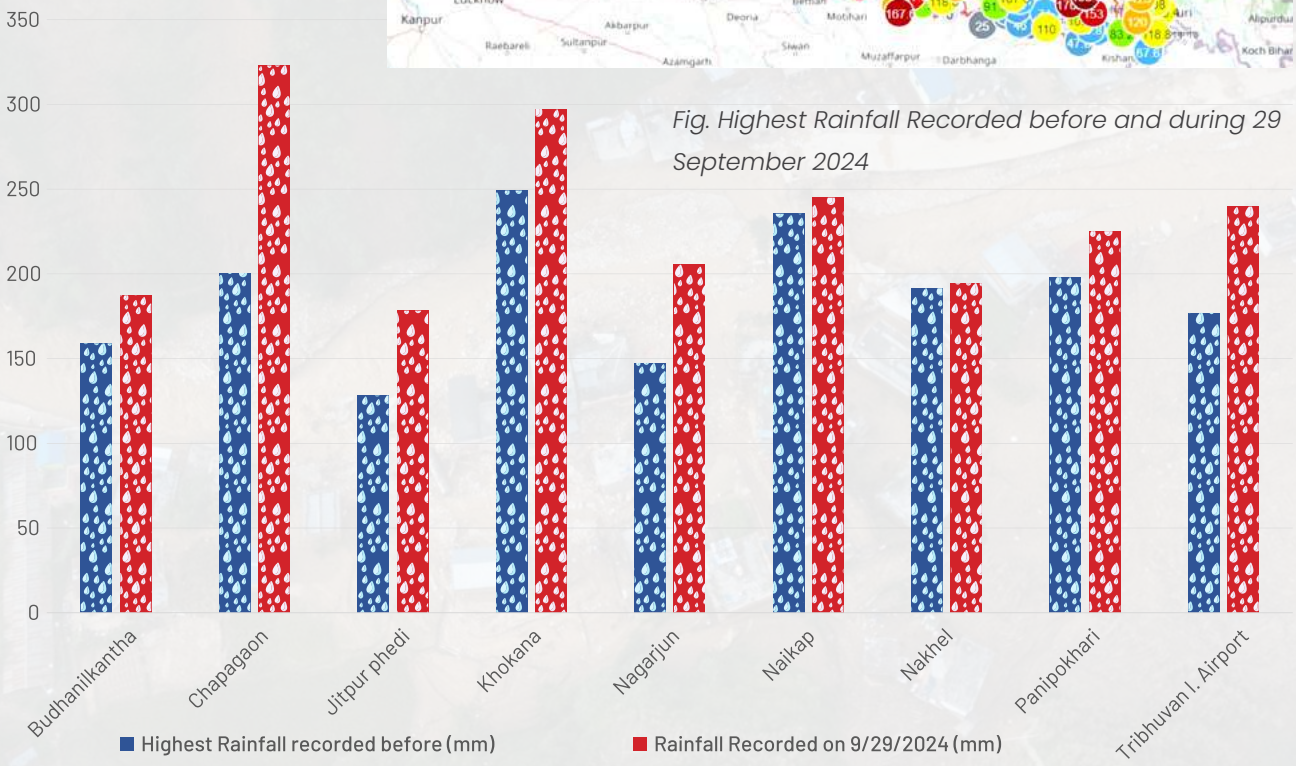


Fig. Highest Rainfall Recorded before and during 29 September 2024



UNOSAT released an analysis of satellite-detected water extent in Koshi and Madhesh Provinces, Nepal, as of 27 September 2024. The analysis illustrates flood conditions detected using Sentinel-1 imagery acquired on 27 September 2024 at 05:56 local time (00:11 UTC). Within the analyzed area of approximately 7,000 km², around 50 km² of land appears to be affected by floodwaters. Based on WorldPop spatial demographic data, an estimated 19,000 people are exposed to or living near the flooded areas.

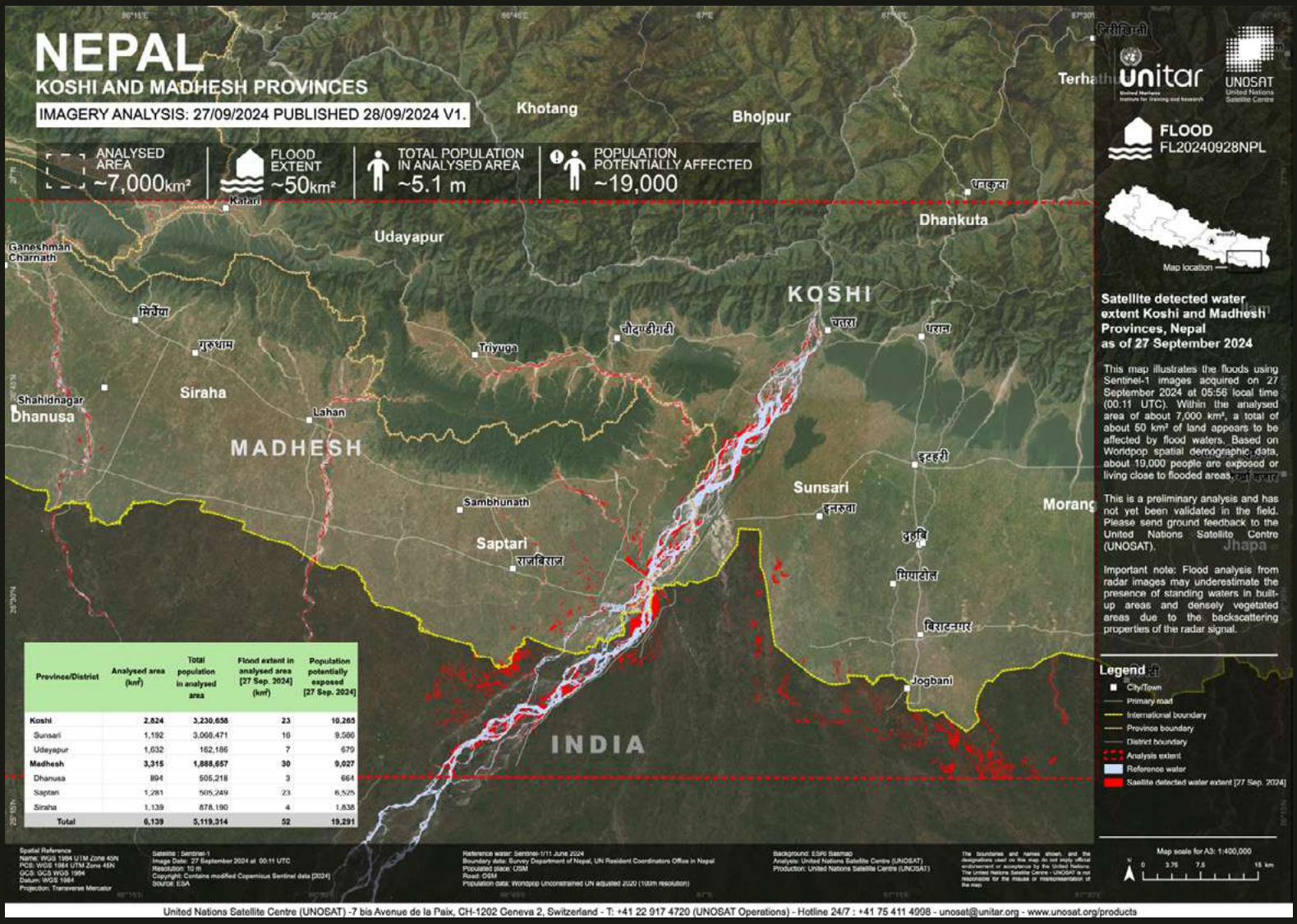


Fig. An analysis of satellite-detected water extent in Koshi and Madhesh Provinces, Nepal, as of 27 September 2024 by UNOSAT

The satellite images, released by Planet, show the extreme rainfall in Kathmandu, Nepal (peaking at 240 mm over 24 hours on 9/28), which caused extensive flooding throughout the city. The worst flooding and damage occurred along the southern edge of the city, where raging tributaries from the southern hills converged before flowing south through the Chobar Gorge (see other featured sliders for details). These events have raised serious questions about the chronic failures of urban planning in Kathmandu, which amplify the impacts of natural hazards along these urban rivercourses, creating human disasters like this. So far, 224 casualties have been reported across Nepal, with dozens more still missing. Extreme and record-breaking precipitation events like this are expected to become more common due to climate change.

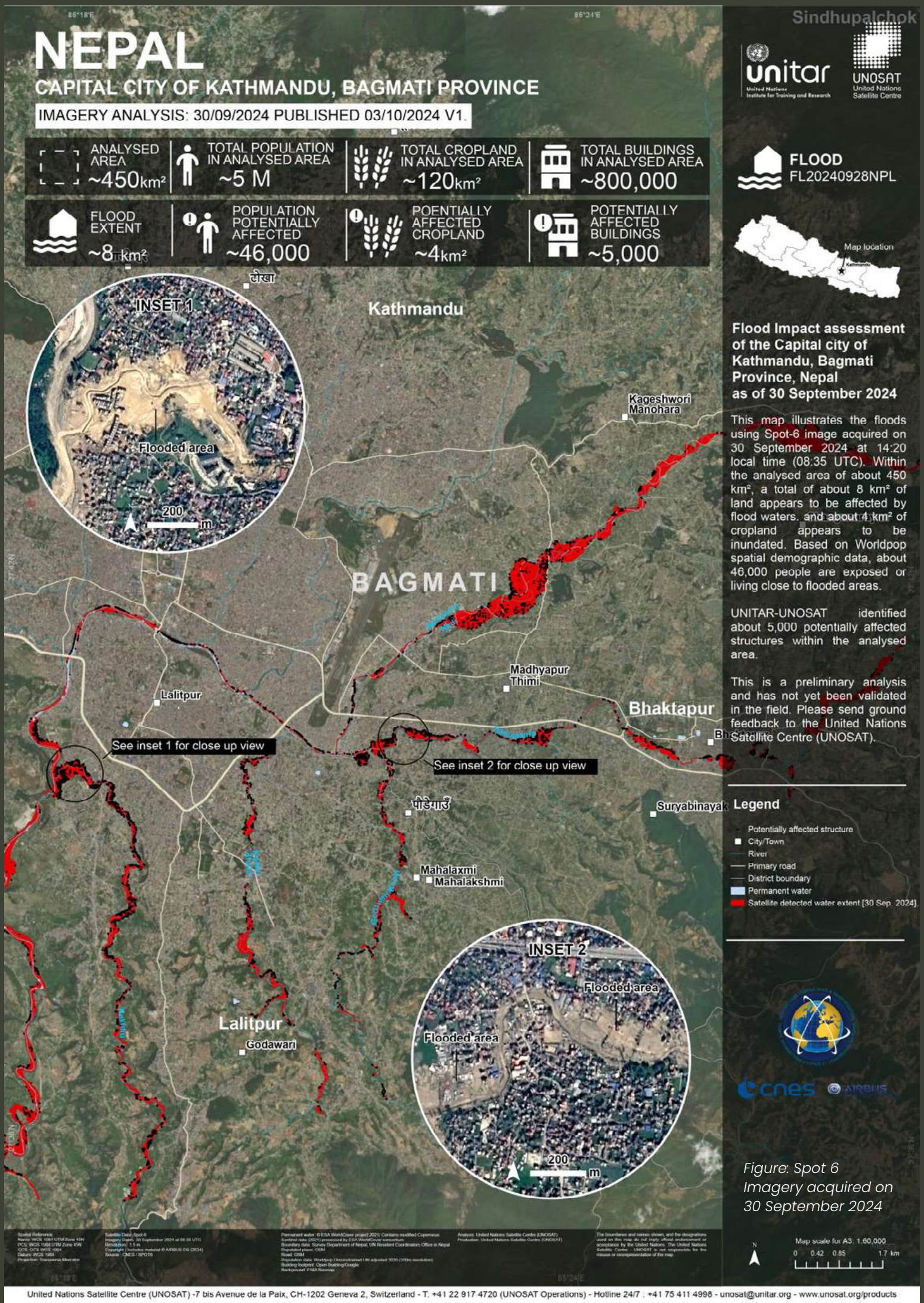


Figure: Spot 6 Imagery acquired on 30 September 2024

The images provide a detailed view of the flooding in Kathmandu Valley as of 30th September 2024. This image highlights the flood's direct impact on the densely populated capital city of Kathmandu, located in Bagmati Province. The floodwaters, covering approximately 8 square kilometers of the total assessed area (~450 km²), have submerged residential, commercial, and public buildings. The image offers a perspective of the submerged streets, flooded structures, and residents attempting to navigate through the water.

