REPORT ON
POST DISASTER NEEDS ASSESSMENT
HIMACHAL PRADESH
MONSOON – 2025
FLOODS, CLOUDBURSTS & LANDSLIDES

POST DISASTER NEEDS ASSESSMENT
2025

The Crossroads: Rebuild the Past or Construct the Future?

HIMACHAL PRADESH

ACKNOWLEDGEMENT

The Government of Himachal Pradesh and the Himachal Pradesh State Disaster Management Authority (HPSDMA) gratefully acknowledge the invaluable guidance, technical support, and collaboration extended by the National Disaster Management Authority (NDMA) in undertaking this Post Disaster Needs Assessment (PDNA) for the Monsoon 2025 disasters.

We express our deep appreciation to the sectoral experts nominated by NDMA, those engaged by the State Government, and the dedicated officers and officials of various State Government departments for their rigorous efforts in data collection, field assessments, and analysis. Our sincere thanks also go to the district administrations, field staff, and all stakeholders whose concerted efforts made this comprehensive assessment possible.

This collaborative exercise aims to formulate a resilient recovery strategy, integrating the principles of ‘Build Back Better’ for the sustainable reconstruction of Himachal Pradesh.

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EXECUTIVE SUMMARY

Post Disaster Needs Assessment 2025 Himachal Pradesh

Himachal Pradesh occupies a fragile and spectacular portion of the north-western Himalaya. Its steep slopes, complex geology and wide altitudinal range create a mosaic of microclimates and ecosystems that sustain agriculture, hydropower, tourism and forest-based livelihoods. Those same physical attributes, however, make the state exceptionally exposed to a suite of interacting natural hazards: intense convective rainfall and cloudbursts, rapid riverine floods, slope failures and landslides, glacial lake outburst floods and seismic shaking along active thrust systems. A new pattern of climate change induced disasters have erupted since 2018, followed by 2023, and then 2025. The monsoon of 2025 did not merely test existing vulnerabilities; it revealed a new, harsher reality in which climate signals and long-standing geophysical risks combine to produce cascading, systemic impacts across communities, infrastructure and the economy.

Between June and September 2025, the state experienced an extended and highly erratic monsoon. District-level rainfall departures were extreme: some districts recorded rainfall many tens of percent above long-term normals, and August 2025 alone produced exceptionally concentrated downpours that triggered rapid onset flash floods and widespread slope failures. The human toll was severe: **468 lives lost** and approximately **2,700 livestock** perished. The physical footprint of damage was extensive and multi-sectoral — roads and bridges were washed away or rendered unsafe, water supply intakes and treatment works were damaged or contaminated, power distribution networks were disrupted, and public buildings including schools and health centres suffered structural and non-structural losses. The disaster also inflicted deep economic pain: markets and supply chains were interrupted, horticultural and agricultural production suffered immediate losses, and tourism and small businesses faced prolonged revenue shortfalls.

This PDNA was commissioned by the Government of Himachal Pradesh and conducted as a state-led, NDMA-supported exercise between 17 September and 30 November 2025. The assessment was designed to move beyond rapid damage tallies to a validated, sectoral recovery plan that embodies the principle of Build Back Better. It combined a large-scale field data collection effort with expert technical review. For the first time the state's Disaster Management Information System (DMIS) was deployed at scale: over **62,000 validated damage entries** were recorded and processed, supported by complementary tools such as KoboCollect and spreadsheet-based validation where gaps were identified. Sector teams visited the most affected districts for field verification and community consultations, and departmental inventories were reconciled with remote sensing and engineering judgment to produce the PDNA's consolidated findings.

The assessment follows a clear analytical logic. It distinguishes **direct damages** — the cost of replacing or repairing physical assets — from **economic losses** — the decline in flows and services such as lost agricultural output, interrupted health and education services, and foregone tourism revenue. It then translates those quantified impacts into a prioritized recovery and resilience agenda that spans immediate restoration, medium-term reconstruction and longer-term risk reduction investments. Where departmental inventories were incomplete, the PDNA applied statistically robust extrapolation and engineering unit rates; where uncertainty remains, conservative contingencies have been included, and further refinement is recommended during detailed design.

Key systemic drivers emerged from the analysis. First, the hazard environment itself is changing: shorter monsoon spells with higher intensity, glacier retreat and permafrost thaw in high altitudes, and an increased incidence of cloudbursts and localized flash floods. Second, exposure has grown through infrastructure expansion and settlement patterns that place lifelines and communities in hazard-prone corridors. Third, institutional and technical gaps amplified impacts: early warning systems are fragmented across agencies, last-mile alerting is inconsistent, and risk information such as high-resolution multi-hazard atlases is outdated. Finally, community preparedness and local response capacity — while heroic in many instances — were overwhelmed by the scale and simultaneity of events, revealing the need for systematic capacity building and community-based preparedness.

The human and economic consequences of these drivers are reflected in the PDNA's headline figures. The state's preliminary damage inventory and sectoral costing indicate **direct damages in the order of several thousand crore rupees**, with concentrated losses in transport corridors, water and sanitation systems, social infrastructure and productive assets. Beyond the immediate price tag, the PDNA highlights cascading socio-economic effects: interrupted health services and school closures that affect human capital; damaged irrigation and orchards that depress incomes for farming households; and severed connectivity that delays relief and constrains market access. Forests and catchment systems — which provide critical natural protection against runoff and slope failure — were also degraded in many places, reducing the landscape's buffering capacity and increasing future risk.

The PDNA process itself surfaced important institutional lessons. The DMIS proved a powerful platform for aggregating granular field data, but data completeness and standardization require further strengthening. Rapid mobilization of sector experts delivered timely technical inputs, yet the condensed timeline limited the depth of some specialized analyses, underscoring the need for pre-positioned expert rosters and clearer protocols for future assessments. The exercise also demonstrated the value of multi-stakeholder validation: district administrations, line departments, academic institutions and community representatives contributed to a shared evidence base that will be essential for coordinated implementation.

From a strategic perspective the PDNA reframes recovery as an opportunity to reduce future losses and to align reconstruction with climate adaptation. The assessment recommends a recovery pathway that is not simply restorative but transformative: prioritize restoration of critical access and lifelines; retrofit and rebuild social infrastructure to hazard-resilient standards; invest in an integrated, multi-hazard early warning backbone with robust last-mile delivery; restore and enhance watershed and forest systems as nature-based defenses; and deploy targeted livelihood support and risk transfer mechanisms to protect vulnerable households. Central to this pathway is the establishment of a State Recovery and Resilience Program with a dedicated program management office to coordinate financing, technical design and district-level implementation.

In sum, the PDNA 2025 documents a disaster of unprecedented scale for Himachal Pradesh and provides a rigorous, evidence-based roadmap for recovery. The findings make clear that immediate life-saving and restoration actions must be paired with medium-term reconstruction that embeds resilience and climate proofing. Doing so will require predictable multi-year financing, strengthened institutional coordination across state and central agencies, and sustained engagement with communities whose knowledge and capacities are indispensable to effective, equitable recovery. The remainder of the PDNA translates these priorities into sectoral needs, costed interventions and an implementation sequencing designed to restore services, revive livelihoods and reduce the state's exposure to future shocks.

Summary of Damages, Losses, Recovery Cost with BBB, and Economic Impact:

Sector	Sub-Sector	Damages	Losses	R&R + BBB	Total Economic Impact
Social	**Housing**	1,146.75	67.53	1,171.96	2,386.24
	Education	568.89	0.36	652.02	1,221.27
	Health	302.81	41.63	378.51	722.95
	Common Asset: AWCS	6.73		10.07	16.80
	Common Asset: RD	211.83	27.38	243.37	482.58
	Sub-Total	**2,237.01**	**136.90**	**2,455.93**	**4,829.84**
Infrastructure	Roads	1,838.56	34.47	2,284.03	4,157.06
	Water Supply	849.99	407.36	934.98	2,192.33
	Power	230.13	543.06	582.23	1,355.42
	Sub-Total	**2,918.68**	**984.89**	**3,801.24**	**7,704.81**
Productive	Agriculture	379.72	204.33	452.92	1,036.97
	Horticulture	87.72	151.32	473.95	712.99
	Animal Husbandry	3.61	3.15	16.02	22.78
	Fisheries	8.59	11.34	17.00	36.93
	Tourism Sector	58.98	3.71	87.08	149.77
	Forestry	420.81		706.78	1,127.59
	Sub-Total	**959.43**	**373.85**	**1,753.75**	**3,087.03**
Cross Cutting	DRR			770.00	770.00
	Environment, CC & Biodiversity			1,450.00	1,450.00
	Sub-Total	**-**	**-**	**2,220.00**	**2,220.00**
all figures in crores					
	GRAND TOTAL	**6,115.12**	**1,495.64**	**10,230.92**	**17,841.68**

Social Sector: A State Uprooted

The monsoon of 2025 will be etched in the memory of Himachal Pradesh as a season of profound loss and upheaval. Unprecedented rainfall, triggering catastrophic flash floods, landslides, and land subsidence, ripped through all twelve districts, leaving communities shattered and landscapes scarred. Beyond the immediate destruction of homes and infrastructure, the disaster exposed deep-seated vulnerabilities in settlement patterns, construction practices, and systemic preparedness. This Post-Disaster Needs Assessment for the Social Sector captures the scale of the devastation and charts a necessary course for recovery—one that must transcend mere rebuilding to foster a more resilient, equitable, and sustainable future for the people of Himachal Pradesh. The path forward is not simply about replacing what was lost, but about building back with greater wisdom, safety, and community spirit.

1. The Sheltering Crisis: Housing Sector in Distress

The most visible and deeply personal impact of the disaster is the widespread damage to housing. A total of 7,625 homes—from *pucca* structures to *kutcha* dwellings—were damaged, with 1,739 completely destroyed. This represents not just a loss of property, but a rupture in the lives of thousands of families who have been displaced, their sense of security swept away with the floodwaters.

The Financial and Human Toll: The physical destruction of houses, cattle sheds, and related structures amounts to a staggering ₹1,146.75 crore in damages. Compounding this are the immediate economic losses—families forced into rental accommodations, the loss of personal belongings, wages forgone during the crisis, and the immense cost of clearing debris—which together add ₹67.53 crore to the toll. The total quantifiable impact on housing alone exceeds ₹1,214 crore.

Underlying Vulnerabilities Exposed: The disaster laid bare critical systemic flaws. Field assessments revealed that much of the newer construction, often built by migrant labour without adherence to seismic codes, lacked essential safety features. Many houses were perilously perched on unstable slopes or within floodplains, violating basic principles of safe siting. Compounding this is the rapid erosion of traditional, resilient construction knowledge, such as the *Kath Kuni* technique, which inherently offers better earthquake resistance.

A New Blueprint for Recovery: Recovery in the housing sector, estimated to cost ₹1,172 crore, must be foundational and transformative. The approach must be **owner-driven**, empowering affected families with direct financial assistance and robust **techno-managerial support** to be delivered through proposed **Nirmithi Kendras** in every district. Reconstruction must be preceded by **scientific slope stability studies**; rebuilding on unsafe ground is a recipe for repeated tragedy. The promotion of **confined masonry** and the revitalisation of vernacular architectures using local stone and timber will be key to building homes that are not only safer but also culturally resonant and economically sustainable.

2. Education Interrupted: Safeguarding the Future

The floods and landslides struck at the very heart of Himachal's future—its education system. Damage to 1,664 schools and government colleges disrupted the learning of tens of thousands of children. Of these, 196 institutions were totally damaged, rendering them unusable and severing a critical community lifeline, along with 400+ students having dropped out of schools.

Beyond Classroom Walls: The damage, valued at ₹568.89 crore, extends beyond classrooms. The destruction of toilets, water sources, kitchen sheds, and digital infrastructure has rolled back years of progress on inclusion, health, and modern learning. The interruption of the Mid-Day Meal programme threatened nutritional security, a key incentive for school attendance. While temporary learning spaces were arranged, the loss of over a month of instructional time and the trauma of displacement pose significant risks of increased dropout rates, particularly among adolescent girls and children from economically vulnerable households.

Building Back Smarter Schools: The recovery need for the education sector is estimated at ₹652.02 crore. This investment must be used to **Build Back Better**. Every reconstructed school must be a model of multi-hazard resilience, incorporating seismic-safe design, improved drainage, and elevated foundations where necessary. The restoration of **WASH facilities** and **digital connectivity** is non-negotiable for dignity and 21st-century learning. Furthermore, recovery presents an opportunity to address pre-existing gaps, ensuring new structures are universally accessible and serve as safer, more inspiring environments for learning and community cohesion.

3. Healthcare Under Strain: A System in Recovery

When disasters strike, a robust health system becomes the frontline of response. The 2025 events severely tested this frontline in Himachal Pradesh, damaging 242 health facilities. While tertiary hospitals remained largely operational, the most significant damage was absorbed by the network of Sub-Centres and Primary Health Centres (PHCs)—the essential first points of care for remote and rural communities.

Damage to the Primary Care Backbone: With damages estimated at **₹302.81 crore**, the physical destruction is extensive. This is compounded by economic losses of **₹41.63 crore** stemming from service disruption—outpatient services halted, emergency referrals skyrocketed, perishable medicines were ruined, and staff were stretched to their limits. This disruption exacerbated health risks for populations already burdened by the trauma of the disaster and the loss of their homes.

Prioritising Resilient Health Infrastructure: The **₹378.51 crore recovery plan** must prioritise the swift restoration of primary healthcare access. Totally damaged facilities require complete reconstruction, while partially damaged ones need retrofitting—all integrating disaster-resilient features. These include solar-powered energy backup to ensure functionality during outages, improved water management and sanitation systems, and inclusive design for persons with disabilities. Strengthening this primary healthcare shield is critical not only for day-to-day well-being but also for the state's capacity to respond to future emergencies.

4. The Social Fabric: Erosion of Community Assets

The disaster's impact extended into the very spaces that bind communities together: the **Anganwadi centres** and **rural public infrastructure**. These assets, often humble in scale, play an outsized role in social protection, local governance, and economic vitality.

Anganwadis - A Broken Safety Net: Of 143 Anganwadis assessed, 135 were damaged. These centres are not just buildings; they are hubs for nutrition, early childhood development, and maternal health support. Their damage, valued at ₹6.73 crore, represents a direct threat to the well-being of the state's most vulnerable—young children and pregnant women. Recovery (estimated at ₹10.07 crore) must swiftly restore these services, ensuring new structures are safe, hygienic, and equipped to support their critical mandate.

Rural Connectivity and Governance: The rural development sector suffered extensive damage: nearly 5,000 km of internal roads were compromised, over 800 street lights were knocked out, and 654 community buildings like *Panchayat Ghars* were damaged. With damages of ₹211.83 crore and losses of ₹27.38 crore due to disrupted access and services, the isolation of villages was sharply intensified. The estimated ₹243.37 crore for recovery must focus on reconnecting habitations with resilient roads, restoring public lighting for safety, and rebuilding community halls that serve as centres for governance, gatherings, and disaster response.

5. Cross-Cutting Impacts: The Human and Environmental Cost

The disaster's ripple effects touch every aspect of life in Himachal Pradesh. **Livelihoods** have been devastated, with farmers, shopkeepers, and daily wage labourers losing their means of income. Many households are now grappling with existing loans taken for horticulture or other activities, creating a cycle of debt. **Vulnerable groups**—widows, the elderly, persons with disabilities, and women-headed households—face compounded hardships, with limited resources to recover.

The environmental footprint is massive, with an estimated 3.55 lakh cubic metres of debris generated. Managing this debris presents a challenge but also an opportunity to **recycle and reuse** material in reconstruction, reducing both costs and environmental harm. The surge in demand for construction materials and skilled labour also threatens to inflate costs and delay other development projects, requiring careful state-level planning and resource management.

6. The Road to Resilience: Guiding Principles for Recovery

The recovery of Himachal Pradesh's social sector must be guided by a clear, principled framework that learns from the past to secure the future.

Build Back Better (BBB) as the Non-Negotiable Standard: Every reconstructed home, school, and clinic must integrate resilience against earthquakes, landslides, and floods. This mandates the use of **scientifically vetted designs**, **confined masonry**, and **local materials**.

Community at the Core: Recovery must be **owner-driven and participatory**. Involving communities in site selection, design, and monitoring through mechanisms like **Nirmithi Kendras** and **Women's Self-Help Groups (SHGs)** ensures ownership, quality, and speeds up implementation.

Science-Based Risk Reduction: No reconstruction should begin without slope stability assessment. The state must invest in detailed hazard zonation, declare **no-construction zones** in floodplains and high-risk slopes, and enforce building codes rigorously beyond urban limits.

Investing in Capacity and Awareness: A massive statewide campaign is needed to **train local masons, engineers, and contractors** in resilient techniques. Simultaneously, **public awareness campaigns** must educate citizens on the dangers of unsafe construction and the benefits of compliance.

Innovative and Inclusive Financing: Given the scale of need, financing must be a blend of government grants, soft loans, and insurance products. Special provisions, such as **revolving funds** and **subsidised premiums** for the most vulnerable, are essential to ensure no one is left behind.

Forging a Safer, Stronger Himachal

The 2025 disaster is a painful turning point for Himachal Pradesh. The scale of loss in the social sector—homes, schools, hospitals, and community spaces—is a stark reminder of the power of nature and the cost of unmitigated risk. The recovery journey ahead is arduous and will require sustained commitment, significant resources, and unprecedented collaboration between the state, communities, and development partners.

However, within this challenge lies a transformative opportunity. By choosing the path of resilient, inclusive, and green reconstruction, Himachal Pradesh can emerge from this tragedy not merely restored, but stronger and safer. This executive summary and the detailed assessment that follows provide the blueprint for that journey—a journey towards a future where communities are not just rebuilt, but are truly resilient.

Social Sector: Summary of Damages, Losses & Recovery Needs

Sector	Damages (₹ Crore)	Losses (₹ Crore)	Recovery Needs (₹ Crore)	Key Focus of Recovery
Housing	1,146.75	67.53	1,171.96	Owner-driven reconstruction, slope stabilization, use of local materials & confined masonry, technical support via Nirmithi Kendras.
Education	568.89	0.36	652.02	Rebuild schools with BBB principles, restore WASH/digital infrastructure, ensure seismic safety.
Health	50.17	41.63	46.83	Prioritize PHC/Sub-Centre reconstruction, integrate resilience features (solar, drainage, accessibility).
Public Assets				
· Anganwadi (ICDS)	6.73	-	10.07	Restore nutrition & childcare services, rebuild infrastructure with WASH facilities.
· Rural Infrastructure	211.83	27.38	243.37	Reconnect villages via roads, restore community buildings & street lighting for safety and governance.
Social Sector Total	1,984.37	136.90	2,124.25	Holistic, resilient recovery prioritizing vulnerable groups and community participation.

Note: Figures are rounded. Losses refer to economic impacts (service disruption, livelihood loss, etc.), while Damages represent the cost of physical destruction. Recovery Needs are estimated for Build Back Better reconstruction.

Infrastructure Sector: The Monsoon Mayhem

The unprecedented monsoon of 2025 left Himachal Pradesh's critical infrastructure in a state of severe distress. Widespread flash floods, cloudbursts, and landslides severed vital lifelines, isolating communities, crippling the economy, and disrupting essential services. This assessment for the Infrastructure Sector—encompassing Roads & Bridges, Water Supply & Sanitation, and Power & Electricity—quantifies the profound damage and charts a course for resilient reconstruction. The overarching finding is that while the physical damage is immense, estimated at nearly ₹2,919 crore, the true cost includes staggering economic losses approaching ₹985 crore. A recovery investment of approximately ₹3,801 crore, guided by the **Build Back Better (BBB)** principle, is imperative not merely to restore, but to reimagine a more resilient infrastructure network capable of withstanding future climate shocks.

1. Roads & Bridges: The Shattered Lifelines

The road network, the veritable arteries of this mountainous state, sustained the most visible and debilitating damage. The calamity transformed crucial corridors into scenes of destruction, with pavements washed away, bridges rendered useless, and hillsides slumped onto roadways. This sector, managed by the Public Works Department (PWD), faced a catastrophic blow that extended far beyond physical assets, striking at the heart of the state's socio-economic well-being.

Scope: This assessment covers State-managed Major District Roads (MDRs) and Village Roads, including their associated bridges and cross-drainage structures. National Highways, managed by the Central Government, are excluded.

Impact Analysis: The damage was both extensive and severe. Key tourist routes, access paths to border areas, and farm-to-market links were destroyed. The iconic Manimahesh Yatra was disrupted, and the state's economic backbone—the apple belt—was cut off during a critical harvest period. The socio-economic ripple effects were immediate: farmers faced spoilage of perishable goods, patients were stranded without access to hospitals, and students lost access to schools. The data reveals a grim picture:

Physical Extent: Over **12,000 individual road stretches** and **180 bridges** were reported damaged.

Severity: A significant portion of assets were completely destroyed, necessitating full reconstruction rather than repair.

Damage, Loss & Recovery Needs for Roads & Bridges:

Component	Damage (₹ Crore)	Losses (₹ Crore)	Recovery & Reconstruction Need (₹ Crore)
Roads & Bridges Sector	**1,838.56**	**34.47** (Muck clearance, temp access)	**2,284.03** (Includes BBB)

Pathway to Recovery & Build Back Better: The reconstruction philosophy must pivot from simple restoration to intelligent resilience. The proposed strategy includes replacing vulnerable **Hume pipe culverts** with more robust **slab/box culverts**, and converting frequently flooded **causeways into high-level bridges**. Slope stabilization will combine structural measures (retaining walls) with bio-engineering solutions (vetiver grass, geo-cells). Crucially, institutional strengthening through the establishment of a **Resilient Infrastructure Design Cell (RIDC)** and the adoption of a **Road Asset Management System (RAMS)** with GIS integration is recommended for future-proof planning and maintenance.

2. Water Supply, Irrigation & Sewerage (WASH): A Crisis of Basic Services

The deluge devastated the state's water security, damaging systems from source to tap. The Jal Shakti Vibhag reported widespread destruction of intake structures, thousands of kilometres of pipelines, and critical treatment facilities. This triggered a dual crisis: a dire shortage of safe drinking water and a collapse of irrigation, threatening both public health and agricultural livelihoods.

Impact Analysis: The damage to water infrastructure created an immediate humanitarian concern. Communities were forced to revert to unsafe, distant water sources, disproportionately burdening women and children. The contamination risk from damaged sewerage lines escalated the threat of waterborne disease outbreaks. In the agricultural sector, the destruction of irrigation channels and tanks placed the upcoming cropping season and the income of thousands of families in jeopardy.

Drinking Water: 1.45 lakh people lost all access to piped water, with an additional **12.95 lakh** experiencing severely disrupted supply.

Irrigation: Damage to **1,814 schemes** jeopardizes water for **139,009 hectares** of farmland.

Public Health: The loss of **122,000 KLD** of sewage treatment capacity poses significant environmental and health risks.

Damage, Loss & Recovery Needs for WASH Sector:

Sub-Sector	Damage (₹ Crore)	Estimated Economic Losses (₹ Crore)	Recovery Need with 10% BBB (₹ Crore)
Drinking Water	621.40		**683.54**
Irrigation	171.06	**407.36** (Total for WASH)	**188.16**
Sewerage	57.53		**63.28**
WASH Sector Total	**849.99**	**407.36**	**934.98**

Pathway to Recovery & Build Back Better: Recovery must prioritize the immediate restoration of water supply to the largest population centres. The **BBB** component will be directed towards **elevating pipeline routes** in flood-prone zones, using more **durable corrosion-resistant materials**, and constructing **reinforced intake structures**. For irrigation, the focus will be on **improved canal lining** and **strengthened diversion works**. A key recommendation is the integration of **nature-based solutions**, such as riparian buffer zones, for sustainable watershed management and source protection.

3. Power & Electricity Supply: The Darkened State

The collapse of the power distribution network, managed by HPSEBL, amplified the chaos triggered by the floods. Landslides and flash floods snapped lines, toppled poles, and inundated substations, leading to prolonged blackouts. In a state dependent on electricity for everything from household water pumping to running cold storages for its prized apple crop, the loss of power paralysed the final remnants of normalcy.

Impact Analysis: The economic impact of the power outage far exceeded the cost of repairing physical assets. The apple industry, a cornerstone of the economy, faced catastrophic post-harvest losses as cold storages failed. Tourism shut down, small industries halted operations, and healthcare facilities reliant on electrical equipment were severely compromised. The damage exposed the vulnerability of centralized distribution lines traversing unstable mountainous terrain.

Network Damage: Significant damage to **896 transformers**, **over 14,400 poles**, and **~6,400 km** of distribution lines.

Economic Multiplier: The sectoral revenue loss of ₹50.52 crore spiralled into a broader economic loss estimated at **₹543.06 crore**, highlighting the power sector's multiplier effect on the state's economy.

Damage, Loss & Recovery Needs for Power Sector:

Component	Damage (₹ Crore)	Total Economic Losses (₹ Crore)	Restoration Cost (₹ Crore)	Additional for BBB Need (₹ Crore)
Power & Electricity	230.13	543.06	264.65	317.58

Therefore, total Recovery cost is: 582.23 crores.

Pathway to Recovery & Build Back Better:

The recovery strategy underscores a paradigm shift towards **decentralization and resilience**. While immediate measures involve repairing lines and substations, the **BBB** vision is to reduce dependence on vulnerable long-distance transmission lines. This involves:

Relocating infrastructure to geologically stable areas.

Promoting decentralized solar microgrids with battery storage for critical facilities like hospitals, water pumping stations, and communication hubs.

Hardening the grid through underground cabling in critical sections and using drone-based surveillance for maintenance.

Integrating smart grid technologies for faster fault detection and isolation.

Cross-Cutting Principles for Resilient Reconstruction

The reconstruction of all infrastructure sub-sectors must be governed by a unified set of principles to ensure coherence and long-term resilience:

Risk-Informed Planning: All projects must be based on updated **multi-hazard risk maps** (landslide, flood, seismic) and future climate projections. No reconstruction should replicate vulnerabilities.

Institutional Capacity Building: Mandatory creation of specialized cells (like the RIDC), partnerships with technical institutions (IITs, NIDM), and continuous training for engineers on resilient design.

Community-Centric Approach: Infrastructure must be rebuilt with, and for, the community. This includes participatory monitoring, grievance redressal mechanisms, and designs that reflect local needs.

Environmental Integration: Mandate the use of **nature-based solutions** (bio-engineering, watershed management) alongside grey infrastructure and enforce strict protocols for sustainable material sourcing and muck disposal.

Financial Sustainability & Innovation: Leverage funding from SDRF, NDRF, central schemes (JJM, PMGSY), and explore green bonds or climate finance. Promote innovative contracts like performance-based maintenance.

Forging a Resilient Future

The 2025 disaster is a stark warning. The Infrastructure Sector assessment reveals a system pushed to its breaking point. The proposed recovery is more than a rebuilding budget; it is a blueprint for transformation. By investing **₹3,484 crore** through a **Build Back Better** lens—prioritizing risk-informed design, decentralised systems (especially in power and water), and robust institutions—Himachal Pradesh can convert this catastrophe into a catalyst. The goal is clear: to emerge not just restored, but stronger, smarter, and infinitely more resilient, ensuring that its infrastructure can safeguard its people and prosperity against the challenges of a changing climate.

Infrastructure Sector: Consolidated Summary of Damages, Losses & Recovery Needs

Department / Sub-Sector	Damage (₹ Crore)	Losses (₹ Crore)	Recovery & Reconstruction Need (₹ Crore)
Roads & Bridges (PWD)	1,838.56	34.47	2,284.03
Water Supply, Irrigation & Sewerage (Jal Shakti Vibhag)	849.99	407.36	934.98
Power & Electricity (HPSEBL)	230.13	543.06	582.23*
Infrastructure Sector GRAND TOTAL	**2,918.68**	**984.89**	**3,801.24**

Note: *The Recovery Need for the Power Sector is the sum of the immediate Recovery Need (₹264.65 Cr) and the additional Build Back Better requirement (₹317.58 Cr), reflecting the total investment needed for a resilient rebuild.

This table provides a high-level financial overview of the immediate impact and the resources required for recovery and resilient reconstruction across the core infrastructure networks of Himachal Pradesh.

Comprehensive Assessment of the Productive Sector

The 2025 monsoon triggered catastrophic floods and landslides across Himachal Pradesh, delivering a profound shock to the state's productive economy. This sector, encompassing agriculture, horticulture, animal husbandry, fisheries, tourism, and forestry, forms the bedrock of rural livelihoods, employment, and regional economic stability. The disaster resulted in **total recorded damages and losses of approximately ₹90,247 lakhs**, exposing systemic vulnerabilities in climate-sensitive, hill-based production systems. The impact extended beyond immediate asset loss, disrupting multi-year income streams, degrading natural capital, and threatening food security. Consequently, the recovery strategy, requiring an estimated **₹104,698 lakhs**, is designed not merely to restore the status quo but to implement a transformative 'Build Back Better' framework. This approach integrates immediate stabilization with medium-term modernization and long-term transition towards climate-resilient, diversified, and high-value economic activities.

Agriculture: Foundations Undermined by Land Degradation

The agriculture sector, employing approximately 54% of the state's workforce and contributing significantly to household food security, was the most severely affected in absolute terms. Damages and losses are estimated at **₹58,404.17 lakhs**, with a staggering **88% of the economic impact attributable to the physical loss and degradation of cultivable land**. Widespread terrace collapse, severe siltation, and the complete washing away of fields constituted a structural devastation of the primary productive asset.

The damage was concentrated in staple cereal belts, with maize and paddy accounting for the majority of crop and land value loss. This poses a direct threat to local food availability. Concurrently, high-value commercial crops like cauliflower, tomato, and peas, while occupying smaller areas, suffered acute financial losses, crippling a critical source of cash income for mid-hill farmers. The disaster has effectively interrupted the agricultural cycle for at least one to two years, pushing small and marginal farmers—who constitute over 88% of landholders—into severe income insecurity and debt distress. The recovery plan, valued at **₹45,291.78 lakhs**, prioritizes large-scale land rehabilitation through desilting and terrace reconstruction, the promotion of short-duration and flood-tolerant crop varieties, and the strengthening of input subsidies, micro-irrigation, and crop insurance to stabilize farmer incomes and rebuild productive capacity.

Horticulture: Perennial Losses and Long-Term Vulnerability

Horticulture, the economic linchpin for over three lakh households, suffered deep, multi-year damage. Total damages and losses reached **₹23,904.10 lakhs**. The sector experienced the uprooting and severe damage of perennial fruit trees across **7,874 hectares**, with apple orchards alone constituting 68% of the affected area. The loss of mature trees translates into a **3 to 7-year income gap** for orchardists, as replanted saplings require years to reach productive maturity.

Compounding the biological loss was extensive damage to supportive infrastructure, including polyhouses, irrigation systems, fencing, and packhouses. This dual shock has severely impacted the liquidity and debt-servicing capacity of farmers, especially small and marginal growers. A critical analysis reveals a high concentration of outstanding agricultural loans (KCC) in the worst-affected horticulture districts, creating a looming financial crisis. The **recovery outlay of ₹47,395.17 lakhs** is the largest among all sub-sectors, reflecting the high cost and long timeline of orchard renewal. Key interventions include financed replantation with climate-resilient varieties, reconstruction of protective infrastructure, urgent credit restructuring with moratoriums and interest subvention, and strategic investments in cold-chain and processing facilities to strengthen market linkages and reduce post-harvest losses.

Animal Husbandry: Erosion of Critical Livelihood Buffers

The livestock sector, which serves as a vital financial buffer and source of nutrition for rural families, incurred damages and losses of **₹676.04 lakhs**. The floods caused the death of **2,690 livestock units**, including cattle, goats, sheep, and poultry, and destroyed shelters, stored fodder, and grazing lands. This led to a immediate decline in milk production, distress sales of surviving animals, and increased exposure to disease.

The impact is particularly acute for smallholders, landless laborers, and women-led households who depend on livestock for daily sustenance and income. The sector was already undergoing a structural shift, with indigenous cattle populations declining sharply, partly due to recurrent climate shocks affecting grazing resources. The **recovery requirement of ₹1,602.24 lakhs** focuses on rapid restocking, emergency fodder provision, and the repair of veterinary infrastructure. Beyond immediate relief, the strategy advocates for a systemic shift towards cluster-based dairying models, the establishment of bulk milk chillers at the village level, and the development of multi-utility cold storage to enhance resilience against future supply chain disruptions.

Fisheries: Infrastructure Destruction in Cold-Water Aquaculture

The fisheries sector, particularly high-value trout farming, was devastated due to its infrastructure's location along vulnerable river stretches. Damages and losses totaled **₹1,992.94 lakhs**. Flash floods caused the breach of ponds and raceways, leading to a total stock loss of **224,801 kg** of fish, with trout accounting for the majority of the financial value. Critical hatcheries, feed storage units, and water supply systems were severely damaged or destroyed.

The disaster highlights the inherent climatic vulnerability of cold-water aquaculture in the state. Recovery, estimated at **₹1,700 lakhs**, must address both immediate and structural needs. Short-term actions include pond rehabilitation and restocking with fast-growing carp species to provide quick livelihood stabilization. Long-term measures involve rebuilding trout hatcheries with climate-resilient engineering, promoting cage culture in reservoirs, and integrating digital monitoring for early warning. Convergence with the Pradhan Mantri Matsya Sampada Yojana (PMMSY) is crucial for implementing this dual-track recovery.

Tourism: Crisis of Confidence and Connectivity

Tourism, a major contributor to the state's GSDP and a generator of widespread informal employment, faced a severe downturn. Reported damages and losses are **₹6,269.34 lakhs**, though under-reporting from private enterprises suggests a significantly higher actual impact. The disaster triggered a collapse in visitor arrivals during the peak season due to widespread road damage, landslides, and negative media coverage.

The economic fallout extended across hoteliers, homestay owners, taxi operators, guides, and artisans. The crisis exposed the risks of a volume-based tourism model concentrated in fragile ecologies and during hazardous monsoon months. The **recovery outlay of ₹8,708.39 lakhs** aims to restore critical infrastructure and tourist safety while strategically pivoting the sector. The plan emphasizes diversifying circuits, promoting value-based eco-tourism and agri-tourism, developing robust digital information systems, and enforcing stricter safety and building regulations in vulnerable zones to rebuild Himachal's brand as a safe and sustainable destination.

Forestry: Degradation of Ecological Capital and Habitat

The floods caused extensive damage to the state's forest ecosystems, with **582 sites across 11 districts** affected, totaling over **2,740 hectares**. The damage ranged from severe destruction of dense forests in Kinnaur and Shimla to the destabilization of riverbed ecosystems. Critically, **39 wildlife habitats** were impacted, including corridors for the endangered Snow Leopard and Ibex.

The loss of forest cover and soil integrity has long-term implications for slope stability, water regulation, and biodiversity. The direct cost for ecological restoration is pegged at **₹420.81 crores**. Applying the PDNA's integrated recovery framework, which includes add-ons for Climate Adaptation (12%) and Disaster Risk Reduction (8%), along with project overheads, the **total recovery need for the forestry sector is calculated at ₹706.78 crores**. This comprehensive package funds not just replantation but also climate-resilient species selection, slope bio-engineering, community-based DRR initiatives, and advanced monitoring systems, ensuring ecological recovery contributes directly to reducing future disaster risk.

Consolidated Financial Overview: Productive Sector Recovery

Sub-Sector	Damages & Losses (₹ in Lakhs)	Recovery Outlay (₹ in Lakhs)
Agriculture	58,404.17	45,291.78
Horticulture	23,904.10	47,395.17
Animal Husbandry	676.04	1,602.24
Fisheries	1,992.94	1,700.00
Tourism	6,269.34	8,708.39
Forestry	**42,081.19** (Direct Damages)	**70,678.43** (Comprehensive Recovery)
Forestry	**42,081.19** (Direct Damages)	**70,678.43** (Comprehensive Recovery)
Subtotal (round off)	**1333.28 crores / 133328 lakhs**	**1753.75 crores / 175375 lakhs**

Note: The Forestry sector recovery is calculated separately using a comprehensive environmental restoration methodology, including climate adaptation and DRR components. Its outlay is substantial, reflecting the scale of ecological damage and the integrated approach required for rehabilitation.

Strategic Way Forward and Cross-Cutting Enablers

The recovery plan is structured across three-time horizons: **Restore and Stabilize (0-12 months), Rebuild and Modernize (1-3 years), and Transform and Accelerate (3-5 years)**. Success hinges on several cross-cutting enablers:

Financial Security & Risk Transfer: Expanding insurance penetration for crops, orchards, and livestock, coupled with farmer-friendly credit restructuring and interest subvention.

Institutional Convergence: Seamlessly integrating resources from key state and central schemes (MGNREGA, PMKSY, MIDH, PMMSY, RKVY) to avoid duplication and maximize impact.

Climate-Resilient Infrastructure: Mandatory investment in slope stabilization, drainage management, watershed development, and disaster-resilient construction codes across all sectors.

Skill Development & Innovation: Training communities in new livelihood models (e.g., hydroponics, organic farming, value-added processing) and leveraging digital tools for market access and advisory services.

The ultimate objective is to guide Himachal Pradesh's productive sectors from a state of post-disaster fragility to a position of strengthened resilience, economic diversity, and sustainable growth, capable of withstanding future climatic shocks.

CROSS CUTTING SECTORS

Disaster Risk Reduction: Building the Foundation for Resilience

Himachal Pradesh's majestic mountains are the source of its beauty and its vulnerability. The Disaster Risk Reduction (DRR) sector is not a standalone initiative but the essential thread that must be woven into the very fabric of the state's development to ensure its long-term safety and sustainability. The catastrophic monsoon events of recent years—2018, 2023, and the devastating 2025 floods—serve as stark reminders that a changing climate is amplifying natural hazards, turning the state's complex topography into a rapidly evolving risk landscape.

The Strategic Shift: From Reactive Relief to Proactive Resilience

The scale of the 2025 disaster, with damages exceeding ₹10,000 crore, exposed critical gaps in the state's defensive systems. It underscored the urgent need to move beyond a cycle of damage and relief. The guiding vision is a fundamental paradigm shift towards **proactive, risk-informed governance**. This is embodied in an eight-pillar strategic framework for 2025–2028, designed not to reconstruct the past, but to **build a more resilient future**. These pillars range from updating hazard maps and integrating early warning systems to embedding DRR into all development planning and securing innovative financing.

Closing the Systemic Gaps: A Coordinated, Science-Based Approach

The path forward requires closing specific, identified gaps. This involves creating a unified, multi-hazard **Early Warning System (EWS)** that delivers actionable alerts to the last mile, and empowering communities to be first responders through training and school safety programs. Critically, it demands deep collaboration with key Government of India agencies:

- **GSI** will lead on landslide mapping and slope stabilization designs.
- **CWC** will provide basin-level flood forecasting and inundation maps.
- **IMD/IITM** will enhance cloudburst prediction and rainfall nowcasting.
- **ISRO** will offer satellite-based damage assessment and glacial lake monitoring.
- **MoEFCC** will streamline environmental safeguards for crucial riverbed management.

This coordinated, science-based approach is the cornerstone of transforming vulnerability into resilience.

Environment, Climate Change and Biodiversity: Securing the Ecological Lifeline

The state's environment is its most precious asset and its first line of defense. With 66% forest cover and being the source of major river systems, Himachal Pradesh is a critical ecological repository for the nation. However, the 2025 disaster highlighted a dire nexus: climate change is intensifying disasters, which in turn devastate the environment, creating a vicious cycle of escalating risk. The sector suffered catastrophic losses, including damage to over 5,000 hectares of forest land, which directly undermines water security, livelihoods, and natural protective barriers.

Integrating Green Recovery with Climate Adaptation

The recovery strategy, therefore, must be a **green recovery**. It recognizes that restoring ecosystems is a cost-effective resilience strategy. The framework focuses on:

Climate Change Adaptation: Supporting glacier monitoring, promoting climate-resilient crops, and planning relocations for communities threatened by Glacial Lake Outburst Floods (GLOFs).

Biodiversity Conservation: Strengthening protected areas, launching large-scale afforestation with native species, and securing critical wildlife corridors.

Water Security: Prioritizing spring-shed and watershed rejuvenation to ensure long-term water availability for communities and hydropower.

Investment for a Resilient and Green Future

Translating this strategic vision into reality requires significant, targeted investment. The following tables summarize the estimated financial requirements for building resilience through DRR and environmental restoration.

Table 1: DRR Implementation Budget (2025-2028)

Component	Key Activities	Estimated Cost (₹ Crore)
1. HRVA Update	Multi-hazard mapping & community validation	25
2. Risk Prevention & Mitigation	Retrofitting schools/hospitals, slope stabilization, flood control	300
3. Mainstreaming DRR	Disaster Impact Assessments, DRR checklists, training	15
4. Preparedness Systems	EWS network, SEOC/DEOC upgrades, Aapda Mitra training	120
5. Community Preparedness	School safety, DRR clubs, mock drills	20
6. Livelihood Resilience	Climate-smart agriculture, tourism safety, insurance	40
7. Recovery & Reconstruction	Build Back Better housing & infrastructure	150
8. Financial Arrangements	Mitigation Fund setup, PPP frameworks	20
9. Institutional Strengthening	DDMA capacity building, coordination protocols	20
10. GoI Tech Interventions	IMD, CWC, NCS, ISRO system expansions	40
11. Risk Transfer Financing	Parametric insurance pilots, catastrophe bonds	20
TOTAL		770

Table 2: Environment & Climate Recovery Budget

Reconstruction/ Recovery Measures	Overall Budget (₹ Crore)
1. Ecosystem Restoration & Slope Stability	
• Bio-engineering for Slope Stabilization	450
• Large-Scale Afforestation	300
2. Water Security & Climate Resilience	
• Spring-shed & Watershed Rejuvenation	500
3. Biodiversity Conservation & Policy	
• Securing Critical Wildlife Corridors	150
• Mainstreaming Climate Risk in Planning	50
TOTAL	1,450

The Cross-Cutting Sectors demonstrate that disaster risk and ecological health are two sides of the same coin. A sustainable future for Himachal Pradesh depends on simultaneous, strategic investment in hardened infrastructure and a restored natural environment, guided by robust governance and community empowerment.

RESILIENT RECOVERY IN A CHANGING CLIMATE

Securing Himachal Pradesh's Future

The Crossroads: Rebuild the Past or Construct the Future?

The 2025 monsoon has irrevocably proven that Himachal Pradesh exists in a new climate reality. The state now stands at a historic crossroads. One path leads to rebuilding the vulnerabilities of the past, ensuring repeated cycles of loss. The other, more arduous path leads to constructing a resilient future. This chapter is a call to choose the latter—to use the recovery not for incremental repair, but as a **transformative leap** that embeds climate resilience into the state's developmental DNA.

Principles for a Climate-Smart Recovery

This transformation must be guided by four foundational principles:

Climate-Proofing Infrastructure: Every rebuilt road, bridge, and water scheme must be designed for future climate stresses, using improved drainage, resilient materials, and, crucially, avoiding high-risk zones.

Investing in Nature-Based Solutions: Recovery must prioritize reviving the state's natural buffers—its forests, watersheds, and springs—which are the most cost-effective defenses against landslides and floods.

Building Resilient Livelihoods: The economic recovery must future-proof sectors like agriculture and tourism by promoting climate-resilient crops, sustainable practices, and green skills for the youth.

