CLIMATE SERVICES USER FORUM

Climate Services for Transport: Nepal Experience

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RIMES

Outline of Presentation

- Climate Risks Faced by Transport Sector in Nepal
- Climate Service Approaches in Nepal
- DSS for Transport
- From Forecast to Action – Nepal Use Case
- Key Lessons
- Challenges and Way Forward

Climate Risks Faced by Transport Sector in Nepal

- Intense monsoon rainfall resulting road washouts, landslides, traffic disruption (mostly highways)
- Climate variability and extremes increasingly affect roads, mobility
- Seasonal uncertainty creating challenges in maintenance scheduling and budgeting
- Multiple road blockages recorded; continuous monitoring and clearance advisories.

/www.nationalheraldindia.com/national/landslides-flooding-block-main-highway-to-nepals-capital (July 2020) (Prithivi Highway)

Risk-informed, sector-specific climate advisories are the need

https://myrepublica.nagariknetwork.com/news/seven-highways-blocked-13-partially-operational-due-to-monsoon-rains-75-53.html (Aug 2025) (7highways blocked/damaged)

Climate Services Approach for Transport Sector

- Climate data and forecasts (weather, seasonal outlooks) through DHM
- Impact analysis (road exposure) - now mostly national highways
- Decision Support Systems (DSSs) –NAVIGATE for Transport,DOR gradually stepping into DSS enabling this translation of seasonal outlooks into sector decisions; DOR using for road closure data inputs and other features
- Transport Sector advisories and planning support - through DSSs in testing phase;
- User feedback and refinement – need to be initiated; not in practice

This should be the co-production with line agencies and a focus on usable information, not just forecasts.

Climate information triggered decisions

Climate Information/DHM Forecast Source	Advisory / Action Taken	Outcome	Date	DHM Forecast / Bulletin Linkage
Heavy rainfall forecast, landslide risk warnings (DHM Daily Weather Forecast + Hazard Advisory Bulletins)	Closure/disruption of major highways (BP Highway, Araniko Highway, Narayanghat–Muglin, etc.)	Temporary cutoff of Kathmandu Valley road connectivity; emergency clearance operations	5 Oct 2025	DHM Daily Weather Forecast Bulletin + 24–72 hr Heavy Rainfall Warning / Landslide Risk Bulletin
Continuous heavy rainfall forecast (Monsoon Special Weather Bulletins by DHM)	Government issued travel restrictions; advised against long-distance travel; vehicle holding in safe zones	Reduced exposure of travelers; coordinated emergency response	Oct 2025 (monsoon extreme rainfall period)	DHM Monsoon Special Weather Bulletin + Impact-based Heavy Rainfall Warning (IBF-style advisory outputs)
Localized intense rainfall and runoff risk (DHM Nowcasting / Local Forecast Bulletins)	Ridi–Wamitaksar rural road completely blocked due to flooding and stream overflow	Local transport disruption; emergency clearance and rerouting	Aug 2025	DHM Short-range Nowcasting + District-level Rainfall Forecast Bulletin
Monsoon rainfall outlook + landslide susceptibility forecasts (DHM Seasonal Monsoon Outlook + Landslide Hazard Mapping inputs)	Multiple road blockages recorded; continuous monitoring and clearance advisories	~63 locations blocked; frequent national transport disruption	Monsoon 2025 (Jun–Sep 2025)	DHM Seasonal Monsoon Outlook Bulletin (DHM + M collaboration) + Landslide Risk Advisory Updates