This imagery is essential for understanding the scope of the disaster. An estimated 46,000 individuals are potentially affected within the analyzed area, with around 5,000 buildings likely to have sustained damage. The floods have also impacted agricultural land, with approximately 4 square kilometers of cropland affected out of a total of 120 square kilometers in the region, raising concerns about food security and livelihood disruption for local farmers.

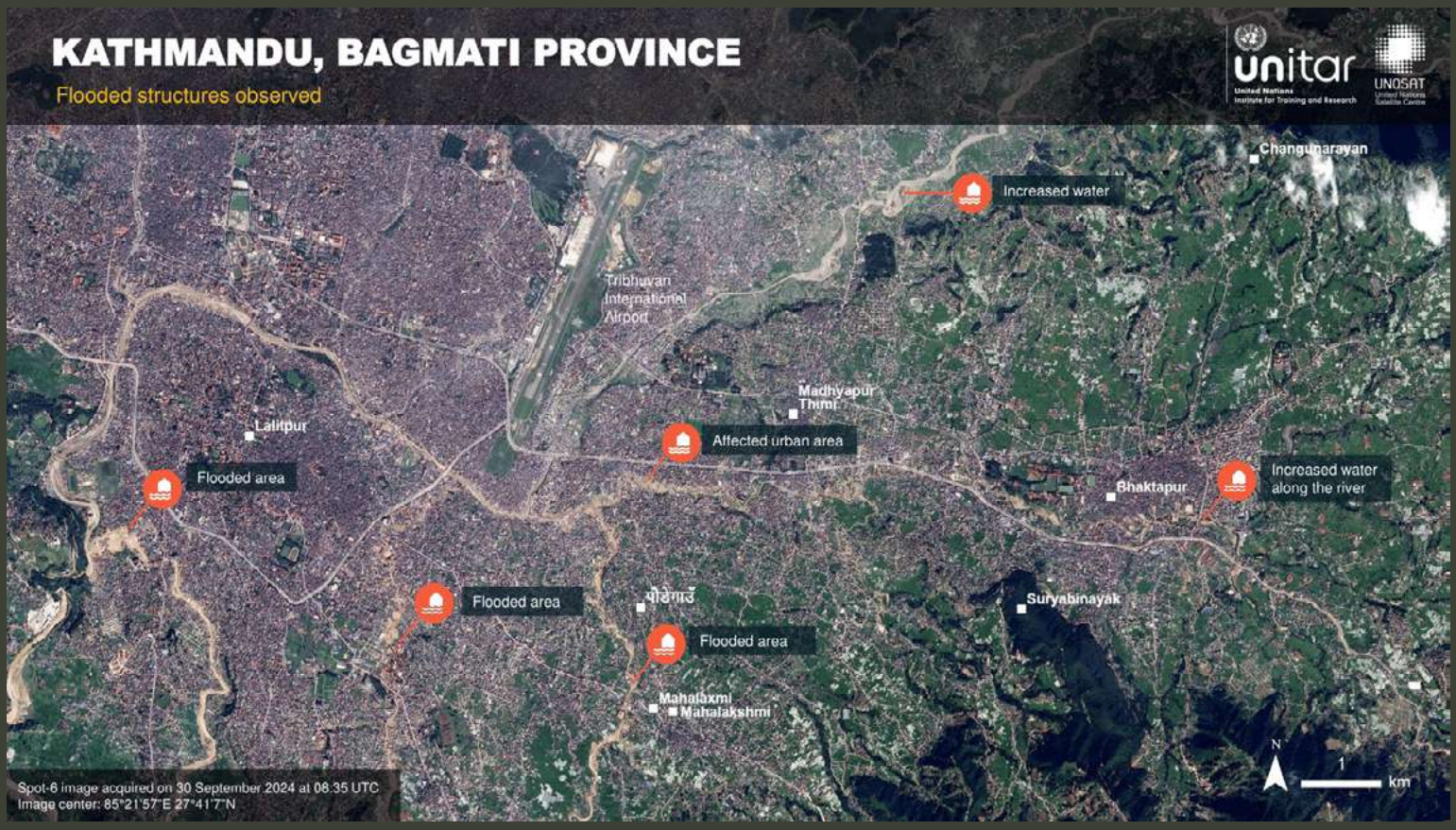


Figure: Spot-6 imagery acquired on 30 September 2024

The floodwaters appear to have originated from the Bagmati River and other local water sources, overwhelming the existing urban infrastructure. The vulnerability of Kathmandu Valley to such extreme weather events is exacerbated by rapid urban growth and inadequate drainage systems, which have turned streets into rivers, disrupting transportation and essential services. The use of satellite data, as indicated by UNITAR-UNOSAT, assists in identifying the extent of the flooding and helps prioritize response efforts in critical areas such as Madhyapur Thimi and Lalitpur, both nearby population centers which is also evident in the flood extent maps of Kathmandu, Lalitpur, and Bhaktapur district areas. Similarly, other images identify specific locations affected by the floods, as well as areas experiencing increased water levels in all three districts of Kathmandu Valley

Figure: Comparison of the flooded area before and after 30 September 2024

Several regions, such as Lalitpur's Nepal Medicity Hospital and other surrounding areas, Mahalaxmi, and the areas close to Madhyapur Thimi, are marked as flooded. This aligns with the earlier report that about 8 km² of land, including both residential and commercial sectors, was submerged. The image visually confirms the spread of the floodwaters through densely populated areas, impacting infrastructure and communities.

The image also highlights regions with increased water levels, notably along the Bagmati River and other tributaries, which correlates with the observation that water overflow from the river contributed to the widespread flooding. These water bodies play a critical role in exacerbating the disaster, as Kathmandu's urban infrastructure struggles to cope with excessive water.

Figure: Comparison of the flooded area before and after 30 September 2024

Areas marked with icons indicating "flooded structures" give a visual confirmation of where damage might have occurred, corroborating the earlier description, which mentioned that approximately 5,000 buildings were potentially affected. The flood-prone zones are mainly concentrated around densely populated sectors, which would have suffered significant damage due to the water.