Strengthening Governance & Early Warnings: It requires the political will to enforce risk-sensitive land-use plans and the technical prowess to deliver actionable early warnings to the last person in the most remote village.

Five Strategic Pillars for Long-Term Resilience

To operationalize these principles, Himachal Pradesh must build its future on five strategic pillars:

Pillar 1: Mainstream Resilience into Governance & Finance. Enact a **Climate Resilience Act**, implement climate-responsive budgeting, and establish a high-powered mission to drive action across all departments.

Pillar 2: Build Nature-Based & Engineered Resilience. Adopt **"Sponge Catchment"** principles to absorb water and develop a stringent **"Himalayan Infrastructure Safety Code"** with global expertise.

Pillar 3: Forge a People-Centric Early Warning System. Move beyond "last-mile" to "last-meter" alerts using local dialects and IoT sensors, and shift to **impact-based forecasts** that tell communities "what the rain will do."

Pillar 4: Promote Climate-Smart Livelihoods. Incentivize a shift to water-efficient agriculture and a **circular bio-economy**, and rebuild tourism around eco-friendly, value-based models.

Pillar 5: Secure Innovative Financing. Create a **Himachal Resilience Fund**, pioneer a state **Green Bond**, and leverage parametric insurance for fiscal protection.

A Call to Visionary Leadership

The disaster is a profound tragedy, but it also exposes an unsustainable path. This moment is a catalyst for fundamental change. By championing a resilient recovery, Himachal Pradesh can honour its losses by emerging **safer, greener, and more resilient**. This is not merely a recovery cost; it is the most critical investment in the state's future—an opportunity to become a global beacon of mountain climate resilience. The time for visionary leadership and collaborative action is now.

1. PRELIMINARIES

1.1 Background

The State of Himachal Pradesh, nestled in the fragile ecosystem of the northwestern Himalayas, is characterized by its complex topography and sensitivity to climatic variations. This mountainous region has consistently been identified as highly vulnerable to a range of natural hazards, including earthquakes, landslides, flash floods, and cloudbursts. The monsoon season, while crucial for the state's water and agrarian economy, often unleashes its destructive potential, with the year 2025 standing out as a particularly catastrophic chapter.

The monsoon period from June to September 2025 was marked by extended, widespread, and erratic rainfall that significantly exceeded long-term averages. This intense precipitation triggered a series of devastating flash floods, cloudbursts, and landslides across all districts of the state. The disaster resulted in the tragic loss of 468 human lives and over ~2700 livestock, underscoring its severe human and animal cost. Preliminary assessments and situation report from the State Government indicated widespread disruption, with essential lifeline services such as road connectivity and electricity being severely crippled. The destruction extended to public and private infrastructure, including roads, bridges, power distribution systems, water supply schemes, agricultural lands, and residential and commercial properties, inflicting a profound impact on the social, economic, and infrastructural fabric of Himachal Pradesh.

In response to the unprecedented scale of the disaster, the Department of Revenue (Disaster Management Cell), Government of Himachal Pradesh, formally sought the guidance and technical support of the National Disaster Management Authority (NDMA) for conducting a Post Disaster Needs Assessment (PDNA) via letter dated 17th September 2025. The NDMA responded positively, endorsing a State-led PDNA process supported by its nominated technical experts. This collaborative assessment, sanctioned by the state government on 13th October 2025, was conducted from 17th September to 30th November 2025.

The PDNA is an indispensable tool in this context, providing the foundational link between immediate disaster response and long-term recovery and reconstruction. The extensive damages have created a critical funding gap that cannot be met through routine budgetary allocations. This assessment is therefore essential to systematically quantify the physical damages and economic losses, and to articulate a scientifically grounded recovery strategy. The findings of this PDNA are crucial for mobilizing and directing resources from dedicated windows such as the State Disaster Response Fund (SDRF), the National Disaster Response Fund (NDRF), and other potential financing mechanisms, ensuring that the recovery process is strategic, resilient, and aligned with the principle of "Building Back Better.

1.2 Rationale for Post Disaster Needs Assessment

The unprecedented scale and frequency of disasters in Himachal Pradesh, starkly highlighted by the devastating monsoon of 2025, represent not merely a seasonal anomaly but a fundamental shift in the state's risk landscape. This new reality, characterized by cascading hazards—intense rainfall, widespread landslides, flash floods, and cloudbursts—demands a response that moves beyond immediate relief and ad-hoc repairs. A systematic and rigorous Post Disaster Needs Assessment (PDNA) is not just a procedural formality; it is an indispensable strategic imperative for Himachal Pradesh's recovery, resilience, and sustainable future. The rationale for conducting a comprehensive PDNA is multi-faceted and can be articulated as follows:

1.2.1 To Transition from Relief to Resilient Recovery

The immediate response to a disaster is rightly focused on saving lives and providing essential relief—evacuation, shelter, food, and medical aid. However, pausing the response at this stage risks creating a "build-back-the-same" vulnerability cycle. The PDNA provides the critical bridge from this emergency phase to a medium and long-term recovery strategy. It shifts the question from "What was lost?" to "What should we rebuild, and how can we rebuild it better?" For Himachal, where settlements and infrastructure are often in inherently risky zones, this transition is vital to avoid replicating the same exposure to future inevitable hazards.

1.2.2. To Comprehensively Understand the Multi-Sectoral Impact

The disaster's impact in Himachal Pradesh is not confined to one sector; it is a systemic crisis. The initial Memorandum provides a high-level estimate of losses, but a PDNA delves deeper into the intricate interdependencies.

- Infrastructure: It goes beyond quantifying damaged roads and bridges to assess the impact on connectivity for remote villages, supply chains for essential goods and tourism, and the functionality of critical services like healthcare and education.
- Social Sectors: It assesses the long-term impact on housing, health (including mental health), education (loss of instructional days, damaged schools), and nutrition, ensuring recovery is people centric.
- Productive Sectors: It evaluates the devastation to the core of Himachal's economy—horticulture (apple orchards), agriculture, animal husbandry, fisheries and tourism—accounting not only for direct damage to assets but also for loss of livelihoods and income for millions.
- Cross-Cutting Themes: A PDNA formally integrates assessments of environmental degradation (e.g., loss of forest cover, riverbank erosion), and the disproportionate impact on vulnerable groups like women, smallholder farmers, labourers, and the poor.

1.2.3. To Quantify Economic and Fiscal Shock with Precision

The Government of Himachal Pradesh has presented a preliminary loss estimate of 5,909 crores of rupees vide Memorandum of Damages[1] submitted to Government of India on 04 Oct 2025, with ref.no. Rev(DMC)2-5/2025 – Memorandum of Losses. A PDNA refines this into an authoritative, validated figure that is credible for both national and international stakeholders. It distinguishes between:

- Direct Damage: The cost of replacing or repairing destroyed physical assets (e.g., a collapsed house, a washed-away road).
- Economic Losses: The decline in economic output and flows (e.g., loss of agricultural yield, lost tourism revenue, reduced tax collection).

This precise quantification is crucial for the state government to understand the true fiscal shock, plan its budgetary response, and make a compelling case for necessary financial support from the central government and other development partners.

1.2.4. To Inform a "Build-Back-Better" (BBB) Strategy

Himachal Pradesh's unique topography and heightened climate vulnerability make the principle of "Building Back Better" non-negotiable. The PDNA is the foundational tool for operationalizing BBB. It helps identify:

- Geographical Hotspots: Areas that are now deemed too hazardous for reconstruction, necessitating planned relocation or stringent land-use planning.

[1] Memorandum can be downloaded from: hpsdma.nic.in//admnis/admin/showimg.aspx?ID=3806

- Technical Standards: The need for revised engineering specifications for roads (e.g., better slope stabilization, adequate drainage), buildings (seismic and flood-resilient designs), and riverbank protection.
- Ecosystem-Based Solutions: Opportunities to integrate green infrastructure, such as restoring forests and managing riverine system for slope stability and water absorption, alongside grey infrastructure.

1.2.5. To Integrate Climate and Disaster Risk Reduction into Development Planning

The disasters of 2023 and 2025 are a clear symptom of the climate crisis. A PDNA directly links the recovery agenda with the state's climate action goals. It provides the evidence base to argue that investments in disaster recovery are, in fact, investments in climate adaptation. The findings can be ***used to revise State Action Plans on Climate Change (SAPCC),*** *strengthen disaster management policies, and ensure that every future development project is screened for climate and disaster risks.*

1.2.6. To Prioritize Recovery Needs and Mobilize Resources

Faced with massive and competing needs, the state must make strategic choices. The PDNA process produces a prioritized recovery framework, outlining specific programs and projects across sectors. This structured "shopping list" is essential for effective resource mobilization. It allows the government to present a coherent investment plan to financing institutions, bilateral donors, and the private sector, ensuring that funds are directed to the most critical and transformative interventions.

1.2.7. To Enhance Governance and Coordination

A large-scale PDNA is inherently a multi-stakeholder exercise, involving various state departments, central agencies, civil society, and subject experts. The process itself fosters unprecedented coordination, breaks down departmental silos, and creates a shared understanding of the challenges and the way forward. This leads to more coherent implementation, reduces duplication of efforts, and strengthens institutional mechanisms for future disaster management.

In conclusion, the rationale for a Post Disaster Needs Assessment in Himachal Pradesh is rooted in the urgent need to convert a catastrophic event into a catalytic opportunity. It is the definitive process through which the state can move from reacting to disasters to proactively shaping a development pathway that is economically vibrant, socially inclusive, and ecologically sustainable. Without the rigorous, evidence-based roadmap that a PDNA provides, recovery efforts risk being fragmented, inefficient, and ultimately insufficient to safeguard the people and the precious environment of Himachal Pradesh from the escalating threats of the 21st century.

1.3 Overview of the Assessment Process and Methodology

The Post Disaster Needs Assessment (PDNA) for the Himachal Pradesh Monsoon 2025 was a meticulously planned, state-led exercise conducted in strategic partnership with the National Disaster Management Authority (NDMA). The overarching objective was to move from rapid damage estimation to a detailed, evidence-based recovery framework. The assessment, officially spanning from 17th September to 30th November 2025, was executed through a multi-phase, collaborative methodology to ensure accuracy, comprehensiveness, and ownership.

The process was designed to be systematic and inclusive, involving the following key stages:

1.3.1 Institutional Setup and Preparation:

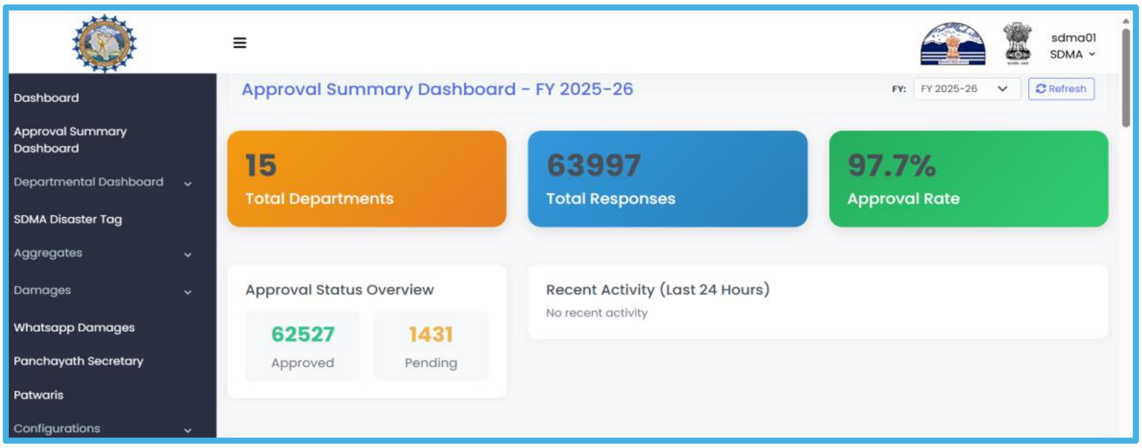
- The Government of Himachal Pradesh issued a formal order to constitute multi-disciplinary, sector-wise teams. These teams integrated State Government officers from all relevant line departments (e.g., Revenue, PWD, Agriculture, Health, Education) with technical experts nominated by the NDMA.
- A State-level coordination team was established under the leadership of the Director-cum-Special Secretary (Revenue-DM) to oversee the entire process. At the district level, Deputy Commissioners were tasked with leading data collection efforts through the DDMA and all departmental officers.

1.3.2. Capacity Building and Training:

- An orientation cum introductory session was conducted for the Nodal Officers of the departments and the Experts engaged by the State, along with those nominated by the NDMA on 13 Oct 2025. This orientation focused on standardizing data collection formats through DMIS, methodologies for validating damage and loss, techniques for estimating recovery costs, and the integration of cross-cutting principles like "Build Back Better," disaster risk reduction, and gender inclusion.

1.3.3. Data Collection and Sectoral Assessment:

- This phase formed the core of the PDNA. Data flow was orchestrated from the ground up through field level staff of 15 different departments, the DMIS system with approvals at district and departmental level. The system was for the first time put to test with over 63,000 damage entries getting reported, and over 62,000 getting approved. However, some errors of omission were noted in the data collection as several sections of the format are optional. Therefore, secondary tools such as Kobo tool and spreadsheets (Google and Microsoft) were used to update and supplement the information collected through the DMIS.[2]



Picture 1: Screenshot of number of data entries of damages in Monsoon 2025, reported till 15 Nov 2025

  - **Primary Data:** District administrations and line departments used standardized templates to collect granular data on damages, losses, and initial needs from the field, supported by GPS coordinates and photographs.
  - **Secondary Data:** Sectoral Expert team gathered baseline information and pre-disaster performance indicators from state departments to contextualize the impact between 2 – 15 Nov 2025. They also visited four most affected districts (Mandi, Kullu, Chamba and Kangra) as two teams for community level and local official level interactions, field verification, community level discussions and validation of damages and losses.
- The sectoral expert teams (Social, Infrastructure, Productive, and Cross-Cutting) then analysed this consolidated data to quantify physical damages, calculate economic losses, and assess the broader socio-economic impact on communities.

1.3.4. Analysis, Reporting, and Validation:

- Based on the analysis, each sectoral team identified and costed specific recovery and reconstruction needs, categorizing them into early, medium, and long-term interventions. The costs against each was validated against SOR or other standardized costing mechanisms.
- The Himachal Pradesh State Disaster Management Authority (HPSDMA) compiled these inputs into a comprehensive draft PDNA report, in collaboration with the sectoral experts.
- A rigorous review mechanism was established. The draft report was scrutinized by a specially constituted Expert Group at the State Level to validate the data, cost estimates, and strategic recommendations. The HPSDMA incorporated this feedback to produce the final, authoritative document.

This structured process ensured that the PDNA 2025 was not merely a damage inventory, but a robust foundation for a resilient

[2] The DMIS developed by the HP SDMA is a unique tool, and with the learning from this PDNA, it will be further improved to be an ideal one in the coming months. It is already being utilized to track the R&R Plan of 2023 floods.

recovery strategy.

1.4 Limitations of the Assessment

Having learned from the limitations of PDNA of 2023, the PDNA 2025 was better coordinated. Yet, there were still few limitations, which the State understands, learns from and would overcome them in future similar exercises. These limitations are acknowledged to provide context for the findings and to inform future exercises:

Timeliness and Completeness of Initial Data: The Disaster Management Information System (DMIS, https://hpdmis.hp.gov.in/) developed by the HP SDMA, though comprehensive in nature, had to be tested in real situation. And this PDNA provided an opportunity. Being a system for entry of data by field level officials, the system allowed different type of entry of information. This meant, at times, the severity of damage was not adequately captured, in spite of over 62,000 validated entries. This opened a challenge in adequacy of information, which was resolved to a large extent by revisiting and revalidating the data of several departments through Kobo Collect tool, and through online Google Forms and Microsoft Excel sheets – made available to the departments for a week. However, some inadequacy remained. This meant, about 10% of the actual data earlier entered in DMIS could not be revalidated within 7 days given for updating of the information once again.

Mobilization of Sector Experts: The condensed timeline for the assessment, while necessary for a swift response, presented challenges in mobilizing the full complement of external sector experts for the entire duration of the exercise. Prior commitments and the short-notice nature of the deployment meant that the depth of expert involvement varied across sectors, potentially affecting the granularity of some sector-specific analyses.

Evolution of Recovery Needs: The assessment of recovery needs, particularly for medium to long-term interventions, is based on the situation analysis at the time of the PDNA. These needs may evolve as more detailed technical assessments (e.g., geological surveys for road re-alignments) are conducted, implying that the recovery strategy and cost estimates may require further refinement during implementation.

These limitations underscore the importance of proactive planning, including pre-positioning expert rosters and standardizing data protocols across departments, including improving the DMIS data capture, data visualization and report generation tools. Addressing these challenges in future exercises will enhance the efficiency and precision of post-disaster assessments, ultimately leading to more robust recovery planning.

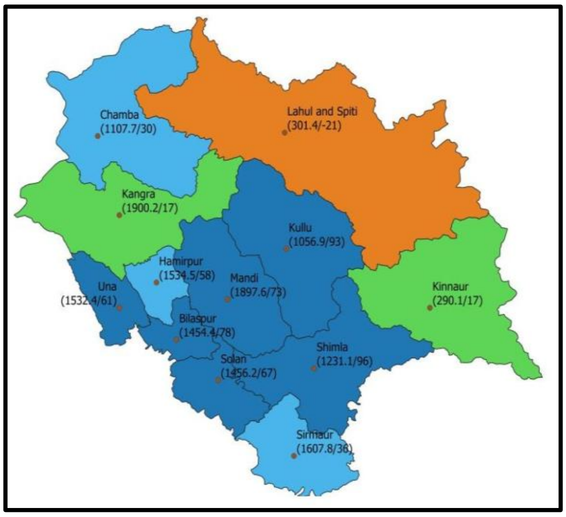
2. Overview

2.1. Profile of the State

Himachal Pradesh, a mountainous state in the geologically active Northwestern Himalayas, is a landscape defined by both beauty and vulnerability. The continuous collision of the Indian and Eurasian tectonic plates has shaped its dramatic terrain making the state highly sensitive to a wide range of natural hazards. Its geography is divided into three major zones: the young and erosion-prone Shiwaliks, the structurally complex Inner Himalayas, and the high, rugged Greater Himalayas. Each zone has its own soil, rock, and climate characteristics, which influence the types of disasters that occur—from frequent landslides in the Shiwaliks to Glacial Lake Outburst Floods (GLOFs) in the higher, cold desert regions.

Administratively, Himachal comprises 12 districts, 81 sub-divisions, 113 tehsils, and 73 sub-tehsils, spread across 55,673 square kilometres. Its climate portrays its vast altitudinal range from just 350 metres to almost 7,000 metres resulting in microclimates that vary from warm subtropical zones to harsh arctic-like conditions. Rainfall and temperature differ sharply across the state depending on altitude and slope. Overall rainfall decreases from west to east and from south to north. Annual precipitation averages around 1111 mm, ranging from only 450 mm in Lahaul & Spiti to more than 3400 mm in Dharamshala. Nearly 70% of this rainfall arrives during the monsoon season (July–September), while higher regions receive snow in winter above 1800 metres.

The 2025 South-West Monsoon highlighted this climatic complexity and the growing influence of climate change. The monsoon entered Himachal on 20 June and engulfed the entire state by 24 June. What followed was extraordinary: the state received 39% above-normal rainfall during the June–September period—1022.5 mm against a normal of 734.4 mm. District-level data showed stark variations, underscoring the increasingly unpredictable nature of the monsoon. August 2025 was especially devastating, recording 68% excess rainfall (431.3 mm against the normal 256.8 mm) as shown in IMD Shimla's rainfall maps. *(Picture 2: on the left: Cumulative rainfall between June – Sep 2025, mapping deviation)*



These extreme patterns mirror global and regional climate assessments, including IPCC projections that warn of more intense and concentrated precipitation events in the Himalayas. For Himachal Pradesh, this means rising pressure on already fragile ecosystems, communities, and infrastructure making the need for stronger disaster preparedness and climate resilience more urgent than ever.

2.2 Disaster Risks of Himachal Pradesh

Himachal Pradesh, with a geographical area of 55,673 sq. km and a population of nearly 70 lakh, is one of India's most hazard-prone Himalayan states. The state diverse physiography ranging from the low-lying plains to the mid-Himalayas, Greater Himalayas, and the cold desert of Lahaul–Spiti creates a wide spectrum of natural and anthropogenic disaster risks. As per the report of the Technical Group by the National Commission, the population of Himachal Pradesh is projected to be 7,555,000, or 75.55 lakhs, as of July 1, 2025[3]. It is the 20th most populous state in India, combined with fragile mountain ecosystems, making the region highly vulnerable to multi-hazard impacts.

2.2.1 Factors Shaping Himachal Pradesh's Disaster Profile

a. Geological Factors

Himachal Pradesh lies in one of the most tectonically active regions of the world the young Himalayan mountain system. The region is intersected by several major tectonic features:

- Main Frontal Thrust (MFT): Separates Shivalik ranges from the plains.
- Main Boundary Thrust (MBT): Divides Shivalik from Lesser Himalaya.
- Main Central Thrust (MCT): Separates Lesser and Greater Himalaya; passes through the central belt of Himachal.
- Local active faults: Kaurik–Chango Fault, Kangra Fault Zone, Mandi Fault Cluster etc.

These major and minor faults have historically produced high-intensity earthquakes, deep cracking, mass movement, and large landslide events.

[3] https://censusofindia.net/himachal-pradesh/2

Major Earthquakes Linked to Himachal Fault Systems

Date	Location	Magnitude	Damage Summary
1905 (Kangra)	7.8	20,000 deaths; 1,00,000 houses destroyed	Linked to MBT; widespread deformation and landslides
1945 (Chamba)	6.5	Moderate impact	Associated with Himalayan frontal fault system
1975 (Kinnaur)	6.8	60 deaths; 2,000 structures destroyed	Linked to Kaurik Fault; triggered massive rockfalls
1986 (Dharamshala)	5.5	6 deaths; major building damage	Shallow MBT event; Siwalik sediments amplified shaking
1994–1997 (Chamba, Sundernagar)	4.5–5.0	Widespread building cracks; 1,000 buildings damaged	Indicates persistent microseismicity along MCT and local faults

Landslide-prone zones such as Chowari (Chamba), Dhauladhar, Hathi Dhar, Pandoh–Sundernagar and Kinnaur valleys directly reflect the influence of these tectonic structures.

Minor/ Notable earthquakes (Himachal Pradesh) — 2020–2025

Date (IST)	District / Location (epicentre)	Magnitude (M)	Damage Summary
16 Jul 2020	Una district (HP)	M 2.3	Small event, reviewed by NCS.
10 Jun 2020	(near) Shimla region (HP)	M 2.5	Small event, reviewed by NCS
16 Apr 2021	Kangra (near)	M 3.5	Moderate local shaking recorded
22 Apr 2021	Bilaspur (HP)	M 2.9	Small event, NCS felt report
28 Dec 2021	Kullu (HP)	M 2.3	Small event, NCS reviewed listing
25 Feb 2022	Dharamshala / Kangra region	M 3.4	Shallow event recorded by NCS
04 Apr 2024	**Chamba district, Himachal Pradesh** (epicentre)	**M 5.3**	Largest notable event between 2020–2025

b. Rock Types and Associated Hazards

Himalayan rock formations vary from Precambrian metamorphic to young sedimentary, each responding differently to rainfall and slope stress.

- Stable formations: Gneiss, schist, quartzite (Higher Himalaya, Lesser Himalaya)
- Unstable formations: Shivalik sedimentary rocks (sandstone, siltstone, mudstone) — highly prone to erosion and sliding
- Valley fills and moraines: Loosely packed, easily destabilised during heavy rainfall

Example:
The 2017 Mandi mudflow disaster that killed 46 people occurred in highly erodible Shivalik sedimentary formations combined with intense rainfall.

c. Slope Stability Factors

Slope instability in Himachal Pradesh is governed by:

Landslide Risk = f(Thrusts + Rock Type + Forest Cover + Rainfall + Infrastructure pressure)

Unstable slopes are concentrated in:

- Lesser and Greater Himalaya (due to active thrusts)
- River valley sides (Satluj, Beas, Ravi)
- Highway expansion zones (Chandigarh–Shimla, Kiratpur–Manali, Chamba–Banikhet)

Example:
Four-lane highway construction has destabilised several slopes on the Chandigarh–Shimla corridor, causing frequent rockfalls and road closures.

d. Climate-Related Disaster Risks

Himachal experiences intense climate-driven hazards:

- Cloudbursts & Flash Floods
- Extreme rainfall events
- Snowstorms & avalanches
- Drought-like winters
- Rising Glacial Lake Outburst Flood (GLOF) risk

Monsoon Trends

- Monsoon days are decreasing,
- Intensity of rainfall is rising, triggering high-energy landslides.
- Winters are becoming drier and snow-scarce, reducing moisture retention and groundwater recharge.
- Due to glacier retreat, several glacial lakes in Himachal are expanding. Expanding Glacial Lakes (India, 2025 model-based assessment):

State / Region	No. of Expanding Lakes
Arunachal Pradesh	197
Ladakh	120
Jammu & Kashmir	57
Sikkim	47
Himachal Pradesh	6
Uttarakhand	5

Sensitive lakes include Ghepan Lake in Lahaul-Spiti.

e. Vegetation & Forest-Related Hazards

According to the Himachal Pradesh Forest Department (2025), the state has 27.73% forest cover[4], which provides several critical protective functions.

- Roots stabilise soil and reduce landslide risk
- Vegetation reduces surface runoff during intense rainfall
- Forests protect riverbanks from erosion
- They reduce flood peaks and enhance infiltration

However, loss of vegetation, deforestation, and forest degradation can worsen disaster risk.
Examples:

- JICA's Swan River catchment project in Una showed successful flood reduction through afforestation and channelisation.
- In Kullu (Bijli Mahadev project) highlighted the role of tree cover in slope stability.
- Pine needle accumulation in hot summers increases forest fire risk.

f. Industrial and Urban Disaster Risks

Himachal Pradesh's industrial clusters, particularly in Una, Solan, Sirmaur, and parts of Kangra, introduce significant hazards such as factory fires, chemical leaks, gas explosions, electrical accidents, and industrial waste spills. These risks are critically intensified by rapid urbanisation that lacks proportional investment in safety infrastructure. This localized vulnerability exists within a broader, complex disaster environment shaped by active tectonics, fragile geology, and steep slopes. Furthermore, climate change is amplifying monsoon extremes and GLOF risks, while depleting vegetation and other anthropogenic pressures compound the state's fragility. The expansion of industrial corridors without commensurate safety planning integrates these threats, collectively establishing Himachal as one of India's most disaster-prone hill states. This necessitates an integrated approach including detailed geological mapping, climate-adaptive infrastructure, real-time monitoring, slope-stability regulations, and robust community-based early warning systems.

2.2.2 Disaster Events and Hazard Trends in Himachal Pradesh

Himachal Pradesh exhibits a multi-hazard profile shaped by its active geology, steep terrain, climatic variations, glacial dynamics, forest ecosystems, and rising industrial footprint. The state has historically experienced significant earthquakes, recurrent landslides, flash floods, cloudbursts, forest fires, avalanches, and anthropogenic disasters.

a) Seismic Events

The state lies predominantly in Seismic Zones IV and V. Historic earthquakes such as the 1905 Kangra (M 7.8) and 1975 Kinnaur (M 6.8) demonstrate the catastrophic potential of Himalayan tectonics. Ongoing micro-seismicity indicates continuous strain accumulation along the MBT, MCT, and associated faults.

b) Landslides and Slope Failures

Landslides constitute one of the most frequent disasters in the state, especially in Mandi, Kinnaur, Chamba, Shimla, Kullu, and Kangra. Slope instability is driven by geological weakness, extreme rainfall, and anthropogenic activities such as road widening and tunnelling.

[4] https://hpforest.gov.in/forest as on 25 Nov 2025

c) Hydrometeorological Events

Increasing intensity of cloudbursts and flash floods, particularly since 2018, underscores the shifting monsoon dynamics induced by climate change. River basins like Beas, Ravi, Satluj, and Chenab frequently witness high-energy flood events.

d) Glacial and Cryospheric Hazards

With six expanding glacial lakes and rapid glacier retreat, Himachal Pradesh faces emerging GLOF threats. Lahaul–Spiti and Kinnaur remain high-risk regions requiring advanced monitoring.

e) Forest and Eco-Environmental Events

Forest fires are increasingly frequent, driven by rising temperatures and dry spells. Loss of vegetation undermines slope stability and accelerates erosion processes.

f) Anthropogenic and Industrial Events

Industrial clusters in Solan, Una, Sirmaur, and Kangra have reported fire incidents, gas leaks, and chemical hazards, highlighting the need for robust safety compliance and monitoring frameworks.

2.3. Hazard Profile of the State

Mountain ecosystems are intrinsically vulnerable to natural disasters, a susceptibility that is critically exacerbated by anthropogenic activities. Developmental pressures over time have disrupted the delicate equilibrium of physical processes, amplifying environmental degradation. This increased stress on the mountainous terrain has significantly contributed to issues such as accelerated soil erosion, widespread deforestation, land subsidence, and a heightened frequency of landslides. It is estimated that approximately 58.36% of the state's land area is subject to intense soil erosion, a testament to the region's inherent fragility.

Forming a part of the geologically young and dynamically evolving Western Himalaya, Himachal Pradesh is characterized by its environmentally fragile and ecologically sensitive nature. As one of the world's youngest mountain chains, still in its orogenic active phase, the region is naturally predisposed to a multitude of hazards. Annually, the state confronts the fury of nature through devastating events including landslides, cloudbursts, flash floods, snow avalanches, and periodic droughts. The compounded effect of its fragile ecology and extreme physio-climatic variations renders it exceptionally susceptible to natural vagaries, a trend intensified in recent years by an unprecedented rise in extreme weather events like cloudbursts.

Despite continuous governmental efforts in relief and rehabilitation, hazards such as landslides and avalanches persistently inflict extensive damage to human life, property, and critical infrastructure. The road network, which serves as the state's socio-economic lifeline, is repeatedly severed, blocked, or completely washed away by these events. Consequently, scarce state resources are perennially diverted towards emergency response and reconstruction, imposing a significant burden on development.

The spectrum of risks facing Himachal Pradesh is extensive and formally recognized. The state is vulnerable to 25 out of the 33 hazard types identified by the Government of India's High-Powered Committee (HPC), which are categorized into five key subgroups. Beyond these identified threats, the state also grapples with emerging challenges such as climate change impacts and increasing human-wildlife conflict. The following provides a visual representation of the identified and prognostic hazards confronting Himachal Pradesh across its districts:

2.3.1. District-Wise Disaster Events Table (Himachal Pradesh)

District	Major Hazards	Key Past Events	Vulnerability Level	Impact Summary
Kangra	Earthquakes, landslides, flash floods, fires	1905 Kangra EQ; 2023–24 floods	**Very High**	High population density; repeated slope failures; riverine floods
Mandi	Landslides, flash floods, road collapses, reservoir-induced slides	2017 Mandi landslide (46 deaths); Pandoh areas recurring slides	**Very High**	Major highway disruptions; drainage-induced failures
Chamba	Landslides, earthquakes, cloudbursts	1945 EQ; Bharmaur–Chowari sliding zones	**High**	Steep slopes; high rockfall frequency; isolated villages
Kinnaur	Landslides, GLOFs, flash floods, avalanches	1975 EQ; 2021 Kinnaur slide disaster	**Very High**	Fragile geology; glacial lake growth; highway instability
Kullu	Flash floods, cloudbursts, avalanches	2018 and 2023–25 monsoon floods; Manali flash floods	**High**	Tourism corridor disruptions; Beas basin floods
Shimla	Landslides, urban slope failures, fires	2023 landslides; fire outbreaks	**High**	Urban expansion on unstable slopes
Lahaul–Spiti	GLOFs, avalanches, cold waves	Glacial lake growth; heavy snow isolation	**High**	Winter isolation; highway blockages; glacial hazards
Solan	Landslides, industrial fires	Factory fires in Baddi-Barotiwala	**Medium**	Rapid industrial growth, chemical hazards
Sirmaur	Slides, flash floods, industrial hazards	Paonta Sahib industrial incidents	**Medium**	Flood-prone valleys; chemical risk zones
Bilaspur	Reservoir-induced slides, drought	Bhakra reservoir slope failures	**Medium**	Water scarcity in lower hills
Una	Flash floods, industrial/chemical disasters	Swan river floods; fire incidents	**Medium**	Industrial clusters; riverine flash floods
Hamirpur	Landslides, heatwaves	Local slides; dry spells	**Low–Medium**	Increasing erosion; semi-urban fires

2.3.2. Timeline of Major Disasters in Himachal Pradesh (1905–2025)

Major Disaster Timeline

Earthquakes

- 1905 – Kangra Earthquake (M 7.8): 20,000 deaths; catastrophic destruction.
- 1945 – Chamba Earthquake (M 6.5): Strong tremors; moderate impact.
- 1975 – Kinnaur Earthquake (M 6.8): 60 deaths; major rockfalls.
- 1986 – Dharamshala Earthquake (M 5.5): Shallow MBT event; building damage.
- 1997 – Sundernagar Earthquake (M 5.0): 1,000 structures affected.

Landslides

- 2017 – Mandi Landslide: 46 killed due to massive mudflow.
- 2021 – Kinnaur Landslide: Several fatalities, bus burial event.
- 2023–2024 – Multiple landslides: Along Shimla, Kullu, Mandi highways.

Flash Floods / Cloudbursts

- 2010 – Leh-like cloudburst impacts in Spiti region (H.P. side).
- 2018 – High inter-district variation in rainfall (>50%) within state; flash floods
- 2023 – Kullu flash floods: Infrastructure damage.
- 2024–25 – Series of cloudbursts in Mandi, Kullu, Chamba.
- 2025 – Highest rainfall in 20+years

GLOF / Glacial Events

- 2025 – AI-based monitoring confirms 6 expanding lakes in H.P.

Avalanches / Snow Events

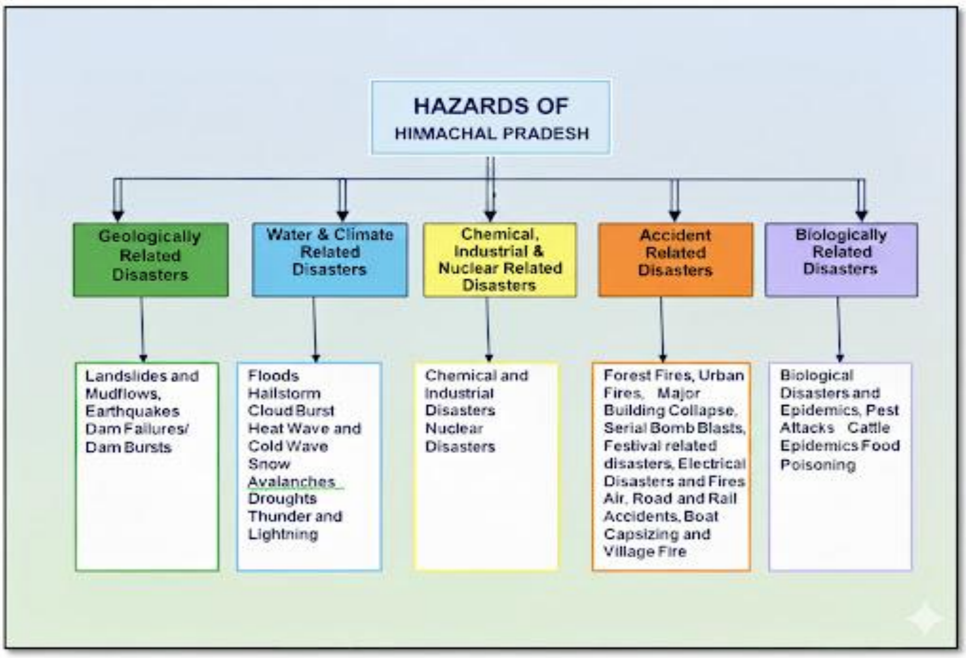
- Annual: Rohtang, Kunzum, Sach Pass closures.
- 2021–22: Heavy avalanche activity in Lahaul–Spiti post-tunnel opening.

Forest Fires

- Recurring every summer: Solan, Mandi, Bilaspur, Shimla face severe fire outbreaks.

Industrial Disasters

- 2018–2024: Chemical leaks, factory fires in Baddi–Barotiwala–Nalagarh belt (Solan).
- Una–Sirmaur: Electrical fires, warehouse incidents.



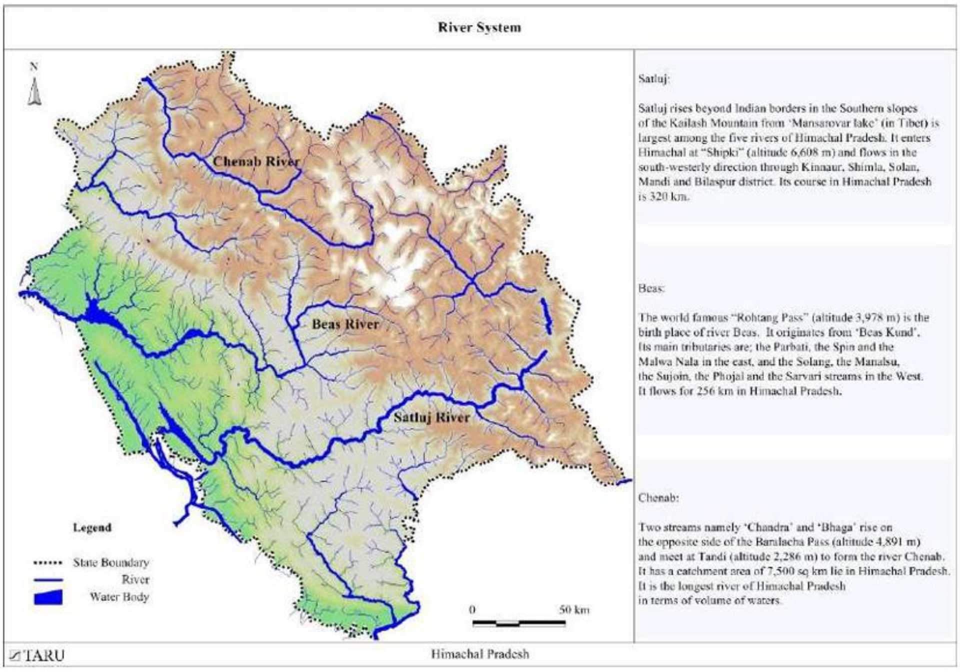
2.4. District-Wise Hazard Vulnerability of the State

A comprehensive vulnerability matrix was developed for the state to systematically assess disaster risk. This matrix assigned qualitative weights on a scale of 0-5 for various hazards, including earthquakes, landslides, avalanches, and industrial risks, while also factoring in elements such as construction types, population density, and risks induced by development projects like hydroelectric dams and roads.

The catastrophic monsoon of 2025 serves as a critical validation of this matrix, demonstrating how theoretical vulnerabilities manifest as tangible devastation. The district-wise risk severity, now viewed through the lens of recent events, is outlined below:

- **Earthquake Vulnerability:** Districts like Kangra, Hamirpur, and Mandi fall into the *very high-risk* category. The 2025 events, while not seismic, highlighted the acute pressure on Mandi's infrastructure, which would be severely compounded by a major earthquake. *High-risk* districts include Chamba, Kullu, Kinnaur, and parts of Kangra and Shimla.
- **Landslide Vulnerability:** The 2025 monsoon, which recorded 122 major landslides, starkly confirmed the high vulnerability of Chamba, Kullu, Kinnaur, and parts of Kangra and Shimla. Districts like Kangra, Mandi, Bilaspur, Shimla, Sirmaur, and Lahaul & Spiti fall in the *moderate* category, a classification borne out by significant landslide incidents across these regions.

  Himachal Pradesh River System:



- **Avalanche Vulnerability:** The *very high-risk* districts of Lahaul & Spiti and Kinnaur are susceptible to winter avalanches, a hazard distinct from but concurrent with the monsoon threats. Chamba, Kullu, and parts of Kangra and Shimla are in the *moderate* category.
- **Flood & Flash Flood Vulnerability:** The 2025 disaster, with 97 recorded flash floods, critically underscored the *high* vulnerability of Chamba, Kullu, and Kinnaur. The event in Khaniyara Khad (Kangra) also demonstrated that districts in *moderate* categories, like Kangra, Mandi, and Shimla, are capable of experiencing extreme, localized flash flood devastation.

Overall Composite Vulnerability: Synthesizing these factors, the matrix clearly identifies:

- **Very High-Risk:** Chamba, Kinnaur, Kullu, and parts of Kangra and Shimla. These districts were the epicentre of the 2025 crisis, suffering from a confluence of landslides, cloudbursts, and flash floods.
- **High-Risk:** Kangra, Mandi, Una, Shimla, and Lahaul & Spiti. The 2025 damages in Mandi and Kangra, in particular, affirm their high-risk status due to the sheer scale of infrastructural and human loss.
- **Moderate-Risk:** Hamirpur, Bilaspur, Solan, and Sirmaur.

The disaster management strategies and infrastructural resilience for Himachal Pradesh must be rigorously evolved by integrating these established vulnerability factors with the hard lessons of the 2025 monsoon, emphasizing that theoretical risk profiles are increasingly becoming annual realities.

Table: District wise Vulnerability Matrix

HAZARD VULNERABILITY OF HIMACHAL PRADESH							
DISTRICTS	E.Q	LANDSLIDE	FLOODS	AVALANCHE	INDUSTRY	CONST. TYPE & DENSITY	OVERALL VULNERABILITY
Kangra	VII	M	L	--	M	VII	II
Chamba	II	II	II	M	M	II	VII
Hamirpur	VII	L	L	--	--	II	M
Mandi	VII	M	M	--	M	II	II
Kullu	II	II	II	M	II	II	VII
Bilaspur	II	M	L	--	M	VII	M
Una	M	L	II	--	II	M	II
Sirmour	M	M	L	--	II	M	M
Solan	L	L	L	--	II	M	M
Kinnaur	II	II	II	VII	II	M	VII
L&Spiti	L	M	L	VII	--	M	II
Shimla	L	M	L	--	II	M	II

Source: HP State Council for Environment Science and Technology. Additional hazard risk vulnerability maps and assessments of the state[5] may be found at hpsdma.nic.in//admnis/admin/showimg.aspx?ID=9.

2.5 Background of the Events

The monsoon of 2023 served as a dire prelude, exposing the acute vulnerability of Himachal Pradesh to climate-amplified hydro-meteorological events. Northern India, and Himachal Pradesh in particular, was ravaged by a convergence of intense monsoon rains and western disturbances, leading to catastrophic flooding and landslides. This period was marked by severe damage to critical

[5] A report on the Earthquake vulnerability is available in hpsdma.nic.in//admnis/admin/showimg.aspx?ID=9

infrastructure, significant loss of life, and widespread disruption, prompting the first major Post-Disaster Needs Assessment (PDNA) in the state.