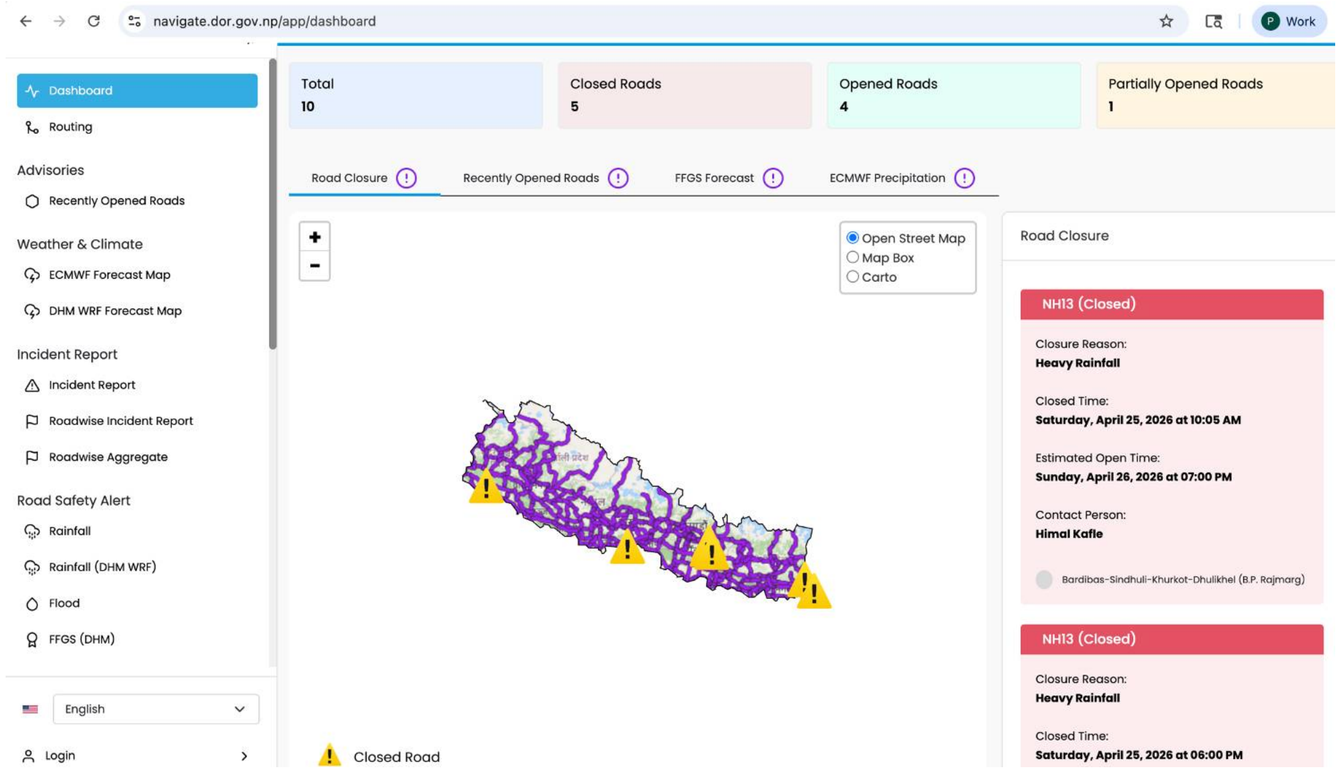
DSS for Transport: NAVIGATE

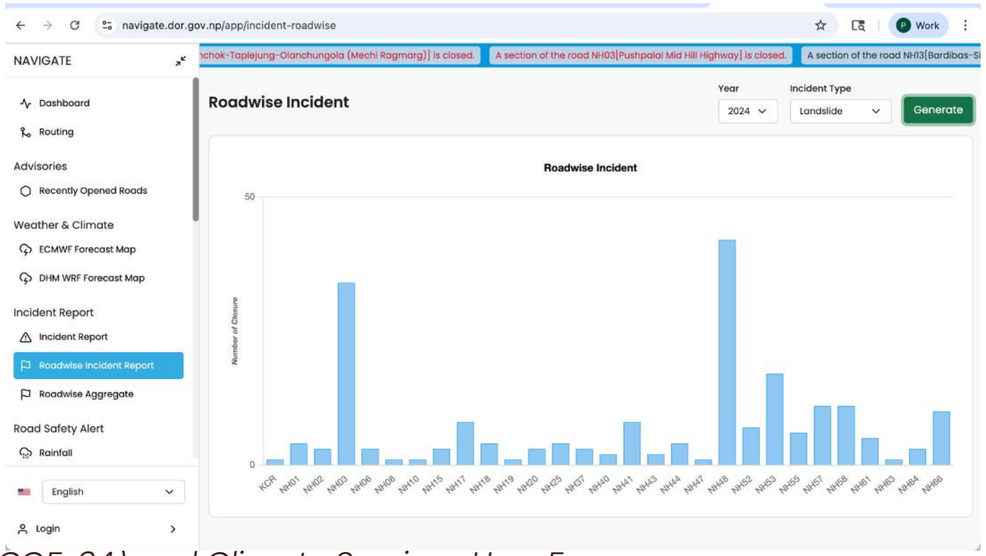
What NAVIGATE supports

- Climate risk insights for road assets and maintenance planning
- Climate-Informed Road Planning and Management