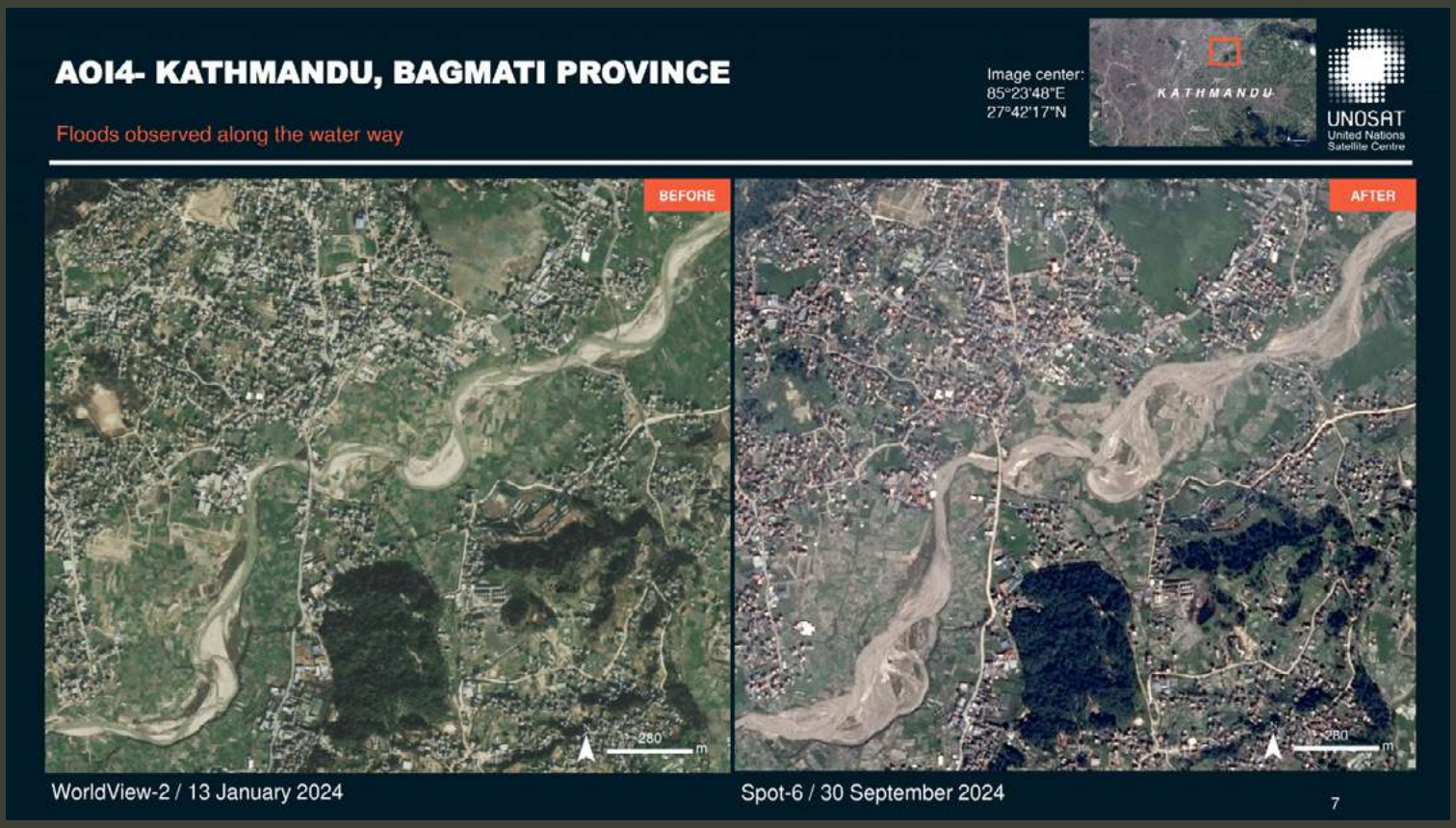


Fig Comparison of the flooded area before and after 30 September 2024

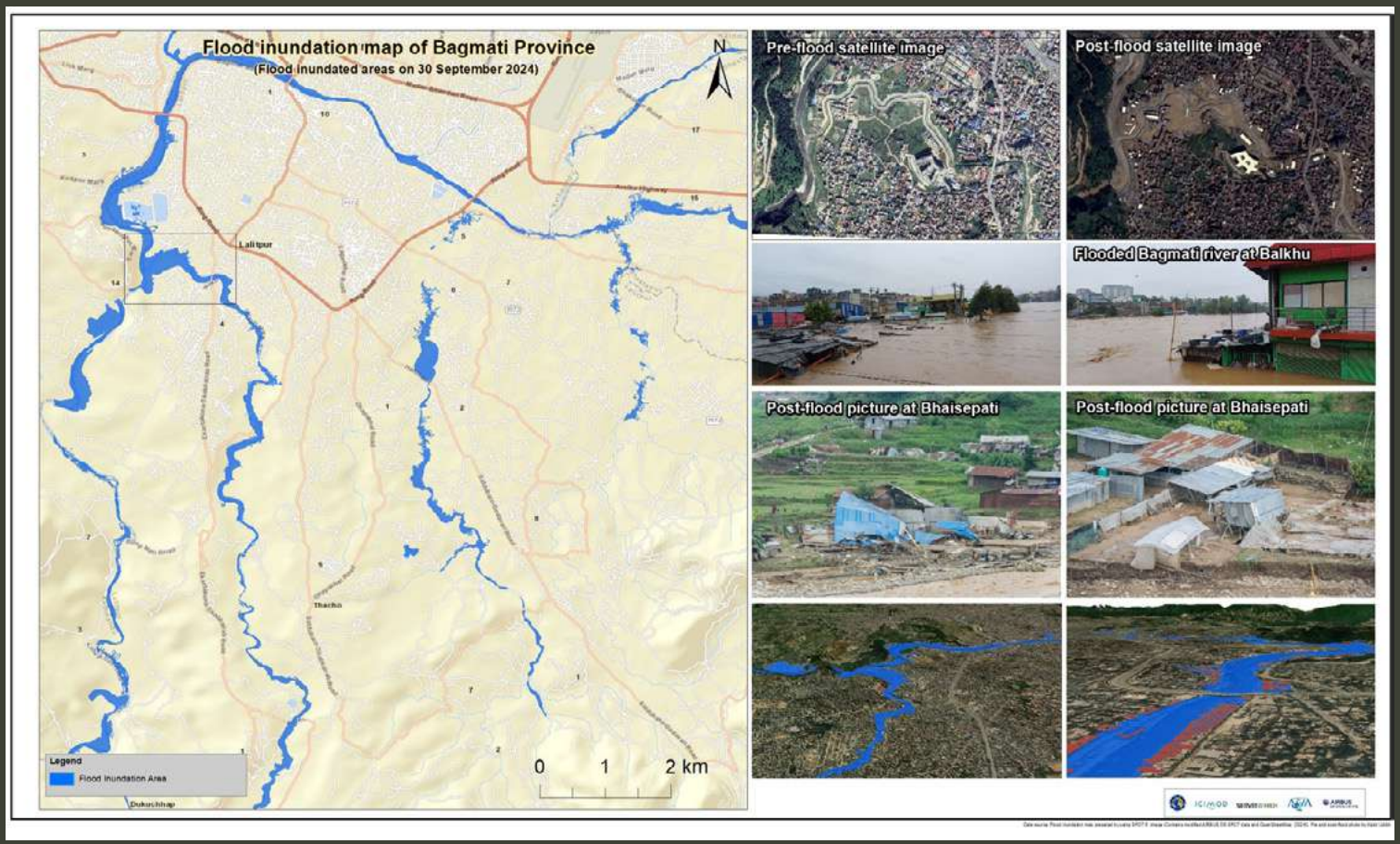


Fig Flood Inundation Map of Bagmati Province

Although it is not detailed enough, some of the surrounding areas in the image, including rural patches, may represent the croplands potentially impacted (~4 km² of flooded cropland). The flooding of agricultural land likely disrupted the livelihoods of many, particularly in areas south of Lalitpur and near Suryabinayak.

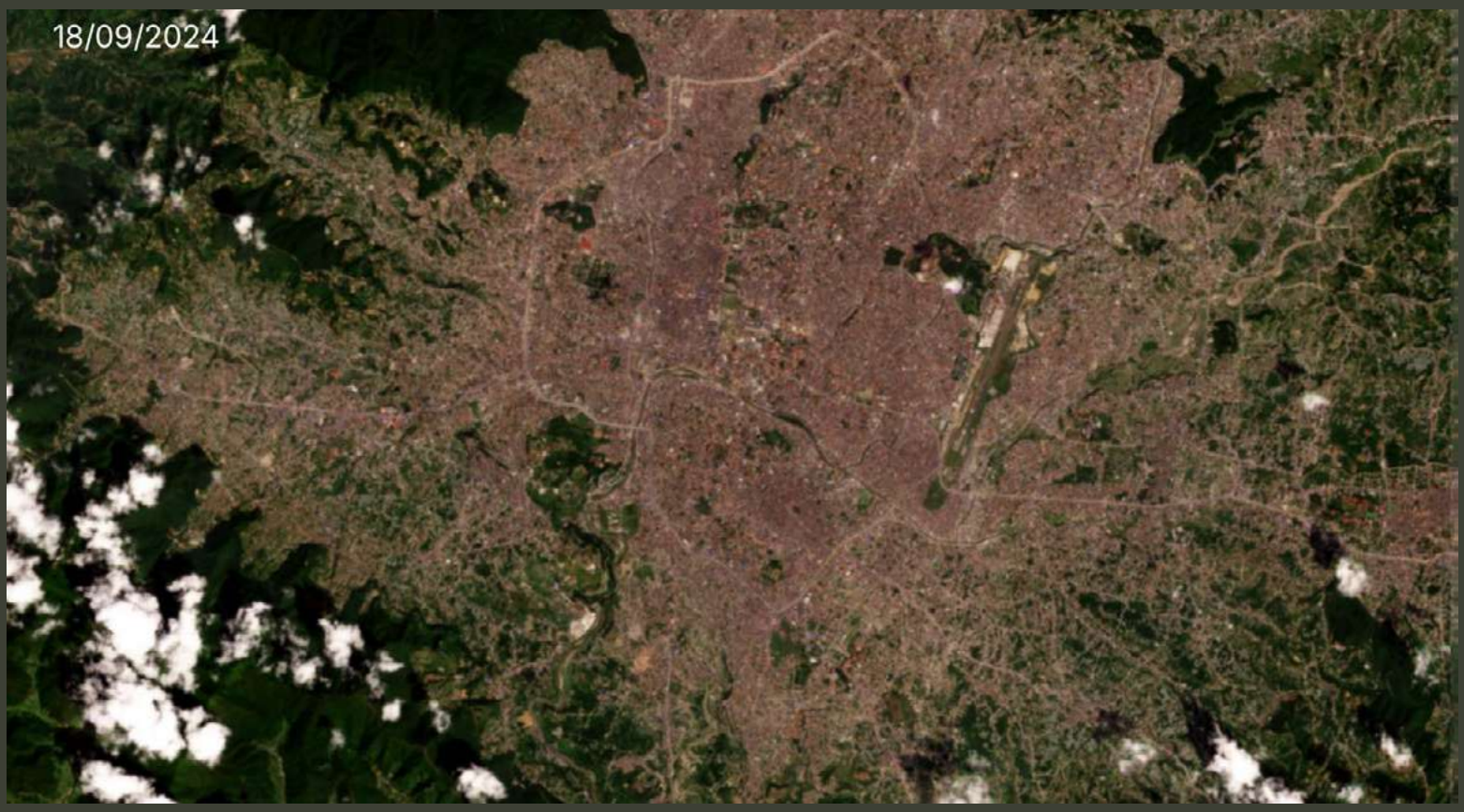


Fig. Satellite Imagery of Kathmandu Valley by Planet on September 18 2024

Fig. Satellite Imagery of Kathmandu Valley by Planet on 30 September 2024

Overview of Incident Reports and Estimated Losses from Recent Disasters in Nepal

The table provides a detailed overview of disaster-related incidents across different provinces of Nepal, reported between September 26 and October 9, 2024. The data, sourced from the Bipad Portal and reported by Nepal Police, highlights key statistics such as the number of incidents, human casualties, property damage, livestock losses, and the total estimated financial loss in Nepali Rupees (NPR).

The total number of incidents reported was 316, with Bagmati province recording the highest number of incidents at 161, followed by Koshi with 121. The provinces of Madhesh, Lumbini, Gandaki, and Karnali had significantly fewer incidents, with only 15, 11, 5, and 3 incidents reported, respectively.

In terms of human impact, the provinces experienced a total of 238 deaths, with Bagmati reporting the highest fatalities at 208, while Koshi saw 20 deaths. A total of 18 people were reported missing, with 14 from Bagmati and 4 from Koshi. Additionally, 170 people were injured, with Bagmati and Koshi provinces again accounting for the highest numbers, reporting 154 and 13 injuries, respectively.

Property damage was also significant, with a total of 551 houses destroyed and 855 houses affected. Bagmati province reported the most extensive damage, with 424 houses destroyed and 743 affected. Koshi followed with 117 houses destroyed and 111 affected. Other provinces, including Madhesh, Lumbini, and Gandaki, saw relatively minor destruction in comparison. Livestock losses were also substantial, with a total of 1,288 livestock destroyed. Bagmati accounted for the majority of this loss, with 1,205 livestock affected.

Finally, the total estimated financial loss across the provinces was NPR 4,580,71,050. Koshi province recorded the highest financial loss at NPR 434,729,050, followed by Gandaki with NPR 15,360,000. Bagmati province's estimated loss was NPR 4,062,000, while other provinces reported comparatively lower figures.

Province	Number of incident	People death	People missing	People injured	House destroyed	House affected	Livestock destroyed	Total Estimated Loss
Koshi	121	20	4	13	117	111	61	434729050
Bagmati	161	208	14	154	424	743	1,205	4062000
Madhesh	15	8	0	1	3	1	0	350000
Lumbini	11	2	0	2	2	0	2	3150000
Gandaki	5	0	0	0	5	0	14	15360000
Karnali	3	0	0	0	0	0	6	420000
Grand Total	**316**	**238**	**18**	**170**	**551**	**855**	**1,288**	**45,80,71,050**

Disclaimer. The reported incidents, casualty data, and estimated financial losses have been verified by Nepal Police and subsequently updated in the Bipad Portal. However, these figures do not necessarily represent the entire province, as many incidents and related data are still pending updates. Consequently, the reported numbers may not fully capture the scale of the impact across all affected areas within the provinces.