However, the events of the **2025 South-West Monsoon season eclipsed the devastation of 2023, establishing a new and alarming benchmark for disaster severity in the Himalayan region.** What unfolded from June to September 2025 was not merely a seasonal weather pattern but a relentless succession of extreme weather events that pushed the state's disaster management apparatus to its limits. At first, we look at the rainfall for the year. (Source: IMD Shimla)[6]

June-September

YEAR	ACTUAL RAINFALL(mm)	NORMAL RAINFALL(mm)	DEPARTURE (%)
2004	423	773.7	-45
2005	569	774	-27
2006	580	774	-25
2007	495.7	773.7	-36
2008	735	774	-5
2009	508	774	-34
2010	889	803	11
2011	730	803	-9
2012	702	826	-15
2013	777	844	-8
2014	522	764	-32
2015	638	764	-16
2016	624	764	-18
2017	717	764	-6
2018	927	764	21
2019	687	764	-10
2020	567	764	-26
2021	689	764	-10
2022	716	734	-2
2023	886	734.4	21
2024	600.9	734.4	-18
2025	1022.5	734.4	39

LEGEND: L. EXCESS (+60% OR MORE) EXCESS (+20% TO +59%) NORMAL (+19% TO -19%) DEFICIENT (-20% TO -59%) L. DEFICIENT (-60% TO -99%) NO RAIN (-100%) NO DATA

The season was characterized by an unprecedented **39% excess rainfall** for the state overall, with the month of August recording a staggering **68% excess—the highest in decades**. This was not a uniform deluge but a series of violent, localized, and vigorous spells. The India Meteorological Department (IMD) reported **nine days of "vigorous" or "active" rainfall activity** in June alone, a pattern that continued through July and August. This intense precipitation triggered a devastating triad of secondary hazards:

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[6] https://mausam.imd.gov.in/shimla/mcdata/monsoon/main2025.html

- **122 Major Landslides**
- **97 Flash Floods**
- **47 Cloudbursts**

The human cost was profound, with **over 468 fatalities** recorded by early September. The infrastructural devastation was systemic and comprehensive. The state's lifeline—its road network—suffered catastrophic damage, with thousands of kilometers severed, blocking access to remote communities and hampering rescue efforts. Critical infrastructure, including power transformers, water supply schemes, and communication networks, was extensively damaged, leaving populations isolated and without essential services. The housing sector suffered a massive blow, with thousands of pucca and kutcha houses either fully destroyed or partially damaged across all twelve districts.

Specific events from the 2025 monsoon have become emblematic of the scale of the disaster:

- The flash flood at Khaniyara Khad in Kangra district on June 25th, which swept away a labour colony at a hydroelectric project site.
- A devastating cloudburst in Siyathi village, Mandi, which obliterated all 20 homes in the settlement.
- The stranding of nearly 15,000 pilgrims during the annual Manimahesh Yatra in Chamba due to landslides and flash floods, requiring a complex multi-day air and ground evacuation.
- A major landslide in Inner Akhara Bazar, Kullu, which buried several structures and resulted in multiple fatalities.

Recognizing the unprecedented scale of the catastrophe, the Government of India proactively deployed an **Inter-Ministerial Central Team (IMCT)** for an on-the-spot assessment from **September 7th to 10th, 2025**, without waiting for a formal memorandum from the state. This was followed by a **Multi-Sectoral Central Team (MSCT)** to analyze the scientific causes and recommend mitigation strategies.

The widespread devastation, far exceeding the state's coping capacity and the benchmarks of the 2023 disaster, necessitated a comprehensive and rigorous evaluation to guide recovery and rebuilding. Consequently, the state government, in coordination with national authorities, initiated this Post Disaster Needs Assessment (PDNA) to meticulously quantify the losses, assess the impacts across all sectors, and formulate a robust recovery and resilience-building framework for the future.

2.5.1 District-wise Impact of the Disaster – 2025 as per Memorandum of the State

The monsoon season of 2025 inflicted widespread and severe damage across Himachal Pradesh, with significant variation in the nature and scale of impact across its twelve districts. The human, infrastructural, and economic losses underscore the vulnerability of the state's mountainous terrain to extreme weather events.

The overall human toll was substantial, with 341 fatalities (final figures: 468) reported across the state up to September 23, 2025. The disaster profile varied significantly by district:

- **Mandi** was the worst-affected district, recording **67 deaths** and **30 missing persons**, primarily due to a high frequency of cloudbursts (19 incidents), landslides, and flash floods. Major incidents included the devastating cloudburst in Siyathi village (Dharampur) and the Janganbag landslide in Sundernagar.
- **Chamba** suffered **68 deaths**, heavily impacted by the disruption of the **Manimahesh Yatra**, where thousands of pilgrims were stranded due to landslides and flash floods triggered by torrential rains.
- **Kangra (57 deaths)** and **Shimla (48 deaths)** also reported high casualties, with Kangra experiencing a severe flash flood at Khaniyara Khad and Shimla facing significant landslide incidents.

- **Kullu** recorded **36 deaths** and extensive infrastructure damage, driven by multiple cloudbursts (12 incidents) and landslides (23 incidents), including a major cloudburst in Sainj and a landslide in Inner Akhara Bazar.
- Other districts like **Una (29 deaths)**, **Solan (25 deaths)**, **Kinnaur (30 deaths)**, **Hamirpur (17 deaths)**, **Bilaspur (23 deaths)**, **Sirmaur (18 deaths)**, and **Lahaul & Spiti (10 deaths)** also faced losses from a combination of flash floods, landslides, road accidents, and other rain-related incidents.

2.6 Response of the State Government and District Administration

Faced with an unprecedented monsoon disaster, the State Government of Himachal Pradesh and its district administrations orchestrated a massive, coordinated response operation. This effort was structured around a four-pillar strategy: Proactive Preparedness, Swift Rescue and Evacuation, Immediate Relief and Support, and Systemic Strengthening for Future Resilience.

2.6.1. Enhanced Pre-Monsoon Preparedness and Drills

Recognizing the forecast of an above-normal monsoon, the government initiated a series of pre-emptive measures to minimize losses:

- **Communication Infrastructure Fortification:** A state-wide Communication Mock Drill was conducted on June 2, 2025, led by the Himachal Pradesh State Disaster Management Authority (HPSDMA). The drill tested the entire emergency satellite network, comprising 227 I-SAT and 144 V-SAT terminals. Voice and video calls were successfully established with the most remote locations, including Tissa (Chamba), Dodra Kawar (Shimla), and Keylong (Lahaul & Spiti), ensuring communication lines would hold during actual disasters.
- **Dam Safety Overhaul:** A high-level review meeting with all large dam authorities was held on June 2, 2025. Learning from the 2014 Thalout and 2023 Bhakra Dam incidents, directives were issued for the strict implementation of the Dam Safety Act, 2021. Key mandates included the installation of I-SAT phones at dam sites, meticulous gate maintenance, clear marking of danger zones, and mandatory enrolment in the AABHAS portal for centralized monitoring.
- **Large-Scale Simulation Exercises:** The 9th State-Level Mega Mock Exercise on earthquake disasters was conducted from May 27 to June 6, 2025, in collaboration with the National Disaster Management Authority (NDMA). This included an Orientation Workshop (May 27), a statewide Table-Top Exercise (TTEx on June 3), and a full-scale physical simulation (June 6). The exercise simulated an 8.0 magnitude earthquake near Kangra, activating the Incident Response System (IRS) in all districts and testing inter-agency coordination among NDRF, SDRF, Army, Police, and all key line departments.

2.6.2. Dynamic Crisis Management and Large-Scale Rescue Operations

As disasters struck, the state machinery responded with agility and scale:

- **Activation of Emergency Operation Centers:** The State Emergency Operation Centre (SEOC) in Shimla and all District EOCs (DEOCs) were activated for 24/7 monitoring, compiling real-time damage reports and coordinating resource deployment.
- **High-Frequency Review and Command:** The Hon'ble Chief Minister, Thakur Sukhvinder Singh Sukhu, chaired numerous review meetings (on June 26, August 29, September 3, and September 17) to provide strategic direction. Similarly, Chief Secretary Shri Prabodh Saxena held daily review sessions from August 27-30 to manage the escalating crisis, particularly the situation in Chamba.

- **Search and Rescue Deployments:**
    - **NDRF and SDRF** teams were pre-positioned and dynamically deployed. For instance, following the Khaniyara Khad flash flood (June 25, Kangra), NDRF teams using drones and divers rescued over 150 laborers, recovering 5 bodies with 3-4 missing.
    - In Kullu, following the Jeeva Nalla cloudburst (June 25) and the Inner Akhara Bazar landslide (September 3), NDRF and SDRF teams worked tirelessly, often in continuing rain, to search for survivors and clear debris.
- **Operation Manimahesh Evacuation:** This was one of the largest and most complex rescue operations. Starting August 24, nearly 15,000 pilgrims were stranded in Bharmour (Chamba). The response included:
    - **Airlift by IAF:** Indian Air Force Chinook helicopters evacuated over 50 pilgrims per sortie. Smaller helicopters conducted 7 sorties to evacuate 35 ailing and elderly pilgrims.
    - **Ground Evacuation:** Approximately 5,000 pilgrims were guided out on foot with administrative support along the route. By August 30, 60 HRTC buses were used to transport 6,000 evacuated pilgrims to Nurpur and Pathankot.
- **Restoration of Critical Infrastructure:**
    - **Roads:** The Public Works Department (PWD) was directed to work on a "war footing." Critical routes like the Chamba-Bharmour road, NH-505, and NH-03 in Lahaul-Spiti were prioritized and progressively reopened.
    - **Telecommunications:** With mobile networks collapsed in districts like Mandi (Thunag, Janjehli), the government coordinated with Telecom Service Providers and the Department of Telecom to restore services, even airlifting fuel and equipment to key locations.

2.6.3. Comprehensive Relief and Financial Support Mechanisms

The government simultaneously addressed the immediate humanitarian and financial needs of the affected population:

- **Financial Allocations:** The state swiftly released funds under the State Disaster Response Fund (SDRF)/National Disaster Response Fund (NDRF). A total of **₹256.96 Crore** was disbursed to Deputy Commissioners for immediate relief, and **₹140 Crore** was allocated to various departments for restoration work. Furthermore, a central allocation of **₹2006 Crore** was approved by the Ministry of Home Affairs for repair and reconstruction under the PDNA 2023.
- **Direct Humanitarian Aid:**
    - **Rental Assistance:** A policy was announced to provide **₹10,000** and **₹5,000** as one-time rental assistance to homeless families in urban and rural areas, respectively.
    - **Relief Camps:** Numerous relief camps were established across affected districts, providing shelter, food, and medical aid to displaced individuals, including the 67 residents of Siyathi village (Mandi) who lost all 20 homes.
    - **Airdropping of Essentials:** In completely cut-off areas like **Bara-Bhangal (Kangra)**, the Air Force was utilized to airdrop rations and essential supplies.

2.6.4. Systemic Reforms and Future Resilience Building

Beyond immediate response, the government initiated several long-term measures:

- **Strengthening Early Warning Systems:** The Common Alert Protocol (SACHET) was actively used for standardized alerts. An MoU with the India Meteorological Department (IMD) was signed to install 48 new Automatic Meteorological Stations in data-sparse blocks.
- **Technological Augmentation:** The satellite phone network was expanded, and C-Band Pass Filters were procured to ensure V-SAT functionality in 5G networks. The process for installing two new Doppler Radars in Kinnaur and Lahaul & Spiti was advanced.
- **Scientific Risk Assessment:** C-DAC, Pune was engaged to conduct bathymetric surveys of sensitive glacial lakes, with reports completed for Geepang Gath (L&S), Baspadhkashang (Kinnaur), and Mantalai Vasuki Lake (Kullu).
- **Landslide Early Warning:** A pilot project for a landslide early warning system, developed by the Geological Survey of India, was officially launched for Shimla and Kinnaur districts.

Through this multi-pronged, layered, and dynamic approach, the State Government and District Administrations demonstrated a committed effort to save lives, alleviate suffering, and build a more resilient framework to confront future climatic challenges.

2.7 Recovery Vision

A resilient, inclusive, and climate-adaptive Himachal Pradesh where recovery from the 2025 monsoon restores lives and livelihoods faster, reduces future disaster risk, and accelerates a just transition to sustainable development. Recovery will prioritize the safety and dignity of affected communities, strengthen local capacities, and rebuild infrastructure and services to higher resilience standards while protecting the state's unique mountain ecosystems and cultural heritage.

Guiding principles

- **People centered** — recovery decisions are driven by the needs and priorities of affected households, with special attention to women, children, elderly, persons with disabilities, farmers and marginalized groups.
- **Risk informed and climate adaptive** — reconstruction follows hazard-sensitive planning and integrates nature-based solutions and low-carbon approaches.
- **Build back better** — investments restore functionality and improve standards for safety, accessibility, and long-term performance.
- **Local empowerment** — local governments, panchayats, and community organizations lead planning and implementation with technical and financial support.
- **Sustainable livelihoods** — recovery restores incomes and creates diversified, resilient economic opportunities that reduce vulnerability to future shocks.

2.8 Recovery Objectives

Overall Objective

To restore essential services, rebuild resilient infrastructure, and reestablish sustainable livelihoods so that affected communities not only regain pre-disaster living standards but achieve safer, more sustainable, and climate-adaptive development pathways. Recovery will be time-bound, inclusive, and risk-informed, ensuring that investments reduce vulnerability to future hazards while strengthening institutional and community capacities.

Specific Objectives

1. Protect lives and restore basic services

- Rehabilitate houses, health facilities, water supply, sanitation systems, and schools to full functionality within the shortest possible timeframe.
- Ensure continuity of essential services (healthcare, education, nutrition, and social protection) for vulnerable groups.

2. Rebuild resilient infrastructure

- Repair and upgrade roads, bridges, and public buildings to resilience standards that incorporate slope stability, drainage, seismic safety, and climate projections.
- Prioritize lifeline corridors and critical facilities (hospitals, schools, emergency shelters) to ensure uninterrupted access during future disasters.
- Integrate digital technologies (early warning systems, resilient communication networks) into infrastructure recovery.

3. Revive and diversify livelihoods

- Restore agricultural production and irrigation systems, with emphasis on climate-smart practices and soil conservation.
- Support horticulture, tourism, and MSMEs through targeted financial packages, skill development, and market linkages.
- Promote alternative income streams (eco-tourism, handicrafts, renewable energy enterprises) to reduce dependence on climate-sensitive sectors.

4. Protect and restore the environment

- Implement watershed restoration, slope stabilization, and reforestation programs to reduce erosion, landslides, and downstream flood risk.
- Promote ecosystem-based disaster risk reduction (eco-DRR) measures alongside engineered solutions.
- Strengthen community-based natural resource management to ensure sustainability and ownership.

5. Strengthen governance and local capacity

- Establish district-level recovery units with trained staff and community representation.
- Build capacity of state and local institutions for risk-informed planning, procurement, and monitoring.
- Ensure transparent, participatory mechanisms for beneficiary targeting, grievance redress, and financial accountability.

Measurable Targets (Illustrative)

- **Service restoration:** 90% of primary health centres and schools functional within 9 months.
- **Infrastructure resilience:** 100% of repaired roads in priority corridors meet revised resilience design guidelines within 18 months.
- **Livelihoods:** 70% of affected farming households regain at least 80% of pre-disaster income within 12 months.

- **Environmental recovery:** 5,000 hectares of degraded watershed treated and stabilized within 24 months.
- **Governance:** Local disaster recovery units established in all affected districts within 6 months.

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SOCIAL SECTOR

3. HOUSING

3.1 Basic Profile of the Sector

Based on Census 2011 data, Himachal Pradesh had approximately 25.76 lakh houses distributed across its twelve districts. Given the population increase of 14.4% between 2011 and 2025, a comparable proportional increase in housing stock is anticipated. The 2011 census also indicates a spatial variation in construction materials: brick walls predominated in the lower hills, whereas stone walls were more common in middle and higher elevations. Slate Stone, and CGI Sheet roofing was notably prevalent in Mandi, Kullu, and Shimla districts. Additionally, in districts like Kangra and Hamirpur, a significant number of houses were constructed with mud walls and slate roofing, reflecting local material availability and traditional practices.

- **Masonry Buildings:** Most vernacular buildings in Himachal Pradesh are typically two-storeyed structures constructed with 450mm thick undressed or semi-dressed dry-stone masonry walls incorporating horizontal wooden members (Kath Kuni technique) placed alternately or after every two courses, well bonded at corners. This wood-stone interlacing imparts ductility to the otherwise rigid masonry walls. Roofs are composed of stone slabs supported by wooden rafters and purlins. This typology inherently satisfies key seismic safety requirements, including anchorage, bracing, and reliable connections between structural elements. Another observed vernacular typology during field surveys is the Dhajji wall system. Contemporary construction practices predominantly feature brick masonry walls laid in cement mortar with reinforced concrete (RCC) lintel bands. These structures are generally erected by migrant masons who arrive seasonally from other states and primarily employ brick masonry with cement mortar and RCC. Field assessments indicate frequent absence of essential seismic bands and presence of structurally vulnerable gable walls in these newer constructions. The traditional cadre of local masons skilled in indigenous construction techniques is rapidly diminishing due to limited demand for generational craftsmanship inherent to vernacular methods.
- **Reinforced Concrete Frame Buildings:** Most RCC-framed buildings were observed to incorporate seismic bands to some degree; however, key factors contributing to their collapse and extensive damage included sitting on geotechnically unstable slopes, improper structural connections, the inclusion of non-engineered elements, and inadequate development lengths of reinforcement. These RCC structures typically feature frames composed of beams and columns with infill walls made of burnt clay or concrete blocks. They range up to five to six stories in height and rest on isolated square footings measuring approximately 1.2 to 1.5 meters per side. A prevalent issue in many buildings was structural irregularity, which significantly increases vulnerability during seismic events and is a primary cause of failure.

3.2 Sectoral Policies

Himachal Pradesh has proactively developed housing policies to cater to its diverse population. The seminal Himachal Pradesh Housing and Urban Development Authority Act, 2004 established the framework for forming a Development Authority tasked with land planning, infrastructure development, and meeting housing needs across income groups. Various schemes under this Act mobilize public and private resources to promote housing colonies and ancillary infrastructure statewide.

However, enforcement challenges have intensified amid rapid urbanization and evolving socio-economic factors. Unauthorized construction has led to compromised building quality, land-use conflicts, and safety hazards. Rigorous enforcement of regulations alongside systematic audits is essential to uphold standards.

Currently, building bye-laws are not mandatory outside designated Town and Country Planning (TCP) zones, resulting in many rural residences lacking safety verifications. Building permits are often sought only for obtaining loans or accessing government benefits, reflecting a critical gap. A significant vulnerability in Himachal's housing sector arises from the absence of a comprehensive building permit system. Consequently, a thorough revision of existing bye-laws is necessary to incorporate multi-hazard resilience—especially addressing landslide and earthquake risks. Achieving compliance demands robust awareness programs and a participatory partnership between government authorities and local communities to foster adherence to safety norms. This strategic approach aims to strengthen housing safety, promote sustainable development, and mitigate disaster risk across Himachal Pradesh.

Many schemes driven by the state are currently running in Himachal, such as;

Swaran Jayanti Ashray Yojana:

The Swaran Jayanti Ashray Yojana is an initiative aimed at promoting affordable housing among the economically weaker sections of society in Himachal Pradesh. This scheme specifically targets permanent residents belonging to Scheduled Castes, Scheduled Tribes, and Other Backward Classes whose annual household income does not exceed ₹50,000. Under this program, eligible beneficiaries receive financial assistance to facilitate the construction of new houses, thereby improving their living conditions and promoting social equity within the state.

Housing Subsidy Scheme:

The Housing Subsidy Scheme provides fiscal incentives in the form of a subsidy amounting to ₹1,30,000 to individuals undertaking the construction of residential properties. This scheme prioritizes marginalized groups, including Scheduled Castes, Other Backward Classes, Minority Communities, single women heads of households, and persons with disabilities. The subsidy aims to reduce the financial burden of housing construction, enabling these disadvantaged groups to secure adequate shelter.

Mukhyamantri Awas Yojna (Himachal Pradesh Building and Other Construction Workers Welfare Board):

This scheme extends financial support of ₹1,50,000 to registered construction workers for the purpose of residential house construction. Administered by the Rural Development Department, the Mukhyamantri Awas Yojna seeks to uplift the standard of living of construction workers by assisting them in acquiring permanent housing. The assistance is contingent upon approval by the competent authority, ensuring proper utilization of funds towards housing development.

Mukhyamantri Vidwa Evam Ekal Naari Awas Yojana:

The Mukhyamantri Vidwa Evam Ekal Naari Awas Yojana was established to empower widows and single women who are economically disadvantaged and permanent residents of Himachal Pradesh. This scheme provides financial grants to facilitate the construction of residential houses, thereby promoting self-reliance and social security among these vulnerable groups. This initiative underscores the state's commitment to supporting women-led households and improving their socio-economic status through sustainable housing solutions.

Apart from these central government schemes such as Pradhan Mantri Awaas Yojna- (Rural and Urban) can be utilised for the house reconstruction.

3.3 Damages in the Sector

A meeting with the district administrations of all the four districts (Chamba, Kangra, Kullu, and Mandi) revealed that the building damages were caused by flash flood, land-subsidence and landslide in the hills. Many of the settlements next to the rivers suffered house and land loss and a part of the village got washed away by the flood and there is no scope for reclaiming such lands. The field inspection revealed that heavy boulders and debris had rolled down the slope and destroyed the buildings at lower level. A good number of buildings were standing precariously which were in highly vulnerable conditions posing a danger of collapse that would damage the buildings existing down the slope. Many of the buildings are completely drowned in mud. A number of buildings had listed badly and were beyond repair and retrofitting. They need demolition. In a congested place and being a highly landslide prone place, demolition also would be a challenge and would require expert human resources and equipment.

In Mandi, the area surrounding the Beas River had experienced massive flooding, with heavy debris flow resulting in severe damages to several houses, which were close to the riverbank or any small nallah. At a few of the locations, even a small nallah, carried huge amount of debris, which reached up to a floor height of 4-5m, drowning the houses and shops completely in mud. The boulders that they carried were huge and destroyed many houses completely. Many of the retaining walls used for flood protection on the riverbanks failed mainly because of 2 reasons; a.) No provision of scour protection, and b.) impact caused by heavy boulders; both these issues however could have been avoided if proper scour protection measures along with a sacrificial protection layer was provided in the flood protection walls. It is thus strongly recommended to utilise both in the reconstruction process, to avoid any such failure in the future.

In Kullu, a few houses were completely destroyed by the slope failure behind the houses. Life loss also occurred in these houses. In such conditions it is strongly recommended that prior to house reconstruction, such slopes must be stabilised. In both Kullu and Mandi districts, land subsidence issue was observed in several villages, verging them on the risk of failure. ***It is hence recommended to carry out detailed scientific study of such places across the state, and recommended measures must be adopted for safeguarding the life and property of the habitants***.

All this has made a huge impact on the education of the children, as several schools were damaged partially or completely, creating hindrances to education. A primary school in Kullu district was completely washed off by the landslide, and currently the school was running in a private home. It is thus suggested that immediate construction of makeshift schools can be done, as these are lightweight structures that are quick in construction, and can be shifted anywhere depending upon the requirements in near future.

Landslide and land subsidence incidents have been characterized as sporadic and localized in the majority of sites where structural damage or destruction of buildings has occurred. It is important to note that such phenomena may potentially manifest in any location in the event of excessive rainfall. In certain cases, buildings have remained intact due to their construction incorporating a degree of resilience; however, these structures remain vulnerable and may collapse in future occurrences of landslides.

Key contributing factors to landslide-induced damage include the unsafe siting of buildings and the obstruction of natural water flow. These elements exacerbate the risk and severity of landslide impacts on built environments. Additionally, while a segment of the affected population had secured insurance coverage for their buildings, a significant proportion had not, underscoring the need for increased awareness and uptake of risk mitigation measures such as insurance.

This assessment highlights the critical need for improved land-use planning, enforcement of construction standards that enhance resilience, and community sensitization to minimize future disaster risks linked to landslides and related geohazards.

Many areas visited during field visits were identified as landslide-prone to varying degrees, contingent upon the geological characteristics of the soil/rock, slope, and moisture content of the ground. It was observed that residents, particularly in urban localities, constructed their houses on unsafe land without adequate consideration for the slope of the soil. Non-compliance with established safety norms has emerged as a principal cause of building damage.

Although certain buildings incorporated elements of resilience in their construction, subsidence and sliding of the land have led to partial or total destruction. Numerous partially damaged structures are deemed retrofittable; however, retrofitting cannot proceed unless a specialised agency certifies that soil sliding or subsidence has ceased.

According to local inhabitants and government officials, including engineers, the root causes of these disasters include: (a) steep unprotected slopes; (b) excessive rainfall—typically one week of heavy rain renders the slope landslide-prone; and (c) blockage of natural water drainage systems.

Flooding along the banks of the Beas River caused extensive damage and destruction to buildings, precipitated by unprecedented rainfall over a brief period. Incidents of cloud bursts were reported in several locations. Villagers during community meetings at various places expressed need of flood protection walls, desilting of River basins to their actual riverbed level (removing just the debris that is accumulated due to recent floods and debris flow), and stabilisation of the slopes.

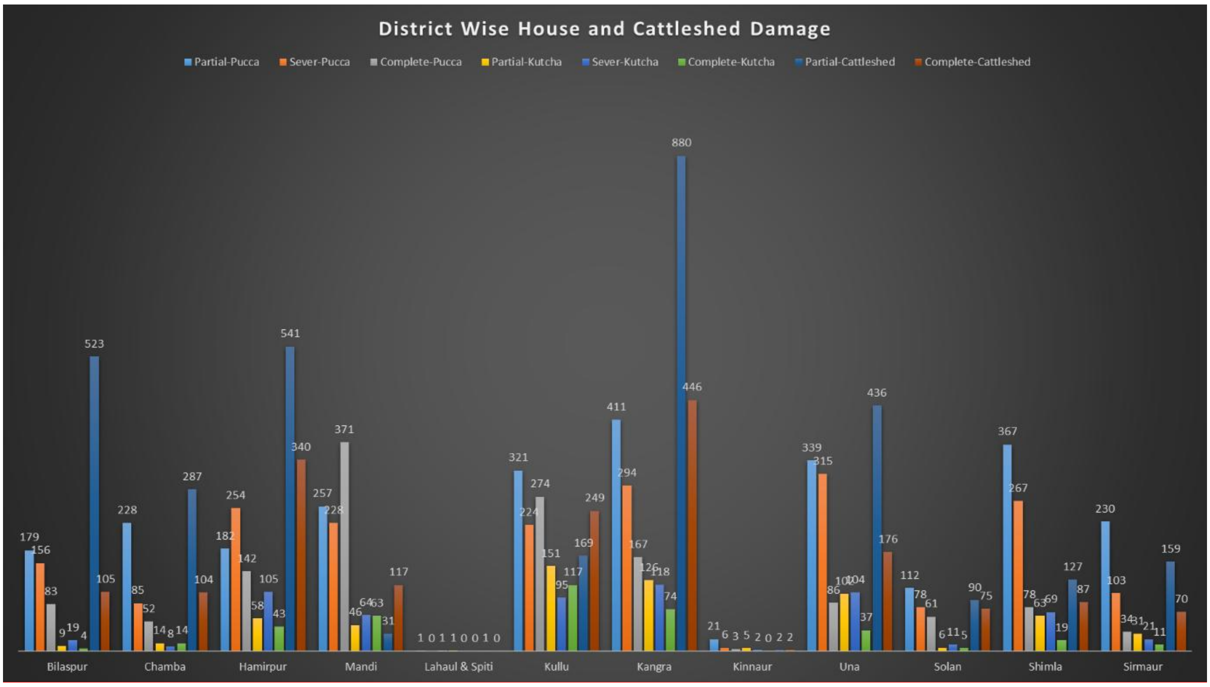
A detailed break up of house damages is shown below;

Pucca Houses - Totally Damaged, Severely, Partially Damaged

Kutcha Houses - Totally Damaged, Severely, Partially Damaged

(Overall Damage Numbers (Absolute Nos.)					
	District	Totally Damaged	Severely Damaged	Partially damaged	Total
Pucca House	Bilaspur	83	156	179	418
	Chamba	52	85	228	365
	Hamirpur	142	254	182	578
	Mandi	371	228	257	856
	Lahaul & Spiti	1	0	1	2
	Kullu	274	224	321	819
	Kangra	167	294	411	872
	Kinnaur	3	6	21	30
	Una	86	315	339	740
	Solan	61	78	112	251
	Shimla	78	267	367	712
	Sirmaur	34	103	230	367
Sub-Total		**1352**	**2010**	**2648**	**6010**
Kutcha/ Hut	Bilaspur	4	19	9	32
	Chamba	14	8	14	36
	Hamirpur	43	105	58	206
	Mandi	63	64	46	173
	Lahaul & Spiti	0	0	1	1
	Kullu	117	95	151	363

	Kangra	74	118	126	318
	Kinnaur	0	2	5	7
	Una	37	104	102	243
	Solan	5	11	6	22
	Shimla	19	69	63	151
	Sirmaur	11	21	31	63
Sub-total		**387**	**616**	**612**	**1615**



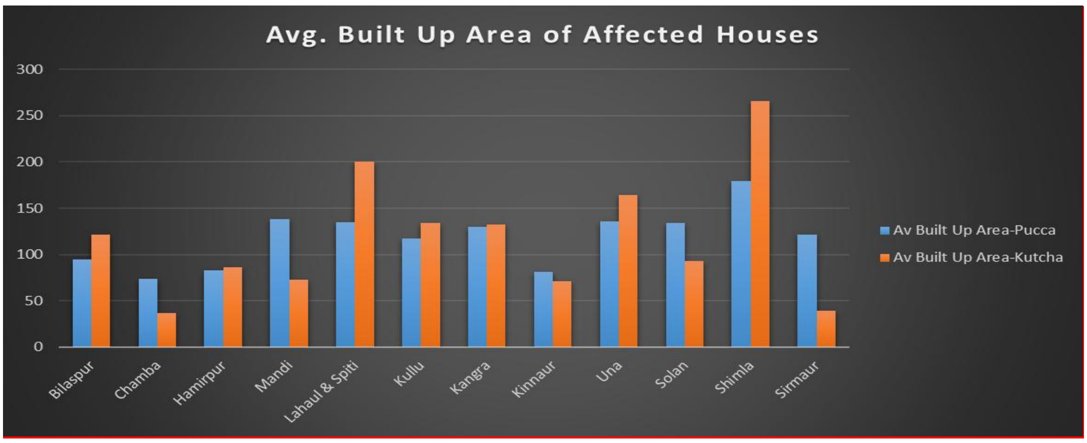
District	Avg. Built Up Area of Affected Houses		
	Pucca+Vernacular		
	Total HHs	**Total Built Up Area**	**Avg. Built Up Area**
Bilaspur	418	39628	94.80382775
Chamba	365	27003	73.98082192
Hamirpur	578	47996	83.03806228
Mandi	856	118505	138.4404206
Lahaul & Spiti	2	270	135
Kullu	819	95678	116.8229548
Kangra	872	112963	129.5447248
Kinnaur	30	2427	80.9
Una	740	100658	136.0243243
Solan	251	33638	134.0159363

Shimla	712	127453	179.0070225
Sirmaur	367	44628	121.6021798
Total	**6010**	**750847**	**124.93**

District	**Avg. Built Up Area of Affected Houses**		
	Kutcha/Hut		
	Total HHs	**Total Built Up Area**	**Avg. Built Up Area**
Bilaspur	32	3876	121.125
Chamba	36	1334	37.05555556
Hamirpur	206	17698	85.91262136
Mandi	173	12520	72.3699422
Lahaul & Spiti	1	200	200
Kullu	363	48696	134.1487603
Kangra	318	42099	132.3867925
Kinnaur	7	500	71.42857143
Una	243	39982	164.5349794
Solan	22	2049	93.13636364
Shimla	151	40152	265.9072848
Sirmaur	63	2456	38.98412698
Total	**1615**	**211562**	**131.00**

Summary of Damage to Houses:

House Type	Totally Damaged	Severely Damaged	Partly Damaged	Total HHs
Pucca Houses	**1352**	**2010**	**2648**	**6010**
Kutcha Houses & Huts	**387**	**616**	**612**	**1615**
Total	**1739**	**2626**	**3260**	**7625**



3.4 Economic Losses in the Sector

The housing sector is severely affected due to the recent disaster in the state. Since, house is one of the basic needs of any individual, it is linked to various other aspects of the lives of the HHs. An impact in the housing sector affects an individual not just on a financial and physical level, but it creates a deep psychological impact on his/her life. Though psychological loss cannot be quantified, the other losses in quantifiable term are as follows:

Rental Loss:

Many families displaced by the destruction of their homes are currently residing temporarily with relatives or in spaces offered by neighbours, or in some rented accommodation. Rental costs vary across locations, ranging from ₹3,000 to ₹5,000 per month. Assuming an 18-month recovery period, the estimated additional financial burden on a family, at an average rent of ₹4,000 per month, amounts to approximately ₹72,000. Therefore, an amount of 72,000 for totally damaged, and 60,000 for one year period may be considered for severely damaged houses. This is: (1739 totally damaged x 72000) + 2626 severely damaged x 60000) = **28.276 crores**

Several affected households operated various shops at ground level, with daily earnings previously averaging between ₹1,500 and ₹3,500. Due to the disaster, income has plummeted to almost nil now, reflecting an average daily loss of approximately ₹2,000 per household. Flooding along the banks of the rivers has severely impacted the lives and livelihoods of the local population, particularly vulnerable groups residing near the river. Their homes have been inundated with debris, and personal belongings—including essential items such as beds, utensils, gas stoves, and cylinders—have been swept away.

The government has provided financial assistance of ₹15,000 per family as compensation for lost belongings such as utensils, clothing and other household goods. This calculates to, for 3362 HHs, a **loss of 6.55 crores**. With many houses rendered non habitable, affected families rely on single-room rentals for shelter. In Mandi, several houses and shops suffered significant damage due to silt accumulation on the ground as well as 1st floor. Owners and tenants occupying the ground and first floors lost their possessions and were forced to vacate their residences. Each tenant received ₹50,000 and owners ₹70,000 in compensation for loss of their belongings as per the special relief package of govt. of Himachal Pradesh.

Other losses by way of shifting to new place, loss economic income through rentals, immediate loss due to kitchen garden etc can be kept at an average of 4,000 per family of totally damaged houses, and 2,000 for severely damaged houses. This comes to 69.56 lakhs + 52.52 lakhs = **1.22 crores.**

Loss of employment

Most of the damaged houses have suffered a loss of about a month's time of work over the period of three months with a loss of Rs 600 per day, which amounts to, at an average of 20 working days, Rs. 12,000 x 2 HH members = Rs 24,000/HH, considering a total HHs of 7625 (including total no. of HHs damage), this amounts to Rs. 18.3 Crores for one month. Considering the extended period of rains and damages, an average of 1 month period may be held as unproductive, and therefore a total employment related wage loss may be held as **36.6 crores**

Temporary Shelter: Key Priorities

With winter approaching, approximately 5,000 displaced households urgently need temporary shelter. Most are currently staying with relatives or in rentals, but these are short-term solutions.

Recommendations:

Location: Build temporary shelters on safe, stable land. For those who lost land, place shelters near relocation sites to maintain access to livelihoods (especially orchards). Ensure all sites have basic amenities (water, sanitation, electricity, access roads).

Shelter Type: Promote the construction of semi-permanent, upgradable shelters. A 25 sq. m. semi-pucca unit with basic WASH facilities can be built for approximately ₹2.6 lakh.

Implementation: Adopt an owner-driven model, providing direct financial assistance to affected families. This aligns with community preference, ensures speed, and empowers homeowners.

Safety First: No permanent reconstruction should begin until land stability is confirmed by qualified engineers. For partially damaged houses, retrofitting to a safe, basic standard (2 rooms, toilet, veranda) is the first priority.

Debris

Majority of the debris could be attributed to the landslide and by the flood and flash flood/cloud burst. It is difficult to quantify the debris. A multi-departmental team would calculate the volume of the debris. The stones brought by the debris can be stacked and utilised for reconstruction purpose, but it is suggested that the stones should be used in the form of Stone blocks. Simultaneously the waste generated from the damaged or collapsed building may also be assessed and utilised for the reconstruction purpose. It is also advised that proper care must be taken while demolishing an inhabitable building such that it should not affect nearby structures or the slope itself, the state government or SDMA may issue a SoP regarding the same consulting any State or Central Govt. body having specialisation in building demolition. The number of totally destroyed houses is 1739. Based on the type of structure found during the field visits, it may be assumed that a volume of approximately 2.1 cum per sqm of plan area per floor would be the debris from the collapsed buildings. Therefore, 1352 totally destroyed Pucca buildings (@ 125 sqm) would result in 3.55 lakh cum of debris. At an average rate of Rs. 1,000 per cum for clearance as per the PWD rates, this is an additional loss **of 35.5 crores.**

Post-disaster waste in Himachal Pradesh primarily consists of timber, doors, windows, roof trusses, vegetation, rocks, mud, soil, bricks, and stones. Approximately 30% of the construction and demolition waste generated from damaged buildings has the potential to be recycled, thereby reducing the volume of debris requiring disposal and mitigating adverse environmental impacts.

Local unskilled workers, including affected house owners, can play a significant role in debris management, facilitating community involvement and supporting livelihood restoration. In the selection, adaptation, and development of reconstruction technologies, priority should be given to maximising the use of recycled construction materials. This approach is expected to minimise the need for debris disposal and lessen negative environmental consequences.

When estimating the unit cost of debris management per building, the calculation should encompass the expenses associated with demolition equipment, human resources, transportation, and safe disposal or recycling processes. Additionally, the overall management costs, including fees for engaging demolition experts, must be integrated into the comprehensive cost assessment of debris clearance and management activities.

The calculation of loss under housing has been based on the data supplied by the district officials.

Loss due to the disaster in Districts

- **Rental Loss:** ₹28.28 crore (for totally and severely damaged houses)
- **Loss of Belongings:** ₹6.55 crore (compensation for lost household goods)
- **Miscellaneous Losses:** ₹1.22 crore (relocation, loss of kitchen gardens, etc.)
- **Employment Loss:** ₹36.6 crore (wage loss for affected households)
- **Debris Clearance:** ₹35.5 crore (at ₹1,000 per cubic metre for 3.55 lakh cubic metres)

Housing Sector: Damages & Losses Summary

Category	Description	Amount (₹ Crore)	Notes
Damages	Physical destruction of houses (pucca, kutcha), huts, cattle sheds, etc.	1,146.75	Includes totally, severely, and partially damaged houses and related structures.
Losses	Economic losses (rental loss, belongings, employment, debris clearance, etc.)	67.53	Includes rental loss, loss of belongings, employment loss, and debris clearance costs.

3.5 Socio-Economic Impact on People.

- **Impact on Sector Goals**

The recent disaster in Himachal Pradesh has caused widespread destruction of residential assets across 12 districts, necessitating the reconstruction, repair, and retrofitting of approximately 9132 housing units, including cattle sheds and huts. This situation has led to a significant surge in demand for construction materials such as cement, steel, aggregates, and bricks, as well as skilled labour including masons, carpenters, electricians, and plumbers. This intensified demand is expected to strain current supply chains and workforce capacities at the district level, leading to systemic constraints.

This surge will likely impact ongoing housing schemes like Pradhan Mantri Awas Yojana–Gramin (PMAY-G) and Pradhan Mantri Awas Yojana–Urban (PMAY-U), along with private residential construction activities. Resource diversion could cause delays, increased costs, and potential compromises in construction quality across both public and private sectors. Meanwhile, many displaced households—especially vulnerable groups comprising the elderly, women, and children—remain in temporary shelters, confronting challenges related to health, safety, privacy, and access to essential services.

From a socio-economic perspective, such post-disaster reconstruction efforts not only demand increased material and labour inputs but also bear significant systemic and community-level impacts. These include disruptions in local economies and government programs, pressures on supply chains and labour markets, and the need for comprehensive planning to address these bottlenecks. Owner-driven reconstruction and community involvement, particularly engaging local skilled labour, can accelerate recovery and optimize resource use.

In light of these factors, strategic and phased implementation of housing recovery, augmented by resource mobilization and capacity building at the district level, is crucial to ensure timely, resilient, and quality reconstruction. Special attention is required to safeguard vulnerable populations displaced by the disaster to mitigate multidimensional socio-economic impacts during the recovery phase.

- **Impact on People**

The social implications of the recent disaster in Himachal Pradesh are profound and multifaceted, deeply affecting the wellbeing of homeowners and tenants alike. Affected families are experiencing distress due to the threat to their properties and ongoing disruptions to their daily lives and livelihoods. Timely government intervention is critical to provide techno-managerial support directly to the affected households, which would help alleviate their anxieties and restore a sense of security.

Vulnerable groups, particularly widows and children, face some of the most severe challenges. The loss of property and possessions has undermined their financial stability, limiting their ability to meet basic needs and trap them in a cycle of poverty and displacement. The emotional and psychological trauma of losing homes exacerbates their hardships. Immediate needs expressed by these populations include:

- Safe shelter located away from flood- and landslide-prone zones

- Facilitation of livelihood restoration and support
- Necessary assistance to rebuild homes and recover lives

Urgent provision of safe and adequate temporary shelters is essential. Partnering with local NGOs and specialised disaster relief agencies can enhance responsiveness to housing needs. Additionally, exploring avenues for livelihood support, skill development, and employment generation is necessary to help affected families regain self-sufficiency and stability.

The disaster also caused a temporary disruption in children's education, which has since been resumed. Damage to cattle sheds has impacted daily life due to dependence on milk and milk products, while many home-based income activities have suffered setbacks. Village-level reports highlight that many affected households had taken loans (such as Kisan Credit Card loans averaging Rs. 1 lakh) for orchard maintenance and fruit plucking, loans which are now difficult to repay due to losses inflicted by the disaster.

Overall, to break the cycle of distress and vulnerability, a holistic approach combining secure housing, livelihood restoration, financial support, and psychosocial care is essential for the long-term recovery and resilience of affected households in Himachal Pradesh.

Key Risks & Required Actions

Current rebuilding practices are increasing disaster risk, as people are repairing and living in unsafe, damaged homes on unstable slopes. This is exacerbated by a lack of mason training, public awareness, and the use of non-resilient construction techniques.

Critical Recommendations:

1. Conduct Scientific Slope Analysis: The State Disaster Management Authority (SDMA) must collaborate with specialized agencies to conduct detailed 3D slope stability analyses for major towns to guide future planning and identify critical sinking zones.

2. Mandate Safe Construction Standards:

- **Promote Confined Masonry:** Shift from vulnerable RCC frames to confined masonry using local materials (stone, mud blocks) for better resilience and local economic generation.
- **Enforce Technical Codes:** Use only mechanical woven gabions (conforming to IS 16014) for retaining walls and ensure proper drainage behind them to prevent failures.
- **Encourage Lightweight Construction:** Advocate for makeshift/lightweight construction to reduce dead load on fragile slopes.

3. Launch Massive Training & Awareness Drives:

- Train local masons, carpenters, engineers, and contractors on multi-hazard resilient construction (earthquake, landslide, flood).
- Run public awareness campaigns on disaster safety and the dangers of building on unsafe slopes.

4. Ensure Emergency Power: Establish micro-grids or alternative power sources for lifeline buildings (e.g., hospitals, shelters) in each block to maintain electricity during disasters.

3.6 Response by the Government

The State government has responded well in the recent disasters. Role of SDMA, SDRF, and district administration in this is commendable. Block level, relief shelters were created. Immediate support as per NDRF/SDRF guidelines and special relief package were provided to the affected families. Restoration of mobile networks, roads, electricity and water lines were made on a war footing basis.