- Use of rainfall, extreme event (floods, landslides), and exposure (road network) analysis
- Evidence-based prioritization of maintenance and preparedness actions
- Key Features: Forecast Maps; Incident report; Road and Bridge closure data; road safety alerts (flood, landslide, rainfall)

https://navigate.dor.gov.np/
https://dor.gov.np/home/page/navigate



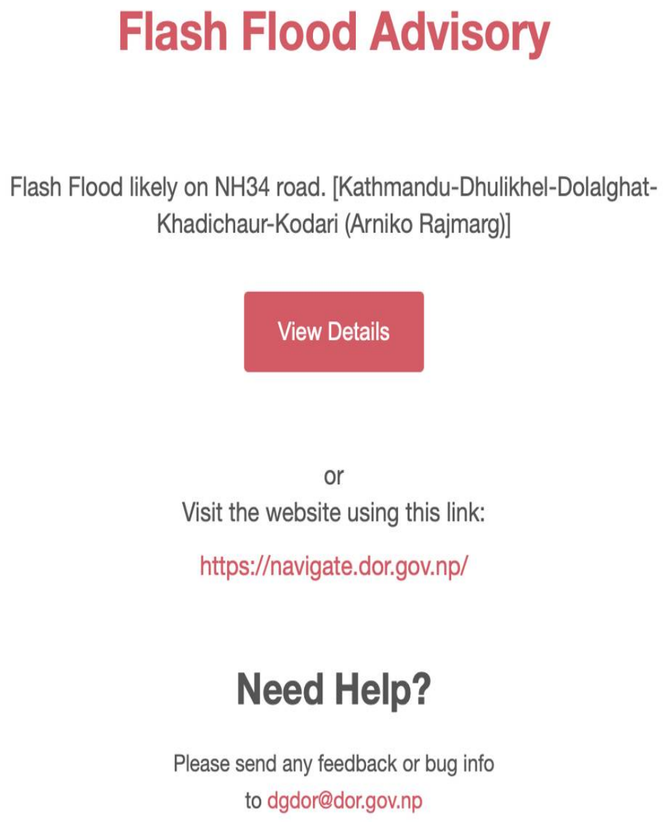


From Forecast to Action: Nepal Use Case

Above-normal rainfall outlook

- NAVIGATE DSS → high-risk road sections flagged and alerted (emails too)
- For preventive maintenance and preparedness , also linking to disaster risk reduction and management

Climate services enable *anticipatory action*



Potential for Climate service :

- Seasonal and sub-seasonal information for operational planning
- Safer, more resilient transport infrastructure
- Disaster Risk Reduction in Transport sector (NDRRMA started informing through Bipad portal – inputs data from NAVIGATE on road closure

Key Lessons

- Strong engagement of sector agencies: Transport (through DOR), Disaster (through NDRRMA) with DHM
- DSS helped to make climate information visual, actionable, and relevant (piloted in few areas; requests for scaling up in other areas of Nepal)
- Capacity building supported in improving interpretation of probabilistic forecasts. (upon DOR's request – post-project , DOR's own fund – trainings for regional staffs conducted)
- Government ownership is key for operation, sustainability and scaling up – DOR started using DSS since October 2025, officially in all offices for data entry

Challenges & Way Forward

Challenges

- Need for more localized climate information
- Sustaining DSS operations beyond project support
- Institutionalizing use in DOR's planning
- SOP for advisory generation , validation and dissemination

Way forward

- Strengthen producer–user co-production (DHM and DOR, and MOPID)
- Integrate DSSs into transport sector planning workflows
- Expand application to anticipatory action & IBF

Climate services are most effective when forecasts are translated into sector-specific decisions, supported by operational DSSs and strong user engagement. Therefore, co-operation and collaboration between governments (federal, provincial, local and sectoral) plays important role for this.

SOUTH ASIA HYDROMET FORUM

Regional Integrated Multi-Hazard Early Warning System RIMES

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