SOCIAL SECTOR

Housing and Human Settlements

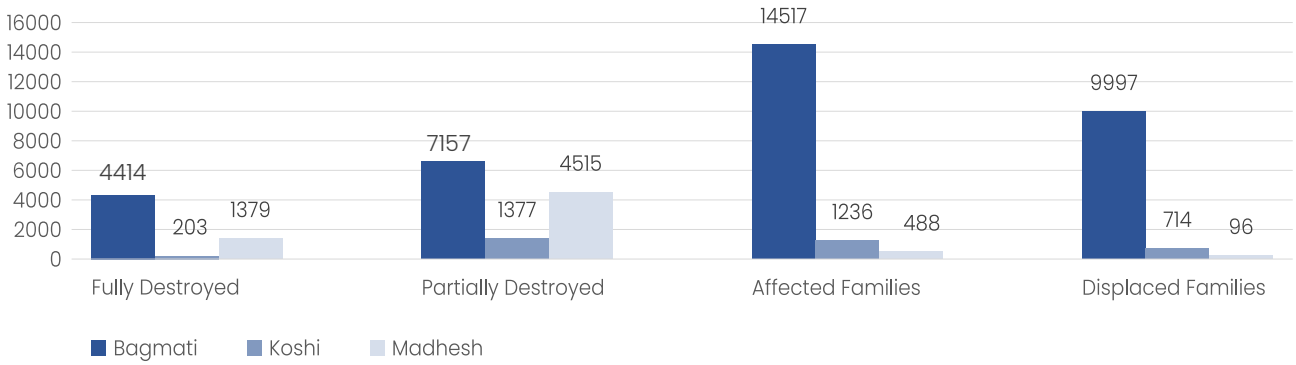
The preliminary assessment of housing and human settlements damage across different provinces highlights significant disparities in impact, particularly between the most affected region, Bagmati Province, and the least affected, Madhesh Province.

Bagmati Province reported the highest levels of destruction, with 4,414 fully destroyed houses and 7,157 partially destroyed houses, affecting more than 14,517 families and displacing 9,997 families.

Notably, Kavrepalanchowk district accounted for a significant impact, with 3,121 fully destroyed houses and 5,749 partially destroyed houses, severely impacting families. In contrast, Madhesh Province experienced destruction, with 1379 fully destroyed houses and 4515 partially destroyed houses. This region recorded more than 488 affected families and 96 displaced families, highlighting its resilience in the face of the recent disasters.

Overall, the total damage across all provinces

Figure depicting the number of destroyed houses along with the number of affected and displaced families.



indicates 5,996 fully destroyed houses, 13,049 partially destroyed houses, 16,241 affected families, and 10,807 displaced families. This assessment underscores the urgent need for targeted recovery efforts, particularly in the severely impacted regions. The assessment of housing damage across districts highlights significant disparities in destruction and affected families. Kavrepalanchowk district experienced the most devastation, with 3,121 fully destroyed houses and 5,749 partially destroyed houses, affecting 9,501 displaced families and 12,775 affected families.

In contrast, Okhaldhunga reported 14 fully destroyed houses and 335 partially destroyed houses, impacting 105 families. Khotang faced moderate damage, with 60 fully destroyed and 247 partially destroyed houses, resulting in 194 displaced families. Illam reported 49 fully destroyed houses and 200 partially destroyed houses.

In Bagmati Province, Dhading and Dolakha had 184 and 13 fully destroyes houses, respectively, while Rautahat district in Madhesh Province also reported significant damage, affecting 544 fully destroyed houses and 2185 partially destroyed houses.Overall, the total damage across all assessed districts includes 5,996 fully destroyed houses, 13,049 partially destroyed houses, impacting more than 10,807 displaced families and 16,241 affected families. This data underscores the urgent need for recovery efforts, especially in Kavrepalanchowk district of Bagmati Province.

Table showing provincial and district level destroyed housed along with the number of displaced and affected families

Province	District	Fully Destroyed Houses	Partially Destroyed Houses	Displaced Families	Affected Families
Bagmati	Chitwan	0	11	8	240
Bagmati	Dhading	184	5	0	15
Bagmati	Dolakha	13	19	0	5
Bagmati	Kavrepalanchok	3121	5749	9501	12775
Bagmati	Lalitpur	302	1040	10	504
Bagmati	Makawanpur	92	60	150	303
Bagmati	Ramechhap	365	100	81	88
Bagmati	Sindhuli	288	102	192	225
Bagmati	Sindhupalchok	49	71	17	22
Koshi	Illam	39	200	3	3
Koshi	Okhaldhunga	14	335	105	106
Koshi	Panchthar	90	595	102	175
Koshi	Khotang	60	247		
Madhesh	Mahotari	25	205	20	85
Madhesh	Rautahat	544	2185	40	214
Madhesh	Sarlahi	300	1300	25	132
Madhesh	Udayapur	450	725	-	-
Madhesh	Siraha	60	100	-	-
Total		**5996**	**13049**	**10807**	**16241**

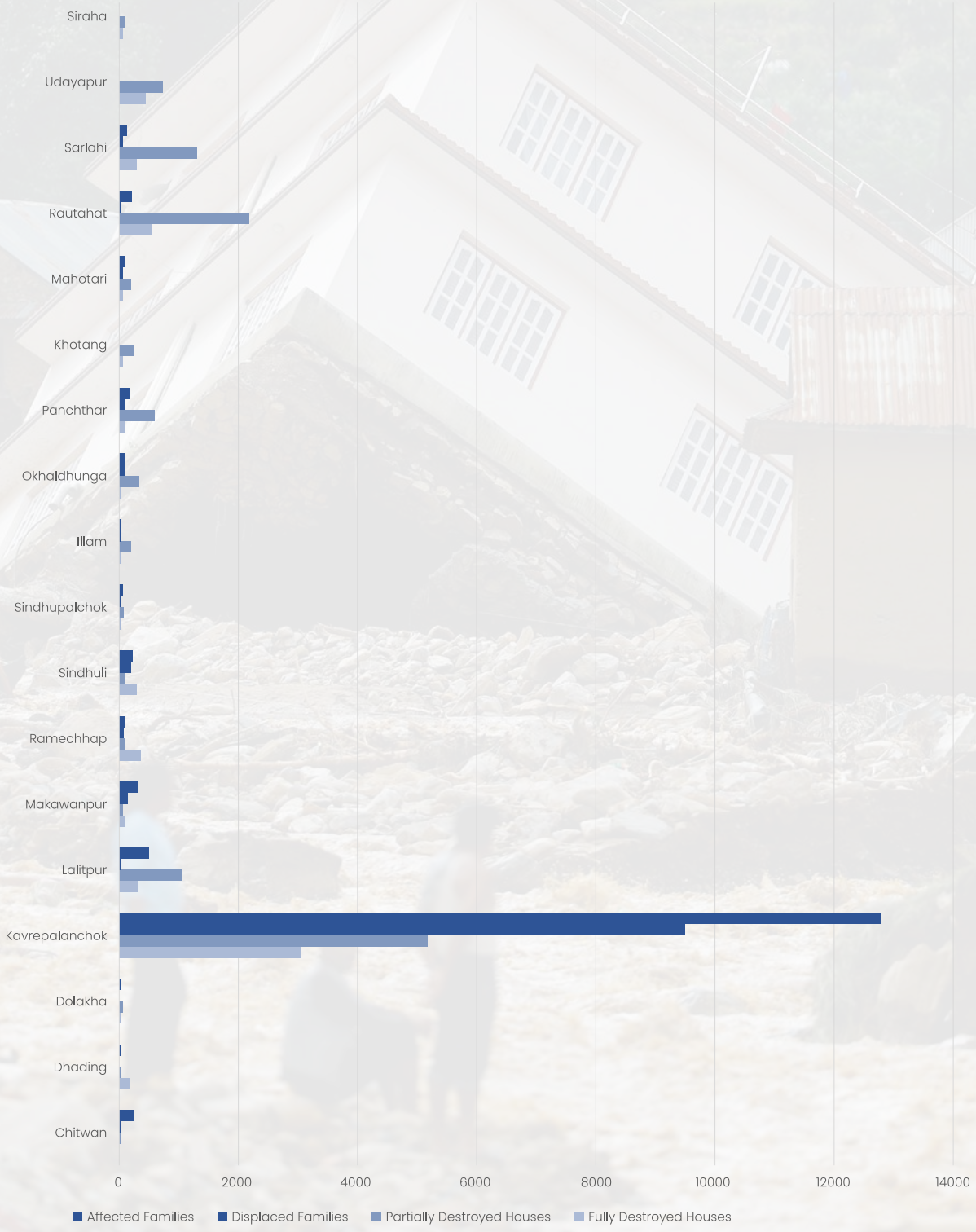


Figure depicting the district level destroyed houses along with the number of displaced and affected families

Province	Fully Destroyed Houses	Partially Destroyed Houses	Affected Families	Displaced Families
Bagmati	4414	7157	14517	9997
Koshi	203	1377	1236	714
Madhesh	1379	4515	488	96
Total	**5996**	**13049**	**16241**	**10807**

Human Impact and Emergency Response Overview by District

The table provides a detailed overview of the human impact caused by a disaster across various districts in Nepal, highlighting casualties, injuries, missing persons, rescues, and police force operations. It covers multiple provinces, including the Valley, Koshi, Madhesh, Bagmati, Gandaki, and Lumbini, presenting a comprehensive summary of the human toll and emergency responses in these areas.

In total, 249 people lost their lives, 177 were injured, and 18 individuals are reported missing across the districts. Kavre stands out as the most severely impacted district, with 79 deaths, 78 injuries, and 6 missing individuals, accompanied by a massive 12,647 rescues and 504 police force operations. Other districts that witnessed significant human loss include Dhading, with 39 deaths, and Sindhupalchowk, with 10 deaths and 17 injuries. The Valley Region, comprising Kathmandu, Lalitpur, and Bhaktapur, also faced a heavy toll, with 70 deaths, 37 injuries, and 6 missing persons. Notably, Kathmandu reported 1,442 rescues and 3,060 police operations, indicating the extensive rescue and relief efforts in the nation's capital.

In Koshi Province, districts like Panchthar and Solukhumbu were notably affected, with Panchthar reporting 8 deaths, 6 injuries, and 3 missing persons, while Solukhumbu recorded 5 deaths. Other districts such as Udayapur and Dhankuta experienced fewer casualties but still contributed to the overall human impact. Moving to Madhesh Province, the impact was comparatively less severe in terms of human loss, although districts like Mahottari, Rautahat, and Sarlahi saw multiple deaths and injuries, with Mahottari recording 625 police operations and Rautahat seeing 725 operations.