The model of constructing Mini Secretariat constructed on a stable ground worked really well, which helped in providing accommodation to affected families, and formulation of control center & store. More such constructions may help the state in future.

3.7 Reconstruction and Recovery Needs Assessment

A total of 12,642 houses, huts and cattle sheds have been affected by the present disaster. Out of that, 1352 destroyed/damaged structures, 387 huts and 1771 cattle sheds need reconstruction. A total of 9,132 houses/cattle shed need repair/ retrofitting. It is important to note that the retrofitting of the partially damaged houses and the reconstruction must be in line with BBB principles to enhance their resilience against not just the present hazards, but also other hazards such as earthquakes. There are several cases of land loss in the twelve affected districts. The following Tables show the recovery needs in Himachal Pradesh due to the present disaster.

	Damage Type	Nos
Reconstruction	**Kutcha houses** > 70% damage or totally destroyed-Covered Area @ 131sqm	387
	Pucca houses > 70% damage or totally destroyed-Covered Area @125 sqm	1352
	Cattle Sheds >70% or totally destroyed	1,771
Repair/Retrofitting	**Kutcha** house >30%<70% damage- Covered Area 131 sqm	616
	Kutcha house <30% damage- Covered Area 131 sqm	612
	Pucca house >30%<70% damage- Covered Area 125 sqm	2010
	Pucca house <30% damage- Covered Area 125 sqm	2,648
	Cattle Shed <30% damage	3,246

Wash	Septic Tank- destroyed	134

3.8 Reconstruction Cost Estimates

The costing has been worked out as per rates of HIMUDA 2023. The cost of Kutcha house construction has been considered @50% of the Pucca reconstruction cost, the details are as follows;

Costing As per HIMUDA-2023	
HOUSING CONSTRUCTION BY OWNER	RS/SQM
Basic Cost of Construction	25000
Water Supply and Sanitary Installation 12.5%	3125

Internal Electrical Installation 12.5%	3125
Site Development 5%	1250
Add 1% Labour Cess	250
Add 1% Quality Control	250
Add 3% Contingency	750
Total Unit Cost of Reconstruction Rs/Sqm	**33750**
Damage Cost 18% Less on Basic Cost of Construction for Lack of Resilient Features	**27675**

Districts	**Pucca House, Area - Like for Like**			**Kutcha, Area Like for Like**			**Cattle shed**		
	Unit cost Rs/sqm	**Area (sqm)**	**Cost/ house**	**Unit cost Rs/sqm**	**Area (sqm)**	**Cost/ house**			**Cost/Cattle shed**
Damage cost	27,675.00	125	34,59,375.00	13,837.50	131	18,12,712.50	AS PER NDMA GUIDELINES		70,000.00

District	**Damage (Avg. Area of 125 sqm)**		
	Pucca+Vernacular Partial	**Cost/HHs**	**Amount**
Bilaspur	179	6,91,875.00	12,38,45,625.00
Chamba	228		15,77,47,500.00
Hamirpur	182		12,59,21,250.00
Mandi	257		17,78,11,875.00
Lahaul & Spiti	1		6,91,875.00
Kullu	321		22,20,91,875.00
Kangra	411		28,43,60,625.00
Kinnaur	21		1,45,29,375.00
Una	339		23,45,45,625.00
Solan	112		7,74,90,000.00
Shimla	367		25,39,18,125.00
Sirmaur	230		15,91,31,250.00
Total	**2648**		**1,83,20,85,000.00**

District	**Damage (Avg. Area of 125 sqm)**		
	Pucca+Vernacular	**Cost/HHs**	**Amount**

	Severely damaged		
Bilaspur	156	17,29,687.50	26,98,31,250.00
Chamba	85		14,70,23,437.50
Hamirpur	254		43,93,40,625.00
Mandi	228		39,43,68,750.00
Lahaul & Spiti	0		-
Kullu	224		38,74,50,000.00
Kangra	294		50,85,28,125.00
Kinnaur	6		1,03,78,125.00
Una	315		54,48,51,562.50
Solan	78		13,49,15,625.00
Shimla	267		46,18,26,562.50
Sirmaur	103		17,81,57,812.50
Total	**2010**		**3,47,66,71,875.00**

District	Damage (Avg. Area of 125 sqm)		
	Pucca+Vernacular Complete	Cost/HHs	Amount
Bilaspur	83	34,59,375.00	28,71,28,125.00
Chamba	52		17,98,87,500.00
Hamirpur	142		49,12,31,250.00
Mandi	371		1,28,34,28,125.00
Lahaul & Spiti	1		34,59,375.00
Kullu	274		94,78,68,750.00
Kangra	167		57,77,15,625.00
Kinnaur	3		1,03,78,125.00
Una	86		29,75,06,250.00
Solan	61		21,10,21,875.00
Shimla	78		26,98,31,250.00
Sirmaur	34		11,76,18,750.00
Total	**1352**		**4,67,70,75,000.00**

District	Damage (Avg. Area of 131 sqm)		
	Kutcha/Hut Partial	Cost/HHs	Amount
Bilaspur	9	3,62,542.50	32,62,882.50
Chamba	14		50,75,595.00
Hamirpur	58		2,10,27,465.00
Mandi	46		1,66,76,955.00
Lahaul & Spiti	1		3,62,542.50
Kullu	151		5,47,43,917.50
Kangra	126		4,56,80,355.00
Kinnaur	5		18,12,712.50
Una	102		3,69,79,335.00
Solan	6		21,75,255.00
Shimla	63		2,28,40,177.50
Sirmaur	31		1,12,38,817.50
Total	**612**		**22,18,76,010.00**

District	Damage (Avg. Area of 131 sqm)

	Kutcha/Hut Severely Damaged	Cost/HHs	Amount
Bilaspur	19	9,06,356.25	1,72,20,768.75
Chamba	8		72,50,850.00
Hamirpur	105		9,51,67,406.25
Mandi	64		5,80,06,800.00
Lahaul & Spiti	0		-
Kullu	95		8,61,03,843.75
Kangra	118		10,69,50,037.50
Kinnaur	2		18,12,712.50
Una	104		9,42,61,050.00
Solan	11		99,69,918.75
Shimla	69		6,25,38,581.25
Sirmaur	21		1,90,33,481.25
Total	**616**		**55,83,15,450.00**

District	Damage (Avg. Area of 131 sqm)		
	Kutcha/Hut Complete Damage	Cost/HHs	Amount
Bilaspur	4	18,12,712.50	72,50,850.00
Chamba	14		2,53,77,975.00
Hamirpur	43		7,79,46,637.50
Mandi	63		11,42,00,887.50
Lahaul & Spiti	0		-
Kullu	117		21,20,87,362.50
Kangra	74		13,41,40,725.00
Kinnaur	0		-
Una	37		6,70,70,362.50
Solan	5		90,63,562.50
Shimla	19		3,44,41,537.50
Sirmaur	11		1,99,39,837.50
Total	**387**		**70,15,19,737.50**

Overall Damage Cost Estimate

District	Kutcha/Hut			
	Partial	Severe damage	Complete damage	Total
Bilaspur	32,62,882.50	1,72,20,768.75	72,50,850.00	2,77,34,501.25
Chamba	50,75,595.00	72,50,850.00	2,53,77,975.00	3,77,04,420.00
Hamirpur	2,10,27,465.00	9,51,67,406.25	7,79,46,637.50	19,41,41,508.75
Mandi	1,66,76,955.00	5,80,06,800.00	11,42,00,887.50	18,88,84,642.50
Lahaul & Spiti	3,62,542.50	-	-	3,62,542.50
Kullu	5,47,43,917.50	8,61,03,843.75	21,20,87,362.50	35,29,35,123.75
Kangra	4,56,80,355.00	10,69,50,037.50	13,41,40,725.00	28,67,71,117.50
Kinnaur	18,12,712.50	18,12,712.50	-	36,25,425.00
Una	3,69,79,335.00	9,42,61,050.00	6,70,70,362.50	19,83,10,747.50
Solan	21,75,255.00	99,69,918.75	90,63,562.50	2,12,08,736.25
Shimla	2,28,40,177.50	6,25,38,581.25	3,44,41,537.50	11,98,20,296.25
Sirmaur	1,12,38,817.50	1,90,33,481.25	1,99,39,837.50	5,02,12,136.25
Total	22,18,76,010.00	55,83,15,450.00	70,15,19,737.50	1,48,17,11,197.50

District	Pucca+Vernacular(Damage Amount in Rs.)			
	Partial	Sever	Complete	Total (Rs.)
Bilaspur	12,38,45,625.00	26,98,31,250.00	28,71,28,125.00	68,08,05,000.00
Chamba	15,77,47,500.00	14,70,23,437.50	17,98,87,500.00	48,46,58,437.50
Hamirpur	12,59,21,250.00	43,93,40,625.00	49,12,31,250.00	1,05,64,93,125.00
Mandi	17,78,11,875.00	39,43,68,750.00	1,28,34,28,125.00	1,85,56,08,750.00
Lahaul & Spiti	6,91,875.00	-	34,59,375.00	41,51,250.00
Kullu	22,20,91,875.00	38,74,50,000.00	94,78,68,750.00	1,55,74,10,625.00
Kangra	28,43,60,625.00	50,85,28,125.00	57,77,15,625.00	1,37,06,04,375.00
Kinnaur	1,45,29,375.00	1,03,78,125.00	1,03,78,125.00	3,52,85,625.00
Una	23,45,45,625.00	54,48,51,562.50	29,75,06,250.00	1,07,69,03,437.50
Solan	7,74,90,000.00	13,49,15,625.00	21,10,21,875.00	42,34,27,500.00
Shimla	25,39,18,125.00	46,18,26,562.50	26,98,31,250.00	98,55,75,937.50
Sirmaur	15,91,31,250.00	17,81,57,812.50	11,76,18,750.00	45,49,07,812.50
Total	1,83,20,85,000.00	3,47,66,71,875.00	4,67,70,75,000.00	9,98,58,31,875.00

Total HHs Damage (in Cr.)	Kutcha/Hut (in Cr.)	Pucca+Vernacular (in Cr.)
1,146.75	**148.17**	**998.58**

Housing Sector: Damages & Losses Summary

The housing sector in Himachal Pradesh suffered extensive damages and losses during the 2025 disaster. A total of 7,625 houses (both pucca and kutcha) were affected, with 1,739 totally damaged, 2,626 severely damaged, and 3,260 partially damaged. The financial impact is significant: the total damages (physical destruction of houses, huts, and cattle sheds) are estimated at ₹1,146.75 crore, while economic losses—including rental loss, loss of belongings, employment loss, and debris clearance—amount to ₹67.53 crore. The combined quantifiable damages and losses in the housing sector exceed ₹1,214 crore, highlighting the severe impact on residential infrastructure and the urgent need for resilient reconstruction and recovery efforts

Category	Description	Amount (₹ Crore)	Notes
Damages	Physical destruction of houses (pucca, kutcha), huts, cattle sheds, etc.	1,146.75	Includes totally, severely, and partially damaged houses and related structures.

Losses	Economic losses (rental loss, belongings, employment, debris clearance, etc.)	67.53	Includes rental loss, loss of belongings, employment loss, and debris clearance costs.

Breakdown of Losses:

- **Rental Loss:** ₹28.28 crore (for totally and severely damaged houses)
- **Loss of Belongings:** ₹6.55 crore (compensation for lost household goods)
- **Miscellaneous Losses:** ₹1.22 crore (relocation, loss of kitchen gardens, etc.)
- **Employment Loss:** ₹36.6 crore (wage loss for affected households)
- **Debris Clearance:** ₹35.5 crore (at ₹1,000 per cubic metre for 3.55 lakh cubic metres)

Note: Some losses overlap in reporting, but the total quantifiable damages and losses in the housing sector exceed ₹1,214 crore.

RECOVERY ESTIMATION

Sl No	DAMAGE TO HOUSES	Nos	Cost/ Housing Unit- INR	Amount (Crore INR)
1	**Kutcha houses** > 70% damage or totally destroyed-Covered Area @ 131sqm	387	18,12,712.50	70.15
2	**Pucca houses** > 70% damage or totally destroyed-Covered Area @125 sqm	1352	34,59,375.00	467.71
3	**Cattle Sheds >70% or totally destroyed**	1,771	1,00,000.00	17.71
4	**Kutcha** house >30%<70% damage- Covered Area 131 sqm	616	9,06,356.25	55.83
5	**Kutcha** house <30% damage- Covered Area 131 sqm	612	3,62,542.50	22.19
6	**Pucca house** >30%<70% damage- Covered Area 125 sqm	2010	17,29,687.50	347.67
7	**Pucca house** <30% damage- Covered Area 125 sqm	2,648	6,91,875.00	183.21
8	**Cattle Shed** <30% damage	3,246	20,000.00	6.49
9	Retaining wall at plot level to protect the house	-----	Costing included in other sector	
10	Land lost due to flood/landslide	------	State to include the land cost	

11	Septic Tank- destroyed	134	75,000	1.01
	TOTAL COST OF RECONSTRUCTION			**1,171.96**

3.9 Impact of Recovery

The reconstruction, repair, and retrofitting of houses, huts, and cattle sheds in the twelve districts of Himachal Pradesh will have multifaceted impacts on people, the environment, and overall human living conditions over the next 18 to 24 months. This policy outlines the anticipated effects of recovery interventions on critical sectors including building materials, livelihoods, environmental sustainability, gender inclusion, and disaster risk reduction (DRR). The primary objective is to utilize the recovery process to maximize environmental and social benefits, thereby fostering a resilient and sustainable future for Himachal Pradesh.

- **Impact of Recovery on Building Materials and Skills**

The landslide has caused extensive damage resulting in a substantial demand for construction materials required to reconstruct, repair, and retrofit houses within a limited timeframe. Effective planning and management of material supply are critical to avoid challenges during the post-disaster recovery phase. Reconstructing thousands of destroyed buildings will necessitate crores of bricks along with corresponding quantities of cement, steel, sand, and aggregates. Including repair and retrofitting of huts and cattle sheds, the quantities required will increase significantly. Given the 18-month recovery timeline, it is imperative to prepare robust plans at the Tehsil level promptly to facilitate timely commencement of reconstruction activities. Exploring alternative materials, such as stones sourced from debris, should be actively considered.

- **Impact of Recovery on Livelihood and Employment**

While the landslide has been a destructive event, the recovery process presents an opportunity to create diverse livelihood options for affected communities. Substantial employment will be generated for both skilled masons and unskilled labourers. Concurrently, opportunities for skill enhancement will be offered through training programs such as the BBB initiative. Activities like sorting stone blocks from debris will generate significant employment and contribute to reduced reliance on energy-intensive materials like bricks and cement. Adoption of labour-intensive reconstruction technologies utilizing local materials will further augment employment opportunities and skill development beyond the recovery period.

- **Impact of Recovery on the Environment**

Although reconstruction, repair, and retrofitting efforts contribute positively toward resilient housing and local employment generation, the use of materials such as bricks, cement, and steel presents environmental concerns. For example, the production of crores of bricks will contribute substantially to CO_2 emissions, excluding emissions from transportation. It is essential that reconstruction follows green design principles and employs climate-resilient technologies that mitigate environmental impacts. Emphasizing the use of local materials, modernized vernacular construction methods, and confined masonry techniques will minimize ecological footprints. Himachal Pradesh is encouraged to reinforce this environmentally sustainable approach through the promotion of BBB features.

- **Gender, Social Inclusion, and Disaster Risk Reduction**

Field assessments have identified several women-headed households living in vulnerable conditions, which must be prioritized within the recovery framework. Persons with disabilities are also disproportionately impacted and require targeted support. These groups will be provided with enhanced technical and financial assistance from the government to facilitate housing reconstruction. Implementing safe settlement planning, strengthening building byelaws and permit systems, and promoting awareness and capacity building among communities and construction workers will enhance overall resilience. The formation of women's self-help groups (SHGs) for supervision and quality control during reconstruction will empower women and provide opportunities for livelihood diversification through skill development.

3.10 Implementation mechanism

Urgent action is needed to relocate hundreds of households from unsafe, landslide-prone areas before winter. Past relocation efforts failed due to lack of community participation.

Therefore, the recovery must be community-centric, involving locals and experts in site selection and housing design. Plans must align with local livelihoods (like orchards and tourism) and undergo environmental and social impact assessments.

Key Approaches:

- **Execution:** A dedicated task force is required for this mission-mode operation.
- **Method:** Primarily use Owner-Driven Reconstruction, encouraging confined masonry with local materials (stone, mud) following "Build Back Better" (BBB) principles.
- **Support:** Provide strong technical and managerial support for resilient, cost-effective construction.
- **Priority:** Integrate vulnerable groups (women-headed households, persons with disabilities, the elderly) in the initial phases.

The focus is on building back better with local materials while generating local skilled manpower.

- **Role of Line Departments**

Effective coordination among all government construction departments is essential for the procurement of materials and skilled masons necessary for reconstruction activities. To strengthen disaster risk reduction (DRR) capacities, it is imperative that departmental staff undergo regular training programs.

For efficient monitoring and control, an adequate number of personnel should be assigned with clearly defined roles and responsibilities. In this context, the establishment of twelve NIrmithi Kendras across the twelve districts is recommended. These NIrmithi Kendras will aid local homeowners in developing designs, sourcing materials, and ensuring quality control. Local NGOs may be contracted on a time-bound basis to manage these centers.

The involvement of young, educated block level officials is crucial for conducting accurate building damage assessments. However, currently, their lack of formal training in damage assessment limits quality. Providing specialized training to these will significantly improve assessment accuracy. Junior Engineers (JEs) must be included as essential members of the assessment teams.

While reinforced cement concrete (RCC) framed structures are increasingly preferred in the state, especially for multi-storey buildings, government policy should actively promote the use of confined masonry and upgraded traditional Kath Koni architecture. These techniques are cost-effective, resilient, and environmentally sustainable.

- **Building Back Better**

In Himachal Pradesh, all reconstruction, repair, and retrofitting activities must ensure multi-hazard safety, addressing not only landslides and floods but also seismic risks corresponding to Zones IV and V. Recovery initiatives should be integrated with disaster risk reduction (DRR) measures. Within the recovery programme, retrofitted houses will serve as demonstrative models of resilience, aimed at educating and motivating communities. The overarching goal is to embed a culture of resilience into everyday life and practice, ensuring Himachal's preparedness for future hazards.

Key actions to achieve this objective include:

- Utilising local materials/lightweight/makeshift construction.
- Generation of skilled manpower and resources
- Identification and stabilisation of slope through proper scientific study and engineered solutions such as retaining walls, soil nailing, drainage control, and vegetation management.
- Establishing effective waste management systems to prevent indiscriminate disposal of kitchen and domestic waste on land.
- Enforcing regulatory measures to restrict construction activities in identified flood-prone zones, particularly along riverbanks.
- Investing in comprehensive flood control infrastructure, including river embankments, floodwalls, and enhanced drainage networks.

These measures collectively contribute to building a safer and more resilient Himachal Pradesh, reducing disaster vulnerability, and fostering sustainable development.

- **Proposed Economic and Technical Arrangements for Reconstruction**

The District Magistrate's office shall serve as the nodal agency overseeing all reconstruction activities under the recovery programme.

- Affected households will receive comprehensive techno-managerial support directly at their doorstep for reconstruction, repair, and retrofitting interventions. This support will be facilitated through Nirmithi Kendras, coordinated by the Deputy Commissioner's office.
- The Nirmithi Kendras will provide timely information to households regarding ongoing government schemes, including financial assistance, sanitation facilities, drinking water, and solar lighting programmes. This initiative aims to empower citizens with knowledge about their entitlements and promote informed participation in the recovery process.

Funding Mechanism

In the post-disaster context of Himachal Pradesh, the efficient and timely disbursement of adequate financial assistance is critical for the successful execution of housing reconstruction activities. Funding sources include government grants, loans, and other financial instruments such as revolving funds.

Key challenges in housing recovery include:

- Insufficiency of government grants to cover the cost of basic housing construction.
- Limited or depleted household savings, which are often exhausted on immediate needs such as food, shelter, and medical care after the disaster.
- Outstanding loans, including those under schemes such as Kisan Credit Cards, adding to the financial burden.

- Construction in river basin gets washed away during floods, leaving the person landless.
- People residing in sinking zones need to be relocated but the problem in relocation include problems related to livelihood also.

Particularly vulnerable are poor and marginalised households, who may lack collateral, regular income, or formal guarantees required by banking institutions to access credit. A comprehensive funding plan must be developed, reflecting the requirements of banking and financial institutions (BFIs) alongside the socio-economic realities of affected households. This may necessitate amendments to existing policies to facilitate lending.

To mitigate risks of fund misuse and diversion, preventive and socially appropriate measures should be implemented during planning. Beneficiaries must be made aware of the legal and social consequences of misappropriation.

To address cash flow challenges faced by the poor, including delays in tranche releases for procurement and labour, a revolving fund scheme should be established. This will enable timely access to short-term loans, ensuring continuity of reconstruction works. The revolving fund must also be governed by strong awareness and enforcement mechanisms to prevent misuse.

Overall, these considerations shall guide the design of a transparent, equitable, and efficient financial disbursement system, ensuring reconstruction progresses smoothly within the recovery timeframe.

For Himachal, it may be suggested that the government provides assistances per affected HH as follows;

In Himachal the Special disaster relief package provided seems to comply with majority of the immediate requirements; however, following suggestions may also be included;

- Reconstruction cost considering grants of PMAY-U across Himachal as the material and labour cost is higher due to tough terrain and harsh working conditions
- NDRF/SDRF Rs 12,500/HH for repair of the damaged pucca houses- already approved
- NDRF/SDRF Rs 10,000/HH for repair of the damaged kutchha houses- already approved
- Provide Rs 2.6 lakh/ HH for makeshift shelter with services -proposed
- Provide additional Rs 2 Lakh/HH for reconstruction, repair and retrofitting- proposed
- Explore any other source of grant in cash or in materials- proposed
- Organise soft loan (simple interest @2%) from BFI for the rest of the construction of a basic structure,
- Setup revolving fund system- proposed
- EMI to be paid directly to the BFI by the state government for the first two years; thereafter, the affected HHs will pay back the EMI including the portion paid by the government- proposed

Techno Managerial Support

Recovery must involve local people in its core; their involvement will help maintaining construction quality, societal acceptance and above all, creation of skilled manpower, capable in building disaster resilient construction for the state.

Nirmithi Kendras must be set up across districts, which will help in providing techno managerial support to people, impart training to local masons and contractors, and will also help in development of local entrepreneurship in the field of building construction. They will guide reconstruction process by providing support in all aspects such as identification of site, preparation of working drawings, preparation of BoQ & cost estimation, necessary guidance and site supervision, and may also help in identification of skill manpower.

3.11 Safety, Sustainability & Economy

The prime focus on BBB model is safety but simultaneously it is very important to keep the balance of economy and sustainability during the process. To achieve this, it is important to utilise local materials in the construction process, this will help in keeping both cost as well as carbon footprint low. Instead of RCC, confined masonry system may be adapted for better utilisation of local materials. Vernacular systems such as Kath Kuni can also be promoted.

Techniques such as Stone Blocks, Stabilised Mud Blocks, Plank & Joist, Brick Panels etc. can also be utilised. Materials such as Mud, Bamboo, Stones etc. can be utilised to construct safe, durable, economic and sustainable structures for the state.

Key Recommendations

- Identification of flood plains and make it a strict no construction zone
- Utilise local materials/Makeshift/lightweight material in the reconstruction process.
- Awareness regarding utilisation of local materials or makeshift/lightweight materials must be spread to motivate habitants of the State to utilise these techniques in the future construction. The same may also be included in T&CP guidelines and adhering to the same may be ensured during upcoming construction.
- Sinking zones must be identified across districts, thorough scientific study of the same must be carried out by involving some specialised State/Central Govt. agency. Based on their recommendations, remedial measures for the same must be implemented.
- Structural Health assessment of all lifeline buildings must be ensured in every 5-10 yrs of time.
- All lifeline buildings must have alternative power source such as Solar, to power them during the time of any disaster or emergency.
- Gabions being used in the state must comply to relevant IS codes, if they are being used in any government funded project/work.
- Before reconstruction of any house/structure, safety/stability assessment of the plot must be ensured.
- It is strongly recommended that risk assessment study of all the important towns/blocks must be carried out.
- All future house designs should compulsorily include Disaster resilient features.
- A copy of book “KAVACH” must be distributed to all Panchayats, and the concerned Pradhans along with JEs may be requested to spread awareness at Panchayat level regarding inclusions of KAVACH.
- Constitute an expert committee at the state level to develop guidelines for hillside construction. Refer to the good examples in this regard, especially some of the northeastern states[7].
- Lack of insurance of the buildings is due to a lack of awareness and lack of access to the facilities. In absence of building bye laws and building permits not being mandatory, the people cannot access building insurance. Provide access to the people of Himachal to insurance. The insurance agencies should train their inspectors to carry out multi-hazard risk assessment of buildings and calculate premiums. Special efforts of the government would be necessary to ensure that the insurance premium for the widowed, elderly, PWD, etc. could be subsidised or be paid under convergence.
- Nirmithi Kendra like those already working in the Southern states such as Karnataka, may be set up in all the districts of Himachal to address the need of BBB and Disaster resilient construction in the state.

[7] "Owner Driven Reconstruction: The Nagaland Model" – is considered as one of the good models in the country.

3.12 Recovery Framework Table

The housing recovery process, formulated in collaboration with the state government, is projected to span 18 months. To meet this timeline, the recovery strategy prioritizes zero tolerance for delays at every stage. The process is structured in two overlapping and mutually reinforcing phases: (a) short-term recovery, and (b) medium-term recovery. These phases are designed to function in tandem, ensuring a seamless transition from immediate response to sustained reconstruction. Effective reconstruction planning must be grounded in risk-sensitive land use and landscape management practices, guided by comprehensive hazard risk assessments. This approach should emphasize ecological integrity, social equity, and economic sustainability at the local level.

The following implementation plan is being suggested to achieve a resilient and green recovery in the sector of Housing in Himachal.

Sr. No.	Period and Task	Lead department	Duration-Parallel activities
	SHORT TERM 0–12 MONTHS (Rs 1171.96 Cr, i.e. @ Rs 292.99 Cr. /quarter)		
S1	Form a project implementation team by coordinating with the line departments	HPSDMA	3 MONTHS
S2	Establish Nirmithi Kendra to promote speedy, safe and sustainable construction using locally available materials, and/or Makeshift/lightweight construction in the state	HPSDMA+ DC	3 MONTHS
S3	Identification of sites of Rehabilitation using specialised agencies, for families Affected by Land Loss	HPSDMA+ DC	3 MONTHS
S4	Construction of temporary shelters using makeshift technique for families Affected by Land Loss and Damaged Houses	HIMUDA+ DC	3 MONTHS
S5	Carryout detailed engineering (Holistic planning, design, construction of Confined Masonry Buildings) analysis of rehabilitation sites for families affected by Land Loss and Damaged Houses.	HIMUDA+ TCPO+ HPSDMA	3 MONTHS
S6	Training of Masons, Unskilled Labourers, Engineers for Best Construction Practices, retrofitting, Structural health audit of existing and newly constructed buildings / with hands-on exercise with examination and certification mechanism	HIMUDA+ HPSDMA	6 MONTHS
S7	Mass awareness on building rules, building codes and their compliance	HIMUDA	12 MONTHS
S8	IEC Material (preferably in pictorial form) on Best Construction Practice, Retrofitting, Maintenance for awareness of Community, Training, Drills, Skill Development activities in construction sector	HPSDMA	12 MONTHS
S9	Identification of sites of Temporary Shelter for families Affected by Land Loss and Damaged Houses	HPSDMA	3 MONTHS
S10	Reconstruction of Damaged houses, Huts and Cattle shed	HIMUDA	12 MONTHS
S11	Identification of sites for dumping of Construction Demolition Waste at different locations	HPSDMA	3 MONTHS

S12	Systematic disposal of Construction Demolition Waste with a view to Recycle / Reuse for value added product	PWD	12 MONTHS
S13	Promotion of Traditional Construction with focus on hazard resiliency in construction	HPSDMA	12 MONTHS
S14	Implementation of planned sewerage and drainage system for the community	MCD	6 MONTHS
S15	Reconstruction and retrofitting of Septic Tank	MCD	6 MONTHS
S16	Model Retrofit of Building Program	HPSDMA	12 MONTHS
S17	Procurement of special equipment for monitoring and control	HPSDMA	12 MONTHS
S18	Strengthen resources in Himachal Pradesh: Technical institutions/ knowledge tapping, Building materials	HPSDMA	12 MONTHS
	MEDIUM TERM 0–18 MONTHS (Rs 585.98 Cr @ Rs 97.66 Cr/quarter)		
M1	Study of all Sinking/vulnerable zones by specialised central/state govt. agencies	HPSDMA	12 MONTHS
M2	Based on recommendations, treat the un-stabilized slope/vulnerable zones	HPSDMA	12 MONTHS
M3	Develop typed design of housing (complete detail including architecture, structural (confined masonry), services, etc.	HPSDMA + HIMUDA	6 MONTHS
M4	Establish Techno-Legal Regime Mechanism in Himachal Pradesh	HPSDMA	18 MONTHS
M5	Reuse, Recycle of Construction Demolition Waste into building components	HPSDMA	18 MONTHS
M6	Channelize planning processes, stakeholder consultations and IEC campaigns for better outreach and introducing people to the urban dynamics.	HPSDMA	18 MONTHS
M7	Master Plan for Himachal Pradesh with emphasis on controlled land-use, Slums & unauthorised constructions, Constructions in No-Development Zones, Infrastructure development (roads, water supply etc.)	HPSDMA + TCPO	18 MONTHS
M8	Creation of local think tanks with local expertise should be contemplated and made a reality	HPSDMA	18 MONTHS

4. EDUCATION

4.1 Basic Profile of the Sector

During the 2025 monsoon season, Himachal Pradesh experienced severe floods and landslides that affected educational infrastructure across 12 districts. The disaster caused structural damage to school buildings, loss of educational materials, disruption of learning activities, and displacement of students and teachers. The hilly terrain of Himachal Pradesh amplified the impact through landslides, soil erosion, and damage to retaining walls and access roads.

Based on UDISE+ 2024-25, Himachal Pradesh's education system operates through a well-established institutional network of 14,411 schools serving 672,945 students from primary to higher secondary levels, representing 1.21% of India's total school infrastructure. The sector functions under the administrative oversight of the Department of Education, Government of Himachal Pradesh, with implementation support from the State Project Office (Samagra Shiksha), State Council of Educational Research and Training (SCERT), HP Board of School Education, and district-level educational authorities. The system cascades through District Education Officers, Block Education Officers, and Cluster Resource Centers to individual schools, ensuring coordinated policy implementation and monitoring across the state's challenging mountainous terrain.

School Category	Number	Percentage	National Comparison
Primary Schools	9733	67.53%	Higher than national avg (50%)
Upper Primary Schools	1736	12.04%	Lower than national avg (29.4%)
Secondary Schools	963	6.69%	Similar to national avg (9.8%)
Higher Secondary Schools	1979	13.74%	Higher than national avg (10.8%)
Total	**14411**	**100%**	**1.21% of India's schools**

The school network shows a distinctive pattern: primary schools dominate at 67.53% (9,733 schools)—substantially higher than the 50% national average—ensuring foundational coverage across mountainous terrain. However, upper primary schools constitute only 12.04% (1,736 schools), well below the 29.4% national average, creating transition bottlenecks. Secondary schools (6.69%, 963 schools) fall below the national average of 9.8%, while higher secondary schools (13.74%, 1,979 schools) exceed the national average of 10.8%, reflecting policy emphasis on completing full education cycles within geographic accessibility constraints. This extensive primary network ensures proximity-based access in a terrain where student mobility is constrained by topography and seasonal weather conditions.

Total enrollment of 672,945 students distributes across levels as: primary 218,981 (47.9%), upper primary 184,487 (23.4%), secondary 135,686 (15.6%), and higher secondary 133,791 (13.1%). The enrollment distribution reveals critical bottlenecks, with progressive narrowing of the education pipeline from primary through higher secondary levels, indicating retention and transition challenges despite the state's low official dropout rates.

Education Level	Enrollment	% of Total HP	% of National Level
Pre-Primary	Data in report	-	-
Primary (I-V)	218981	0.479	0.63% of national primary
Upper Primary (VI-VIII)	184487	0.234	0.53% of national upper primary
Secondary (IX-X)	135686	0.156	0.60% of national secondary
Higher Secondary (XI-XII)	133791	0.131	0.69% of national higher secondary

TOTAL (Primary to Higher Secondary)	672945	1	0.61% of national total

Gender parity remains strong across all education levels, with girls comprising approximately 48.2% of total enrollment (333,844 students) and boys 51.8% (339,101 students). The Gender Parity Index (GPI)—calculated as the ratio of girls' to boys' Gross Enrollment Ratio—approaches or exceeds 1.0 at primary (0.98-1.02), upper primary (0.97-1.00), and secondary levels (0.95-0.98), with some narrowing at higher secondary (0.92-0.96). This performance substantially exceeds norms for hill states and reflects both cultural factors valuing education and targeted interventions including girls' toilets, safety measures, and scholarship schemes.

Parameter	Value
Girls' Enrollment (Primary to HS)	~333,844 (estimated)
Boys' Enrollment (Primary to HS)	~339,101 (estimated)
Gender Parity Index (GPI)	Near parity across levels

4.2 Access of Basic Infrastructure

Himachal Pradesh demonstrates exceptional performance in basic infrastructure provision, ranking first nationally in functional drinking water availability at 90.4% of schools (versus 98.3% national average for availability), Toilet facilities are near-universal, with 99.5% of schools having some form of toilet, 99% providing girls' toilets, and 98.5% having boys' toilets, Electricity connectivity reaches approximately 94% of schools, with 89% having functional connections—slightly below the 91.8% national average but representing substantial progress given terrain challenges. Hand wash facilities (94%) and playgrounds (80-82%) align with national benchmarks. However, a critical equity gap emerges in accessibility for Children with Special Needs (CWSN): only 30% of schools have CWSN-friendly toilets (versus 34.4% national average) and 52% have ramps with handrails (matching national 52.3%)

While Himachal Pradesh excels in basic physical infrastructure, digital infrastructure reveals deficits that fundamentally constrain 21st-century learning capabilities and disaster-time learning continuity. Only 47.5% of schools possess computer facilities—10 percentage points below the 57.2% national average—and merely 31% have functional computers for pedagogical purposes. Internet connectivity reaches only 48.7% of schools, five points below the national average, rendering digital learning platforms, online teacher training, and emergency remote education virtually impossible for more than half the state's schools.

4.3 Infrastructure Profile and Building Typology

School buildings in Himachal Pradesh reflect construction adaptations to mountainous terrain and seismic vulnerability. The predominant building types include stone and brick masonry structures using local materials combined with cement or mud mortar, representing an estimated 70-80% of government school buildings, particularly in rural and remote areas. Reinforced concrete framed (RCC) structures constitute approximately 15-20% of buildings, concentrated in urban centers and newer constructions funded through centrally-sponsored schemes. The remaining infrastructure comprises mixed construction methods, prefabricated structures in temporary facilities, and older timber-based buildings in high-altitude zones.

Critical terrain-related considerations shape infrastructure vulnerability and maintenance patterns. Schools constructed on hill slopes require specialized foundation systems, retaining structures, and drainage mechanisms to prevent subsidence during monsoon seasons. Accessibility constraints in remote areas—where schools are reachable only via foot trails or difficult motor roads—significantly elevate construction and maintenance costs by an estimated 30-50% compared to plain terrain areas. Seismic vulnerability is universal, as the entire state falls within Seismic Zones IV and V (high to very high risk), yet an estimated 30-40% of existing government school buildings predate modern earthquake-resistant design norms, representing a critical infrastructure deficit requiring systematic retrofitting.

4.4 Sectoral Policies

The education sector in Himachal Pradesh operates within a comprehensive policy and regulatory framework encompassing national mandates, state-specific legislation, and programmatic guidelines that govern service delivery, infrastructure development, and disaster risk management. The following table summarizes key sectoral policies relevant to disaster recovery and resilient reconstruction:

S.No	Policy/Regulatory Instrument	Brief Description
1	Right of Children to Free and Compulsory Education Act, 2009 (RTE Act)	Mandates free and compulsory education for children aged 6-14 years; prescribes infrastructure norms including classroom ratios, WASH facilities, playground requirements, and barrier-free access; establishes school management committee structures for community participation.
2	Himachal Pradesh Education Act, 1971 (amended)	Provides legal framework for administration and regulation of educational institutions in the state; defines roles of state government, local authorities, and private providers; establishes standards for teacher qualifications, student safety, and institutional governance.
3	Samagra Shiksha Abhiyan (SSA)	Integrated scheme for school education from pre-primary to senior secondary levels; provides financial and technical support for infrastructure development, teacher training, quality improvement, digital learning, and inclusive education interventions; operational framework for implementation of RTE norms.
4	National School Safety Policy and Comprehensive School Safety Framework	Establishes guidelines for hazard-resilient school infrastructure; mandates integration of DRR in curricula; prescribes emergency preparedness protocols including mock drills, school disaster management plans, and structural-non-structural safety audits.
5	Mid-Day Meal Scheme (PM-POSHAN)	Provides cooked mid-day meals to children in government and aided schools from classes I-VIII; critical for nutritional security and enrollment retention; requires functional kitchen infrastructure, safe water supply, and hygiene facilities; plays vital role in disaster-affected contexts for food security.

6	Accessible India Campaign (Sugamya Bharat Abhiyan)	Mandates universal accessibility in public buildings including schools; prescribes barrier-free design standards including ramps, accessible toilets, tactile pathways, and assistive technologies to ensure inclusive education for children with disabilities.
7	Rashtriya Madhyamik Shiksha Abhiyan (RMSA) / Secondary Education Guidelines	Framework for universalization of secondary education; provides norms for secondary and higher secondary school infrastructure including science laboratories, libraries, ICT facilities; establishes quality benchmarks and student-classroom ratios.
8	Swachh Vidyalaya Campaign	Component of Swachh Bharat Mission focusing on WASH facilities in schools; mandates provision of functional, gender-segregated toilets with adequate water supply; prescribes hygiene education and behavioral change communication; critical for health, dignity, and enrollment of adolescent girls.

4.5 Damages in the Sector

A total of 1664 schools and government colleges were affected during the monsoon of 2025 with damages to classroom, educational infrastructure, kitchen sheds, WASH facility, digital infrastructure etc, regarding damages to the school buildings,

Educational Institute	No Damage	Partially Damaged)	Severely Damaged	Totally Damaged	Grand Total
Government College	50	10	4		64
Higher Secondary School	93	64	89	29	275
Middle School	28	16	24	14	82
Primary School	323	212	313	128	976
Secondary School	84	74	84	25	267
Grand Total	**578**	**376**	**514**	**196**	**1664**

Damage Estimate

The damage estimation for the education sector encompasses building structures, boundary walls, furniture and equipment, digital learning facilities, and slope stabilization measures. The assessment methodology applies standardized unit costs, geographic terrain adjustments, and severity-based damage coefficients to ensure consistent damage quantification across affected districts.

Technical Parameters and Assumptions

- Infrastructure Sizing: Each standard classroom is estimated at **35 square meters (7m × 5m),** consistent with Right to Education Act norms and Samagra Shiksha guidelines.

- **Unit Construction Costs**: Baseline unit cost derived from **HIMUDA standards at ₹34,125 per square meter**. Recognizing that existing school infrastructure lacks disaster-resilient features (estimated at 18% of construction costs), the **adjusted unit cost for damage calculation is ₹28,102 per square meter**, reflecting reconstruction to pre-disaster conditions.

Terrain-Based Adjustments: Topographic diversity influences construction costs through differential accessibility and foundation requirements. The assessment applies terrain-specific multiplication factors:

- **Low-altitude districts**: Factor of **1.0** (baseline)
- **Medium-altitude districts**: Factor of **1.2** (20% premium)
- **High-altitude districts**: Factor of **1.3** (30% premium)

Damage Severity Classification: Building damage categorized into three levels with corresponding reconstruction percentages:

- **Partially damaged**: **30%** of reconstruction cost (repairable non-structural damage)
- **Severely damaged**: **50%** of reconstruction cost (major structural compromise)
- **Totally damaged/collapsed**: **100%** of reconstruction cost (complete reconstruction required)

Non-Building Infrastructure Costs:

- **Retaining walls**: lumpsum ₹40,000 per running meter for 5 m length (1.5m height)
- **Boundary walls**: lumpsum ₹3,000 per running meter for 10m length(1.2m height)
- **Furniture and fixtures**: ₹5,000 per classroom
- **Kitchen infrastructure**: ₹100,000 per school
- **Digital learning equipment**: ₹240,000 per school
- **Sanitation facilities**: ₹20,000 per school

Damage Calculation Formula

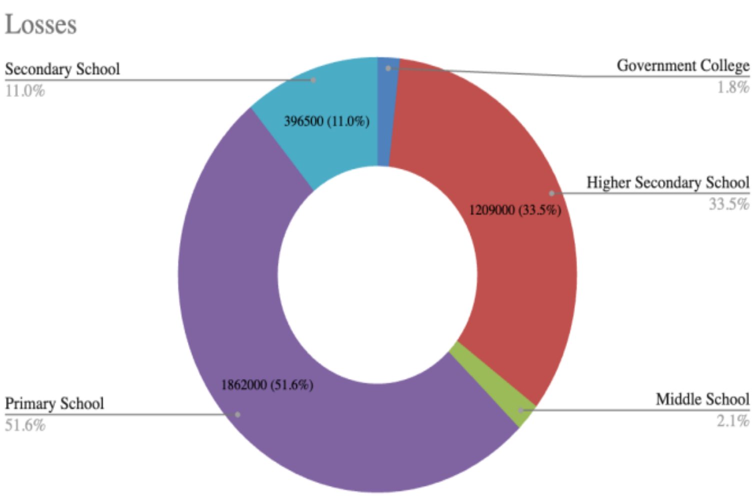
- **Total Damage** = (Building Structure Damage) + (Boundary Wall Damage) + (Retaining Wall Damage) + (Kitchen Infrastructure Damage) + (Sanitation Facility Damage) + (Furniture Damage) + (Digital Equipment Damage)
- Where **Building Structure Damage** = Number of classrooms × 35 m² × ₹29,625/m² × Terrain Factor × Severity Percentage

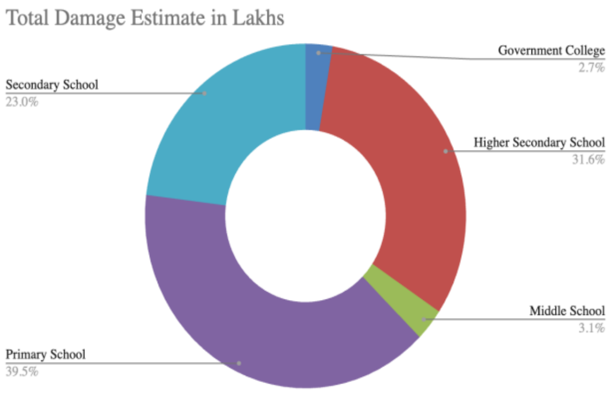
Total Damage Estimate

The education sector suffered damage valued at INR 568.89 crores which included damage to school buildings, classrooms, laboratories, furniture, equipment, and educational resources. The damage assessment covered educational institutions across twelve districts of Himachal Pradesh, the damage evaluated for Primary Schools is INR 229.67 crores , Higher Secondary Schools at INR 178.94 crores , and Secondary Schools at INR 129.50 crores, Middle Schools and Government Colleges sustained damage of INR 17.77 crores and INR 12.9 crores respectively.

Total Damage Estimate in Lakhs	*Educational Institute*					
District	Government College	Higher Secondary School	Middle School	Primary School	Secondary School	Grand Total
Bilaspur	4.05	895.56	171.51	859.48	1330.28	3260.86
Chamba		3704.01	461.01	4641.22	1410.49	10216.72
Hamirpur	123.07	1685.37	69.61	1498.49	902.34	4278.88
Kangra	260.87	3153.69	90.01	1356.95	2898.24	7759.76
Kinnaur		83.16	29.33	156.30	139.48	408.28
Kullu	353.04	1589.06	302.86	3287.19	1161.42	6693.57
Lahul and Spiti		68.75		64.98		133.72
Mandi	100.07	2501.57	252.79	4804.73	1766.07	9425.23
Shimla	279.18	521.05	76.51	1940.43	1072.26	3889.42
Sirmaur	90.67	1301.28	76.68	1700.33	834.85	4003.81
Solan	7.65	140.07	81.11	1349.33	447.00	2025.17
Una	79.04	2251.26	165.83	1308.52	988.15	4792.79
Grand Total	**1297.65**	**17894.81**	**1777.25**	**22967.93**	**12950.57**	**56888.20**

The education sector suffered losses valued at Rupees 36 Lakh, including the costs of temporary learning spaces, classroom cleaning, debris removal, and transporting students to alternative schools. Primarily School Management Funds were utilised to cover losses, these losses were reported by the school management authorities.





4.6 Socio-Economic Impact on People.

Although most of the students have returned back to school, The floods and landslides severely disrupted education service delivery across Himachal Pradesh, affecting critical infrastructure and student access. **196 educational facilities sustained total structural damage**, directly impacting 12,602 learners (6,356 boys and 6,246 girls), while **180 facilities experienced completely damaged access routes**, affecting an additional 13,810 students.

349 schools lost functional sanitation facilities affecting 23,032 students, **223 schools experienced damage to potable water supply systems** impacting 13,868 students, and **137 schools faced interruption of mid-day meal programmes**—a vital safety net for 8,256 students from economically vulnerable households. At the time of assessment, **108 educational facilities remained non-operational**, displacing 2,255 learners, while **307 facilities operated partially from temporary or alternative locations**, accommodating 9,535 students under sub-optimal learning conditions.

In immediate response, the Department of Education and district authorities have established temporary learning spaces and coordinated student relocation to functional facilities. **1,044 learners (453 boys and 591 girls) were transferred to alternative schools** to ensure continuity of learning. Priority interventions focused on restoring essential WASH services, establishing temporary sanitation facilities, and resuming mid-day meal distribution—critical for maintaining enrollment rates among food-insecure families. However, **419 students (210 boys and 209 girls) have discontinued their education**, indicating heightened protection risks including child labour and adverse coping mechanisms during household recovery. Gender-differentiated impacts are evident, with adolescent boys at increased risk of withdrawal to support families while girls face intensified domestic care responsibilities. The destruction of specialized learning facilities—including science laboratories, information technology infrastructure, and library resources—disproportionately affects senior secondary students preparing for board examinations, jeopardizing their academic progression and future opportunities.

Analysis of school closure data indicates that affected facilities experienced an average closure period of 27.4 days. Given the standard academic calendar of 205 teaching days in Himachal Pradesh, this represents an approximate **13.4% loss of instructional time**. Several facilities reported extended closures exceeding 50 days, necessitating compensatory teaching arrangements including extended school hours, weekend classes, and curtailed term vacations to recover lost curriculum time. The prolonged disruption compounds pre-existing learning gaps and requires sustained catch-up programming, particularly for students from disadvantaged backgrounds with limited access to supplementary learning resources.

Recovery interventions must prioritize the restoration of safe, protective learning environments with adequate WASH facilities, reconstruction of specialized learning infrastructure, provision of psychosocial support services for trauma-affected students and educators, and establishment of robust monitoring mechanisms to prevent further attrition and facilitate the safe return of out-of-school children. Gender-responsive and inclusive education programming is essential to address differentiated vulnerabilities and ensure equitable access to quality education throughout the recovery and reconstruction phases.

4.7 Reconstruction and Recovery Needs

Recovery and reconstruction costs for the education sector are valued at INR 652.02 crores encompassing: rebuilding completely damaged educational facilities; repairing and upgrading partially damaged schools; replacing damaged furniture, equipment, and teaching-learning resources; and restoring essential infrastructure including kitchen facilities, sanitation blocks, boundary walls, and retaining structures. The following table provides a comprehensive breakdown of recovery and reconstruction requirements.

S.No	Recovery and Reconstruction Needs	Number of Units	Cost (in Lakhs)
1	Government Colleges		
1.1	Partially damaged facilities (< 30% damage) - Minor repair works	10	893.73
1.2	Severely damaged facilities (30-70% damage) - Major repair works	4	516.99
2	Higher Secondary Schools		
2.1	Partially damaged facilities (< 30% damage) - Minor repair works	64	4,379.09
2.2	Severely damaged facilities (30-70% damage) - Major repair works	89	9,688.09
2.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	29	6,021.36
3	Middle Schools		
3.1	Partially damaged facilities (< 30% damage) - Minor repair works	16	276.92
3.2	Severely damaged facilities (30-70% damage) - Major repair works	24	800.23
3.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	14	844.59
4	Primary Schools		
4.1	Partially damaged facilities (< 30% damage) - Minor repair works	212	4,578.21
4.2	Severely damaged facilities (30-70% damage) - Major repair works	313	11,332.91

S.No	Recovery and Reconstruction Needs	Number of Units	Cost (in Lakhs)
4.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	128	9,249.58
5	Secondary Schools		
5.1	Partially damaged facilities (< 30% damage) - Minor repair works	74	4,219.90
5.2	Severely damaged facilities (30-70% damage) - Major repair works	84	6,499.96
5.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	25	3,752.04
6	Reconstruction of Kitchen facilities	345	345.00
7	Reconstruction of Boundary Walls	549	198.45
8	Reconstruction of Retaining walls	345	835.40
9	Provision of new furniture	1,661	500.30
10	Reconstruction of toilets	355	71.00
11	Provision of E-learning material	84	199.20
	Totally - recovery and Reconstruction Estimate		65,202.96

Of the 1,664 educational facilities impacted by floods and landslides, **366 (Partially damaged Schools) schools require minor repairs** assessed at less than INR 30 lakhs per facility to restore them to safe operational standards, which must be done on priority basis. Priority interventions may also focus on **rebuilding 510 (Severely damaged Schools) severely damaged facilities** requiring complete reconstruction, alongside 196 **(Totally Damaged Schools) schools necessitating major structural repairs** to address significant damage to foundations, load-bearing structures, and roofing systems.

Technical assessments conducted by the expert team have identified critical factors contributing to infrastructure vulnerability:

Inadequate periodic maintenance and structural upgrades;

age and obsolescence of existing structures, many predating current seismic and climate-resilient building codes;

substandard construction practices and materials; and

exposure to geological hazards including landslides, erosion, and flooding.

It is highlighted that *some new building constructions have been heavily over-designed*, leading to increased expenditure in building and cost-overrun. All buildings, while adopting safe construction methods, must **be inspired by vernacular methods of construction, which had strong foundation and lighter super-structure**

All reconstruction activities will adhere to **Build Back Better (BBB) principles** to enhance disaster resilience and improve service delivery. Technical specifications will ensure that rebuilt facilities: (i) comply with IS codes for seismic resilience, flood-resistant design, and landslide mitigation; (ii) incorporate climate-adaptive features including improved drainage, elevated foundations, and reinforced structures; (iii) meet inclusive design standards with universal accessibility for children with disabilities; (iv) provide adequate WASH facilities conforming to Swachh Bharat Mission guidelines; and (v) integrate modern pedagogical requirements including science laboratories, digital learning infrastructure, and library facilities.

Before commencing major reconstruction, the Department of Education, in coordination with the State Disaster Management Authority and district administrations, must undertake comprehensive risk assessments to inform potential relocation of the most vulnerable facilities from high-risk zones. Multi-hazard vulnerability mapping and climate change projections will guide land-use planning decisions. Further consultations with line departments including Revenue, Forest, Rural Development, and Urban Development will ensure integrated spatial planning for education infrastructure resilience.

5. HEALTH

This chapter examines the impact of the disaster on Health systems and services, including health infrastructure across 12 districts of Himachal Pradesh. The systematic analysis has been done through consultation with the Health Department and primarily focuses on damage to infrastructure along with service disruption. The chapter also looks into key interventions required to build resilient services.

5.1 Health Infrastructure in Himachal Pradesh

Himachal Pradesh's health system is organized as a multi-tiered network intended to provide healthcare services across its largely mountainous and widely dispersed population of 68.64 lakh (Census 2011) or ~ 75 lakhs projected population. At the apex level, the state has six Medical Colleges functioning as tertiary care institutions. These are supported by a broad network of secondary and primary healthcare facilities across all twelve districts.

The secondary care layer includes 92 Community Health Centers (CHCs) with capacities that vary from specialized units to facilities with fewer than 50 beds. Additionally, 110 Primary Health Centers (PHCs) operate as first-referral units at the block level. The primary care foundation consists of 586 Sub-Dispensaries and Health & Wellness Centers that provide outpatient services and preventive healthcare at the community level. The system also includes 23 specialized institutions such as district hospitals, ESI hospitals, and other dedicated facilities.

Across the state, 16,699 hospital beds are sanctioned within the public health network, of which 12,147 are currently functional. This indicates that a portion of sanctioned capacity remains non-operational due to various factors within the system. District level distribution of health infrastructure varies across Himachal Pradesh. Mandi has the highest concentration of facilities (in terms of facility to population ratio), with 19 CHCs, 18 PHCs, and 2,520 sanctioned beds. At the other end of the spectrum, Lahul and Spiti has 2 CHCs, 1 PHC, and 204 sanctioned beds. Kangra, the state's most populous district with 1,510,075 residents, has 20 CHCs, 19 PHCs, and a sanctioned bed strength of 3,640

As per the information received from the department access to health services varies widely across different types of facilities. Sub Centres receive an average of 5 male and 7 female visitors per day, while Primary Health Centres see higher footfall with 15 male and 19 female visitors. Community Health Centres handle around 30 male and 37 female visitors daily, and facilities with maternity wards record a much larger load, averaging 93 male and 139 female visitors. Sub-District Hospitals witness even higher usage, with about 125 male and 180 female visitors per day, whereas District or Civil Hospitals serve roughly 115 male and 151 female visitors. Other health infrastructure shows relatively low usage, with about 10 visitors each from both male and female groups.

5.2 Infrastructure Profile and Building Typology

The structural characteristics of health facilities in Himachal Pradesh are shaped by the state's mountainous terrain, challenging accessibility, and high seismic risk. An assessment of **249 health facilities** across all tiers of the health system reveals a diverse mix of construction types, reflecting both historical building practices and recent investments in resilient infrastructure.

A significant portion of health facilities—**107 buildings**, or roughly **43%** of the total—are constructed using **load-bearing masonry systems**, typically stone or brick walls joined with mud or cement mortar. These structures are especially common among **Sub-Centres (62 buildings)** and **Primary Health Centres (27 buildings)**, highlighting that many frontline service points continue to operate from older, non-engineered buildings. Given that Himachal Pradesh lies entirely within **Seismic Zones IV and V**, the masonry structures represent a major vulnerability, as many pre-date modern earthquake-resistant design norms.

In contrast, **RCC (Reinforced Cement Concrete) framed buildings** now form the largest share of health infrastructure, with **139 facilities** (about **56%**). RCC construction is most prevalent in upgraded PHCs (**45 buildings**), CHCs (**12 buildings**, plus **6** CHCs with maternity wards), and higher-level facilities such as **Sub-District Hospitals (16 buildings)** and **District/Civil Hospitals (6 buildings)**. This shift indicates ongoing efforts to strengthen the structural resilience of critical health facilities through centrally sponsored health programmes and improved engineering standards.

Traditional building types, such as **timber-framed structures (2 buildings)** and **one Katkuni-style facility**, now represent less than **1%** of the infrastructure stock. These appear primarily in older or high-altitude locations. While timber systems have historically shown better seismic performance, their ageing condition requires targeted structural assessment and maintenance.

Overall, the structural profile of the state's health facilities reflects a system in transition. While over half of the buildings now use engineered RCC frames, a large share—especially at the Sub-Centre and PHC levels—still rely on older masonry construction. This mix underscores the need for a phased strategy to retrofit, reinforce, or rebuild vulnerable buildings, particularly those in remote, slope-prone, or seismically sensitive areas. Strengthening these facilities is critical for ensuring uninterrupted service delivery and enhancing the disaster resilience of the health sector.

5.3 Damages in the Sector

The health sector experienced physical damage across all categories of facilities, ranging from Sub Centres to District Hospitals. A total of **242 health facilities** were assessed, of which **55 (23%)** remained undamaged, while **187 facilities** sustained some form of damage. Within the damaged group, **84 facilities** were classified as partially damaged, **77 facilities** as severely damaged, and **26 facilities** as totally damaged and requiring full reconstruction. The damage pattern highlights significant structural vulnerability across primary and secondary care facilities, with Sub Centres and Primary Health Centres representing the largest share of affected assets

Type of Institution	Partially	Severely	Totally	Total
Health Sub-Center	40	42	18	**100**
Primary Health Center	22	18	5	**45**
CHC Without Maternity Ward	9	7	0	**16**
CHC with Maternity Ward	3	4	0	**7**
Sub-Divisional Hospitals	8	5	3	**16**
District Hospitals	2	1	0	**3**
Total	**84**	**77**	**26**	**187**

District wise Impact:

District	District Wise Damage to Institutions			
	Partially	Severely	Totally	Total
Bilaspur	1	1	1	3
Chamba	4	7	0	11
Hamirpur	0	0	0	0
Kangra	20	24	7	51
Kullu	15	6	3	24
Mandi	7	7	4	18
Shimla	11	3	1	15

Sirmaur	5	13	3	21
Solan	17	16	7	40
Una	4	0	0	4
	0	0	0	0
Total	**84**	**77**	**26**	**187**

5.4 Damage Estimate

The damage estimation for the health sector encompasses building structures, boundary walls, furniture, health equipment and slope stabilization measures. The assessment methodology applies standardized unit costs, geographic terrain adjustments, and severity-based damage coefficients to ensure consistent damage quantification across affected districts.

Technical Parameters and Assumptions

- **Infrastructure Sizing:** Each institution is taken as per the standards approved by the Ministry of Health under the IPHS for the relevant structure, as that should be the minimum standard from BBB perspective.

- **Unit Construction Costs:** The cost of the structures per unit for each type is taken from the AAES whereby the rates in Himachal Pradesh are:

Type	**Cost Estimate as per AAES** in Crores	Applied Rate in PDNA
Sub center	0.80	0.80
PHC	3.00 – 4.00	3.50
CHC with / without **Maternity Ward**	12.00 – 15.00	12.00 – for those without Maternity Ward; 15 for those with Maternity Ward
District Hospital	25.00 – 30.00	25.00

Terrain-Based Adjustments: No terrain-based variation is considered as the AAES pricing formula already has taken the topography into consideration.

Damage Severity Classification: Building damage categorized into three levels with corresponding reconstruction percentages:

- **Partially damaged**: **30%** of reconstruction cost (repairable non-structural damage)
- **Severely damaged**: **50%** of reconstruction cost (major structural compromise)
- **Totally damaged/collapsed**: **100%** of reconstruction cost (complete reconstruction required)

- **Consideration of Aging and pre-existing damages:** An additional 20% is reduced from the reconstruction cost.

Non-Building Infrastructure Costs:

- **Retaining walls**: lumpsum ₹40,000 per running meter for 5 m length (1.5m height)
- **Boundary walls**: lumpsum ₹3,000 per running meter for 10m length(1.2m height)
- Other Equipment Cost - As per market rates, through secondary data.

Total Damage Estimate

The health sector has sustained significant damage across 10 districts of Himachal Pradesh, with total estimated damages amounting to **INR 302.81 crores**. The damages span across the entire spectrum of public health infrastructure, Sub Centres to tertiary care facilities, severely impacting service delivery at all levels of the health system.

Geographically, the damage distribution reveals stark disparities across districts. Kangra & Solan districts have been the most severely impacted, accounting for nearly 49% of the total health sector damage – affecting 91 institutions. Sirmaur and Kullu districts follow as significantly affected areas with damages of 21 and 24 institutions. Kangra, Kully, Solan and Shimla – have shown significantly high impact on health sub-centers, with more than 10 affected in each district.

Primary healthcare access has been severely affected, particularly in Kangra, Solan, and Mandi districts where Sub Centres and PHCs—the first point of contact for rural and remote populations—have sustained extensive damage. The geographic distribution of damage, especially to peripheral facilities in remote and hilly terrain, will significantly increase travel time and costs for vulnerable populations seeking healthcare services, potentially leading to increased morbidity and mortality during the recovery period. Therefore, it is imperative that these are retrofitted / reconstructed with great urgency.

S.No	Recovery and Reconstruction Needs	Number of Units	Applied %	Unit Cost in Lakhs	Less: Aging and Wear & Tear (20% of column D)	Damage Cost in Rupees	Damage Cost in Lakhs
A	B	C	D	E	F	G	H
1	Sub- center (Reconstruction cost calculated at Approx Area						
1.1	Partially damaged facilities (< 30% damage) - Minor repair works	40	30	24.00	19.20	7,68,00,000	768.00
1.2	Severely damaged facilities (30-70% damage) - Major repair works	42	50	40.00	32.00	13,44,00,000	1,344.00
1.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	18	100	80.00	64.00	11,52,00,000	1,152.00
	Primary Health Care			-	-	-	-
2.1	Partially damaged facilities (< 30% damage) - Minor repair works	22	30	105.00	84.00	18,48,00,000	1,848.00
2.2	Severely damaged facilities (30-70% damage) - Major repair works	18	50	175.00	140.00	25,20,00,000	2,520.00
2.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	5	100	350.00	280.00	14,00,00,000	1,400.00
3	Community Health Centre			-	-	-	-
3.1	Partially damaged facilities (< 30% damage) - Minor repair works	9	30	360.00	288.00	25,92,00,000	2,592.00
3.2	Severely damaged facilities (30-70% damage) - Major repair works	7	50	600.00	480.00	33,60,00,000	3,360.00
3.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	0	100	1,200.00	960.00	-	-
4	CHC - With Maternity Ward			-	-	-	-
4.1	Partially damaged facilities (< 30% damage) - Minor repair works	3	30	450.00	360.00	10,80,00,000	1,080.00
4.2	Severely damaged facilities (30-70% damage) - Major repair works	4	50	750.00	600.00	24,00,00,000	2,400.00

S.No	Recovery and Reconstruction Needs	Number of Units	Applied %	Unit Cost in Lakhs	Less: Aging and Wear & Tear (20% of column D)	Damage Cost in Rupees	Damage Cost in Lakhs
4.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	0	100	1,500.00	1,200.00	-	-
5	Sub- District Hospital			-	-	-	-
5.1	Partially damaged facilities (< 30% damage) - Minor repair works	8	30	450.00	360.00	28,80,00,000	2,880.00
5.2	Severely damaged facilities (30-70% damage) - Major repair works	5	50	750.00	600.00	30,00,00,000	3,000.00
5.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	3	100	1,500.00	1,200.00	36,00,00,000	3,600.00
6	District Hospital			-	-	-	-
6.1	Partially damaged facilities (< 30% damage) - Minor repair works	2	30	750.00	600.00	12,00,00,000	1,200.00
6.2	Severely damaged facilities (30-70% damage) - Major repair works	1	50	1,250.00	1,000.00	10,00,00,000	1,000.00
6.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	0	100	2,500.00	2,000.00	-	-
7	Other Infrastructure			-	-	-	-
7.1	Partially damaged facilities (< 30% damage) - Minor repair works			-	-	-	-
7.2	Severely damaged facilities (30-70% damage) - Major repair works	1		29.76	-	29,75,700	29.76
7.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	1		59.51	-	59,51,400	59.51
8	Reconstruction of Boundary Walls Boundary Wall for 10 m of Boundary wall damage @rate of 3000 m	59		14.16	-	14,16,000	14.16

S.No	Recovery and Reconstruction Needs	Number of Units	Applied %	Unit Cost in Lakhs	Less: Aging and Wear & Tear (20% of column D)	Damage Cost in Rupees	Damage Cost in Lakhs
9	Reconstruction of Retaining walls in Health Facilities for minimum- 5 m of retaining wall damage of 1.5 meter height @40000 per unit	21		33.60	-	33,60,000	33.60
	Total Damage			**In Rupees**		**3,02,81,03,100**	**30,281.03**
				In Crores		**302.81**	

Estimated Economic Losses in the Health Sector

The following table quantifies the secondary economic losses stemming from the disruption of healthcare services. These are distinct from the physical damage costs and represent the financial impact on both the public healthcare system and the affected population.

Loss Category	Calculation Basis & Justification	Estimated Amount (₹ Crore)
Loss of Outpatient Services	• **Calculation:** 27.4 avg. disruption days × 1,140 avg. daily outpatient visits across 187 damaged facilities. • **Assumption:** ₹50 avg. cost per forgone consultation (blended cost of service delivery & patient productivity loss). • **Justification:** Damaged facilities were non-operational, leading to a complete halt in routine outpatient care, impacting revenue and public health.	187 Facilities × 1,140 Visits/Day × 27.4 Days × ₹50 = **₹29.23 Crore**
Emergency Medical Transport & Patient Referrals	• **Calculation:** 28 totally damaged facilities assumed to require 5 emergency patient transfers/day during disruption. • **Assumption:** ₹5,000 avg. cost per transfer (ambulance, fuel, logistics). • **Justification:** Critical patients from non-functional facilities needed emergency transport to operational hospitals, incurring significant additional costs for the state.	28 Facilities × 5 Transfers/Day × 27.4 Days × ₹5,000 = **₹1.92 Crore**
Loss of Medicines & Perishable Medical Supplies	• **Calculation:** 5% loss assumed on annual drug budget for 187 facilities. • **Assumption:** ₹100 Crore estimated annual drug budget for affected facilities. • **Justification:** Power outages, water damage, and structural collapse in pharmacies and storage areas would have ruined vaccines, insulin, and other temperature-sensitive medicines.	5% of ₹100 Crore = **₹5.00 Crore**
Additional Staff Costs & Overtime	• **Calculation:** 30% premium on monthly wage bill for critical staff during 27.4-day emergency response. • **Assumption:** ₹20 Crore estimated monthly wage bill for staff at 187 facilities. • **Justification:** Health department staff worked extended hours, in hazardous conditions, and were often redeployed, necessitating overtime and hazard pay.	(₹20 Crore / 30 Days) × 27.4 Days × 30% Premium = **₹5.48 Crore**
Total Estimated Economic Losses		**₹41.63 Crore**

Summary of Justification and Key Assumptions:

1. **Basis for Disruption Period:** The average closure period of **27.4 days** is taken from the Education Sector report, as a reliable proxy for the duration of severe service disruption across public infrastructure.
2. **Focus on Service Disruption:** These loss calculations capture the *flow* of economic impact—lost services, emergency measures, and wasted resources—as opposed to the *stock* of physical damage.
3. **Conservative Estimates:** The figures used (e.g., ₹50 per consultation, 5% drug loss) are conservative and based on standard operational costs, making the total a reasonable lower-bound estimate.
4. **Tangible Impact:** These losses represent a real financial drain on the state's health budget and a tangible economic burden on the population due to lost productivity and increased out-of-pocket expenses.

5.5 Reconstruction and Recovery Needs

The health sector recovery program requires **INR 42,057.29 Lakhs (INR 420.57 Crores)** to restore 187 damaged health facilities across Himachal Pradesh. The recovery strategy encompasses three intervention categories based on damage severity: **minor repairs for 82 partially damaged facilities (<30% damage)** costing INR 12,786 Lakhs will address roofing, windows, doors, plumbing fixtures, and minor electrical repairs to restore basic functionality; **major repairs for 77 severely damaged facilities (30-70% damage)** requiring INR 19,910 Lakhs will involve structural strengthening, replacement of damaged walls and roofs, restoration of water supply and sanitation systems, electrical installations, and medical equipment replacement; and **complete reconstruction of 27 totally damaged facilities (>70% damage)** estimated at INR 9,190 Lakhs will include foundation-to-finish rebuilding with disaster-resilient design features.

Implementation must prioritize the 27 non-functional facilities requiring complete reconstruction while incorporating Build Back Better principles including seismic-resistant structures, improved drainage systems, solar backup power, enhanced WASH facilities, and accessibility features for persons with disabilities.

S.No	Recovery and Reconstruction Needs	Number of Units	Applied %	Unit Cost in Lakhs	R&R Cost with BBB in Lakhs
1	Sub- center (Reconstruction cost calculated at Approx Area				
1.1	Partially damaged facilities (< 30% damage) - Minor repair works	40	30	24.00	960.00
1.2	Severely damaged facilities (30-70% damage) - Major repair works	42	50	40.00	1,680.00
1.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	18	100	80.00	1,440.00
	Primary Health Care			-	-

S.No	Recovery and Reconstruction Needs	Number of Units	Applied %	Unit Cost in Lakhs	R&R Cost with BBB in Lakhs
2.1	Partially damaged facilities (< 30% damage) - Minor repair works	22	30	105.00	2,310.00
2.2	Severely damaged facilities (30-70% damage) - Major repair works	18	50	175.00	3,150.00
2.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	5	100	350.00	1,750.00
3	Community Health Centre			-	-
3.1	Partially damaged facilities (< 30% damage) - Minor repair works	9	30	360.00	3,240.00
3.2	Severely damaged facilities (30-70% damage) - Major repair works	7	50	600.00	4,200.00
3.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	0	100	1,200.00	-
4	CHC - With Maternity Ward			-	-
4.1	Partially damaged facilities (< 30% damage) - Minor repair works	3	30	450.00	1,350.00
4.2	Severely damaged facilities (30-70% damage) - Major repair works	4	50	750.00	3,000.00
4.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	0	100	1,500.00	-
5	Sub- District Hospital			-	-
5.1	Partially damaged facilities (< 30% damage) - Minor repair works	8	30	450.00	3,600.00
5.2	Severely damaged facilities (30-70% damage) - Major repair works	5	50	750.00	3,750.00
5.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	3	100	1,500.00	4,500.00
6	District Hospital			-	-
6.1	Partially damaged facilities (< 30% damage) - Minor repair works	2	30	750.00	1,500.00

S.No	Recovery and Reconstruction Needs	Number of Units	Applied %	Unit Cost in Lakhs	R&R Cost with BBB in Lakhs
6.2	Severely damaged facilities (30-70% damage) - Major repair works	1	50	1,250.00	1,250.00
6.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	0	100	2,500.00	-
7	Other Infrastructure			-	-
7.1	Partially damaged facilities (< 30% damage) - Minor repair works			-	-
7.2	Severely damaged facilities (30-70% damage) - Major repair works	1		-	37.20
7.3	Totally damaged facilities (> 70% damage) - Complete reconstruction	1		-	74.39
8	Reconstruction of Boundary Walls Boundary Wall for 10 m of Boundary wall damage @rate of 3000 m	59		-	17.70
9	Reconstruction of Retaining walls in Health Facilities for minimum- 5 m of retaining wall damage of 1.5 meter height @40000 per unit	21		-	42.00
	Total Cost of Reconstruction				**37,851.29**
				In Crores	**378.51**

6. PUBLIC ASSETS AND COMMON AMENITIES

6.1 Basic Profile of the Sector

Anganwadi centers constitute the primary delivery mechanism for India's Integrated Child Development Services (ICDS) scheme, representing the nation's flagship program for early childhood development since 1975. In Himachal Pradesh, these centers function as the critical interface between government social protection systems and vulnerable communities, delivering supplementary nutrition, pre-school education, immunization support, health and nutrition education, and referral services to children under six years and pregnant or lactating women.

The Anganwadi infrastructure operates under challenging geographical conditions characteristic of Himalayan terrain. Most centers serve remote rural populations where accessibility remains constrained by topography and weather patterns. These facilities represent more than physical infrastructure; they embody community-level social safety nets particularly crucial during emergencies when vulnerable populations face heightened risks. Anganwadi workers, predominantly women from local communities, serve as vital links between government systems and beneficiary households, often being first responders in community-level health and nutrition crises.

Rural infrastructure in Himachal Pradesh operates within a multi-tiered governance structure comprising the Department of Rural Development and Panchayati Raj at the state level with gram panchayats as grassroots implementing units. The sector encompasses essential infrastructure including internal roads providing last-mile connectivity, street lighting, and community buildings, housing, local governance, public services and community activities pertaining to religious activities, community gatherings etc.

6.2 Sectoral Policies

The Integrated Child Development Services scheme represents India's comprehensive policy response to childhood malnutrition, developmental delays, and maternal health challenges. Implemented through the Ministry of Women and Child Development, the program operates through a three-tier structure with Anganwadi centers serving as grassroots delivery points. The scheme's universalization strategy aims to provide every child under six years access to supplementary nutrition, immunization, health check-ups, referral services, pre-school education, and health education for mothers.

Name of Scheme	Brief Description	Department/Ministry
Integrated Child Development Services (ICDS)	Flagship programme providing a package of six services: supplementary nutrition, pre-school non-formal education, nutrition and health education, immunization, health check-up and referral services to children under 6 years, pregnant women and lactating mothers through Anganwadi Centres.	Ministry of Women and Child Development
Poshan 2.0 (Saksham Anganwadi and Poshan 2.0)	Mission to address malnutrition comprehensively through a holistic approach, combining ICDS, Poshan Abhiyaan, and Scheme for Adolescent Girls. Focus on improving nutritional outcomes for children 0-6 years, pregnant women, and lactating mothers.	Ministry of Women and Child Development
Mission Vatsalya	Umbrella scheme for Child Protection Services and Child Welfare Services providing institutional and non-institutional care, emergency outreach, adoption services, and support to children in need of care and protection.	Ministry of Women and Child Development
Pradhan Mantri Gram Sadak Yojana (PMGSY)	Nationwide programme to provide all-weather road connectivity to unconnected habitations in rural areas. Launched in 2000, upgraded to PMGSY-II (2013) for upgrading existing roads and PMGSY-III (2019) for consolidating Through Routes and Major Rural Links.	Ministry of Rural Development
Mahatma Gandhi National Rural Employment	Demand-driven wage employment programme guaranteeing 100 days of unskilled manual work per household per year in rural areas. Aims to enhance	Ministry of Rural Development

Guarantee Act (MGNREGA)	livelihood security, create durable assets, and strengthen grassroots governance.	
Deendayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY-NRLM)	Aims to mobilize rural poor into Self-Help Groups (SHGs) and provide them with financial and technical support for income generation activities. Focus on women's economic empowerment through social mobilization and institution building.	Ministry of Rural Development
Shyama Prasad Mukherji Rurban Mission (SPMRM)	Aims to develop 300 Rurban clusters by providing economic, social and physical infrastructure facilities. Focuses on cluster of villages with growth potential to create 'Rurban' areas with urban amenities.	Ministry of Rural Development
Pradhan Mantri Adarsh Gram Yojana (PMAGY)	Aims to develop model villages (Scheduled Caste majority villages) with focus on improving infrastructure, education, health, and livelihood opportunities to bridge gaps in development indicators.	Ministry of Rural Development
Panchavati Yojana	Senior citizen welfare scheme providing parks and gardens with entertainment facilities for elderly citizens. As of August 2020, 256 locations selected and work initiated in 43 places to enhance quality of life for senior citizens.	Rural Development & Panchayati Raj Department, Government of Himachal Pradesh

Himachal Pradesh has operationalized ICDS through the Department of Women and Child Development, achieving near-universal coverage with particular emphasis on geographically challenging areas where private alternatives remain non-existent. The state's disaster management policy explicitly mandates resilient reconstruction of social infrastructure, emphasizing risk-informed development planning, structural safety compliance, and early warning system integration. However, translation of policy intent into implementation practice has remained inconsistent, with budget constraints and technical capacity gaps limiting systematic application of disaster-resilient design principles.

Rural infrastructure development in India is guided by constitutional provisions under the 73rd Amendment Act mandating decentralized governance and rural development responsibilities to panchayati raj institutions. The Ministry of Rural Development oversees flagship programs including PMGSY focusing on rural road connectivity, MGNREGA providing employment through infrastructure and asset creation, and various schemes addressing water supply, sanitation, and community infrastructure.

Himachal Pradesh Rural Development Policy prioritizes mountain-specific infrastructure solutions recognizing unique topographical and climatic challenges. The state emphasizes quality construction using appropriate technologies, regular maintenance through community participation, and integration of disaster risk reduction in infrastructure planning. The State Disaster Management Plan identifies rural infrastructure as critical for emergency response and economic continuity.

State guidelines mandate engineering standards addressing slope stability, drainage adequacy, and seismic safety. The Himachal Pradesh Panchayati Raj Act empowers gram panchayats with infrastructure development and maintenance responsibilities supported by technical and financial resources from state agencies. Recent policy emphasis on climate-resilient infrastructure incorporates adaptive design features, improved materials, and nature-based solutions.

6.3 Women and Child Development

6.3.1 Damage Assessment: Anganwadi Centers

The 2025 floods and landslides inflicted catastrophic damage representing one of the most severe impacts on early childhood development services in Himachal Pradesh's recent history. Assessment documented damage to 135 of 143 centers surveyed (94.4 percent damage rate). Severity distribution reveals disaster intensity: 17 centers sustained destruction requiring complete reconstruction, 86 centers suffered severe structural compromise necessitating major repairs, and 31 centers experienced partial damage requiring minor rehabilitation.

District	Totally Damaged (>70%)	Severely Damaged (30-70%)	Partially Damaged (<30%)	No Damage	Total Anganwadis
Bilaspur	1	2	3	0	6
Chamba	5	17	6	1	30
Kangra	1	0	0	4	5
Kullu	2	3	3	0	8
Mandi	3	2	0	1	6
Shimla	2	30	9	1	42
Sirmaur	3	28	8	1	40
Solan	0	4	2	0	6
TOTAL	**17**	**86**	**31**	**8**	**143**

Spatial concentration follows the disaster's geographical footprint. Shimla district recorded highest absolute numbers with 42 facilities impacted (30 severely damaged, two totally destroyed). Sirmaur district followed with 40 affected centers (28 severely damaged, three totally destroyed). These two districts account for 57 percent of damaged infrastructure. Chamba district, though having 30 affected centers, exhibited highest damage intensity with five centers totally destroyed and 17 severely damaged, reflecting particular severity of landslide impacts.

Damages to the premises included, 5 centers experiencing complete or partial land parcel erosion requiring land stabilization or site relocation, 16 centers affected by retaining wall damage and eight centers sustaining boundary wall damage indicating broader premise instability, and multiple centers experiencing access road destruction that increased reconstruction costs and logistical complexity while compromising site accessibility.

Damages to Premises	
Damage Type	**Anganwadis Affected**

Land washed away	5
Retaining wall washed away	16
Boundary Wall Washed Away	8

WASH facilities in the anganwadi sustained some damages, including toilet facilities at 36 centers (ranging from fixture damage to complete toilet block destruction), septic tanks and soak pits damaged at 20 centers through structural failure and debris accumulation, and drinking water supply systems disrupted at 30 centers through damage to water source structures, storage tanks, distribution networks, and source

Damage to WASH infrastructure in Anganwadi	
Item	**Anganwadis Affected**
Toilet damaged	36
Septic tank/Soak pit damaged	20
Drinking water point damaged	30

Essential equipment and materials were destroyed or damaged across affected centers, including furniture at 14 centers, educational toys and play materials at 14 centers, kitchen equipment at 12 centers, water filters at 11 centers, and weighing machines and health monitoring equipment at 10 centers, fundamentally undermining capacity for nutrition programming, early childhood development activities, and health monitoring.

Damage to Furniture and Equipments	
Item	**Anganwadis Affected**
Furniture	14
Toys	14
Children Books	14
Kitchen Utensils	12
Water Filter	11
Weighing Machine	10

Service delivery was severely disrupted with center closures ranging 0 to maximum 31 days, the supplementary nutrition program experiencing the most critical impact due to loss of cooking facilities and storage capacity, service quality remaining substantially compromised even where alternative arrangements were established, and significant loss of documentation including beneficiary registers and administrative records affecting program continuity and accountability.

6.3.2 Anganwadi - Damage Estimate

The overall damage estimate for Anganwadi is 672.29 lakhs (6.73 Crore). The unit cost of the building damage estimate has been calculated with approx area of 30 sq m with damage cost estimate of 29,625 per sq m cost of construction. There hasn't been any terrain factor that has been accounted for in damage estimation. Similarly, unit cost of each item have been listed in the table below and damage has been estimated accordingly.

Total Damage Estimate		**Amount in lakhs**
Building Damage Estimate	**₹61,590,375**	**₹615.90**
Premise Damage Estimate	**₹3,440,000**	**₹34.40**
Furniture and Equipments	**₹509,000**	**₹5.09**
Water and Sanitation	**₹1,690,000**	**₹16.90**
Total Damage Estimate		**₹672.29**

UNIT COST INPUTS				
Damage Category	**Avg Size (sq-m)**	**Cost/ Sq M**	**Additional (₹)**	**Unit Cost (₹)**
Totally Damaged - Reconstruction	30	₹29,625	₹0	₹888,750
Severely Damaged - Major Repair	30	₹14,813	₹0	₹444,375
Partially Damaged - Minor Repair	30	₹8,888	₹0	₹266,625

Building Damage Estimate (District Wise)						
District	**No Damage**	**Totally Damaged**	**Severely Damaged**	**Partially Damaged**	**Total Cost (₹)**	**Damage Estimate in lakhs**
Bilaspur	0	1	2	3	₹2,577,375	₹25.77
Chamba	1	5	17	6	₹13,597,875	₹135.98
Kangra	4	1	0	0	₹888,750	₹8.89
Kullu	0	2	3	3	₹3,910,500	₹39.11
Mandi	1	3	2	0	₹3,555,000	₹35.55
Shimla	1	2	30	9	₹17,508,375	₹175.08
Sirmaur	1	3	28	8	₹17,241,750	₹172.42
Solan	0	0	4	2	₹2,310,750	₹23.11
TOTAL	**8**	**17**	**86**	**31**	**6,15,90,375**	**₹615.90**

Damage Type	Anganwadis Affected	Unit Cost (₹)	Total Cost (₹)	Damage Estimate in lakhs
Land washed away	5	₹0	₹0	₹0.00
Retaining wall washed away	16	₹200,000	₹3,200,000	₹32.00
Boundary Wall Washed Away	8	₹30,000	₹240,000	₹2.40
TOTAL PREMISE DAMAGE			**₹3,440,000**	**₹34.40**

FURNITURE & EQUIPMENT				
Item	**Number Damaged**	**Unit Cost (₹)**	**Total Cost (₹)**	**Damage Estimate in lakhs**
Furniture	14	₹15,000	₹210,000	₹2.10
Toys	14	₹5,000	₹70,000	₹0.70
Children Books	14	₹3,000	₹42,000	₹0.42
Kitchen Utensils	12	₹8,000	₹96,000	₹0.96
Water Filter	11	₹6,000	₹66,000	₹0.66
Weighing Machine	10	₹2,500	₹25,000	₹0.25
Sub-total (Furniture)			**₹509,000**	**₹5.09**
Item	**Number Damaged**	**Unit Cost (₹)**	**Total Cost (₹)**	**Damage Estimate in lakhs**
Toilet damaged	36	₹15,000	₹540,000	₹5.40
Septic tank/Soak pit damaged	20	₹50,000	₹1,000,000	₹10.00
Drinking water point damaged	30	₹5,000	₹150,000	₹1.50
Sub-total (WASH)			**₹1,690,000**	**₹16.90**

6.3.3 Recovery Needs: Anganwadi (ICDS) Sector

- Complete reconstruction of 17 totally damaged centers, major structural repairs at 86 severely damaged facilities, and minor rehabilitation of 31 partially damaged centers to restore service delivery capacity for 142 affected Anganwadi centers across eight districts.

- Reconstruction of 16 retaining walls and eight boundary walls, land stabilization measures, and access road rehabilitation to ensure operational safety and site accessibility.
- Restoration of toilet facilities at 36 centers, repair/reconstruction of septic systems at 20 centers, and rehabilitation of drinking water supply points at 30 centers to meet hygiene standards and prevent waterborne disease risks.
- Replacement of furniture, educational toys, learning materials, kitchen equipment, water filters, and health monitoring devices essential for nutrition, early childhood development, and growth monitoring services.
- Service resumption activities, staff capacity building, disaster preparedness training, and documentation system restoration to ensure program continuity and resilience.

6.3.4 Recovery and Reconstruction Estimate.

The post-disaster recovery requirements for the Integrated Child Development Services (ICDS) and Rural Development sectors have been comprehensively assessed based on Build Back Better principles, government reconstruction norms, and sector-specific technical standards.

Anganwadi - Women and Child Development Department

- Total recovery needs are estimated at ₹1,007.50 lakhs (₹10.07 crore), comprising infrastructure recovery and reconstruction (₹709.46 lakhs - Critical priority) to restore 142 affected centers including complete reconstruction, major repairs, and minor rehabilitation works
- The Assessment also includes reconstruction of damages in the premises (₹99.80 lakhs - Critical priority) for retaining walls, boundary structures, and land stabilization measures essential for operational safety.
- WASH infrastructure restoration (₹77.40 lakhs - Critical priority) encompassing toilet facilities, septic systems, and drinking water supply points to ensure hygiene and public health standards
- furniture and equipment replacement (₹24.28 lakhs - High priority) to restore essential service delivery assets including educational materials, kitchen equipment, and health & nutrition monitoring devices.
- Operational support and capacity building (₹96.56 lakhs - High priority) for service resumption, staff training, and disaster risk reduction integration.

Anganwadi - Recovery and Reconstruction Needs			
Item	**Total Cost (₹)**	**Cost in lakhs**	
1. Infrastructure Recovery	**₹70,945,875**	₹709.46	Critical
2. Premise & Safety Recovery	**₹9,980,000**	₹99.80	Critical
3. WASH Recovery	**₹7,740,000**	₹77.40	Critical

4. Furniture & Equipment	**₹2,428,000**	₹24.28	High
5. Operational & Capacity Building	**₹9,656,000**	₹96.56	High
Total Recovery Estimate	**₹100,749,875**	**₹1,007.50**	

6.4 Community Buildings and Other Assets (Rural Development Department)

6.4.1 Damage Assessment of Community Buildings and Other Assets

The 2025 floods and landslides caused extensive damage to rural infrastructure across 12 districts affecting 94% of assessed locations. Physical assessments documented 4,989.75 kilometres of damaged internal roads, 809 damaged streetlights, and 654 affected community buildings. Damage intensity varied significantly across districts with Chamba, Mandi, and Solan experiencing the most severe impacts as per the data provided by Rural Development.