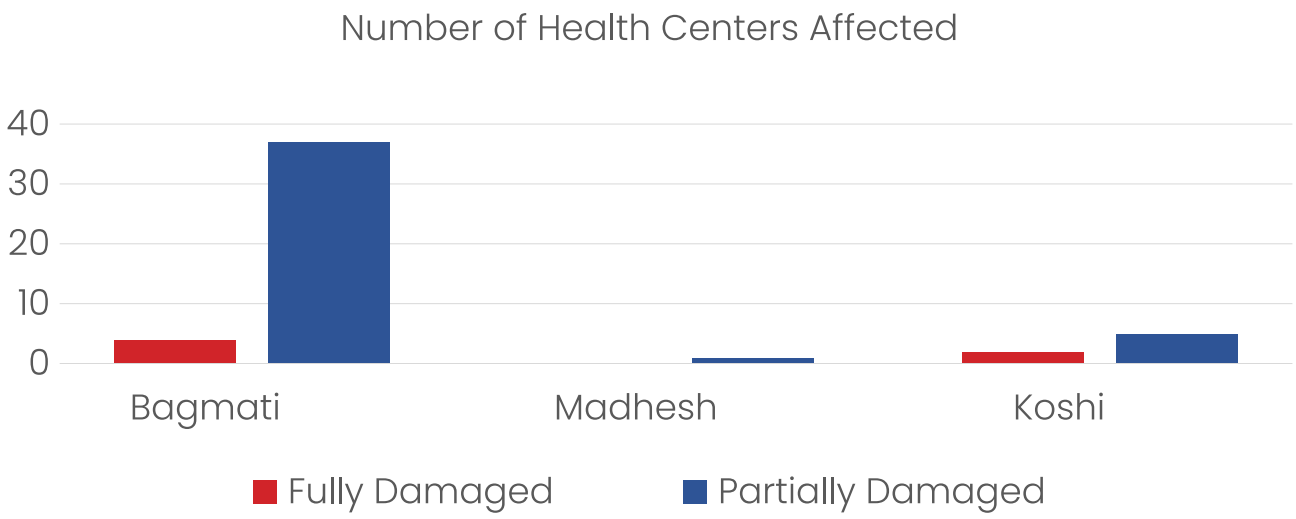
Bagmati Province, aside from Kavre, experienced significant casualties, particularly in Sindhupalchowk, with 10 deaths, 17 injuries, and 2 missing individuals, along with 385 police operations. Makwanpur, Ramechhap, and Dolakha also saw some loss of life, but the impacts were notably lower compared to the heavily affected districts. Finally, in Gandaki and Lumbini Provinces, there was relatively less human impact. Nawalparasi East and Gulmi reported no deaths, while Rupandehi had 2 deaths but fewer overall injuries.

The table underscores the diverse level of impact across Nepal's districts, with some areas suffering substantial loss of life and injury, while others faced less severe consequences. The rescue efforts were significant, with over 17,174 individuals rescued across all regions, and nearly 14,802 police force operations conducted in response to the disaster, reflecting a substantial mobilization of resources to assist affected populations. The data highlights both the human cost of the disaster and the extensive efforts undertaken to mitigate its effects.

			Human Impact				
S.N.	Province	District	Dead	Injured	Missing	Rescued	Policeforce Operation
1	Bagmati	Kathmandu	19	18	1	1442	3060
2		Lalitpur	46	16	5	660	1100
3		Bhaktapur	5	3	0	56	350
4	Koshi	Jhapa	2	0	0	0	100
5		Paanchthar	8	6	3	0	35
6		Dhankuta	2	2	0	4	65
7		Tehrathum	0	1	0	1	91
8		Khotang	0	2	0	143	215
9		Udayapur	1	0	0	127	75
10		Solukhumbu	5	1	0	5	51
11		Ilam	1	0	0	0	42
12		Sankhusabha	0	1	0	1	13
13		Okhaldungha	1	1	0	1	39
14		Bhojpur	0	0	0	0	30
15		Taplejung	0	0	0	0	35
16		Sunsari	0	0	0	8	25
17		Morang	0	0	1	0	98
18	Madhesh	Mahottari	2	0	0	1	625
19		Saptari	1	0	0	0	560
20		Sarlahi	3	2	0	0	605
21		Rautahat	4	3	0	34	725
22		Parsa	0	0	0	0	777
23		Siraha	1	1	0	0	559
24		Dhanusha	0	0	0	0	590
25		Baara	0	3	0	0	670
26	Bagmati	Makwanpur	7	3	0	54	569
27		Chitwan	0	0	0	318	759
28		Dhading	39	7	0	0	404
29		Nuwakot	0	1	0	19	359
30		Rasuwa	0	0	0	19	201
31		Kavre	79	78	6	12662	504
32		Sindhupalchwok	10	17	2	17	385
33		Dolakha	7	5	0	9	271
34		Ramechhap	1	3	0	119	286
35		Sindhuli	3	1	0	481	381
36	Gandaki	Nawalparasi East	0	0	0	997	90
37	Lumbini	Gulmi	0	2	0	0	0
38		Rupandehi	2	0	0	0	58
Total			249	177	18	17174	14802

Health and Population

Report from the Ministry of Health and Population states that landslides and floods have damaged 41 health facilities across 3 provinces and 12 districts. The table and chart both provides an overview of hospital damages caused by recent disasters in three provinces: Bagmati, Madhesh, and Koshi. The types of disasters affecting these regions include floods, landslides, and thunderstorms. In Bagmati Province, seven hospitals were fully damaged, while 27 were partially damaged, with the primary causes being floods and landslides. The estimated cost for maintenance, upgrades, and reconstruction in this region is NPR 17.5 million. Madhesh Province reported only one hospital partially damaged by floods, with an estimated cost of NPR 1.6 million. In Koshi Province, one hospital was fully damaged and five were partially damaged, primarily due to landslides, with a total estimated cost of NPR 2.6 million. Overall, the estimated total reconstruction cost for all affected hospitals across the three provinces amounts to NPR 21.7 million.



S.N	Province	Description of Damage		Affected by Disaster Type				Maintainance/ upgrage/ Reconstruction Cost (NPR)
		Fully Damaged	Partially Damaged	Flood	Landslide	Landslide/ Flood	Lightening	
1	Bagmati	4	37	27	10	4		17,500,000
2	Madhesh	-	1	1	-	-	-	1,600,000
3	Koshi	2	5	2	4	-	1	2,600,000
Total		**6**	**43**	**30**	**14**	**4**	**1**	**21,700,000**

Disclaimer: It is important to note that these figures represent available cost estimates rather than the actual number of hospitals damaged.

Population Dynamics and Communication Infrastructure During the Crisis

The analysis of population dynamics during the September 2024 flooding and landslides in Nepal is critical for effective disaster response and recovery efforts. The following datasets: Facebook Population During Crisis, Probability of Network Coverage, and Movement Distribution offer valuable insights into how individuals in affected areas have been displaced, the state of communication infrastructure, and the movement patterns of the population. These insights are essential for emergency responders to allocate resources efficiently and coordinate relief efforts effectively.

The **Facebook Population During Crisis** dataset provides insight into how the population in affected areas during the September 2024 flooding and landslides in Nepal has shifted compared to pre-crisis levels. This dataset uses Facebook user presence to gauge displacement, showing whether individuals have left or remained in disaster-stricken regions. The map visualizes areas with darker shades to indicate a decrease in population, while lighter areas suggest stability. This data is crucial for emergency responders to understand population displacement patterns and direct humanitarian aid to areas that have experienced the most significant out-migration or where people are still concentrated. By analyzing this information, response teams can allocate resources efficiently to meet the immediate needs of displaced communities and ensure that areas with stable populations continue to receive necessary support.