Rural Department has reported damages to internal roads, pavements and other last mile connectivity from village road to habitations; while damages to Village Road is accounted for in the road and transportation network, the internal roads are reported and managed by rural development department. Internal roads sustained damage with 107.37 kilometres requiring complete reconstruction, 2,059.32 kilometres needing major structural repairs, and 2,807.76 kilometres requiring minor rehabilitation. Totally damaged internal roads experienced foundation washout, pavement destruction, embankment collapse, and drainage structure failure rendering them completely non-functional and alternate routes are used by community members.

District	Damage to Internal Roads						
	Total Km	Totally damaged (Count)	Totally damaged (Km)	Severely damaged (Count)	Severely damaged (Km)	Partially damaged (Count)	Partially damaged (Km)
Bilaspur	6.07	0	0	2	1	12	5.07
Chamba	2220.45	17	24.96	220	748.9	554	1433.58
Hamirpur	267.82	9	4.22	140	106.56	180	156.53
Kangra	305.85	7	0.03	109	130.39	136	175.44
Kinnaur	58.22	0	0	16	58.22	0	0
Kullu	390.98	5	13.6	162	232.22	58	143.36
Lahaul spiti	2	0	0	2	2	0	0

Mandi	422.6	32	48.17	236	336.24	31	38.18
Shimla	92.3	1	3	23	33.48	26	55.82
Sirmour	389.95	1	0.5	31	47.89	244	341.56
Solan	771.85	1	12	187	352	233	407.85
Una	61.16	12	0.88	25	10.42	61	49.86
TOTAL	**4989.25**	**85**	**107.36**	**1153**	**2059.32**	**1535**	**2807.25**

Street lighting infrastructure sustained damage affecting 809 installations across gram panchayats with 68 lights requiring complete replacement, 430 needing major repairs, and 237 requiring minor interventions. Totally damaged lights experienced pole collapse, complete fixture destruction, electrical system failure, and wiring damage. Severely damaged installations showed pole bending, fixture damage, electrical component failure, and partial wiring destruction.

District	Damage to Street Lights			
	Total	Totally	Severely	Partially
Bilaspur	8	7	1	0
Chamba	200	21	99	37
Hamirpur	29	0	15	14
Kangra	18	1	7	9
Kinnaur	100	0	100	0
Kullu	46	1	27	18
Lahaul spiti	1	0	0	1
Mandi	294	31	140	123
Shimla	14	0	5	9
Sirmour	2	0	2	0
Solan	39	0	22	17
Una	58	7	12	9
TOTAL	**809**	**68**	**430**	**237**

Community buildings including panchayat ghars, community halls, religious building and other community buildings suffered damages across the state with 28 buildings requiring complete reconstruction, 331 needing major structural repairs, and 265 requiring minor rehabilitation. Totally damaged buildings experienced damages of more than 70%; these buildings housed critical governance functions, community meetings, and public service delivery along with community rituals which is necessary for maintaining community fabric.

District	Damage to Community Buildings/ Gram Panchayat buildings.			
	Total	Totally	Severely	Partially
Bilaspur	3	0	3	0
Chamba	253	4	164	81
Hamirpur	35	0	10	20
Kangra	84	0	44	26
Kinnaur	0	0	0	0
Kullu	77	10	22	40
Lahaul spiti	8	0	7	1
Mandi	89	14	54	20
Shimla	18	0	12	6
Sirmour	55	0	5	49
Solan	21	0	9	12
Una	11	0	1	10
TOTAL	**654**	**28**	**331**	**265**

6.4.2 Community Buildings and Other Assets - Damage Estimate.

The comprehensive damage assessment yielded total estimated damage cost amounting to 21,183.23 lakh (211.83 Crore) which includes 98.96 crore of damages to internal roads, 1.23 Crore damages to street lightning, 96.91 Crore damages to community buildings and also accounts for 14.71 Crore additional expenditure/ losses for Debris removal.

Item	Total Cost in Lakhs
1. INTERNAL ROADS	₹9,896.79
2. STREET LIGHTS	₹123.94

3. BUILDINGS	₹9,691.50
4. Debris Removal	₹1,471.00
TOTAL ALL COMPONENTS (In lakhs)	₹21,183.23

The damage for internal roads have been estimated for 5,00,000 rupees per km of road damages for totally damaged internal roads; Damages to streetlights have been calculated for 35,000 rupees per pole; including pole and solar powered lights, along with the battery as per the market rates. The community buildings damage has been estimated for an average building size of 120 Sqm considering that building lacked any hazard resilient features and unit cost of construction to be 29,625 per sq m., with severity of 50% of the total cost of reconstruction and 30% of total cost of construction applied for severely and partially damaged structures.

1. INTERNAL ROADS				
Category	**Length (Km)**	**Unit Cost (₹/Km)**	**Total Cost**	**Total Cost in Lakhs**
Totally Damaged	107.37	₹500,000	₹53,685,000	₹537
Severely Damaged	2059.32	₹250,000	₹514,830,000	₹5,148
Partially Damaged	2807.76	₹150,000	₹421,164,000	₹4,212
Subtotal Roads	**4989.75**		**₹989,679,000**	**₹9,897**

2. STREET LIGHTS				
Category	**No.**	**Unit Cost (₹)**	**Total Cost**	**Total Cost in Lakhs**
Totally Damaged	68	₹35,000	₹2,380,000	₹24
Severely Damaged	430	₹17,500	₹7,525,000	₹75
Partially Damaged	237	₹10,500	₹2,488,500	₹25
Subtotal Lights	809		₹12,393,500	₹124

3.. BUILDINGS				
Category	**No.**	**Unit Cost (₹)**	**Total Cost**	**Total Cost in Lakhs**
Totally Damaged	28	₹3,550,000	₹99,400,000	₹994

Severely Damaged	331	₹1,775,000	₹587,525,000	₹5,875
Partially Damaged	265	₹1,065,000	₹282,225,000	₹2,822
Subtotal Buildings	654		139.8	₹9,692

6. DEBRIS REMOVAL				
Item	**Locations**	**Unit Cost (₹)**	**Total Cost**	**Total Cost in Lakhs**
Debris Removal	1471	₹100,000	₹147,100,000	₹1,471

6.4.3 Loss Estimation

Since the damage is vast and widespread, and there is no standard way to calculate it, AI was used to do the calculation, and this Loss Estimation has been written by AI.

A common approach is to calculate losses as a percentage of damages, like 10-30%. For example, we could assume a 20% loss for roads. Let's use the damage totals from the document and apply percentages like 15% for roads, 5% for streetlights, and 10% for buildings. Let us also include indirect losses, like transport costs and income loss, at 10%. After calculating, We shall summarize everything in a table with assumptions clearly stated. Let's get those numbers!

Item	Damage (₹ in lakhs)	Loss rate used	Estimated Loss (₹ in lakhs)	Notes
Internal roads	₹9,896.79	15%	₹1,484.52	Short-term transport disruption, increased vehicle operating costs, market access loss, emergency response delays.
Street lights	₹123.94	5%	₹6.20	Reduced night-time safety, limited economic activity; lower unit impact.
Community buildings	₹9,691.50	10%	₹969.15	Loss of governance/service delivery, cancelled events, temporary relocation costs.
Debris removal (reported cost)	₹1,471.00	2%	₹29.42	Environmental/health impacts, temporary loss of land use; debris cost already captured under damages.
Subtotal (direct losses)	₹21,183.23	—	₹2,489.29	Sum of the four items above.

Indirect/secondary losses (est. 10% of subtotal)	—	10%	₹248.93	Business interruption, livelihood impacts, multiplier effects on local economy.
Total estimated losses (direct + indirect)	—	—	₹2,738.22	≈ ₹2,738.22 lakhs (≈ ₹27.38 crore).

Key assumptions and rationale for Loss Estimation:

Loss vs damage: *Damage* = physical replacement/repair costs (already in your document). *Loss* = economic value lost because services were interrupted, additional operating costs, temporary relocation, lost income, and other short-term economic impacts.

Loss rates chosen: conservative, sector-specific percentages reflecting typical PDNA practice where losses are a fraction of physical damages for infrastructure and public buildings. Rates used: roads 15%, buildings 10%, street lights 5%, debris 2%. Indirect/secondary losses added as 10% of direct losses to capture multiplier and livelihood effects.

Time horizon: these loss estimates represent short-to-medium term economic impacts (weeks to months) and do not include long-term development losses or avoided future losses from resilience measures.

Rounding: values rounded to two decimal places (lakhs).

6.4.4 Recovery Needs - Rural Development

- ✓ Restoration of damaged internal roads in 78 (seventy-eight) gram panchayats to re-establish connectivity for 150,000+ population, enable market access, and support emergency response capabilities.
- ✓ Reconstruction of panchayat bhavans, community halls, and public facilities essential for local governance, social services delivery, and community gatherings.
- ✓ Installation of solar/electric street lighting systems to restore public safety, security, and mobility in affected rural settlements.
- ✓ Systematic removal of disaster debris, site clearance, and environmental restoration to enable safe reconstruction and reduce secondary hazards.

6.4.5 Recovery and Reconstruction Estimate.

The post-disaster recovery requirements for the Rural Development sector has been comprehensively assessed based on Build Back Better principles, government reconstruction norms, and sector-specific technical standards.

Community Infrastructure - Department of Rural Development

- Total recovery needs are estimated at ₹24,337 lakhs (₹243.37 crore), comprising internal road reconstruction (₹11,480 lakhs - Critical priority) to restore connectivity in 78 affected gram panchayats; street lighting restoration (₹144 lakhs - High priority) for public safety and security;
- Community building reconstruction (₹11,242 lakhs - Critical priority) including panchayat bhavans, community halls, and public facilities essential for governance and social services;

and debris removal and site clearance (₹1,471 lakhs - Medium priority) for safe reconstruction and environmental restoration. T

Rural Development - Recovery and Reconstruction Needs			
Item	**Recovery Estimate**	**Recovery Estimate (In Lakhs)**	
1. Internal Road	₹1,148,027,640	₹11,480	Critical
2. Street Lights	₹14,376,460	₹144	High
3. Community Buildings	₹1,124,214,000	₹11,242	Critical
4, Debris Removal	₹147,100,000	₹1,471	Medium
Total		**₹24,337**	

The combined recovery requirement across both sectors totals ₹25,344.50 lakhs (₹253.45 crore), as a critical priority requiring immediate intervention to restore essential public services, ensure public safety, and re-establish governance infrastructure serving vulnerable populations including children, women, and rural communities.

Looking ahead, recovery efforts must prioritize resilient rebuilding of Anganwadis, durable rural infrastructure, and multifunctional community spaces that can serve both developmental and disaster-response needs. Integrating climate adaptation measures, local materials, and community participation into asset restoration will strengthen ownership and sustainability. By embedding resilience into the rehabilitation of public assets, Himachal Pradesh can ensure that its rural development investments deliver long-term dividends in safety, equity, and inclusive growth.

INFRASTRUCTURE SECTOR

7. ROADS & BRIDGES

7.1 Summary

The flash floods and prolonged monsoon spells during July to September 2025 caused severe and widespread disruption to the road and bridge infrastructure across Himachal Pradesh. Intense cloudbursts, riverbank erosion, slope failures, landslides, and debris flows led to extensive damage to National Highways, State Highways, Major District Roads, rural road networks, and cross-drainage structures. Several critical road corridors connecting district headquarters, tourist destinations, border areas, and remote habitations were rendered inaccessible for some periods.

The current Post-Disaster Needs Assessment (PDNA) evaluates the reported damages and losses in the road and bridge infrastructure sector managed by Public Works Department across twelve districts of Himachal Pradesh. The National Highways, and Railway infrastructure are excluded from the scope of this report, as they fall under the jurisdiction of the Central Government, which has dedicated funds for disaster repair and reconstruction. All critical and affected road links and bridges under the management of the State Government particularly under the jurisdiction of PWD have been temporarily restored.

Based on the data provided by the State PWD through the DMIS portal, along with the revised inputs and the model repair costs for pavement and other road assets (such as retaining walls, breast walls, and cross/roadside drainage), the total estimated damage and loss to the road and bridge network across the twelve districts is INR **1873.03** crore. This includes **estimated damages of INR 1838.56** crore and **losses** as reported of INR **34.47** crore The brief break-up of the same is given in Table 1.

Table 1 Summary of Damage Cost based on the category of damages in Roads and Bridges Sector

Damage Category	Cost in (Cr)
Totally Damaged	**1106.96**
Severely Damaged	**457.92**
Partially Damaged	273.68
Total	**1838.56**

It is important to highlight that the data of various damages provided by the department could not be physically validated except for the limited field sampling that was possible during the site visits over three days.

Pavement damages, along with washed-away breast walls and retaining walls at several locations, have caused extensive harm to the road infrastructure. The damaged pavement, retaining walls, breast walls, cross-drainage structures, and bridges need to be repaired under the recovery needs. In addition, new retaining walls, breast walls, and several replacement bridges are required under the Build Back Better approach. Damaged and outdated pipe and slab culverts also need to be upgraded to flood-resilient structures. Overall, the **total recovery and reconstruction needs** for the Roads and Bridges sector in the state are **estimated at INR 2284.03 crore.** The distribution of damage, loss, and Reconstruction and recovery needs is provided in Table 2 for the Roads and Bridges sector.

Table 2 Damage, Loss and Recovery Needs (In Crore) in Roads and Bridges Sector

SL No	District	Damages	Losses	Damage+ Losses	Recovery and Reconstruction Needs
1	Bilaspur	198.5779	34.47	198.5779	2284.03
2	Chamba	162.6695		162.6695	
3	Hamirpur	177.9201		177.9201	
4	Kangra	331.9828		331.9828	
5	Kullu	107.0045		107.0045	
6	Kinnaur	0.0787		0.0787	
7	Lahaul & Spiti	28.7314		28.7314	
8	Mandi	324.9252		324.9252	
9	Shimla	304.3809		304.3809	
10	Solan	48.0149		48.0149	
11	Sirmaur	74.6759		74.6759	
12	Una	78.9016		78.9016	
Total		**1837.8634**	**34.47**	**1872.333**	**2284.03**

Note: **The muck disposal quantity along with average rate has been provided by the Department and the same has been considered as loss. The Department is requested to incorporate the loss data in accordance with the PDNA framework.*

7.2 Basic Profile of the Sector

The road network in Himachal Pradesh is characterized by mountainous terrain, steep gradients, highly fragile geology, and climate-sensitive slopes. The State has an extensive multi-agency road system comprising National Highways, Major District Roads and Cross Drainage Structures and Roadside drainage. The road lengths in the state are as per the summarized details in

Table 3.

Table 3 Total Road length under Various category in the State

Road Category	Length (in Km)
National Highways **under MoRTH, NHAI & BRO**	2259
Major District Roads	5004
Village Roads (Metalled/water Bound/CC/Earthen)	34090
Total	**41353**

Given the terrain, roads act as the primary lifeline, ensuring access to essential services, tourism circuits, emergency response, inter-valley connectivity, agricultural transport, and defence logistics, but the sector remains highly vulnerable to cloudbursts and extreme rainfall, landslides, rockfall and debris flows, river and stream erosion, high sediment loads, glacial-fed river surges during the monsoon, and the overall presence of weak and unstable hill slopes.

7.3 Sectoral Policy Profile: Roads & Bridges Sector – Himachal Pradesh

Key State Schemes and Government Aided Programs

(a)Pradhan Mantri Gram Sadak Yojana (PMGSY)

- Central flagship for rural connectivity; provides technical and financial support for all-weather roads linking unconnected habitations.
- Implemented by: PWD Himachal Pradesh; leverages central design norms and funds.

(b) Central Road Infrastructure Fund Scheme (CRIF)

- Projects of wort Rs 675 Cr have been sanctioned under CRIF during last 3 years.

(c) National Highways Development Programme (NHDP) and Bharat Mala

- Managed by NHAI, these programs support the upgradation of select National Highways and key inter-state connectors in Himachal.

(d) Rural Infrastructure Development Fund (RIDF) Scheme

- Several projects wort r 1924 Cr have been sanctioned under RIDF scheme through NABARD during last 3 Years.

(e) State Disaster Response Fund (SDRF) / National Disaster Response Fund (NDRF)

- Dedicated funds for emergency repairs, short-term restoration, and temporary structures after disasters—critical in the PDNA-to-reconstruction transition phase.

7.4 Damages in Roads & Bridge Sector

The flood damage data submitted by the State Government in the PDNA format indicates significant impacts across all categories of road assets, including road pavements, retaining walls, breast walls, causeways, culverts, drains, and bridges. The State Government has also provided the extent and severity of damages for each individual road section. To assess the financial impact, the Himachal Pradesh PWD has furnished the **unit replacement cost** of these assets based on the prevailing Schedule of Rates (SOR) & market rate as per MoRTH data book (replacement cost furnished by the Deptt is annexed as Appendix-3), and these rates have been adopted for the PDNA analysis.

The classification of damages used is as follows:

- **Totally Damaged:** Roads, bridges, and culverts that were completely washed away or destroyed, where the cost of reconstruction is estimated to be **more than 70%** of the total replacement cost of the asset at prevailing SOR of 2025.
- **Severely Damaged:** Assets that suffered major structural damage, where the repair cost is estimated to be **between 30% and 70%** of the total replacement cost.
- **Partially Damaged:** Assets with surface-level or minor structural damage—such as crust damage, potholes, drain or guardrail damage—where the repair cost is estimated to be **less than 30%** of the replacement cost.

- **Loss Estimate:** Additional expenditure incurred for providing temporary connectivity or diversions where roads or bridges became non-functional until permanent repairs or reconstruction were completed. These costs are over and above the reconstruction and repair costs.

The PWD has submitted the road and asset damage data in the prescribed PDNA format. The dataset includes **over 12,000 roads** (**Appendix-1)** reported as damaged in different stretches, along with damages in other assets if any of that road including separate data for **180 damaged bridges** submitted through Excel sheets (**Appendix-2**).

The affected roads fall into two key categories: **Major District Roads (MDRs)** and **Village Roads**. The State PWD has provided unit replacement costs for each pavement type—Bituminous, Cement Concrete (CC), and Water-Bound Macadam (WBM). Village Roads also include an additional pavement category of **earthen roads**, which constitute about **20–25%** of the damaged Village Road length.

For MDRs, the share of CC and WBM pavements within the total damaged length is only about **1–2%**. Therefore, while analysing the damage cost for MDRs, the **unit replacement cost of Bituminous pavement** has been used uniformly, as the small share of CC and WBM sections does not significantly influence the overall cost.

For Village Roads, the **replacement cost of each pavement type** (Bituminous, CC, WBM, and Earthen) has been considered separately, given their larger proportion and variability.

For assessing damages to retaining walls, breast walls, Hume-pipe culverts, and slab culverts, the damaged lengths and numbers have been aggregated for both MDRs and Village Roads together, and a weighted-average unit replacement cost—based on the proportional share of MDR and Village Road networks—has been applied for the PDNA damage estimation.

To estimate the cost of damage under different category, the 100%, 50% and 20% factors have been applied to the replacement cost of **Totally, Severely and Partial** Damage asset category respectively. **While assessing the damage cost, it has been assumed that the roads and associated assets damaged in various stretches are not covered under any insurance provisions for repair, and therefore the full responsibility for restoration lies with the asset-owning department. This needs to be looked into by the Department.**

Reconstruction of roads has been proposed only in cases where the road stretches have been damaged completely with additional provision of protection works (R/W & B/w) for better resilience.

As for culverts, pipe culverts that were severely or totally damaged have been proposed for reconstruction as slab culverts, following the Build Back Better (BBB) approach. Similarly, **damaged slab culverts** have been considered for reconstruction under BBB only when departments have proposed increasing the vent size or when more waterway is required, based on local site conditions.

For causeways that were reported to have insufficient waterway and were affected by the flooding, we have proposed reconstructing them as high-level bridges, in line with the BBB strategy. This is to ensure greater resilience against future floods like those caused by recent flood and experience gained from past.

The department has formulated standard replacement cost and repair estimates for the damaged roads and road assets. These estimates are annexed **as Annexure-3**. Using these, the financial impact of the reported damages has been assessed.

Table 04: District Wise **Road Pavement Damage statistics** in MDR & Village Rd

Name of District	MDR (Length in Km)			Village Road (Length in Km)		
	Totally Damaged	Severely Damaged	Minor Damaged	Totally Damaged	Severely Damaged	Minor Damaged
Bilaspur	29.45	25.36	36.95	147.48	133.57	119.19
Chamba	2.14	2.91	1.93	35.07	28.59	18.44
Hamirpur	7.44	4.33	14.15	143.25	73.43	102.26
Kangra	18.27	28.46	29.56	104.96	345.38	370.65
Kullu	4.09	6.54	6.17	39.32	30.30	12.65
Kinnaur	0.00	0.00	0.00	0.23	0.00	0.00
Lahaul and Spiti	3.00	2.80	0.00	37.86	38.63	14.96
Mandi	14.37	19.58	23.10	160.74	235.72	173.85
Shimla	22.15	24.42	23.96	140.92	140.45	82.69
Solan	2.33	10.16	1.55	11.24	36.24	10.17
Sirmaur	4.33	8.98	7.20	59.97	48.75	54.54
Una	0.52	2.53	8.46	41.89	22.94	56.51
Total	**108.09**	**136.08**	**153.02**	**922.93**	**1134.01**	**1015.90**

Table 05: District Wise **Damage statistics of Road Protection works (MDR & VR combined)**

Name of District	R/Wall Damaged (in Km)			B/Wall Damaged (in Km)		
	Totally Damaged	**Severely Damaged**	**Minor Damaged**	**Totally Damaged**	**Severely Damaged**	**Minor Damaged**
Bilaspur	1.65	0.89	14.45	0.77	0.69	7.52
Chamba	23.78	3.40	1.74	13.28	2.66	1.75
Hamirpur	12.17	1.92	4.91	1.92	0.60	4.46
Kangra	11.96	3.50	7.53	4.15	3.75	5.62
Kullu	11.48	0.73	2.45	7.07	1.02	2.18

Kinnaur	0.12	0.00	0.00	0.11	0.00	0.00
Lahaul and Spiti	0.76	0.54	0.61	0.44	0.68	0.77
Mandi	26.17	3.80	34.98	5.77	2.85	10.70
Shimla	27.96	8.54	13.70	20.52	6.72	7.97
Solan	5.07	0.83	1.01	2.37	0.32	0.83
Sirmaur	6.70	0.75	2.18	1.41	0.12	1.06
Una	2.08	0.69	2.24	0.50	0.07	0.42
Total	**129.87**	**25.59**	**85.79**	**58.31**	**19.47**	**43.27**

Table 06: District wise **Cross Drainage Damage Statistics** of MDR & VR Combined

Name of District	Number of Hume Pipes Damaged			Number of Slab / Box Culvert Damage		
	Totally Damaged	Severely Damaged	Minor Damaged	Totally Damaged	Severely Damaged	Minor Damaged
Bilaspur	21	24	111	18	12	28
Chamba	37	31	9	4	11	2
Hamirpur	28	11	0	11	0	1
Kangra	68	110	44	8	13	85
Kullu	33	25	9	14	14	2
Kinnaur	0	0	0	0	1	0
Lahaul and Spiti	0	0	0	0	1	9
Mandi	119	155	105	19	28	23
Shimla	34	14	291	1	17	38
Solan	6	2	42	6	0	5
Sirmaur	16	0	52	0	0	11
Una	2	5	16	0	1	3
Total	**364**	**377**	**679**	**81**	**98**	**207**

Table 07: District wise **Causeway & Roadside drainage Damage Statistics** (MDR & VR Combined)

Name of District	Number of Causeway Damaged			Length of Roadside Drainage Damaged (in Km)		
	Totally Damaged	Severely Damaged	Minor Damaged	Totally Damaged	Severely Damaged	Minor Damaged
Bilaspur	0	0	42	14.34	15.76	115.57
Chamba	1	17	0	16.50	7.70	0.38
Hamirpur	30	28	21	41.54	26.33	76.67

Kangra	4	9	8	32.99	45.38	49.96
Kullu	0	1	1	28.71	5.94	2.83
Kinnaur	0	0	0	0.00	0.11	0.00
Lahaul and Spiti	0	0	0	0.20	0.70	1.77
Mandi	10	12	12	73.81	185.25	37.22
Shimla	0	0	4	51.78	32.16	70.60
Solan	0	0	0	11.98	4.53	6.47
Sirmaur	0	0	4	17.75	5.09	11.54
Una	1	0	6	4.53	4.01	3.69
Total	**46**	**67**	**98**	**294.13**	**332.95**	**376.69**

Table 08: District Wise **Bridge Damage Statistics**

Name of District	**Deck Area (Sqm) of Bridges (Minor/Major) Damaged**			
	Totally Damaged	**Severely Damaged**	**Minor Damaged**	**Remarks**
Bilaspur	0	0	3383.82	The replacement cost of (i) **Double Lane** Bridge has been taken as **Rs 9.0 Lac per m** and for (ii) Single Lane **Rs 4.0 Lac per m** based on awarded cost of Bridge projects under NABARD. Accordingly, the average per Sqm cost works out to be Rs 1.13 Lac.
Chamba	876.5	1013.635	2885.0575	
Hamirpur	0	0	85	
Kangra	605.75	2973.375	6903.72	
Kullu	481.95	151.25	2350.5	
Kinnaur	0	0	0	
Lahaul and Spiti	0	0	0	
Mandi	865.95	1822.6	3220.775	
Shimla	1006.5	0	1271.5	
Solan	0	0	0	
Sirmaur	263.5	99	38.7	
Una	0	3600	5080.846	
Total	**4100.15 (27Nos)**	**9659.86 (30Nos)**	**25219.9185 (83Nos)**	

Table 09: Replacement Cost of (Roads pavement), Major & Minor Repair

Road Category	**Pavement/Protection**	**Replacement Cost (Lakh Per Km)**	**Major/Severe Repair (Lakh Per Km)****	**Minor/Partial Repair (Lakh Per Km)****
MDR	Bituminous	93.90	46.95	18.78
	Cement Concrete	122.07*	61.035	24.41
	Water Bound	49.96	24.98	9.992
	Retaining Wall	394	197	78.8

	Breast Wall	212.1	106.05	42.42
Village Road	Bituminous	51.36	25.68	10.72
	Cement Concrete	66.64*	33.32	13.328
	Water Bound	43.94	21.97	8.788
	Earthen	12.22	6.11	2.44
	Retaining Wall	316.2	158.1	63.24
	Breast Wall	168.6	84.3	33.72

**For Cement Concrete 30% extra cost from Bituminous*

*** For Severely and Partially damaged, the repair cost has been taken as average 50% & 20% respectively of replacement cost*

Table 10: Replacement & Repair (Major & Minor) Cost of Culverts & Drains

Road Category	Cross/Rd Side Drainage	Replacement Cost (in Lakh)	Major Repair	Minor Repair
MDR	Hume Pipe	6.075 for each	Average 50% of replacement cost	Average 20% of Replacement cost
	Slab/Box Culvert	27 lakhs for each		
	Causeway	16.24 lakh for each		
	Rd Side Drainage	11.95 lakh per Km		
Village Road	Hume Pipe	5.875 for each		
	Slab/Box Culvert	24.71 lakh for each		
	Causeway	9.11 lakh for each		
	Rd Side Drainage	5.57 lakh per km		

Table 11: Replacement & Repair (Major & Minor) Cost of Bridges

Road Category	Bridge	Replacement Cost	Major Repair	Minor Repair	Remarks
	Double Lane	Rs 9.0 lac per m/ 1.133 per Sqm	0.566 per Sqm	0.23 per Sqm	The replacement cost is based on awarded cost of Bridge projects under **NABARD** which makes average per Sqm cost to be

MDR & Village Rd	Single Lane	Rs 4.0 lac per m/ Rs1.133 per sqm	0.566 per Sqm	0.23 per Sqm	**Rs 1.133 Lac.** Since damaged bridges have different deck widths and lengths so per Sqm rate has been applied.

Table 12: Weighted Average Replacement & Repair (Major & Minor) Cost of Drainage Structures

Road Category	Cross/Rd Side Drainage & Bridges	Replacement Cost (in Lakh)	Major Repair	Minor Repair	Remarks
MDR & Village Rd combined	Hume Pipe	**Rs 5.895** per No			**10% & 90%** Nos share in MDR & VR
	Slab/Box Culvert	**Rs 25.57** per No			**16% & 84%** nos share in MDR & VR
	Causeway	**Rs 9.54** per No			**6% & 94% Nos** share in MDR & VR
	Rd Side Drainage				

**For damage cost of Retaining Wall, Breast Wall, Roadside Drain and Cross drain works the weighted average replacement cost of these have been used based on % distribution in MDR and Village Road.*

Table 13: The Abstract of Damage (All Districts Combined)									
	Pavement/ Protection Works/ Drainage works	**Totally Damaged**		**Severely Damaged**		**Partially Damaged**		**Total Damaged**	
		length/ Nos	cost (in lakh)	length	cost (in lakh)	length	cost (in lakh)	Length	cost (in lakh)
MDR	Road Bituminous	108.09	10149.65	136.07	6388.49	153.03	2873.90	397.19	19412.04
Village Road	Bituminous	644.91	33058.09	869.44	22283.75	838.57	8597.02	2352.92	63938.85
	Cement Concrete	7.59	505.80	12.21	406.84	8.34	111.16	28.14	1023.79
	Water Bound	42.93	799.36	45.64	424.91	32.58	121.33	121.15	1345.59
	Earthen	227.56	2780.78	206.76	1263.30	136.85	334.46	571.17	4378.55
	Sub Total (Pavement)	**1031.08**	**47293.68**	**1270.12**	**30767.28**	**1169.37**	**12037.87**	**3470.57**	**90098.83**
MDR & Village Road	Retaining Wall*	129.90	42165.54	25.59	4133.04	85.80	5596.73	241.29	51895.31
	Breast Wall*	58.31	10033.98	19.48	1688.72	43.28	1508.31	121.07	13231.01
	Sub Total (Protection works)	**188.21**	**52199.52**	**45.07**	**5821.76**	**129.08**	**7105.04**	**362.36**	**65126.33**
	Roadside Drain*	294.13	1900.08	332.96	1045.49	376.70	463.34	1003.79	3408.92
	Sub Total (Rd side Drain)	**294.13**	**1900.08**	**332.96**	**1045.49**	**376.70**	**463.34**	**1003.79**	**3408.92**
	Hume Pipe (in Nos) *	364	2147.60	377	1112.15	679	801.22	1420	4060.97
	Slab Culvert (in Nos) *	81	2071.17	98	1252.93	207	1058.60	386	4382.70
	Causeway (in Nos) *	46	438.84	67	319.59	98	186.98	211	945.41
	Sub Total (Cross Drain)	**491**	**4657.61**	**542**	**2684.67**	**984**	**2046.80**	**2017**	**9389.08**
	Bridges (Nos)	27	4645.47	30	5472.31	83	5714.83	140	12399.71
	Sub Total (Bridges)	**27**	**4645.47**	**30**	**5472.31**	**83**	**5714.83**	**140**	**12399.71**
Total									**183855.77**

7.5 Loss Estimate

Between July to September 2025, Himachal experienced severe flash floods due to unprecedented heavy rainfall. This natural disaster caused widespread damage across the state's roads and bridges. The continuous rainfall triggered landslides, slope failures, erosion, and washouts, severely affecting road connectivity and cutting off several districts. To address the immediate disaster impacts, it is reported that the Public Works Department (PWD) rapidly mobilized adequate manpower and machinery resources to clear debris, restore blocked sections, and re-establish basic connectivity. However, the PWD Himachal Pradesh has additionally shared, details indicating that **13,78,666 cum of muck was generated**, with an estimated **disposal cost of Rs. 34.47 crore.** However, this figure will only reflect the immediate operational costs and does not fully capture the long-term losses from damaged infrastructure, reduced connectivity, or indirect economic impacts.

7.6 Socio Economic Impact

The disruption of Himachal Pradesh road and bridge networks had cascading effects on the local economy and communities. Roads are the backbone of economic activity, enabling the transport of goods, people, and services. The flood-induced disruptions meant that rural producers, especially farmers growing staple grains like maize and wheat, large portion of fruits like apple with other fruits like peaches, plums, and Kiwis and Offseason vegetables, such as tomatoes, capsicum, cauliflower, peas including significant crop such as seed potato, ginger, mushroom etc. could not move their goods to markets on time. This led to spoilage, reduced income, and higher transport costs as alternative longer routes or costlier modes of transport were used. Urban and rural communities also faced hardship as access to essential services like healthcare, schools, markets, and workplaces was hampered. Businesses suffered reduced footfall, supply chain interruptions, and rising operational costs. Extended connectivity disruptions over more than a week in some districts led to compounded losses, including a dent in the state's GDP. Additionally, houses, small shops, and commercial properties located alongside damaged roads suffered structural damage. Many residents lost personal property, important documents, and family heirlooms. While some losses are quantifiable, many—such as emotional trauma, stress, and psychosocial impact—are non-monetary but no less significant. These factors must be considered when designing people-centred recovery programs.

7.7 Response by the Government:

The 2025 monsoon season inflicted catastrophic damage on Himachal Pradesh's road network, with hundreds of routes blocked by landslides, flash floods, and cloudbursts. Critical national highways and vital link roads were severed, stranding thousands, disrupting the annual Manimahesh Yatra, and crippling the movement of essential supplies and apples, the state's economic lifeline.

Immediate Government Response & Restoration Actions: The state government, under the direct supervision of the Hon'ble Chief Minister and Chief Secretary, treated road restoration as a "war-footing" priority. The response was characterized by a massive, coordinated effort across multiple departments and agencies.

1. Mobilization of Machinery and Manpower: The Public Works Department (PWD) was directed to deploy all available resources. The memorandum highlights instances like the Janganbag landslide in Sundernagar (Mandi), where four JCB machines were immediately deployed for debris clearance. In critical situations, heavy machinery was airlifted by the Indian Air Force to inaccessible areas, such as the severely affected Banjar and Anni regions of Kullu district.

2. Strategic Focus on Critical Corridors: Restoration efforts were strategically prioritized to open key arteries first:

- Chamba-Bharmour Route: Essential for the evacuation of ~15,000 stranded Manimahesh pilgrims. The route was progressively cleared and reopened, enabling the movement of buses and evacuation teams.

- National Highways: A major success was the reopening of NH-505 and NH-03 in Lahaul & Spiti, which had been blocked by multiple landslides, restoring connectivity to the cold desert region.
- Apple Belt Roads: Direct orders for the urgent restoration of roads in apple-growing regions to prevent financial losses for farmers, recognizing the season's critical timing.

3. Coordination and War-Room Monitoring: Daily review meetings chaired by the Chief Secretary from August 27 to 30, 2025, specifically tracked road restoration progress in worst-hit districts like Chamba, Kullu, and Lahaul & Spiti. The State Emergency Operation Centre (SEOC) acted as a war room, using GIS platforms to monitor bottlenecks and coordinate the deployment of PWD, Border Roads Organisation (BRO), and other agencies.

4. Quantifiable Outcomes (as per Government Data): While the memorandum provides district-specific damage data, the restoration outcomes cited in government reviews include:

- Successful evacuation of thousands of pilgrims and tourists via reopened routes.
- Partial or full restoration of connectivity to major sub-divisions like Thunag and Karsog in Mandi, and Banjar in Kullu, within days of the worst landslides.
- Clearing of the Pathankot-Chamba road, a vital lifeline for the region.

In brief, the Himachal Pradesh Government's response to the road connectivity crisis was immediate, massive, and strategically targeted. By mobilizing state machinery, leveraging air support for inaccessible areas, and maintaining relentless high-level oversight, the administration succeeded in restoring critical links in an exceptionally challenging environment, thereby facilitating larger rescue and relief operations and providing a crucial lifeline to isolated communities.

7.8 Recovery and Reconstruction Needs Assessment:

While emergency repairs restored basic connectivity, the scale of damage demands a comprehensive recovery and reconstruction strategy focused not just on rebuilding but on making infrastructure more resilient to future disasters. The immediate priority is to repair and restore damaged assets such as roads, bridges, culverts, retaining walls, and drainage systems, with an estimated timeline of 6–18 months. However, reconstruction efforts should integrate resilience measures to account for future flood risks and climate change impacts. For detailed calculation of Recovery and Reconstruction Needs. Key actions include:

- Rebuilding breast walls and retaining walls in landslide-prone sections.

- Reinforcing slope stability with structural (e.g., masonry, RCC) and bioengineering (e.g., vetiver grass, geocells) solutions.

- Upgrading culverts by replacing old, undersized, or collapsed pipe culverts with larger vented box culverts to improve drainage.

- Replacing unsafe bridges with new RCC high-level bridges designed based on updated hydrological and geological data, considering the new High Flood Levels (HFL).

Table 14: **Recovery and Reconstruction of Damaged Assets**							
Description of Items	**Totally Damaged**		**Severely Damaged**		**Partially Damaged**		**Recovery And Reconstruction Cost (in Lakh)**
	Length	Cost (in Lakh)	Length	Cost (in Lakh)	Length	Cost (in Lakh)	
Road Pavement (MDR & Village Rd)	1031.08 Km	47293.68	1270.12	30767.28	1169.37	12037.87	90098.83
Retaining Wall & Breast Wall (MDR & VR)	188.21 Km	52199.52	45.07 Km	5821.76	129.08 Km	7105.04	65126.32
Roadside Drain (MDR & VR)	294.13Km	1900.08	332.96 Km	1045.49	376.70 Km	463.34	3749.801
Causeway (MDR & VR)	28 Nos*	267.12	67 Nos	319.59	98 Nos	186.98	851.059
Slab Culvert (MDR & VR)	63 Nos*	1610.91	98 Nos	1252.93	207 Nos	1058.6	4314.684
Hume Pipe Culvert (MDR & VR)	All proposed for slab culvert (covered in above table)		377 Nos	1112.15	679 Nos	801.22	1913.37
Bridges (MDR & VR)	12 Nos	3482.01	30 Nos	5472.31	83 Nos	5714.83	14669.15
Total							**180723.21**
**** Partially covered under reconstruction***							

Table 15: Reconstruction under BBB

Description of Items	**Details of Proposed Works**		
	Length (Km)/Area (Sqm)	Unit Cost	Cost (in Lakh)
Provision for construction of additional Retaining wall structures along vulnerable stretches prone to road cutting, designed with enhanced stability measures and improved drainage for long-term resilience	36.62	394	**14428.28**

Provision for construction of additional Breast walls in identified landslide-prone sections, incorporating improved slope-protection and geo-technical measures to enhance slope stability.	9.28	316	**2932.48**
Replacement of 15 structurally distressed and hazard-affected bridges with new, disaster-resilient bridge structures conforming to current design standards and hydraulic requirements.	1029.61Sqm	1.243 Lakh Per Sqm	**1279.81**
Reconstruction of 18 washed-away Causeways with high-level bridges, ensuring uninterrupted connectivity and enhanced flood resilience.	7577.25 sqm	1.243 Lakh Per Sqm	**10835.4675**
Replacement of 21 washed-away slab culverts with hydraulically adequate minor bridges designed to accommodate increased discharge and future flood events.	1713.635 Sqm	1.243 Lakh Per Sqm	**1726.06**
Reconstruction of 364 Nos all washed-away and fully damaged Hume Pipe Culverts with reinforced concrete slab culverts incorporating improved hydraulic and structural capacity.	364	27	**9828**
Total			**41030.0975**

Overall Recovery & Reconstruction Matrix

The overall recovery matrix for the short to medium term, including both infrastructure costs and associated soft costs for technical studies, training, and capacity augmentation, is provided in Table below.

Table 16: Roads and Transport: Recovery Framework

Recovery and Reconstruction Needs	Amount (INR Lakhs)	Responsible Department	Supporting Department	Funding Source	Timeline
Recovery and Reconstruction of damaged road pavement, protection works, cross & Rd side drainage and Bridges	180723.21	PWD Himachal	SDRF	R&R window under NDRF	6-24 months

Resilient Road Bridge Reconstruction and Rehabilitation for damaged/ washed away bridges/ culverts, Additional Protection works as resilient measures as per Table-15	41030.10	PWD		As Above	12-36 months
Slope stabilisation of Approximately 3500 Sqm area affected by Landslides (lumpsum)	150.00	PWD	SDRF & NDRF	As Above	
Detailed Study and DPRs for New Bridges Connectivity Program	500.00	PWD		As Above	18 months
Health Monitoring of all major Bridges followed by Retrofitting and River Training works/ Hydraulic Control works like check dams/ dykes at vulnerable bridge location and downstream Dams	1000.00	PWD		SDMF	24 months
Technical studies to deal with sinking section, bridge design options across mountains rivers with considering high flow discharge as results of event like torrential rain and local geo-morphology	500.00	PWD		SDMF	18 months
Vulnerability assessment of road network along Rivers, identifying hotspots of Toe erosion by High floods for river Training works including dykes	1000.00	PWD		SDMF	18 months
Training and Capacity Building of PWD (R&B), RDD Engineers and Contractor on resilient road design, bridge health design and management	1000.00	PWD		SDRF	
Carrying out study for damage mapping, geo-	2500.00	PWD		NDMF	

technical, geophysical, geological geomorphological details, along with catchment area mapping, run off, record of flooding etc for suggesting land slide measures across the region in the State					
Total	**228403.31**				

7.9 Implementation mechanism

The proposed reconstruction and recovery interventions will be carried out by the Public Works Department. All initiatives will be undertaken in consultation and coordination with the Himachal State Disaster Management Authority. Funding for these activities will be accessed through the National Disaster Relief Fund, the State Disaster Relief Fund, state and central sector schemes, and Development Finance Institutions (DFIs).

Multi-stakeholder partnerships, including research organizations, scientific institutions, and community representatives, will be formed to facilitate on-ground planning and ensure timely execution of the proposed interventions.

All recovery actions will adhere to the principles of 'Build Back Better' (BBB), aimed at enhancing the resilience of both the state and its communities. Disaster risk reduction measures will take into account the specific needs of the ecologically sensitive Indian Himalayan Region. Recovery efforts will begin with short-term actions and evolve into more sustainable, mainstreamed practices in the medium to long term, guided by comprehensive technical studies. Key focus areas for recovery actions include:

7.9.1 Policy and Systems

There are increasing instances of landslides during construction and during operation period which continue to disrupt the traffic. Looking into this construction practices in hilly terrain especially in Himalayan region require improvement at planning, project preparation and execution stages so that proper protection measures are designed and implemented while allowing sufficient time for the hills to achieve time dependent stability. The need is felt to take additional augmented and systematic remedial measures on the basis of experience gained over the years, issues encountered and feedback/suggestions received from the stakeholders which can be integrated with the existing practices seamlessly in the following areas:

(a) Improvement in quality of Detailed Project Report through proper planning including slope stabilisation measures, wherever required, along the alignment, with available data and leveraging technology, requisite investigations and validation of DPR parameters including making use of historical data as available on online resources developed by the National Remote Sensing Agency.

(b) Adequate provisions of hill slope protection measures in the scope of work;

(c) Amendments in contract agreement to incorporate special provisions related to hill roads.

i. Improvements in construction practices in hilly terrain.
ii. Adequate time period of construction; and
iii. Monitoring and early warning system for potential landslides.

Mainstreaming Resilience in Hill Roads: The Public Works Department should prioritize the integration of resilience into hill road infrastructure, ensuring the protection of both the natural and social environments. This can be achieved by developing a comprehensive policy framework, strategies, and technical manuals focused on: (i) an integrated landslide risk mitigation strategy, (ii) planning and designing roads along river courses with soft banks, (iii) establishing an emergency warning and response system, (iv) implementing nature-based solutions and resource protection measures, and (v) creating an environmental and social management framework.

Local Guidelines for Resilient Road Infrastructure: A set of localized guidelines for resilient road infrastructure should be developed, based on thorough assessments, local engineering practices, the use of marginal materials, nature-based solutions, and lessons learned from other states. These guidelines will provide valuable insights to inform reconstruction and recovery efforts. Wherever feasible, bio-engineering solutions, combined with low-cost structural measures such as gabions for slope stabilization, should be employed to support a greener and more sustainable recovery process.

Road Asset Management System (RAMS): The development of a RAMS is essential for scientific planning, budgeting, and execution of road infrastructure works. This system should explore the implementation of a GIS-based climate module that includes multi-hazard mapping, climate and population data for vulnerability assessments, and climate and hazard risk evaluations of road and bridge assets. Additionally, a bridge-specific module should be incorporated within the RAMS to capture detailed as-built and condition surveys, which can be overlaid with climate and hazard data on the GIS platform for better decision-making.

Bridge Inspections and Maintenance: Regular bridge inspections and timely repairs are crucial to prevent the escalation of damage, particularly during flash floods caused by events such as torrential rainfall, cloudbursts, or high-intensity rainfall. Routine health assessments of bridges should be institutionalized as part of the Bridge Module Manual within the RAMS, ensuring that early-stage damages are addressed before they result in significant structural failures.

Geo-Technical Risk Zoning and Corridor Planning: Before initiating reconstruction or new road alignment, a geo-technical risk zoning framework should be established to guide the selection of safe, geologically stable corridors. Corridor planning must integrate landslide susceptibility mapping, soil stability assessments, and fault line monitoring, especially in high-risk hill zones.

Climate-Responsive Design Templates for Hill Infrastructure: Develop a library of modular, climate-adaptive engineering designs suited for varied hill typologies (e.g., steep slopes, river-adjacent stretches, seismic fault zones). These should incorporate elevated roadbeds, all-weather surface treatments, cross-drainage flexibility, and modular retaining structures, enabling faster, safer deployment in remote and risk-prone areas.

Integrated Debris and Drainage Management Plans: Post-disaster road failures often stem from blocked culverts, clogged drains, or unmanaged slope debris. A district-level plan for debris clearance, seasonal drainage maintenance, and emergency slope stabilization teams should be institutionalized—especially before and during monsoon seasons.

Sustainable Sourcing and Haulage of Construction Materials: Encourage the use of marginal or locally available materials (e.g., fly ash, cold mix, laterite) that reduce environmental degradation and minimize haulage cost and carbon footprint. Partnerships with academic institutions can help define locally validated material specifications and their resilience thresholds.

Resilience Certification and Capacity Building for Contractors: Introduce a resilience certification program for contractors and implementing partners. This should cover training in climate-resilient construction practices, environmental safeguards, and bioengineering techniques, creating a pool of certified professionals equipped to handle hill road complexities.

Community-Based Monitoring and Reporting Mechanisms: Establish community-driven monitoring systems using mobile platforms and citizen science tools to report infrastructure issues like road cracks, small slides, or culvert blockages. This allows for early alerts and fosters community ownership of infrastructure resilience.

Emergency Access Route Mapping and Redundancy Planning: Develop and periodically update a redundant access route inventory, including seasonal diversions, foot trails, and potential bridge deployment sites. This ensures that at least one operational route remains functional to critical locations during disasters or peak monsoon disruptions.

7.9.2 Institutional

Expand Planning Division Capacity: The Planning Division of the Department of Research and Development should enhance its capacity to design and construct climate-resilient roads and bridges. To achieve this, the department may engage the services of one geologist cum geotechnical expert, one hydrology expert, one bridge design expert, and one road design expert for a duration of two years. These experts will provide essential support for practical planning and design efforts during the short to medium-term recovery and reconstruction phases. Additionally, the PWD should explore opportunities for collaboration with IITs, NITs, and local engineering colleges to provide training, capacity building, and technical guidance to the resilient design team.

Collaboration with Hydropower Companies: Key stakeholders, such as NHPC, CWC, and the Water Resources Department, play a critical role in designing resilient roads and bridges across rivers in the state. New bridge locations, flow conditions, and river training requirements should be determined in consultation with these agencies, with all meetings and discussions thoroughly documented to ensure transparent and informed decision-making.

Establish a Resilient Infrastructure Design Cell (RIDC): Set up a dedicated Resilient Infrastructure Design Cell within the Planning Division, staffed by the experts, with additional support from structural engineers, GIS analysts, and environmental planners. This unit would develop technical design guidelines, maintain a database of geotechnical and hydrological assessments, and serve as the state's technical advisory unit for all hill road and bridge projects.

Technical MOU with Premier Institutions: Formalize Memorandums of Understanding (MoUs) with premier engineering institutes such as IIT Roorkee (known for hydraulic modeling), IIT Bombay (transport systems), and the National Institute of Disaster Management (NIDM) for long-term technical assistance, faculty exchange, hands-on workshops, and mentoring of state engineers and junior planners.

Geo-Hazard and River Basin Mapping Unit: Create a permanent Geo-Hazard and River Basin Mapping Unit under the Water Resources Department with active involvement from the PWD and Planning Division. This unit will conduct watershed-level planning, maintain multi-hazard risk atlases, and work with agencies like IMD, ISRO, and CWC to predict flood zones, slope instability, and erosion-prone areas impacting road/bridge alignment.

Mobile Field Technical Support Units (FTSUs): Deploy mobile technical units with survey equipment, GIS mapping tools, soil testing kits, and drone capabilities. These units will support rapid site investigations, pre-feasibility checks, and post-disaster inspections, especially in remote and difficult-to-access locations.

State-Level Design and Engineering Fellowship Program: Launch a fellowship program in partnership with leading engineering schools to engage young professionals in resilient design work across Himachal. These fellows can assist with data collection, field validation, and prototype testing while being mentored by the core technical team.

7.9.3 Engineering

Flood and Landslide Vulnerability Assessment: The Public Works Department should initiate a site-specific flood and landslide vulnerability assessment for roads along river watersheds within the next 2-3 months. This assessment will enable road agencies to conduct comprehensive flood risk mapping, identify and characterize unstable hillsides, and evaluate soil and rock conditions. It will help determine viable options for slope protection, with a focus on a combination of retaining structures (such as breast walls and retaining walls) and bioengineering solutions. This post-disaster assessment is crucial for identifying and marking critical locations prone to flood hazards or unstable slopes, using geo-tagging. Some resilience-building measures may require cross-sector collaboration, particularly with the Water Resources Department and hydropower companies for toe protection, dredging, river training, bank protection (using retaining walls), check dams, and dykes at the approach to minor bridges. For critical landslide locations along road alignments, a multi-sectoral assessment involving the Water Resources, Forest, and State Disaster Management Authorities (SDMA), along with the construction of a detailed ground model, will provide the best approach to determining mitigative measures.

Bridge Monitoring and Replacement Program: A detailed monitoring program should be established to assess the condition of all major and minor bridges in the state. This should be followed by a programmatic approach for the replacement of outdated and severely deteriorated bridges, and the repair/rehabilitation of weaker bridges. Measures should include the replacement or restoration of expansion joints, bearings, raising the bridge deck above the High Flood Level (HFL), where possible, and implementing protection measures against unforeseen changes in river flow (such as dykes and check dams), along with riverbank stabilization.

Design of Climate-Resistant Bridge Structures: Bridge structures should be designed to withstand the effects of climate change, based on thorough hydrological and geological assessments. In areas with challenging terrain, integrated bridges, cantilever bridges, and other steel structures with long spans are the most suitable options. During torrential rainfall or future flash floods, the bridge foundations should be deepened. If piers are necessary, a full evaluation of the foundation design is recommended, including the use of raft foundations. Protection against bridge scour, which is a leading cause of failure and collapse, is crucial. Stabilized riverbanks can prevent erosion and protect bridges from scour, achieved through measures such as revetments, gabions, riprap, and increasing vegetation/forest cover—much of which was impacted by the recent heavy rainfall.

Slope Stabilization and Retrofit of CD Structures: As the PWD restores and rebuilds damaged roads, it is essential that slope stabilization be prioritized at locations where slope failures have occurred. A combination of breast walls on the hillside and retaining walls on the valley side, with site-specific designs (e.g., robust masonry, gabion, or RCC for lower layers), should be used. At critical sections, nature-based solutions such as bioengineering techniques (including geo-cells, geogrids, and vetiver grass) should be employed to prevent surface erosion. Additionally, CD (Culverts and Bridges) structures should be retrofitted with robust protection, including bioengineering solutions like vetiver grass, hydro-seeding, and bamboo or shrub plantations at critical points (such as river/streambanks and piers).

Design of New CD Structures: New CD structures (Bridges and Culverts) should be designed to account for the latest flood and hydrological flow projections, considering climate change impacts.

Damaged hillside drains should be reconstructed in alignment with catchwater channels to efficiently discharge water from the hills into the nearest CD outfall.

7.9.4 Technical Assistance Support Required (In Short to Medium Term)

Geotechnical and Geomorphological Studies: The Himachal Pradesh State Disaster Management Authority (SDMA) may undertake geotechnical and geomorphological studies for critical slopes, in collaboration with reputed national and international academic institutions. These studies are expected to be completed within the next 24 months.

Detailed Project Reports (DPRs) for "Fair Weather to All Weather Road Program": DPRs may be developed for roads across Twelve districts, aimed at improving road connectivity along river basins.

Community Footbridge Program Design and DPRs: Detailed design and DPRs need to be developed for the community footbridge program, which will enhance connectivity in rural and flood-prone areas.

Study for New Bridge Construction: A detailed study may be undertaken to design and plan new bridge construction across rivers to ensure continuity of transportation in affected areas.

Strategic Connectivity Options Study: A strategic study may be conducted to explore and identify alternative connectivity options for the affected districts and regions, ensuring resilience against future disasters.

Capacity Building for PWD Department and Local Contractors: A capacity-building program may be implemented for engineers in the Public Works Department (R&B) and local contractors. This will focus on resilient road design and construction, bio-engineering solutions, topsoil conservation during construction, and the use of local and marginal materials. The program will also raise awareness about long-term performance-based management contracts and the role of sustainable road maintenance for core facilities. The capacity-building efforts will include targeted training sessions, contractor outreach programs, and advanced seminars on relevant topics.

7.10 Key Recommendations

7.10.1 Practices during DPR Preparation

a) Route / Alignment Planning: Use modern survey tools such as LiDAR/AI-enabled drones to map the terrain. The base plan prepared using topographical data should be superimposed with Indian Landslide Susceptibility Map. Also, the landslide inventory of the past landslides should be collected and studied. Further, the slope movement mm/year should be analysed from the Digital Elevation Modelling (DEM) using INSAR or similar satellite imagery and historical data as available on online resources developed by the National Remote Sensing Agency. Considering vulnerability of the hills and construction capability, the route/alignment selection/widening proposal should be finalised irrespective of whether it is on hill side or valley side. Alternative options such as tunnels, bridges and viaduct should also be evaluated including its seismic analysis. The tension cracks in the crown area within the influence area/zone in the considered wide strip should also be identified, if any, and marked on the map. The provision of repair of the identified tension crack should be considered in the scope of work of civil contract.

b) Provision of Additional Right-of-Way (RoW): Acquire extra land wherever required at culvert/structures locations to channelise hill side streams for construction of catch water drains for effective interception and disposal of hill runoff avoiding erosion, slope instability, and pavement deterioration. ROW shall consider stable slope requirements and cannot be of fixed width. For high cut slopes wider ROW would be needed and must be based on slope stability analysis and safety measures ascertained during DPR stage. This will ensure safe construction and long-term slope stability.

c) Identification of Muck Disposal Sites: For new roads, design the road in such a way that excavated material is fully utilised in construction of embankments and fill slopes within a short distance of source, but this is often not feasible and may be uneconomical. It is experienced that during construction, excess/unsuitable materials are dumped in unplanned manner resulting in blockage of natural water channels. So, plan designated dump sites for excess earth and debris generated during excavation. The dumpsites, along with capacity and location, must be part of the DPR.

d) Sufficient provision of Protection Measures including drainage for cut slope and valley slope: Protection measures including sub-surface and surface drainage provisions for cut slope and valley slope should be designed on the basis of detailed geotechnical investigation bore holes at identified critical locations—such as deep cut/fill sections, bridge abutments, soft ground zones, landslide-prone forming materials. Tests such as large shear box must be performed for coarse materials. Geotechnical investigations should be conducted just after recession of monsoon to represent the weakest sub soil condition. Detailed drawings, specifications, and quantities should be prepared and later vetted by Experts who have extensive experience in this field. The State Govt should empanel such experts.

e) Safeguard Communities abutting Right of Way: Survey and geo-tag all buildings, utilities, private lands, forest areas, and access roads within 100 m on both sides of the proposed RoW. DPR Consultant shall identify secondary intersecting/access roads/crossroads, design improvement thereof and incorporate all the required quantity and associated cost.

f) Consultation With Stakeholders: Coordinate with Forest Departments, government agencies, and local communities for works beyond RoW and for safety measures during construction. The nearby residents should be regularly informed at all stages of the project development and advance warning may be issued through local administration/SDRF for any likely collapse/landslides.

7.10.2 Good Construction Practices

Execution of Stabilization Measures: If slope stabilization measures are already included in the DPR, follow them. If not, the contractor must propose designs supported by investigation data, which should be verified by a competent government body.

Stage-wise Construction: Construction should be phased. First complete hill cutting and slope protection works and wherever possible, allow one monsoon season to verify slope stability before proceeding with the remaining works.

Controlled Slope Cutting: Use stepped or benched excavation from top to bottom instead of vertical cutting. Protective works must be executed simultaneously to avoid slope failures.

Safe Handling of Unusable Material: Dispose of unusable excavated material only at approved designated dumping sites to prevent environmental damage and avoid blocking streams and rivers.

7.10.3 Post-Construction Maintenance

The contractor must maintain the road during the Defect Liability Period. A schedule of rates for emergency works should be included in the contract, so payments can be made quickly for landslide-related repairs beyond the RoW.

D. **Insurance Provisions**

All contracts must include adequate insurance coverage for works, assets, and natural disaster risks, as landslides and floods occur frequently in hilly regions.

8. WATER SUPPLY

8.1 Water Resource - Drinking Water, Irrigation and Flood Control.

8.1.1 Introduction

This chapter examines the impact of the disaster on water resources infrastructure across three critical sectors in Himachal Pradesh Drinking water and sanitation services. minor irrigation systems, and flood protection measures. The assessment analyzes the extent of damage sustained by each sector's infrastructure and identifies the recovery interventions required to restore essential water services to affected communities.

The evaluation encompasses irrigation networks that support agricultural livelihoods, drinking water supply systems and sanitation facilities vital for public health, and flood protection infrastructure designed to safeguard communities from future water-related disasters. Through damage assessment and needs analysis, this chapter provides the foundation for prioritizing reconstruction efforts and developing a comprehensive recovery strategy water resource sector.

8.1.2 Sectoral Policies

Several national and state-level schemes provide comprehensive funding mechanisms for drinking water, irrigation, and flood control recovery and reconstruction needs in Jammu and Kashmir. These policies offer structured financial support and technical frameworks essential for post-disaster infrastructure rehabilitation and enhancement.

- **Jal Jeevan Mission (JJM):** Established in 2019 in Himachal Pradesh, this flagship scheme aims to provide functional household tap connections to all rural households, initially targeting completion by 2024 but extended to 2028 for comprehensive coverage. The mission focuses on delivering 55 litres of safe and sustainable water per capita per day while adhering to prescribed quality standards, making it crucial for post-disaster drinking water infrastructure reconstruction.

- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT):** Launched in June 2015 to enhance urban infrastructure across 5000 towns and cities, AMRUT addresses universal water supply coverage, sewage and septage management, and storm water drainage systems. The upgraded AMRUT 2.0 expands scope to include treated sewage water recycling, water body rejuvenation, and comprehensive water conservation measures, providing significant funding opportunities for urban water infrastructure recovery.

- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** This centrally sponsored scheme focuses on enhancing irrigation efficiency and expanding irrigated agriculture coverage, particularly relevant for rebuilding damaged irrigation infrastructure and implementing water-efficient technologies in post-disaster scenarios.

- **NABARD Funding Mechanisms:** The National Bank for Agriculture and Rural Development provides specialized financing for rural infrastructure projects, including irrigation systems, water supply schemes, and flood protection measures, offering long-term financial support for comprehensive reconstruction efforts in rural areas affected by disasters.

8.1.3 Institutional Arrangements - Public Health Engineering, Irrigation and Flood Control Department

Jal Shakti Vibhag, formerly known as public Health and Engineering Department, serves as a central agency responsible for water resource management in the state. This department is executing Water Supply Schemes, Irrigation Schemes, Flood Protection Works, and Sewerage Schemes.

The Jal Shakti Department is dedicated to ensuring comprehensive water supply and sanitation services across the region. Some of the key functions of the department includes

- Construction of drinking water supply schemes / Irrigation schemes / Sewerage schemes / Flood Protection works under various programs from concept to commissioning
- Monitoring of Water quality to ensure safe drinking water
- Monitoring of Physical & Financial progress of various schemes/ Projects under different Sectors
- Installation / maintenance of Hand pumps
- Maintenance of schemes constructed under various sectors
- Monitoring of legal matters, court cases etc.
- Establishment matters related to departmental personnel, accounting, budgeting, office expenditure, stores, inventory etc.

8.1.4. Drinking Water

The Jal Shakti Department of Himachal Pradesh is the nodal agency responsible for planning, implementing, and managing water supply and sanitation infrastructure across the state. The department operates under the broader framework of the national Jal Jeevan Mission and other Central Government schemes aimed at providing functional household tap connections (FHTC) to rural households.

As per the data provided by the department it manages an extensive network of piped water supply schemes across all 12 districts of Himachal Pradesh. As per the sanction data for Central Schemes, the department oversees a total of **1,747 piped water supply schemes** comprising both Single Village Schemes (SVS) and Multi-Village Schemes (MVS). These schemes are designed to provide piped water connections to **487,398 households** across the state, with **468,650 connections already provided**, achieving approximately 96% physical coverage.

Piped Water Supply Schemes:

Total (SVS + MVS)								
S.No	District	No. of Schemes	No. of house connections planned	No. of house connections provided	Total Est. cost	Total exp.	SVS	MVS
1	Bilaspur	37	41454	53386	326.09	266.42	1	36
2	Chamba	253	6949	2349	494.73	290.42	77	176
3	Hamirpur	66	35774	28140	431.8	315.43	4	62
4	Kangra	234	131502	142771	1120.4	888.98	14	220
5	Kinnaur	72	4648	2694	64.11	41.99	15	57
6	Kullu	152	39667	40728	312.37	171.37	29	123
7	Lahaul And Spiti	50	2582	2639	12.76	6.46	36	14
8	Mandi	232	114206	104030	1594.08	1216.85	14	218
9	Shimla	264	44958	22494	901	701.91	60	204
10	Sirmaur	266	32778	39685	386.84	275.51	84	182
11	Solan	106	17117	15170	516.51	316.61	7	99
12	Una	15	15763	14564	234.42	228.57	0	15
Total		**1747**	**487398**	**468650**	**6395.11**	**4720.52**	**341**	**1406**

The piped water supply infrastructure is categorized into:

- **Single Village Schemes (SVS)**: 341 schemes with an estimated cost of ₹267.65 crore (expenditure: ₹180.97 crore)
- **Multi-Village Schemes (MVS)**: 1,406 schemes with an estimated cost of ₹6,127.46 crore (expenditure: ₹4,539.55 crore)

The total estimated investment for these piped water supply schemes amounts to **₹6,395.11 crore**, with cumulative expenditure of **₹4,720.52 crore**.

Detail of JJM schemes	
Total schemes approved under JJM	1747
Multi village schemes (MVS)	1406
Single village scheme (SVS)	341
Schemes completed physically & financially	650
Ongoing schemes	1097
Length of Transmission lines	66229.28 KM
Length of Distribution lines	43913.72 KM

Abstract of Completed Water Supply Scheme

Sr. No	Name of District	Gravity	LWSS	Tube Well	Total No of Schemes
1	Chamba	840	13	0	853
2	Kangra	144	452	53	649
3	Lahual & Spiti	288	3	0	291
4	Kullu	743	37	0	780
5	Mandi	1463	393	1	1857
6	Hamirpur	0	174	0	174
7	Una	10	98	102	210
8	Bilaspur	91	181	6	278
9	Solan	358	278	90	726
10	Sirmour	952	274	82	1308
11	Shimla	1369	1307	1	2677
12	Kinnaur	264	0	0	264
	Total	**6522**	**3210**	**335**	**10067**

In addition to the ongoing schemes under Jal Jeevan Mission, the Jal Shakti Department manages a portfolio of legacy water supply schemes that were completed prior to or outside the JJM framework, representing decades of water supply infrastructure development that forms the backbone of the state's rural water supply network. The department currently operates and maintains 10,067 completed water supply schemes across the state, categorized by source type and technology: Gravity-based schemes constitute the majority with 6,522 schemes Lift Water Supply Schemes (LWSS) comprise 3,210 schemes ; and Tube Well-based schemes represent the smallest category with 335 schemes. The total length of distribution network within the legacy schemes is unavailable to quantify the vast network of the water supply network in the state.

8.1.5 Water Supply Infrastructure Configuration

- Small mountain streams are tapped using diversion weirs or nalla intake structures that channel water from natural sources flowing through the hilly terrain. These intake points constitute the primary source of raw water for the municipal water supply infrastructure across the district.

- Diverted water is collected and stored in tanks strategically located at higher elevations to enable distribution through gravity flow. The storage capacity of these reservoirs is calculated to support the rationed water distribution schedule, providing adequate buffer storage to manage daily supply variations and maintenance requirements.

- Water flows from elevated storage tanks through a hierarchical three-level pipeline network consisting of primary mains, secondary sub-mains, and tertiary distribution lines. The sub-mains cater to distinct urban and rural settlement clusters, with individual household service connections tapping directly from sub-mains to ensure sufficient hydraulic pressure for rooftop storage tanks.

- At the community level, water distribution is managed by an appointed Water-man who regulates supply from sub-mains to residential areas. Households receive their daily water allocation for a one-hour duration based on a scheduled time-slot system, ensuring equitable distribution across all connected households within the service area.

8.1.6. Damages - Drinking Water Supply

For the purpose of the assignment, data was reported from 8,789 drinking water schemes, which included 6,147 multi-village schemes and 2,642 single village schemes. Of these, 156 schemes are fully repaired and restored, and 2,423 schemes are functioning fully after temporary arrangements. 5,996 schemes are working partially with disruptions in the water supply, and 214 schemes are neither repaired nor functioning.

COUNTA of Alternate arrangements	*Alternate arrangements*				
Type of Scheme	Fully Repaired and restored and Functioning Fully	Not Repaired	Temporary Arrangement - Functioning Fully	Temporary Arrangement - Functioning Partly	Grand Total
Multi Village Scheme	122	140	1739	4146	6147
Single Village Scheme	34	74	684	1850	2642
Grand Total	**156**	**214**	**2423**	**5996**	**8789**

- The floods severely impacted water supply source infrastructure across Himachal Pradesh, damaging 2,224 source structures in total. Nala intakes were the most affected with 1,615 structures damaged (955 totally damaged and 660 partially damaged).
- Spring sources suffered damage to 215 structures (99 totally damaged and 116 partially damaged).
- Diversion weirs had 394 structures damaged (213 totally damaged and 181 partially damaged).
- Overall, approximately 1,267 source structures were totally destroyed and 957 were partially damaged, critically affecting water collection and diversion infrastructure throughout the state.

Damages to Water supply source structures

District	Spring Source Totally damaged	Spring Source Partially damaged	Nala INtake Partially Damaged	nala Intake Totally Damaged	Diversion Weir-Partially damaged	Diversion Weird Totally Damaged
Bilaspur	0	1	51	9	15	4
Chamba	36	19	111	297	16	48
Dharamsala	0	0	1	1	0	0
Hamirpur	1	0	64	10	4	4
Kangra	1	7	53	19	30	19
Kinnaur	2	0	15	29	7	13
Kullu	4	3	55	109	48	16

Damages to Water supply source structures						
Lahaul and Spiti	10	30	17	11	0	1
Mandi	11	14	95	172	18	33
Shimla	14	22	166	152	12	16
Sirmaur	19	1	21	139	28	45
Solan	1	19	11	7	3	14
Una	0	0	0	0	0	0
Grand Total	**99**	**116**	**660**	**955**	**181**	**213**

- The floods caused extensive damage to water supply systems across all schemes, affecting **3,461 pumps** (1,709 partially damaged and 1,752 totally damaged).
- The pipeline network suffered severe damage with **518 km of main pipes** destroyed (501 km GI pipes and 17 km HDPE pipes) and **4,187 km of distribution pipes** totally damaged (4,013 km GI pipes and 174 km HDPE pipes).

Damage to Mains and Distribution Network

District	Number of Partially Damaged Pumps	Number of totally damaged pumps	Totally Damaged _GI_Main Pipe (In Meter)	Totally Damaged _HDPE Main Pipe (In Meter)	Totally Damaged _ GI_Distribution Pipe (In Meter)	Totally Damaged _ HDPE_Distribution Pipe (IN Meter)
Bilaspur	193	118	24072	270	169733	0
Chamba	72	44	26874	500	1150979	43275
Dharamsala	0	0	1250	0	200	0
Hamirpur	180	711	85184	0	179802	0
Kangra	218	122	84400	0	148374	0

Damage to Mains and Distribution Network						
Kinnaur	1	2	13215	600	23530	3350
Kullu	54	34	77885	11810	579605	66010
Lahaul and Spiti	0	0	590	350	2765	44080
Mandi	356	299	93041	2422	741936	5290
Shimla	131	105	35053	180	293639	5890
Sirmaur	151	120	17741	730	406001	6030
Solan	75	63	20299	110	182023	300
Una	278	134	21370	0	134335	0
Grand Total	**1709**	**1752**	**500974**	**16972**	**4012922**	**174225**

Damaged to other Drinking Water Supply Infrastructure							
District	Filtration Plant- Fully Damaged	Filtration Plant- Partially Damaged	Overhead Reservoirs- Fully damaged	Partially Damaged Electrical Equipments	Totally Damaged Electrical Equipments	WTP_ PartiallY Damaged	WTP_partially Damaged
Bilaspur	0	23	0	34	19	25	4
Chamba	4	7	0	0	0	19	19
Dharamsala	0	0	0	0	0	0	0
Hamirpur	2	36	2	28	9	57	2
Kangra	1	17	0	83	33	26	24
Kinnaur	3	2	0	0	0	4	3
Kullu	5	11	1	7	2	44	33
Lahaul and Spiti	0	3	0	0	0	2	1

Damaged to other Drinking Water Supply Infrastructure							
Mandi	4	46	1	55	15	42	10
Shimla	4	97	0	10	4	113	80
Sirmaur	2	14	2	19	28	42	21
Solan	0	7	0	14	3	8	2
Una	0	2	0	23	4	2	0
Grand Total	**25**	**265**	**6**	**273**	**117**	**384**	**199**

8.1.7 Damage Estimate for Drinking Water Supply Schemes

The damage assessment for water supply infrastructure in Himachal Pradesh was conducted using standardized rates from the state's Schedule of Rates (SoR) for water supply, irrigation, and sewerage works provided by the department of Jal shakti, detailed list of all SOR is provided in the Annexure. The estimation methodology applied different unit rates based on the type of infrastructure and extent of damage (partial or full).

- **Pipeline Network Damage:** Pipe damage costs were calculated per meter length, combining material costs and installation/laying charges. Rates varied by pipe material (GI, HDPE, DI) and diameter, ranging from ₹465 per meter for HDPE-20mm pipes to ₹12,252 per meter for DI-600mm pipes. GI and HDPE pipes under 65mm were classified as distribution pipes, while larger diameters were considered transmission mains.
- **Water Source Structures:** Source infrastructure damage was estimated per structure with fixed rates distinguishing between full and partial damage: spring sources (₹1 lakh fully damaged, ₹30,000 partially damaged), nala intake structures (₹1 lakh fully, ₹30,000 partially), diversion weirs (₹10 lakh fully, ₹3 lakh partially), tubewells (₹3 lakh fully, ₹90,000 partially), and handpumps (₹1.5 lakh fully, ₹45,000 partially).
- **Treatment Infrastructure and Equipment:** Damage to treatment facilities was calculated per liter of capacity based on the population served at 45 liters per capita daily requirement. Filtration plants were estimated at ₹20 per liter for full damage and ₹6 per liter for partial damage. Water Treatment Plants (WTPs) used rates of ₹10 per liter (fully damaged) and ₹3 per liter (partially damaged). Electrical equipment damage was calculated per installed horsepower capacity at ₹3,000 per HP for total damage and ₹900 per HP for partial damage calculated for average of 40 HP pumps.
- **Storage Infrastructure:** Water storage facilities were assessed per liter capacity with differential rates: overhead reservoirs (₹12 per liter fully damaged, ₹3.6 per liter partially damaged) and water tanks (₹7 per liter fully damaged, ₹2.1 per liter partially damaged). Civil infrastructure including pump houses used per square meter rates (₹30,920 per sq.m for full reconstruction, ₹9,000 per sq.m for partial repairs).
- This standardized rate-based methodology ensured consistent, transparent, and verifiable damage estimation across all affected districts in accordance with Government of Himachal Pradesh norms.

Based on this calculation the total damage estimate for the drinking water supply scheme is 621.40 Crore.

District	Total Damage Estimate	Damage Estimate in lakhs
Bilaspur	₹367,763,288.10	₹3,677.63
Chamba	₹1,030,033,040.65	₹10,300.33
Dharamsala	₹2,678,842.50	₹26.79
Hamirpur	₹746,183,475.70	₹7,461.83
Kangra	₹886,190,546.80	₹8,861.91
Kinnaur	₹69,898,664.00	₹698.99
Kullu	₹695,565,355.80	₹6,955.65
Lahaul and Spiti	₹30,209,840.00	₹302.10
Mandi	₹1,047,521,116.45	₹10,475.21
Shimla	₹426,007,058.80	₹4,260.07
Sirmaur	₹510,266,478.35	₹5,102.66
Solan	₹225,031,288.65	₹2,250.31
Una	₹176,632,866.15	₹1,766.33
Grand Total	**₹6,213,981,861.95**	**₹62,139.82**

Damages -Sewerage Schemes

The floods severely impacted sewerage infrastructure across Himachal Pradesh, affecting 144 sewerage schemes in total. The damage assessment revealed that 121944 KLD (kiloliters per day) of Sewage Treatment Plant (STP) capacity was totally destroyed and 902 KLD of septic tank capacity was completely damaged. Additionally, 11,157 meters (approximately 11 km) of trunk sewer lines were damaged across the affected districts.

District	Number of Sewarage Schems Affected	SUM of STP-Capacity of totally damaged (in KLD)	SUM of Septic Tank - Capacity of totally damaged (in KLD)	SUM of Trunk Sewer - Length of damaged sewerage line
Bilaspur	5	15	0	60
Chamba	7	6011	0	1

Hamirpur	4	5030	17	100
Kangra	52	57750	0	1380
Kinnaur	4	180	0	0
Kullu	30	14272	0	8350
Mandi	22	27274	835	580
Shimla	10	10347	0	750
Sirmaur	2	61	50	150
Solan	7	1003	0	200
Una	1	1	0	0
Grand Total	**144**	**121944**	**902**	**11571**

As per the damage estimates provided by the department The total estimated damage to sewerage infrastructure across Himachal Pradesh amounts to ₹5,752.92 lakhs (approximately ₹57.53 crores) affecting 144 sewerage schemes.

District	COUNTA of Name of Sewerage Scheme	Damage-Estimate - Sewearge Network	STP-Estimate totally damaged (in lakhs)	Septic Tank - Estimate totally damaged (in lakhs)	Trunk Sewer - Estimate (in lakhs)	Total Damage Estimate Sewerage
Bilaspur	5	7	3.1	0	2.4	12.5
Chamba	7	236.3	536.7	0	0	773
Hamirpur	4	389	241	9	2	641
Kangra	52	910.45	318.85	0	96	1325.3
Kinnaur	4	41	10.5	0	0	51.5
Kullu	30	877.23	173.5	0	324.4	1375.13
Mandi	22	413.3	71.5	20	90	594.8
Shimla	10	304	309	0	55.8	668.8
Sirmaur	2	55.5	9.5	6.5	6.89	78.39

Solan	7	4	210	0	12	226
Una	1	5.5	1	0	0	6.5
Grand Total	**144**	**3243.28**	**1884.65**	**35.5**	**589.49**	**5752.92**

Damage Breakdown by Category:

- Sewerage Network: ₹3,243.28 lakhs (56% of total damage)
- Sewage Treatment Plants (STP): ₹1,884.65 lakhs
- Septic Tanks: ₹535.55 lakhs
- Trunk Sewers: ₹89.49 lakhs

Irrigation

The floods caused extensive damage to irrigation infrastructure across Himachal Pradesh, affecting 1,814 irrigation schemes comprising 1,622 partially damaged and 192 totally damaged schemes. The schemes included 914 (FIS-Khul), 841 (LIS- Khils, and 59 MIS-Khul

COUNT of Damage Category	*Damage Category*		
District	Partially Damaged	Totally Damaged	Grand Total
Bilaspur	44	4	48
Chamba	165	32	197
Hamirpur	29	4	33
Kangra	273	33	306
Kinnaur	98	3	101
Kullu	138	68	206
Lahaul and Spiti	68	4	72
Mandi	261	20	281
Shimla	56	4	60
Sirmaur	85	6	91
Solan	110	9	119

Una	295	5	300
Grand Total	**1622**	**192**	**1814**

COUNT of Damage Category	*Damage Category*		
Type of Irrigation Scheme	Partially Damaged	Totally Damaged	Grand Total
FIS-Khul	796	118	914
LIS	768	73	841
MIS	58	1	59
Grand Total	**1622**	**192**	**1814**

The damaged irrigation infrastructure has severely impacted 139,009 hectares of agricultural land across the state. FIS-Khul schemes affected 65,182 hectares, LIS schemes impacted 44,161 hectares, and MIS schemes affected 29,667 hectares. Of the total affected area, 119,701 hectares are under partially damaged schemes while 19,308 hectares are served by totally damaged schemes.

SUM of Area affected (in Ha)	*Damage Category*		
Type of Irrigation Scheme	Partially Damaged	Totally Damaged	Grand Total
FIS-Khul	53791.58	11390.13	65181.71
LIS	36285.51	7875.25	44160.76
MIS	29623.53	43	29666.53
Grand Total	**119700.62**	**19308.38**	**139009**

The irrigation network sustained severe physical damage with 24,267 breach locations reported across canal networks and 11,305 irrigation tanks damaged. FIS-Khul systems were most affected with 17,287 canal breaches and 7,706 damaged tanks, followed by LIS with 5,529 breaches and 2,069 tank damages. MIS reported 1,451 canal breaches and 1,530 damaged tanks.

Type of Irrigation Scheme	Irrigation Tank Damaged-Number	Breach of Canal Damaged-Number
FIS-Khul	7706	17287

LIS	2069	5529
MIS	1530	1451
Grand Total	**11305**	**24267**

The total estimated damage to the irrigation sector amounts to ₹17,105.89 lakhs (approximately ₹171 crores). FIS-Khul schemes account for the highest damage at ₹9,536.47 lakhs (56%), followed by LIS at ₹6,847.62 lakhs (40%), and MIS at ₹721.8 lakhs (4%). This substantial damage to irrigation infrastructure poses significant threats to agricultural productivity and rural livelihoods across the affected regions.

Overall Damage Estimate

The floods in Himachal Pradesh caused extensive damage to Water, Sanitation, and Hygiene (WASH) infrastructure across the state, with total estimated damage amounting to ₹84,998.62 lakhs (approximately ₹850 crores). The damage assessment covered three critical sub-sectors: drinking water supply (₹62,139.81 lakhs), irrigation systems (₹17,105.89 lakhs), and sewerage infrastructure (₹5,752.92 lakhs)

Total Damage Estimate (In Lakhs	*Item*			
District				
Bilaspur	₹3,677.63	₹372.25	₹12.50	₹4,062.38
Chamba	₹10,300.33	₹2,000.60	₹773.00	₹13,073.93
Dharamsala	₹26.79			₹26.79
Hamirpur	₹7,461.83	₹487.70	₹641.00	₹8,590.53
Kangra	₹8,861.91	₹4,711.59	₹1,325.30	₹14,898.80
Kinnaur	₹698.99	₹1,367.15	₹51.50	₹2,117.64
Kullu	₹6,955.65	₹1,787.45	₹1,375.13	₹10,118.23
Lahaul and Spiti	₹302.10	₹348.50		₹650.60
Mandi	₹10,475.21	₹2,525.72	₹594.80	₹13,595.73
Shimla	₹4,260.07	₹486.01	₹668.80	₹5,414.88
Sirmaur	₹5,102.66	₹1,304.45	₹78.39	₹6,485.50

Solan	₹2,250.31	₹462.45	₹226.00	₹2,938.76
Una	₹1,766.33	₹1,252.02	₹6.50	₹3,024.85
Grand Total	**₹62,139.81**	**₹17,105.89**	**₹5,752.92**	**₹84,998.62**

Impact on Communities

- Access and Service Delivery Constraints: Communities have been forced to rely on alternative water sources at higher elevations, substantially increasing collection time and effort. This burden falls disproportionately on women and children, disrupting daily routines, education, and productive activities. The 12.95 lakh people with partial service face inconsistent supply requiring multiple collection trips, while 1.45 lakh people without any service often walk several kilometers daily for water access.

- Water Quality and Public Health Risks: Temporary water sources lack adequate protection from contamination, with rainfall events introducing pathogens and increasing risks of waterborne diseases. Damaged sewerage infrastructure has caused sewage overflow and environmental contamination, creating conditions for disease transmission. This combination poses acute health risks, particularly for children under five, pregnant women, and elderly populations.

- Seasonal Vulnerability: Current temporary sources remain viable only during the monsoon season. As winter approaches, these sources will diminish threatening acute water scarcity for 18.9 lakh people. The situation is critical for the 12.95 lakh people already experiencing partial service, as seasonal conditions will further reduce availability and may trigger secondary displacement.

- WASH service deterioration affects tourism-dependent businesses, while damaged irrigation infrastructure compromises 139,009 hectares of agricultural land. Water collection time burdens reduce income-generating capacity, and health expenditures from waterborne diseases strain vulnerable household economies. Multi-village schemes serving 17.95 lakh people face disruptions affecting entire regional economies.

- With only 2.5% of affected populations having restored services and 7% without any supply, immediate intervention is critical to prevent a public health emergency. Priority attention is needed for 214 non-functional schemes serving 1.45 lakh people and 359 partially functioning schemes affecting 12.95 lakh people, who face the most severe water security challenges.

Breaking down loss categories for Water Supply

The losses for the Water Supply sector can be broken into categories like service interruption, health impacts, agricultural productivity, and more. The **losses** are (economic and service-interruption impacts) implied by the documented **damages** to drinking water and sewerage infrastructure (damage base **A = ₹67,892.74 lakhs**). In three **scenarios** (Low = 30% of A; Medium = 50% of A; High = 70% of A) we may allocate each scenario across seven loss categories that typically arise after water-supply disasters. Percent shares reflect plausible sectoral impacts given the scale and nature of the damages (intake destruction, long pipeline replacement, many schemes only partially functioning, and large numbers of pumps and distribution pipes lost).

Summary table of losses by category, scale and cost

Loss category	Medium share	Low cost (₹ lakhs; ₹ crore)	Medium cost (₹ lakhs; ₹ crore)	High cost (₹ lakhs; ₹ crore)	Scale (qualitative)
1. Service interruption — domestic water supply	**45%**	9,165.52; ₹91.66	**15,275.87; ₹152.76**	21,386.21; ₹213.86	Widespread household supply disruption; time lost collecting water; reduced hygiene.
2. Health impacts	**8%**	1,629.43; ₹16.29	**2,715.71; ₹27.16**	3,801.99; ₹38.02	Increased waterborne disease, higher outpatient visits, treatment costs.
3. Agricultural productivity (irrigation-linked losses)	**15%**	3,055.17; ₹30.55	**5,091.96; ₹50.92**	7,128.74; ₹71.29	Crop losses where drinking/irrigation sources affected; reduced yields for seasonal crops.
4. Economic activity and livelihoods	**12%**	2,444.14; ₹24.44	**4,073.56; ₹40.74**	5,702.99; ₹57.03	Small businesses, tourism, local markets affected by water shortages and outages.
5. Emergency provisioning and increased O&M	**10%**	2,036.78; ₹20.37	**3,394.64; ₹33.95**	4,752.49; ₹47.52	Tankering, temporary treatment, overtime, premium procurement of parts.
6. Environmental and ecosystem service losses	**6%**	1,222.07; ₹12.22	**2,036.78; ₹20.37**	2,851.50; ₹28.52	Reduced recharge, watershed degradation, longer-term water regulation impacts.
7. Education and social disruption	**4%**	814.71; ₹8.15	**1,357.85; ₹13.58**	1,900.99; ₹19.01	School closures, lost learning time, caregiver productivity loss.

Subtotal (direct losses)	**100%**	**20,367.82; ₹203.68**	**33,946.37; ₹339.46**	**47,524.92; ₹475.25**	Direct, short-to-medium term losses.
Indirect multiplier (broader economy)	**+20% of subtotal**	4,073.56; ₹40.74	**6,789.27; ₹67.89**	9,504.98; ₹95.05	Secondary effects on supply chains, wages, local GDP.
Total estimated losses (direct + indirect)	—	**24,441.38; ₹244.41**	**40,735.64; ₹407.35**	**57,029.90; ₹570.30**	Full short-to-medium term economic loss estimate.

Methodology and key assumptions

- **Damage base used:** total documented damage for Drinking Water + Sewerage = **₹67,892.74 lakhs** (from your chapter). Loss scenarios are expressed as a **percentage of that damage base** (Low 30%, Medium 50%, High 70%) to reflect uncertainty in service interruption duration and secondary impacts.
- **Why percentage scenarios:** PDNA practice commonly uses factor-based loss scenarios when detailed service valuations are unavailable. The 30/50/70 range captures rapid recovery (many temporary fixes), moderate recovery (months), and protracted recovery (major reconstruction and long service outages).
- **Category shares:** for the Medium scenario we allocate the total loss across seven categories that typically drive economic loss after water disasters. Shares reflect the relative importance of household service interruption (largest), agriculture where water supports livelihoods, emergency provisioning, health impacts, and environmental services.
- **Indirect multiplier:** a conservative **20%** uplift on direct losses to capture multiplier effects (lost wages, reduced local commerce, supply chain impacts). This is applied uniformly across scenarios.
- **Time horizon:** these losses represent **short-to-medium term** economic impacts (weeks to 1–2 years). They do not attempt to monetize long-term ecosystem service decline, biodiversity loss, or irreversible social costs.

Interpretation and practical use

- **Medium scenario (recommended for planning): ≈ ₹40,735.64 lakhs (₹407.36 crore)** — a balanced estimate to inform contingency funding, social protection, emergency water provisioning, and temporary health interventions.
- **Low scenario (conservative): ≈ ₹24,441.38 lakhs (₹244.41 crore)** — useful if most schemes are restored quickly with temporary fixes and limited secondary impacts.