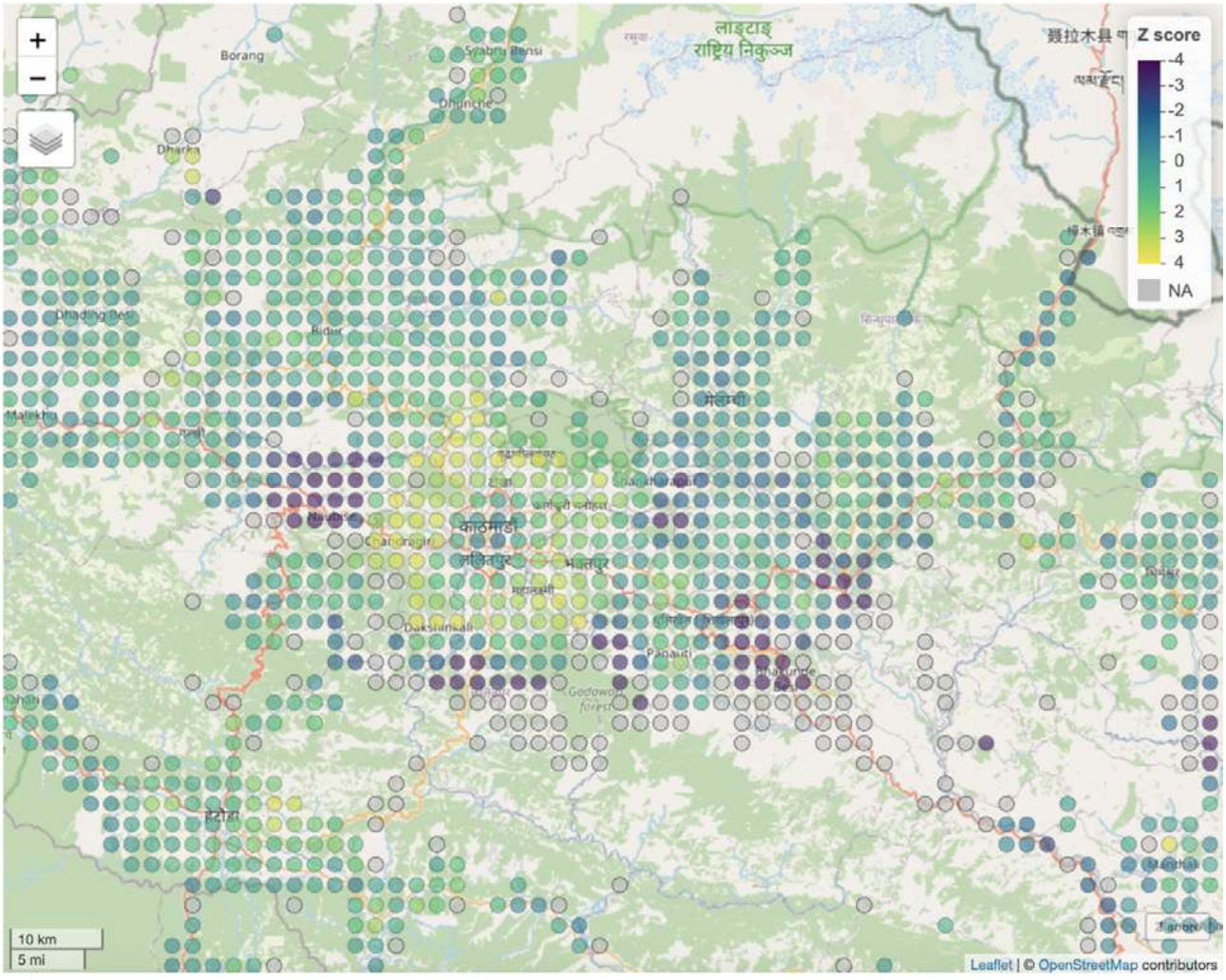


Figure: Population during Crisis during the Bagmati and Koshi province Flooding

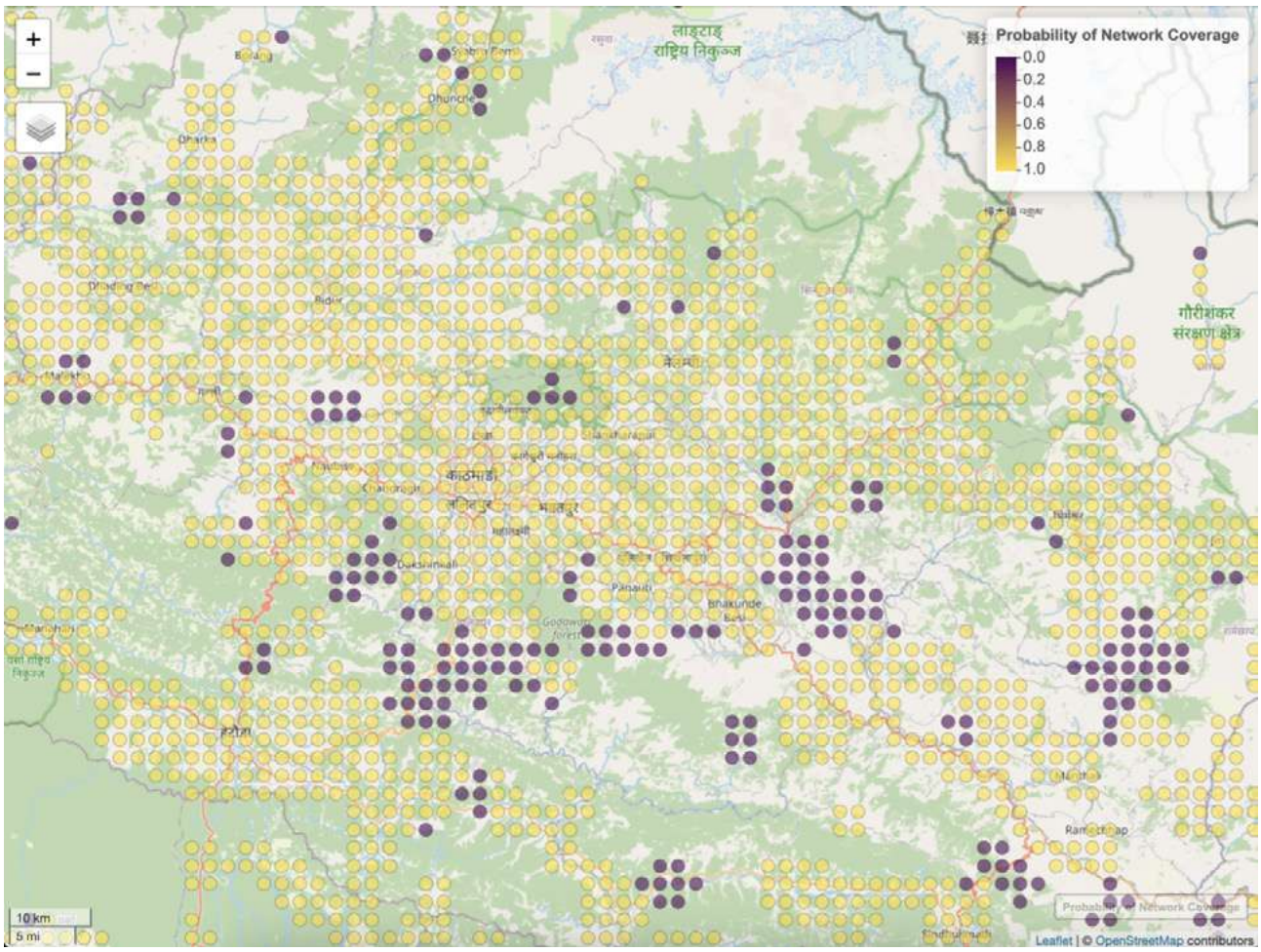


Figure: Probability of Network Coverage Dataset during Bagmati and Koshi Province

The **Probability of Network Coverage** dataset estimates the likelihood of mobile network functionality in various regions during the crisis. By comparing pre-disaster data with current conditions, the dataset helps identify areas where mobile networks may be disrupted due to floods or landslides. The map employs color gradients to show regions with higher or lower probabilities of network connectivity. Areas with a high probability of functional networks are shown in bright colors, while regions with potential connectivity issues are represented in darker tones. This information is pivotal for emergency teams, as it allows them to identify areas where communication may be compromised, prompting the deployment of alternative communication tools, such as satellite phones or mobile network boosters. Maintaining communication is critical for coordinating rescue and relief efforts, making this dataset an essential part of the disaster response strategy.

The **Movement Distribution dataset** tracks the mobility of individuals during the crisis by categorizing travel distances into four groups: those staying in place, traveling short distances (1-10 km), medium distances (10-100 km), or long distances (over 100 km). This data reveals how people are responding to the disaster, whether by evacuating to nearby areas, relocating to distant locations, or remaining in their homes. The map visualizes these movements with different shades, where lighter tones represent areas where the population remains in place, and darker tones show regions with significant displacement and movement. Understanding these movement patterns is crucial for disaster response teams to identify where displaced populations are relocating, allowing for targeted relief efforts. Moreover, the data helps planners anticipate where to focus long-term recovery and resettlement support, especially in areas experiencing significant population outflow or inflow due to the disaster.

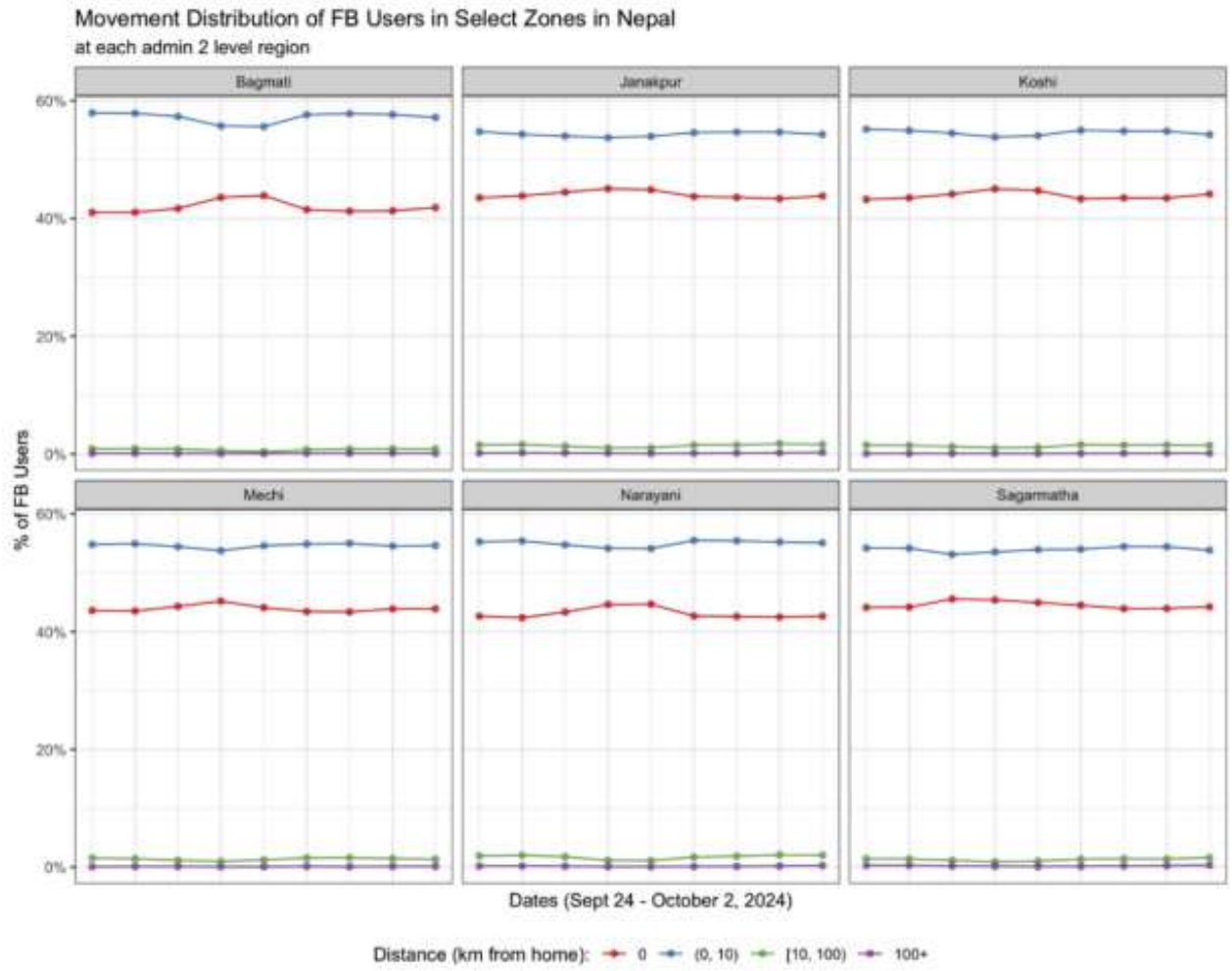


Figure: Movement Distribution of Facebook Users in selected areas in Nepal

Education

In total, 142 school buildings were either fully or partially damaged, affecting over 10,925 students. Some of the major damages include destroyed walls, inundated classrooms, and buildings buried under landslides. Rescue operations successfully evacuated 50 students, while sadly, 13 students lost their lives due to landslides and related accidents. The damage is spread across several provinces, with Bagmati Province being the most affected, particularly Kavrepalanchowk District, where 82 schools were damaged in various municipalities. Lalitpur also saw a significant impact, with 31 schools affected. Other districts in Bagmati, including Rasuwa, Sindhuli, Makwanpur, Dhading, and Chitwan, also reported damage to multiple schools. Additionally, schools in Gandaki, Karnali, Koshi, and Lumbini provinces suffered damage, though on a smaller scale.p`

Province	District	Affected Municipalities	Number of Affected Schools
Bagmati	Rasuwa	Gosaikunda Rural Municipality, Aamchodingbo Rural Municipality, Uttargaya Rural Municipality, Kalika Rural Municipality	5
Bagmati	Sindhuli	Sunkoshi Rural Municipality, Phikkal Rural Municipality	6
Bagmati	Makwanpur	Bagmati Rural Municipality, Makwanpurgadi Rural Municipality	3
Bagmati	Lalitpur	Mahalaxmi Municipality, Lalitpur Metropolitan City, Kanjyosom, Godawari Municipality	31
Bagmati	Kavrepalanchowk	Bethanchowk Rural Municipality, Dhulikhel Municipality, Panchkhal Municipality, Temal Rural Municipality, Roshi Rural Municipality, Bhullu Rural Municipality, Panauti Municipality	82
Bagmati	Dhading	Dhunibesi Municipality	1
Bagmati	Chitwan	Ratnanagar Municipality	1
Gandaki	Nawalparasi West	Susta Rural Municipality, Ramgram Municipality	2
Gandaki	Tanahau	Bandipur Rural Municipality, Ghiring Rural Municipality, Bhimad Municipality	5
Karnali	Humla	Kharpunat Rural Municipality	1
Karnali	Jajarkot	Chhedagad Municipality	1
Koshi	Terhathum	Phedap Rural Municipality, Laligurans Municipality	2
Koshi	Panchthar	Phidim Municipality	1
Lumbini	Gulmi	Chhatrakot Rural Municipality	1
Total			**142**

PRODUCTIVE SECTOR

Agriculture and Livestock

The preliminary assessment of agricultural losses reveals significant impacts due to crop and livestock damage across several provinces. In the Mechi, Madhesh, Gandaki, Bagmati, and Sudurpaschim provinces, paddy crops suffered the most, with 58,772 hectares affected and an estimated loss of NPR 3.5 billion. Districts impacted include Saptari, Siraha, Dhanusha, Mahottari, and several others.

Khotang district in the Koshi province reported damage to Alaichi crops over 1,300 hectares, leading to an estimated loss of NPR 700 million. Sugarcane losses in Parsa district affected 85 hectares, resulting in a loss of NPR 340 million. The fishery sector also experienced significant losses in Dhanusha, Mahottari, Sarlahi, Rautahat, and Bara, with 458 hectares affected, totaling NPR 1.13 billion in losses.

Vegetable farms across the Koshi, Bagmati, and Madhesh provinces faced damage covering 4,743 hectares. Fruit farms in Kaski, Nawalparasi East, Kanchanpur, and Rautahat were also impacted, with losses reported in 22 hectares. The Ministry's infrastructure suffered losses in Sarlahi, Dhanusha, Lalitpur, and other districts, amounting to NPR 160 million.

Overall, the total agricultural losses include 65,380 hectares affected, with a total estimated financial loss of NPR 5.88 billion. This early and rapid assessment highlights the urgent need for recovery efforts in the agricultural sector to support affected communities.

Table demonstrating province and district-wise agricultural loss and damage

S.N.	Province	District	Categories	Area (Hectare)	Number of Livestock	Estimated Loss
1	Mechi, Madhesh, Gandaki, Bagmati, Sudur Paschim	Saptari, Siraha, Dhanusha, Mahottari, Sarlahi, Rautahat, Bara, Parsa, Nawalpur, Baglung, Khotang, Jhapa, Kailali, Lamjung, Parbat, Kaski, Syangja, Sindhuli, Makwanpur, Kavre	Paddy crop	58476	-	3,500,000,000
2	Koshi	Khotang	Alaichi	1300	-	700,000,000
3	Madhesh	Parsa	Sugarcane	85	-	340,000,000
4	Madhesh	Dhanusha, Mahottari, Sarlahi, Rautahat, Bara, Parsa	Fishery	458	-	1,130,000,000
5	Koshi	Paanchthar, Dhankuta, Terhathum	Barn	-	-	
6	Koshi, Bagmati, Madhesh	Paanchthar, Ilam, Sunsari, Dhankuta, Solukhumbu, Okhaldhunga, Ramechhap, Dolakha, Lalitpur, All districts of Madhesh Province		-	26205	
7	Gandaki, Sudur Paschim, Madhesh	Kaski, Nawalparasi East, Kanchanpur, Rautahat	Fruit Farm	22		
8	Koshi, Bagmati, Madhesh	Khotang, Makwanpur, Chitwan, Saptari, Siraha, Dhanusha, Bara, Parsa	Vegetable Farm	4743		
9	Madhesh, Bagmati, Karnali, Gandaki	Sarlahi (Lalbandi), Dhanusha (Naktajhij), Lalitpur (Godawari, Khumaltaar), Western Rukum (Musikot), Sindhuli (Phikkal), Kathmandu (Kirtipur), Mustang (Marpha), Nawalpur	Infrastructure within Ministry			160,000,000
10	Bagmati	Dhulikhel Municipality	Maize, Paddy Crop and Vegetable Farm	296	467	52812500
Total				**65380**	**26698**	**5,882,812,500**

Irrigation

The estimated losses associated with various irrigation projects in Nepal reveal significant financial impacts due to recent events. The Sunsari-Morang Irrigation Project, which includes ten branch canals, is projected to a loss of NPR 50 million. Similarly, the Bagmati Irrigation Project, encompassing both the eastern and western main canals, faces an estimated loss of NPR 54 million. The Jhajh Irrigation Canal Project is expected to lose about NPR 30 million, while the Koshi Pump-Chandra Canal Project has an estimated loss of NPR 5 million. The Kamala Irrigation Management Project also reports a loss of NPR 50 million. In contrast, the Narayani Irrigation Management Project indicates a much smaller estimated loss of NPR 1 million. Notably, the Mahakali Irrigation Project in Kanchanpur is projected to face the highest loss, amounting to NPR 1.14 billion. In total, the estimated loss and damage across these irrigation projects amount to NPR 1,350,000,000 billion, highlighting the significant impact on irrigation infrastructure in the affected areas.

Table showing number of irrigation projects damaged with its estimated loss in NPR

Details		**Estimated Loss**
10 branch canals under the Sunsari-Morang Irrigation Project		NPR 50,000,000
Bagmati Irrigation Project eastern and western main canals		NPR 54,000,000
Jhajh Irrigation canal Project		NPR 30,000,000
Koshi Pump-Chandra Canal Project		NPR 5,000,000
Kamala Irrigation Management Project		NPR 50,000,000
Narayani Irrigation Management Project		NPR 1,000,000
Mahakali Irrigation Project in Kanchanpur		NPR 1,140,000,000
Total estimated loss and damage		**NPR 1,350,000,000**
Sub-sector	**Disaster Effects (Number)**	**Disaster Effects (in NPR)**
	Damage	Loss
Irrigation Projects	**7**	**NPR 1,350,000,000**

PHYSICAL INFRASTRUCTURE SECTOR

Transportation

The recent floods and landslides from September 26–28, 2024, have severely impacted key highways across Nepal, leading to widespread road closures and infrastructure losses. This natural disaster has disrupted transportation networks essential for connectivity, trade, and the movement of goods and people, particularly in Koshi, Bagmati, and Karnali Provinces. The damage encompasses both the immediate costs of making the roads operational again and the extensive requirements for complete reconstruction of critical infrastructure.

In Koshi Province, the Diktel-Gaighaat highway has been particularly affected, with a concrete bridge near Phoksingtar completely swept away. This incident has led to the full closure of the route, cutting off access to various communities and hindering the movement of emergency services and supplies. Such closures emphasize the vulnerability of critical infrastructure to extreme weather events and highlight the urgent need for resilient construction solutions.

Bagmati Province has also suffered extensive disruptions. In Dhading District, road cave-ins on the Prithvi Highway and Kalupandey Road have reduced traffic flow to a single lane, affecting thousands of daily commuters and transport vehicles. Meanwhile, in Ramechhap District, the Pushpalal Highway and the Ramechhap-Sindhuli route are fully closed after the destruction of bridges. Additionally, landslides on the B.P Highway in Kavre District have restricted access to one-way traffic, causing significant delays and posing challenges for both residents and travelers. The Araniko Highway in Sindhupalchowk District remains entirely closed due to severe flooding, further compounding transportation issues in the region.

In Karnali Province, the Karnali Corridor in Humla District has been blocked by a dry landslide, rendering it impassable. This closure has significant implications for the region's connectivity, as the Karnali Corridor is a critical route for remote and mountainous areas, which now face isolation and limited access to essential services. The blockage also poses challenges for relief operations, complicating efforts to provide support and resources to affected communities.

The combined estimated cost for immediate repairs and comprehensive reconstruction across all affected highways is NPR 27,980,000,000. This estimate underscores the massive financial and logistical challenges involved in restoring these transportation networks. The impact of these losses is far-reaching, affecting not only immediate mobility but also economic activities, healthcare access, and disaster response capabilities in the long term.

Table showing the road and highways damaged due to Flood and Landslide.

S.N.	Province	Date	District/Place	Name of Highway	Reasons of Blockage	Condition
1	Koshi	6/12/2081	Khotang/ Khotehang RM-09 Phoksingtaar	Diktel-Gaaighaat	Concrete bridge swept	Closed
2		6/16/2081	Dhading/Benighat Rorang RM-07 Krishnabhir	Prithvi Highway	Road cave in	One way resumed
3		6/29/2081	Section in Dhading Siddhalek RM-06	Kalupandey Road	Road cave in	One way resumed
4		6/12/2081	Ramechhap/ Manthali Municipality-06 Seleghaat	Pushpalal Highway	Bridge swept	Closed
5	Bagmati	6/12/2081	Ramechhap/ Khaadadevi RM-01 Khaireni	Ramechhap-Sindhuli	Bridge swept	Closed
6		6/12/2081	Kavre/ Roshi RM-11 Piple	B.P Highway	Landslide	One way resumed
7		6/12/2081	Kavre/ Roshi RM-09 Chiure Baari, Daunne, Naarke, Biruwa Dada	B.P Highway	Landslide	One way resumed
8		6/12/2081	Sindhupalchwok/ Bhotekoshi RM-02 Liping	Araniko Highway	Flood	Closed
9	Karnali	6/28/2081	Humla/ Sarkegaad Rm-04, Dullikuna Pahiro	Karnali Corridor	Dry landslide	Closed

Bridge

The early assessment of bridge damages across various provinces in Nepal reveals significant losses due to natural disasters. In the Koshi Province, a total of nine bridges have been reported damaged along the Sunkoshi River and its tributaries, with full damage affecting bridges at Okhaldhunga and Bhojpur, resulting in losses of NPR 40 million and NPR 50 million, respectively. The Khotang district faced damage to six bridges on the same river, with three suffering full damage and three partial damage, leading to an estimated loss of NPR 175 million. In Udayapur, six bridges were also impacted, five of which experienced full damage, totaling NPR 245 million in losses.

In the Bagmati Province, the Sindhuli district saw the highest number of affected bridges, with ten bridges on the Sunkoshi River experiencing damage-seven fully damaged and three partially damaged, incurring an estimated loss of NPR 300 million. Similarly, in Chitwan and Dhading districts, all three bridges on the Trishuli River sustained full damage, leading to losses of NPR 200 million and NPR 40 million, respectively. Kavrepalanchok district reported partial damage to three bridges along Rosi Khola, costing around NPR 25 million. Additionally, Lalitpur faced partial damage to six bridges of various types, although the financial loss is not specified.

In total, the assessment identifies 41 damaged bridges across the regions, with the cumulative estimated loss amounting to NPR 1.137 billion. This significant damage emphasizes the urgent need for repairs and improvements to ensure the safety and functionality of Nepal's transportation infrastructure.

Table demonstrating the number of bridged damaged along with their estimated loss in NPR

Province	District	River/Stream	Number of Bridges	Status	Loss (NPR)
Koshi	Okhaldhunga	Sunkoshi River	1	Full damage	NPR 40,000,000
Koshi	Okhaldhunga	Kharthe Khola	1	Full damage	NPR 40,000,000
Koshi	Okhaldhunga	Molung Khola	1	Partial damage	NPR 2,000,000
Koshi	Bhojpur	Sunkoshi River	1	Full damage	NPR 50,000,000
Koshi	Khotang	Sunkoshi River	7	3 Full, 4 Partial damage	NPR 175,000,000
Koshi	Udayapur	Sunkoshi River	6	5 Full, 1 Partial damage	NPR 245,000,000
Bagmati	Sindhuli	Sunkoshi River	12	7 Full, 3 Partial damage	NPR 300,000,000
Bagmati	Kavrepalanchok	Rosi Khola	3	Partial damage	NPR 25,000,000
Bagmati	Chitwan	Trishuli River	3	Full damage	NPR 200,000,000
Bagmati	Dhading	Trishuli River	2	Full damage	NPR 40,000,000
Gandaki	Nawalparasi	Narayani River	1	Partial damage	NPR 20,000,000
Bagmati	Lalitpur	Various	6	Partial damage	-
Total			**44**		**NPR 1,042,000,000**

Damage Type	Number of Bridges	Total Estimated Cost (NPR)
Full Damage	25	NPR 950,000,000
Partial Damage	19	NPR 92,000,000
Total	**44**	**NPR 1,042,000,000**

Hydropower

In the hydropower sub-sector, operational plants with a total capacity of 625.96 MW reported 11 instances of disaster effects, resulting in damage amounting to NPR 2.35 billion. For hydropower projects that are currently under construction, a total capacity of 1,010.15 MW faced 15 disaster-related incidents, leading to damages of NPR 650 million.

The distribution sector reported 2,178 disaster effects, resulting in a loss of NPR 13.8 million. The transmission sector experienced additional impacts, although no specific number of incidents was reported; it incurred losses amounting to NPR 67.5 million.

Overall, the total impact on the power sector is significant, with estimated damage and losses reaching NPR 3.08 billion. This highlights the need for robust disaster management strategies to mitigate future impacts on this vital infrastructure.

Table showing the number of operational and underconstruction hydropower dams, transmission lines and distribution system damaged with its estimated loss in NPR

Sub-sector	**Total Capacity (MW) Damage**	**Disaster Effects (Number)**	**Disaster Effects (in NPR)**
		Damaged	**Loss**
Hydropower (Operation)	625.96	11	NPR 2,350,000,000
Hydropower (Under Construction)	1010.15	15	NPR 6,50,000,000
Distribution	-	2178	NPR 13,800,000
Transmission	-	-	NPR 67,500,000
Total	**-**	**-**	**NPR 3,081,300,000**

Water supply and Sanitation

The water supply and sanitation assessment indicate significant impacts resulting from recent events. Approximately 500,000 houses have been affected, impacting around 2.5 million people across 66 districts, including key areas like Kathmandu, Lalitpur, Bhaktapur, and Kavre.

The damage to water supply projects is extensive, with about 1678 federal and provincial projects affected, while data collection for provincial and local projects is ongoing. Critical infrastructure has suffered severe damage, including pipelines, chambers, water tanks, treatment plants, and other essential structures. Assets such as GI and HDPE pipes have also been damaged, along with the structures of wastewater treatment plants and both household and institutional toilets.

The total estimated damage for these water supply and sanitation systems is approximately NPR 5.9 billion. This highlights the urgent need for recovery and reconstruction efforts to restore water supply and sanitation services in the affected districts.

Table showcasing the number of water supply and sanitation project damaged with its estimated loss in NPR

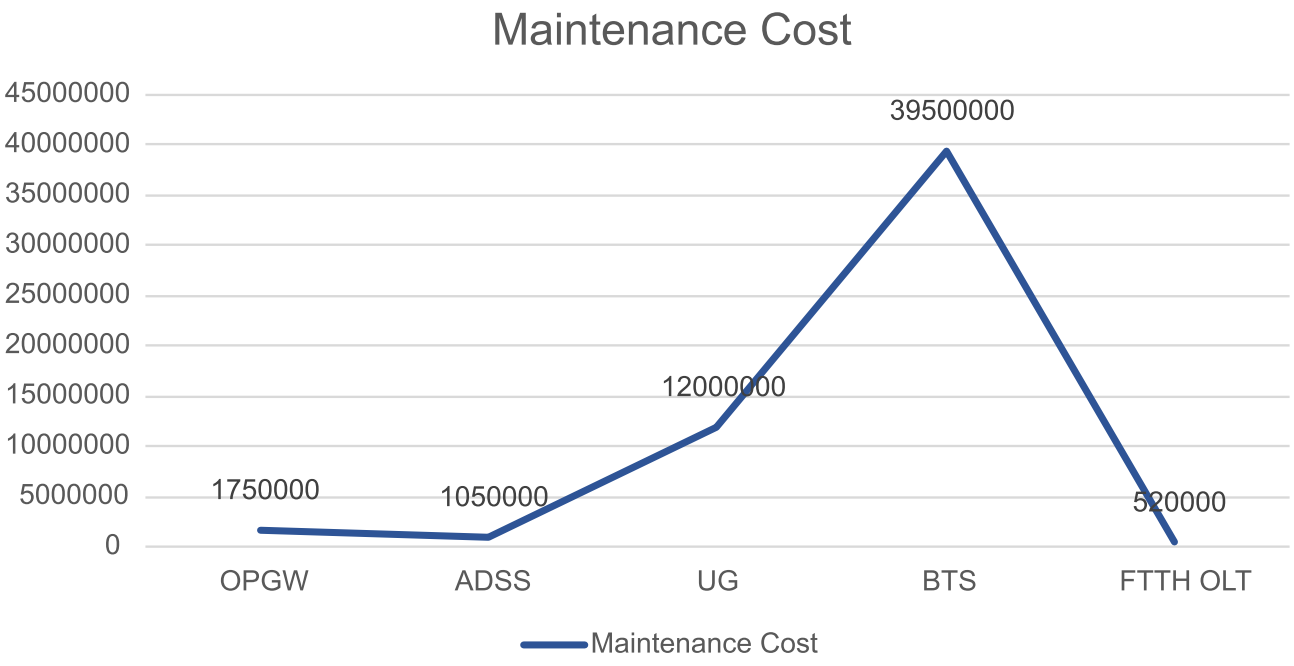
Details	Information
Number of Houses Affected	**Approximately 500,000**
Number of People Affected	Approximately 2.5 million
Number of Water Supply Projects	Approximately 1678 (Federal, Provincial and local projects)
Damage Details	• Extensive damage to pipelines, chambers, water tanks, treatment plants, and other critical structures. • Damage to assets like GI pipes, HDPE pipes. • Damage to wastewater treatment plant structures. • Damage to household and institutional toilets.
Total Estimated Damage	Approximately **NPR 5.9 billion**
Number of Affected Districts	**67 districts** including Kathmandu, Lalitpur, Bhaktapur, Kavre, Sindhupalchok, Ramechhap, Sindhuli, Udayapur, Sunsari, among others.

Communication

The projected impact on revenue from mobile services (2G/3G/4G) amounts to NPR 14,199,175 as of 1 October 2024 at 12 PM. In terms of other services, the impact is negligible, and there is no reported impact on FTTH (Fiber to the Home) services. Overall, the total revenue impact is approximately NPR 14,199,175.

The estimated damage to infrastructure and maintenance costs for various equipment is detailed as follows: For Optical Ground Wire (OPGW), 50 kilometers at a cost of NPR 35,000 per kilometer results in total infrastructure damage of NPR 1,750,000. For All-Dielectric Self-Supporting Cable (ADSS), 200 kilometers at the same cost per kilometer leads to infrastructure damage totaling NPR 7,000,000, with an additional maintenance cost of NPR 1,050,000. The Underground (UG) network spans 100 kilometers at a significantly higher cost of NPR 800,000 per kilometer, accumulating a total damage of NPR 80,000,000 and a maintenance cost of NPR 12,000,000. The Base Transceiver Station (BTS) network comprises 790 units, each costing NPR 50,000, resulting in total infrastructure damage of NPR 39,500,000. For Fiber to the Home Optical Line Terminal (FTTH OLT), 26 units at NPR 20,000 each yield a total damage of NPR 520,000. Additionally, miscellaneous items incur a total damage cost of NPR 10,000,000. In summary, the total estimated cost for infrastructure damage is NPR 97,000,000, with maintenance costs amounting to NPR 54,820,000, leading to a combined total of NPR 152,305,000.

Figure depicting the estimated loss and maintainance cost of different types of telecommunication channels



Recommendations

In response to the recurring climate induced disaster events, there is a need for both immediate and long-term strategies to enhance disaster resilience and improve response mechanisms. Strengthening early warning systems is key to providing timely alerts, while continuous disaster preparedness training will ensure a faster, more coordinated response. Investment in resilient infrastructure, especially in vulnerable districts and municipalities, will safeguard essential services during extreme weather events. To improve efficiency in disaster management, better coordination among governmental agencies, local authorities, and humanitarian organizations is vital. Equally important is empowering communities to manage disasters locally through awareness programs and first aid training. Comprehensive risk mapping, along with sustainable recovery practices, will ensure long-term resilience. In addition, the provision of psychosocial support for affected populations and the standardization of disaster-related data collection are crucial to improving both immediate relief efforts and long-term recovery plans. A detailed Post-Disaster Needs Assessment (PDNA) should be conducted promptly after disasters to guide resource allocation and evidence-based recovery planning.

1. **Effective Risk Communication:** Despite early warnings, the message couldn't reach the most vulnerable communities, and the priority of risk wasn't effectively communicated. Therefore, an effective risk communication plan should use a multi-channel approach (radio, mobile alerts, community leaders), ensure messaging is in local languages, and focus on reaching remote areas. Clear, actionable instructions should be provided, and regular drills should be conducted to reinforce preparedness.

2. **Strengthen Early Warning Systems:**
   Develop and expand localized early warning systems across all districts, ensuring real-time data collection and dissemination to provide timely alerts to communities at risk of floods, landslides, and earthquakes.

3. **Enhance Disaster Preparedness and Response:**
   Conduct regular drills, training, and capacity-building programs for local authorities, law enforcement, rescue teams, and the general public. Incorporate lessons learned from past disasters into future preparedness plans.

4. **Infrastructure Resilience:**
   Invest in disaster-resilient infrastructure, including roads, bridges, and communication systems, especially in vulnerable districts. Retrofit existing infrastructure in high-risk zones to withstand extreme weather events.

5. **Increase Coordination Among Agencies:**
   Improve coordination among government agencies, local authorities, and humanitarian organizations by establishing a centralized command system. This will streamline communication and resource allocation, reducing redundancies during disaster responses.

6. **Strengthen Community-Based Disaster Management:**
   Empower local communities through disaster preparedness awareness programs, first aid training, and the formation of disaster response committees. Localized responses can significantly reduce casualties and improve disaster resilience.

7. **Comprehensive Risk Mapping and Vulnerability Assessments:**
   Conduct thorough risk assessments and update hazard maps regularly to highlight areas prone to natural disasters. These maps will guide the planning and prioritization of interventions for high-risk zones.

8. **Sustainable Recovery and Reconstruction:**
   In post-disaster recovery, adopt sustainable, climate-resilient practices and use environmentally friendly materials in reconstruction efforts. This will ensure long-term resilience and reduce future disaster impacts.

9. **Psychosocial Support Services:**
   Provide psychosocial and trauma care services to affected individuals, prioritizing districts with high casualties. Mental health support is crucial for families who have suffered loss or significant life disruptions.

10. **Standardized Reporting for Disaster Loss and Damage:**
    Establish a standardized reporting template to ensure consistency in disaster-related data from various ministries and line agencies. This will streamline post-disaster assessments and improve the efficiency of managing relief and recovery efforts.

11. **Post-Disaster Needs Assessment (PDNA):**
    Conduct a comprehensive Post-Disaster Needs Assessment (PDNA) immediately after disasters to assess the physical, social, and economic impacts. This will enable evidence-based decision-making and better resource allocation during recovery efforts.