- **High scenario (precautionary): ≈ ₹57,029.90 lakhs (₹570.30 crore)** — appropriate for worst-case budgeting where many sources and long pipeline sections require full reconstruction and livelihoods are heavily affected.

Summing district losses

I've calculated the total damage for each district by adding drinking water and sewerage damage. The totals seem to match up well, with the sum coming to approximately 67,892.74 lakhs. Now, I'll compute the direct loss as 50% of the damage, the indirect loss as 20% of the direct loss, and the total loss as 60% of the damage. I'll also define a scale based on the total loss: High for >10,000 lakhs, Medium for 3,000–10,000 lakhs, and Low for <3,000 lakhs. I'll present this in a table with the necessary columns.

District-Wise Approximate Loss Estimates — Water Supply (Drinking Water + Sewerage)

Below is a district breakdown of **losses** derived from the documented **damage** figures provided by the department.

Methodology (brief): Sum of Drinking Water damage + Sewerage damage (both in ₹ lakhs). Then estimate **direct losses = 50% of damage**, **indirect losses = 20% of direct losses**, and **total loss = direct + indirect = 60% of damage**. These follow the PDNA factor-based approach we used earlier (medium scenario). The **Scale** column classifies the district loss magnitude for prioritization: **High ≥ 10,000 lakhs**, **Medium 3,000–9,999 lakhs**, **Low < 3,000 lakhs**.

District	Damage (₹ lakhs)	Direct loss 50% (₹ lakhs)	Indirect 20% of direct (₹ lakhs)	Total loss (60% of damage) (₹ lakhs)	Total loss (₹ crore)	Scale
Bilaspur	3,690.13	1,845.07	369.01	2,214.08	22.14	Low
Chamba	11,073.33	5,536.67	1,107.33	6,644.00	66.44	Medium
Dharamsala	26.79	13.39	2.68	16.07	0.16	Low
Hamirpur	8,102.83	4,051.42	810.28	4,861.70	48.62	Medium
Kangra	10,187.21	5,093.61	1,018.72	6,112.33	61.12	Medium
Kinnaur	750.49	375.25	75.05	450.29	4.50	Low
Kullu	8,330.78	4,165.39	833.08	4,998.47	49.98	Medium
Lahaul and Spiti	302.10	151.05	30.21	181.26	1.81	Low
Mandi	11,070.01	5,535.01	1,107.00	6,642.01	66.42	Medium
Shimla	4,928.87	2,464.44	492.89	2,957.33	29.57	Low

Sirmaur	5,181.05	2,590.53	518.11	3,108.63	31.09	Medium
Solan	2,476.31	1,238.16	247.63	1,485.79	14.86	Low
Una	1,772.83	886.42	177.28	1,063.70	10.64	Low
GRAND TOTAL	**67,892.74**	**33,946.37**	**6,789.27**	**40,735.64**	**407.36**	

Key observations and interpretation

- **State total (medium scenario): ≈ ₹40,735.64 lakhs (₹407.36 crore)** in short-to-medium term losses for Drinking Water + Sewerage. This equals **60% of the documented damages** and includes a 20% indirect multiplier on direct losses.
- **Largest district losses (absolute): Chamba, Mandi, Kangra, Hamirpur, Kullu** — these reflect high damage bases and therefore larger service-interruption impacts

However, this is a rapid PDNA-style estimate using a medium scenario (50% direct loss). It is suitable for planning and prioritization but not a substitute for detailed economic valuation. Also, the same percentage was applied across districts; local conditions (dependence on irrigation, tourism, seasonal crops, household coping capacity) will change actual losses.

8.2 Recovery Needs and Priority Actions

The total recovery and reconstruction requirement for the WASH sector is estimated at **₹93,498.48 lakhs (approximately ₹935 crores)**, which includes the baseline damage estimate of ₹84,998.62 lakhs plus an additional 10% (₹8,499.86 lakhs) for Build Back Better (BBB) interventions. This BBB allocation will enable the incorporation of disaster risk reduction measures, improved engineering standards, and climate resilience features to reduce vulnerability to future flood events.

Sector-wise Recovery Requirements:

Drinking Water Supply (₹68,353.79 lakhs): The drinking water sector requires the largest investment, accounting for 73% of total recovery needs. The reconstruction encompasses comprehensive rehabilitation of water supply infrastructure serving approximately 20.9 lakh affected people across 789 schemes. Critical components include replacement of 4,705 km of damaged pipelines (comprising GI and HDPE main and distribution lines), repair or replacement of 3,461 pumps (1,709 partial, 1,752 total damage), reconstruction of 2,224 water source structures (spring sources, nala intakes, and diversion weirs), rehabilitation of 290 filtration plants, restoration of 583 water tanks and 6 overhead reservoirs, and replacement of 390 electrical equipment units. The BBB allocation will support elevated pipeline routing in flood-prone areas, use of more durable materials, reinforced source protection structures, and installation of early warning systems for water quality monitoring.

Irrigation Systems (₹18,816.48 lakhs): The irrigation sector recovery addresses damage to 1,814 schemes affecting 139,009 hectares of agricultural land, representing 20% of total needs. The reconstruction covers 914 Flow Irrigation Schemes-Khul (FIS-Khul), 841 Lift Irrigation Schemes (LIS), and 59 Medium Irrigation Schemes (MIS), along with repair of 24,267 canal breaches and 11,305 damaged irrigation tanks. The BBB component will incorporate improved canal lining to prevent seepage and erosion, strengthened diversion structures designed for higher flood flows, installation of automated water level monitoring systems, and construction of protective embankments in vulnerable sections to ensure agricultural water security and enhance climate resilience.

Sewerage Infrastructure (₹6,328.21 lakhs): The sewerage sector reconstruction addresses 144 damaged schemes requiring 7% of total recovery investment. The work encompasses repair and reconstruction of sewerage networks, restoration of 1,219 KLD of STP capacity, reconstruction of 4,490 KLD of septic tank capacity, and repair of 21.2 km of trunk sewers. The BBB allocation will support elevation of critical infrastructure above design flood levels, installation of backup power systems for treatment plants, construction of overflow containment structures, and implementation of decentralized wastewater treatment systems in high-risk areas to prevent future service disruptions and environmental contamination.

Build Back Better Framework:

The 10% BBB allocation reflects international best practices in post-disaster reconstruction and aligns with the Sendai Framework for Disaster Risk Reduction. This investment will finance specific resilience measures including: (1) enhanced structural standards exceeding pre-disaster specifications to withstand extreme weather events; (2) relocation or elevation of critical infrastructure from high-risk flood zones identified through updated hazard mapping; (3) installation of early warning systems and real-time monitoring equipment for water quality and infrastructure performance; (4) use of climate-resilient materials and construction techniques suited to changing precipitation patterns; (5) incorporation of nature-based solutions such as riparian vegetation buffers and watershed management measures; (6) improved operation and maintenance systems including spare parts inventory, emergency response protocols, and staff capacity building; and (7) integration of smart water management technologies for efficient resource allocation and leak detection.

Implementation Priorities:

Recovery implementation should follow a phased approach prioritizing:

- (1) immediate restoration of critical water supply schemes serving the largest populations, particularly the 214 non-functional schemes affecting 1.45 lakh people;
- (2) rapid repair of irrigation infrastructure to enable the upcoming agricultural season and prevent further livelihood losses;
- (3) restoration of sewerage infrastructure in urban centers to mitigate public health risks; and (4) comprehensive reconstruction with BBB features for schemes requiring complete rebuilding.

The reconstruction program presents a strategic opportunity to modernize WASH infrastructure, improve service delivery standards, and establish a more resilient system capable of withstanding future climate-related disasters while ensuring sustainable water security for Himachal Pradesh's population and economy.

Recovery Component	Extent of Damage	Number of Units	Damage Estimate	Recovery and reconstruction with BBB (In Lakhs)
A. DRINKING WATER SUPPLY			62,139.81	
1. Pumping Infrastructure				
Pumps - Partially Damaged	Repair/Replacement	1,709 units	**62,139.81**	**68,353.79**
Pumps - Totally Damaged	Full Replacement	1,752 units		
2. Pipeline Network				
GI Main Pipes	Full Replacement	500,974 meters		
HDPE Main Pipes	Full Replacement	16,972 meters		
GI Distribution Pipes	Full Replacement	4,012,922 meters		
HDPE Distribution Pipes	Full Replacement	174,225 meters		
3. Water Source Structures				
Spring Sources - Totally Damaged	Reconstruction	99 structures		
Spring Sources - Partially Damaged	Rehabilitation	116 structures		
Nala Intake - Totally Damaged	Reconstruction	955 structures		
Nala Intake - Partially Damaged	Rehabilitation	660 structures		
Diversion Weirs - Totally Damaged	Reconstruction	213 structures		
Diversion Weirs - Partially Damaged	Rehabilitation	181 structures		
4. Treatment Infrastructure				

Recovery Component	Extent of Damage	Number of Units	Damage Estimate	Recovery and reconstruction with BBB (In Lakhs)
Filtration Plants - Fully Damaged	Reconstruction	25 plants		
Filtration Plants - Partially Damaged	Rehabilitation	265 plants		
Overhead Reservoirs - Fully Damaged	Reconstruction	6 reservoirs		
Water Tanks - Fully Damaged	Reconstruction	199 tanks		
Water Tanks - Partially Damaged	Rehabilitation	384 tanks		
5. Electrical Equipment				
Electrical Equipment - Totally Damaged	Full Replacement	117 units		
Electrical Equipment - Partially Damaged	Repair/Replacement	273 units		
B. IRRIGATION SYSTEMS			17,105.89	18816.479
Flow Irrigation Schemes (FIS-Khul)	Rehabilitation/Reconstruction	914 schemes	9,536.47	
Lift Irrigation Schemes (LIS)	Rehabilitation/Reconstruction	841 schemes	6,847.62	
Medium Irrigation Schemes (MIS)	Rehabilitation/Reconstruction	59 schemes	721.80	
Canal Breaches	Repair	24,267 locations	**Included in total**	
Irrigation Tanks	Repair/Reconstruction	11,305 tanks	**Included in total**	
Agricultural Land Affected	Service Restoration	139,009 hectares	-	

Recovery Component	Extent of Damage	Number of Units	Damage Estimate	Recovery and reconstruction with BBB (In Lakhs)
C. SEWERAGE INFRASTRUCTURE			5,752.92	6328.212
Sewerage Schemes	Rehabilitation/Reconstruction	144 schemes	**Included in total**	
Sewerage Network	Repair/Reconstruction	As required	3,243.28	
Sewage Treatment Plants (STP)	Reconstruction	1,219 KLD capacity	1,884.65	
Septic Tanks	Reconstruction	4,490 KLD capacity	535.55	
Trunk Sewers	Repair/Reconstruction	21,157 meters	89.49	
TOTAL WASH SECTOR RECOVERY NEEDS			**84,998.62**	**93,498.48**

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
	Damaged Component	Unit	Rate (WSS/Irrigation/Sewerage))				
			Material Rate	Laying, joining/execution at site			
			(Rs. Per metre length)	RMT	Total Cost in Rs.		Remarks
Pipe	GI-15 mm	length in metre	88	450	538	Per M	Distribution
Pipe	GI-20mm	length in metre	124	450	574	Per M	Distribution
Pipe	GI-25mm	length in metre	164	450	614	Per M	Distribution
Pipe	Gi-32mm	length in metre	210	450	660	Per M	Distribution
Pipe	GI-40mm	length in metre	267	450	717	Per M	Distribution
Pipe	GI-50mm	length in metre	339	450	789	Per M	Distribution
Pipe	GI-65mm	length in metre	476	450	926	Per M	Distribution
Pipe	GI-80mm	length in metre	562	450	1012	Per M	Transmisison
Pipe	GI-100mm	length in metre	811	835	1646	Per M	Transmisison
Pipe	GI-125mm	length in metre	1323	835	2158	Per M	Transmisison
Pipe	GI-150mm	length in metre	1580	835	2415	Per M	Transmisison
Pipe	DI-150mm	length in metre	1815	1125	2940	Per M	Sewarage - Distributioon

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
Pipe	DI-200mm	length in metre	2550	1125	3675	Per M	Sewarage - Mains
Pipe	DI-250mm	length in metre	3350	1125	4475	Per M	Sewarage - Mains
Pipe	DI-300mm	length in metre	4000	1125	5125	Per M	Sewarage - Mains
Pipe	DI-350mm	length in metre	4826	1125	5951	Per M	Sewarage - Mains
Pipe	DI-400mm	length in metre	5696	1480	7176	Per M	Sewarage - Mains
Pipe	DI-450mm	length in metre	6892	1480	8372	Per M	Sewarage - Mains
Pipe	DI-500mm	length in metre	7998	1480	9478	Per M	Sewarage - Mains
Pipe	DI-600mm	length in metre	10772	1480	12252	Per M	Sewarage - Mains
Pipe	HDPE-20mm	length in metre	15	450	465	Per M	Distribution
Pipe	HDPE-25mm	length in metre	19	450	469	Per M	Distribution
Pipe	HDPE-32mm	length in metre	26	450	476	Per M	Distribution
Pipe	HDPE-40mm	length in metre	41	450	491	Per M	Distribution
Pipe	HDPE-50mm	length in metre	63	450	513	Per M	Distribution
Pipe	HDPE-63mm	length in metre	101	450	551	Per M	Distribution
Pipe	HDPE-75mm	length in metre	143	450	593	Per M	Transmission
Pipe	HDPE-90mm	length in metre	205	835	1040	Per M	Transmission
Pipe	HDPE-110mm	length in metre	304	835	1139	Per M	Transmission

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
Pipe	HDPE125mm	length in metre	392	835	1227	Per M	Transmission
Pipe	HDPE-140mm	length in metre	492	835	1327	Per M	Transmission
Pipe	HDPE-160mm	length in metre	644	1125	1769	Per M	Transmission
Pipe	HDPE-180mm	length in metre	816	1125	1941	Per M	Transmission
Pipe	HDPE-200mm	length in metre	1003	1125	2128	Per M	Transmission
Pipe	HDPE-225mm	length in metre	1274	1125	2399	Per M	Transmission
Pipe	HDPE-250mm	length in metre	1569	1125	2694	Per M	Transmission
Pipe	HDPE-280mm	length in metre	1967	1125	3092	Per M	Transmission
Pipe	HDPE-315mm	length in metre	2624	1125	3749	Per M	Transmission
	Water Source Damage to water reservior						
	Tubewell	Per structure	fully damaged		300000	Per structure	
		Per structure	partially damaged		90000	Per structure	
	Handpump	Per structure	fully damaged		150000	Per structure	
		Per structure	partially damaged		45000	Per structure	

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
	Spring source	Per structure	fully damaged		100000	Per structure	
		Per structure	partially damaged		30000	Per structure	
	Percolation well	Per structure	fully damaged		1500000	Per structure	
		Per structure	partially damaged		450000	Per structure	
	Pump House	Per Horse Power	Totally damages Per HP		10000	Per HP	
		Per Horse Power	to be repaired Per HP		3000	Per HP	
	Structure						
	Nala Intake Structure	at the rate (1 lac)	fully damaged		100000	Per structure	
			partially damaged		30000	Per structure	
	Reconstruction ofdiversion weir	at the rate (10 lac)	fully damaged		1000000	Per structure	
			partially damaged		300000	Per structure	
	Other Damages						

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
	Filteration plant						
	(a)Partially damaged	Rs Per liter	At the rate-		6	Per litre capacity	Calculated for population at 45 litres per person
	(b) Fully damaged	Rs Per liter	At the rate- Rs Per liter		20	Per litre capacity	at the rate of Rs. 2 Cr. /MLD for full reconstruction
	Capacity of filteration	Kld/Mld	normally it is in Kld/Mld				
	Damage to filteration system	Per Litre capacity	partially/fully damaged				
	Civil Infrastructure						
	Damage to Civil infrastructure		Fully Damaged		2000000		
			Partially damaged		600000		
	Damage to civil infrastructure (Rooms) Standard size of pump houses 20 sq m	Partially (at the rate of 9000 Per sq m)	partially damaged		180000	Per pump house	
		fully (at the rate of 30920 Per sq m)	fully damaged		600000	Per pump house	
	Electric Equipment's	Per HP of the installed capacity	partially		900	Per HP	Calculated for 25 HP Power Plant
		Per HP of the installed capacity	fully		3000	Per HP	

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
		Rs. Per litre	Partially damaged(At the rate- Rs Per litre)		3	Per litre	Calculated for population at 45 litres per person
	Water Treatment Plant	Rs. Per litre	Fully damaged(At the rate- Rs Per litre)		10	Per litre	Calculated for population at 45 litres per person
	Tanks/Reservoirs	Rs. Per litre					
	Overhead Reserviors-partially damaged	Rs. Per litre			3.6	Per litre	
	Overhead Reserviors-Fully damaged	Rs. Per litre			12	Per litre	
	Water tanks- partially damaged	Rs. Per litre			2.1	Per litre	
	Water tanks-fully damaged	Rs. Per litre			7	Per litre	
		(at the rate of Per litre	partially(at the rate of Per litre)		3	Per litre	
	Sewerage Treatment Plant	(at the rate of Per litre	fully		10	Per litre	
		(at the rate of Per litre	partially		3	Per litre	
	Septic Tank		fully		7	Per litre	
	Phythoremedial					Per litre	
	Trunk Sewer	Per metre			5000	Per metre	

Unit Cost - for Damage Estimate - Provided by Jalshakti Department							
	Sewer Network	Per metre			3000	pwe mwtre	
		Per litre capacity	partially		3	Per litre	
	Irrigaiton tank damage value	Per litre capacity	fully		7	Per litre	
	breach of canal damaged-value						
	breach of canal damaged-number						
	Office building	Per sq metre	at the rate of Per sq metre		30920	Per sq metre	
	Approx. Plinth (SQM)	sq metre			50	sq metre	

9. POWER AND ELECTRICITY SUPPLY

The Post-Disaster Needs Assessment (PDNA) for the Power Sector quantifies the damage and losses to electricity infrastructure in Himachal Pradesh, analyses the macro- and micro-economic impacts, and sets out the short, medium, and long-term recovery and reconstruction needs for resilient restoration of power supply. For the state, the total damage to power sector assets is estimated at ₹230.13 crore, whereas the loss due to power outages is estimated at ₹50.52 crore. Conducted in a single phase, the assessment focuses on the sub-transmission and distribution network, covering overhead lines, distribution transformers (DTs), substations and associated civil/structural components. It provides district-wise estimates of direct damage costs, sectoral and cross-sectoral economic losses, and recovery and reconstruction costs, including build back better (BBB) strategies, based on field visits to Mandi, Kullu, Kangra and Chamba and damage and loss data provided by Himachal Pradesh State Electricity Board Ltd. (HPSEBL).

Extreme rainfall between 29 June 2025 and 30 October 2025 triggered widespread floods and landslides, causing multiple failures in the power system. Flood-induced erosion and landslide activity undermined tower and pole foundations, washed away distribution transformers and poles, and damaged HT/LT lines, resulting in prolonged outages and localised blackouts. From the compiled data, Sirmaur, Solan, Mandi, Kullu, Chamba and Shimla were identified as the most affected districts. Despite limited manpower and difficult conditions, HPSEBL teams worked continuously to restore supply, with temporary restoration in several locations taking more than ten days.

Recurrent floods cause inundation and silt/mud ingress that can lead to severe, sometimes explosive, failure of live electrical equipment, while moisture and contamination require lengthy drying, cleaning and testing of submerged assets before safe re-energisation. The PDNA identifies elevation of critical equipment, provision of embankments/levees and locating substations and control facilities outside flood-prone areas as key risk-reduction measures and sets out short- and long-term measures and recommendations for power-system resilience, integrated planning with transport and telecom sectors, and adoption of flood- and landslide-resilient design standards.

Basic Profile of the Sector

Himachal Pradesh is an almost entirely mountainous state, with elevations ranging from approximately 350 meters to 6,975 meters above mean sea level, and climatic conditions varying from semi-tropical to semi-arctic. As per the 2011 Census, the total population of the state was 68,56,509, with a population density of 123 persons per square kilometer. At the time of the state's formation in 1948, electricity supply was confined primarily to the capitals of the erstwhile princely states, with a total connected load of less than 500 kW. Consequently, the development of the power sector in Himachal Pradesh is relatively recent. The first Electrical Division was established under the Public Works Department (PWD) in August 1953, followed by the creation of the Department of M.P.P. & Power in April, 1964.

The Himachal Pradesh State Electricity Board (HPSEB) was constituted on 1st September 1971 in accordance with the provisions of the Electricity (Supply) Act, 1948. It was subsequently reorganized as Himachal Pradesh State Electricity Board Limited (HPSEBL) with effect from 14.06.2010 under the Companies Act, 1956. The registered office of HPSEBL is located at Vidyut Bhawan, Shimla–171004, Himachal Pradesh. HPSEBL is mandated to provide reliable, uninterrupted and quality power supply to all categories of consumers across the state at the most economical tariff. Power is transmitted and distributed through an integrated network of transmission, sub-transmission and distribution lines spread throughout the state.

Since its inception, the Himachal Pradesh State Electricity Board Limited (HPSEBL) has made remarkable strides in electrification and power infrastructure. Himachal Pradesh achieved 100% electrification of all census villages in 1988 and has since maintained 24×7 power supply, offering one of the lowest electricity tariffs in India. The state has also attained 100% metering, billing, and collection, with a household coverage ratio of approximately 98% as per REC's survey. **Table 1** presents the baseline data for all districts of Himachal Pradesh, detailing the number of divisions, consumers, transformers, poles, and the total line length (in kilometres). Between 2022 and 2025, HPSEBL provided 213,587 new electricity connections, installed 2,226 distribution transformers and 15 EHV transformers (203.3 MVA), and laid 37.67 km of EHV lines, 1,120.25 km of HT lines, and 2,332.64 km of LT lines. Additionally, 12,850 old wooden poles were replaced with steel ones. Five EHV substations were established at Pooh, Sanehad, Bithal, Hatkoti, and Bijhad Kotla, along with nine 33 kV substations across Shimla, Kangra, Sirmaur, Kullu, Bilaspur, and Una districts. Under the Low Voltage Phase-1 scheme (till March 2024), 976 transformers, 641.37 km of HT lines, and 391.48 km of LT lines were installed, while Phase-2 (till October 2025) added 102 transformers, 82.04 km of HT lines, and 44.46 km of LT lines. During this period, 27 hydro power projects with a combined capacity of 489.35 MW generated approximately 5,186.86 million units of electricity, and the Uhl-III project (100 MW), operational since March 2025, produced 320.73 million units. HPSEBL also made 1,380 appointments across various categories and initiated recruitment for 2,229 additional posts.

Table 1: Base Line Data for Districts

District	No. of Divisions	No. of Consumers	No. of Transformers*	No. of Poles	Line Length in Km.
Shimla	10	414634	5307	323723	**15552.813**
Solan	5	297619	4087	137426	**9379.817**
Sirmour	3	189860	3324	172428	**11712**
Kinnaur	1	38199	467	34717	**2169.824**
Lahual & Spiti	2	12941	346	15353	**1346.63**
Kullu	3	205669	2538	86354	**6122.99**
Mandi	8	402701	5263	273412	**17227.48**
Chamba	3	150604	2527	129047	**8115**
Hamirpur	3	219052	2668	94937	**6197.889**
Una	4	233092	3368	77240	**6614.487**
Kangra	13	630001	8023	258604	**17710.73**

Bilaspur	2	159754	1744	74117	**5220.933**
TOTAL	**57**	**2954126**	**39662**	**1677358**	**107370.593**

Notably, the Rongtong Power House, situated at around 12,000 feet, is among the highest-altitude power stations globally, and the Bhabha Power House (120 MW) stands out as a fully underground facility, unique in Asia. These achievements have earned HPSEBL recognition as one of the best electricity boards in the country. For administrative efficiency, the distribution area of HPSEBL is divided into three zones: South, Central and North. Himachal Pradesh, being rich in water resources, has substantial potential for hydropower development. Of the estimated hydroelectric potential of about 27,436 MW, only 10,351 MW has been harnessed so far. More than 30 hydel projects with an installed capacity greater than 25 MW each have been commissioned in the state, underscoring its growing role as a key hydropower-producing region. **Table 2** presents the installed capacity and generation mix of different types of power plants in Himachal Pradesh.

Table 2: Power Generation Summary

Hydro Power (MW)*	**2802**
Thermal Power (state)	0
Thermal Power (outside or central)	159
Nuclear Power	42
Wind Power	Nil
Solar Power	775
Gas	Nil
Other Sources	Nil
TOTAL (MW)	**3778**

This includes HPSEBL's own generation of 589.35 MW

9.1 Hydro Power Policy, 2006 (Himachal Pradesh)

The Hydro Power Policy, 2006 of Himachal Pradesh aims to develop the state as a "Hydro Power State" by harnessing its hydro potential to provide affordable, reliable and quality power to consumers on a round-the-clock, year-round basis. The policy emphasises maximising local employment opportunities for residents of Himachal Pradesh in hydropower projects, while simultaneously addressing and mitigating the social, economic and environmental impacts associated with project planning, construction and operation. In the specific Himalayan context of Himachal Pradesh, the policy envisages that hydroelectric schemes shall be planned, designed and operated with due consideration to the geo-environmental conditions, including location in seismic Zones IV–V, high sediment load, glacial and snowmelt regimes, slope instability and extreme hydro-meteorological events, so as to enhance the structural and operational resilience of projects over their design life. The policy is aligned with the provisions of the Electricity Act, 2003, particularly with respect to promoting competition, protecting consumer interests, rationalising tariffs, reducing subsidies, strengthening regulatory institutions and facilitating non-discriminatory open access for various categories of users.

9.1.1 Regulatory, Codes and Standards Framework for the Power Sector

Electricity utilities in Himachal Pradesh operate within the national regulatory framework laid down by the Central Electricity Authority (CEA) and the relevant Indian Standards (IS) and REC specifications. CEA, as the apex technical body of the Government of India, issues regulations under the Electricity Act, 2003, which are notified in the Official Gazette and are accessible on the CEA website. Key CEA regulations relevant to planning, design, construction, operation and maintenance of the power system include:

- CEA (Grid Standards for Operation and Maintenance of Transmission Lines) Regulations, 2010 (notified on 26.06.2010).
- CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010 (notified on 24.09.2010).
- CEA (Technical Standards for Construction of Electric Plants and Electric Lines) Regulations, 2010 (notified on 20.08.2010).
- CEA (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electrical Lines) Regulations, 2011 (notified on 14.02.2011).
- CEA (Technical Standards for Connectivity to the Grid) and subsequent amendments.
- CEA Report on Cyclone-Resilient and Robust Transmission and Distribution Infrastructure, March 2021.
- Disaster Management Plan for the Power Sector, Government of India, January 2021, prepared by CEA.

For hydropower and associated transmission and distribution infrastructure in Himachal Pradesh, these regulations are read in conjunction with relevant Bureau of Indian Standards (BIS) codes for seismic design, concrete and steel structures, and foundations in hill areas (e.g. IS 1893 for earthquake-resistant design, IS 456 for plain and reinforced concrete, IS 800 for steel design, and the IS 14458 series for slope stability and hill-area treatments), as well as the sectoral Disaster Management Plan, which provides guidance on risk reduction, emergency preparedness and post-disaster restoration protocols. In addition to CEA regulations, utilities typically adopt BIS/IS codes and REC specifications to ensure uniformity of design margins, structural safety, electrical clearances, insulation coordination, earthing, lightning protection and maintainability of lines and substations in rugged hill terrain, including the following:

- IS 5613 (Part 1/Sec 1): Code of Practice for Design, Installation and Maintenance of Overhead Power Lines up to and including 11 kV – Section 1: Design
- IS 5613 (Part 1/Sec 2): Code of Practice for Design, Installation and Maintenance of Overhead Power Lines up to and including 11 kV – Section 2: Installation and Maintenance.
- IS 802: Code of Practice for Use of Structural Steel in Overhead Transmission Line Towers – Design Strength
- IS 4091: Code of Practice for Design and Construction of Foundations for Transmission Line Towers and Poles
- REC specifications for construction of transmission and distribution lines and substations.

Standards and Technology

The power system in Himachal Pradesh is predominantly hydro-based, with large, medium and small hydroelectric plants feeding power at 132 kV, 220 kV and above to the state and regional grids. Transmission infrastructure mainly comprises lattice steel tower lines on concrete foundations traversing steep and landslide-prone terrain, interconnected through 220/132 kV and 132/33–66 kV grid substations with outdoor switchyards and plinth-mounted power transformers designed broadly as per

CEA/REC standards. However, alignments along unstable slopes, erodible riverbanks and narrow valleys make select stretches vulnerable to tower tilting, foundation distress and conductor failure under extreme rainfall, slope instability and flash-flood conditions, which also complicate access and delay restoration.

The distribution system operates primarily at 33 kV, 22 kV and 11 kV, feeding 400 V LT networks through a predominantly overhead configuration. Most HT lines use steel tubular poles with concrete foundations and spans of about 30–60 m, following REC guidelines, but their comparatively low longitudinal strength and the absence of inadequacy of stay/guy sets at bends and gradient changes increase susceptibility under broken-conductor, wind and landslide-induced loading. LT networks are largely implemented with aerial bunched (AB) cables, although bare conductors persist in some sections, and in a few locations HT and LT circuits share common or closely spaced supports, elevating operational risk. Distribution transformers are mostly DP-mounted, with units above 250 kVA generally installed on stone masonry plinths; both DP structures and plinths located on unstable slopes, road embankments or near active erosion and debris-flow paths are particularly prone to tilting, scour, washout and consequent prolonged outage during disaster events.

Figure 1 : Layout of HT and LT Distribution Network

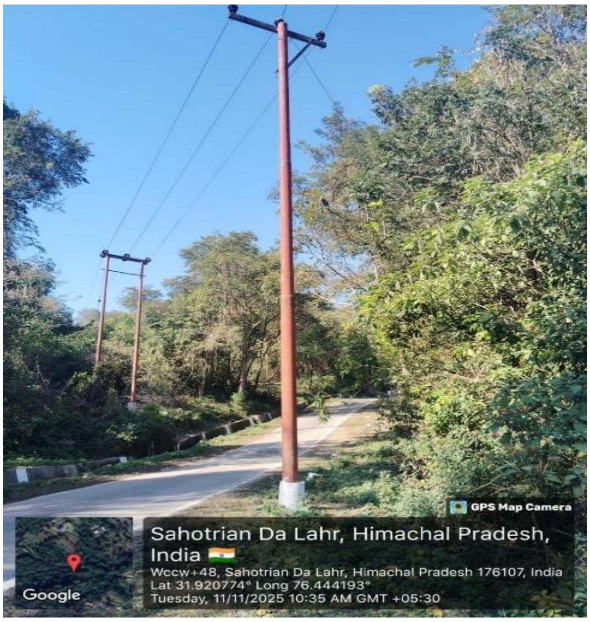


Figure 2 Distribution

Field Visits

The PDNA team for the power sector conducted field visits to four of the most severely affected districts—Mandi, Kangra, Chamba and Kullu—following briefings with district administration and HPSEB Ltd. officials. The extreme rainfall event of triggered flash floods, landslides, debris flows, subsidence and muck deposition along river corridors, causing washout and structural failure of poles, tower foundations and plinth-mounted equipment on riverbanks and unstable slopes. Toe erosion undermined foundations, damaged retaining and breast walls, approach roads, and induced distress to substation civil works. Multiple 33 kV and 11 kV feeders, distribution transformers (DTs) and LT networks were rendered inoperative, with protection systems tripping on faults due to conductor snapping, pole tilting, insulation flashover, inundation and debris impact, necessitating extended shutdowns for safe inspection and repair. Restoration was technically complex, requiring temporary supply through load rearrangement, back-feeding and mobile/temporary DTs, engagement of specialist contractors for re-stringing using line-throwing guns and drones, emergency strengthening and toe protection of foundations and access roads, and extensive muck and debris clearance. Restoration times ranged from about 7 to 30 days, during which HPSEB Ltd. incurred substantial asset damage and revenue loss, with Mandi district experiencing the most critical impacts.

The recent hydro-meteorological events exposed critical vulnerabilities in the sub-transmission network of Mandi district. The 33 kV Thunag–Janjehli feeder, a vital link for Thunag tehsil and adjoining load centers, suffered extensive damage during the severe rain and flash-flood event of 30 June–1 July 2025. Approximately 7.285 km of its 13 km alignment (~55%) was washed away, leading to the loss of supports, foundations, and conductor spans, thereby disrupting electricity supply to dependent areas. **Fig. 3** illustrates the damage to the 33 kV Thunag–Janjehli sub-transmission line caused by slope failure and debris flow, resulting in prolonged interruption of power supply. Similarly, the 33 kV Pandoh–Thalout–Bajaura feeder, a strategic sub-transmission corridor supplying Banjar, Sainj, Darang, and Seraj areas while also providing contingency support to the Bajaura–Thalout line, sustained landslide-induced damage to approximately 3 km of its 19 km alignment on 5 September 2025. This disruption underscores the vulnerability of critical corridors to slope instability and geomorphic hazards. Early and technically robust restoration, incorporating improved routing, slope stabilisation, protective works, and

Figure 2 33 kV Thunag–Janjehli sub-transmission line

Figure 1 damage to the 33 kV Pandoh–Thalout sub-transmission line

upgraded structural design, is essential to re-establish reliable electricity supply, strengthen contingency operations, and enhance long-term resilience of the power system in this part of Himachal Pradesh. **Fig. 4** illustrates the damage to the 33 kV Pandoh–Thalout sub-transmission line caused by toe failure, resulting in interruption of supply.

Damage to HPSEB Ltd. infrastructure was documented across multiple districts, affecting both electrical and civil/structural components of the network. In Thunag tehsil, Mandi district, **Fig. 5 & Fig. 6** show post-disaster damage to 22 kV HT and LT feeders and associated distribution transformer structures (DRTs) at Surah village under Electrical Section Kelodhar, ESD Janjehli, following the flash flood and severe storm of 30.06.2025, with insulator strings, cross-arms and pole top fittings subjected to impact loading and contamination.

Figure 4 Damaged 22 kV HT and LT line

Figure 3 Washed-out site of 22 kV HT line at Surah

In Chamba district, **Fig. 7** and **Fig. 8** depict flash flood–induced landslide and submergence of the 33/11 kV Substation Jarangala (tehsil Chamba), where inundation, slope instability and failure of peripheral protection work compromised switchgear, control panels, earthing systems and cable trenches, significantly reducing insulation coordination and safety margins.

Figure 5 Showing Damage to Civil Infrastructure

Figure 6 Muck Deposited in Substation

Fig. 9 shows muck and debris deposition within the substation yard obstructing yard drainage and access, while **Fig. 10** illustrates structural damage to substation buildings and equipment plinths due to high-velocity debris impact, surcharge loading and prolonged waterlogging.

Figure 8 Mucked up deposition inside substation

Figure 7 Structural damage because of debris flow

In Una district, **Fig. 11** presents severe structural distress of a transformer plinth along the Swan River arising from flash flooding and hydraulic scour, resulting in toe erosion, exposure of foundation elements and reduction in factors of safety against sliding and overturning, whereas **Fig. 12** shows the reconstructed and structurally upgraded plinth with improved foundation detailing, concrete grade, anchorage and surface drainage provisions.

Figure 10 Post disaster effect of flash flood in Swan River

Figure 9 Post restoration work

In Shimla district, **Fig. 13** and **Fig. 14** show damage to the 11 kV HT line at Bemloie, tehsil Shimla, where heavy rainfall–induced flash floods and slope movement caused pole tilting, foundation displacement, misalignment of conductors and loss of mechanical tension balance, leading to sustained feeder tripping and highlighting the high susceptibility of hillside distribution corridors to combined hydro-meteorological and geotechnical hazards.

Figure 12 HT pole fallen on car due to heavy rainfall

Figure 11 HT line lying on road triggered by heavy rainfall

9.1.2 Damages in the Sector

This section presents a sector- and sub-sector-wise quantification of damages. It summarises the number of affected divisions and inventories the damaged assets (infrastructure, transformers, poles and line lengths) to support category-wise and severity-wise damage estimation. It also provides the consolidated cost assessment for the power sector, based on the extent and degree of damage across all asset classes. **Table 3** summarises the extent of damage sustained by HPSEB Ltd. due to the heavy rainfall–induced disaster events in Himachal Pradesh.

Table 3: Damage Database

District	No. of Divisions	Other Infrastructure	No. of Transformers	No. of Poles	Line Length (Km)
Shimla	10	1	87	2420	**833.102**
Solan	5	Nil	16	1314	**921.751**
Sirmour	3	Nil	71	1576	**1311**
Kinnaur	1	0	3	66	**55.7**
Lahual & Spiti	2	0	1	22	**2.18**
Kullu	3	0	45	1741	**416.551**

District	No. of Divisions	Other Infrastructure	No. of Transformers	No. of Poles	Line Length (Km)
Mandi	8	1	131	2472	**829.579**
Chamba	3	3	146	1447	**702**
Hamirpur	3	2	21	600	**416.305**
Una	4	1	91	720	**301.68**
Kangra	13	10	282	1868	**572.838**
Bilaspur	2	0	2	218	**23.635**
TOTAL	**57**	**18**	**896**	**14464**	**6386.321**

9.1.3 Economic Losses in the Sector

This subsection presents the overall economic losses in the power sector. **Table 4** summarises the total revenue losses incurred by HPSEB Ltd. due to prolonged power outages across different regions of Himachal Pradesh arising from the disaster-induced disruption of supply. The average cost of supply for FY25 based on approved ARR for the calculations is taken as Rs 6.64/unit. **Table 5** illustrates the expenses incurred for temporary restoration of power supply in severely affected districts of Himachal Pradesh.

Table 4: Economic Loss to the Department

Sl. No	District	Losses (Amount in lakhs)			
		Number of House Holds without power	The number of days Power supply was not there	Total Number of units not supplied	Amount
1	Shimla	89130	145	2547580	169.16
2	Solan	56963	19	1505000	99.93
3	Sirmour	122869	120	58977120	3916.08
4	Kinnaur	7232	3	125534	8.34
5	Lahual & Spiti	50	7	0.041	0.00
6	Kullu	21550	18	69259.28	4.60
7	Mandi	65763	24	4165247.99	276.57
8	Chamba	4965	4	2378302	157.92
9	Hamirpur	72012	5	1592054	105.71

10	Una	34168	15	3320000	220.45
11	Kangra	86315	48	855604	56.81
12	Bilaspur	28948	6	541626	35.96
	Total	**589965**	**414**	**76077327.31**	5051.53

Table 5: Expenses Incurred for Temporary Restoration

Sr. No	District	Expenditure incurred (Amount in lakhs)			
		Hiring heavy vehicles & machineries	Arrangement of food, snacks and accommodation (labour)	Clearing of debris for Restoration activities	**Total**
1	Shimla	150.09			**150.09**
2	Solan	Nil	Nil	Nil	**Nil**
3	Sirmaur	Nil	Nil	Nil	**Nil**
4	Kinnaur	Nil	Nil	Nil	**Nil**
5	Lahual Spiti	0.1			**0.1**
6	Kullu	0.6			**0.6**
7	Mandi	0.2			**0.2**
8	Chamba	0	0	4	**4**
9	Hamirpur	Nil	Nil	Nil	**Nil**
10	Una	Nil	Nil	Nil	**Nil**
11	Kangra	22.96	0	25.50	**48.46**
12	Bilaspur	0	0	0	**0**
Total					**203.45**

9.1.4 Socio-Economic Impact on People

During the 2025 monsoon, the districts of Sirmaur, Solan, Shimla, Kullu and Mandi experienced the most severe socio-economic impacts linked to power system disruption (**Table 4**). Prolonged outages on multiple 33 kV and 11 kV feeders left many villages without electricity for several weeks, affecting domestic consumption, rural water supply and lift water schemes, irrigation pumping, telecom towers and municipal services. Breakdowns in mobile and data connectivity led to functional isolation of remote hill panchayats, while non-availability of power at pumping stations and treatment facilities disrupted safe drinking water and basic civic services.

Electricity-dependent livelihoods across Himachal Pradesh were significantly affected. Small-scale industries, agro-processing units, workshops and service enterprises faced extended downtime due to non-availability of power for machinery and process equipment. Tourism circuits in Kullu, Manali, Shimla and surrounding areas suffered due to the combined effect of road closures and unreliable power supply, constraining hotel and homestay operations and reducing tourist footfall. In apple-growing belts of Shimla, Kullu and Mandi, outages rendered grading, packing, pre-cooling and cold storage facilities inoperative, causing post-harvest losses and distress sales. Education and health services were also impacted: schools and colleges could not operate digital classrooms or e-learning platforms, and healthcare facilities, particularly those with critical care and diagnostic services, faced serious constraints where backup generation was inadequate or fuel supplies were disrupted.

9.2 Power Sector Losses Overview

Below is a **loss estimate** for the Power sector in the Himachal Pradesh PDNA that goes beyond the utility's revenue loss and temporary restoration costs reported above. We need to convert the documented **sector revenue loss (₹50.52 crore)** and temporary restoration cost of **2.03 crores,** and the observed asset damages into a comprehensive, short-to-medium term **economic and social loss** estimate across categories most affected by prolonged outages and infrastructure failure.

Losses by category with scale and cost

Loss category	Rationale	Medium estimate (₹ crore)	Medium estimate (₹ lakhs)
1. Sector revenue loss (HPSEBL)	Billed energy not supplied; documented in PDNA Table 4	**50.52**	**5,051.53**
2. Business downtime and industrial losses	SMEs, agro-processing, workshops, cold-chain downtime, lost production	**150.00**	**15,000.00**
3. Agricultural post-harvest losses	Cold storage, grading, packing, apple value chain losses from outages and transport delays	**80.00**	**8,000.00**
4. Tourism and hospitality losses	Reduced arrivals, hotel/homestay closures, lost bookings in Kullu, Manali, Shimla	**60.00**	**6,000.00**
5. Household welfare and coping costs	Generator fuel, tankering, extra water purchases, time cost for water collection	**25.00**	**2,500.00**

6. Water supply and sanitation impacts	Lift schemes and treatment plants offline; emergency water provisioning costs	**20.00**	**2,000.00**
7. Health and education impacts	Outpatient visits, disrupted diagnostics, school closures, e-learning loss	**15.00**	**1,500.00**
8. Telecom and connectivity losses	Mobile/BSNL tower outages, loss of digital services, economic impacts from isolation	**10.00**	**1,000.00**
9. Emergency response and temporary restoration	HPSEBL temporary expenses (documented) + additional government emergency costs	**12.03**	**1,203.00**
10. Increased O&M, testing and asset rehabilitation	Drying, testing, replacement of submerged equipment, extended maintenance	**30.00**	**3,000.00**
Subtotal direct and sectoral losses	Sum of rows 1–10	**452.55**	**45,255.53**
Indirect multiplier (secondary economy effects 20%)	Lost wages, supply chain ripple effects, reduced local GDP	**90.51**	**9,050.11**
Total estimated losses short to medium term	Direct + indirect	**543.06**	**54,305.64**

Key assumptions and methodology

- **Base data used:** PDNA reported **sector revenue loss ₹50.52 crore** and HPSEBL temporary restoration expenses (₹2.03 crore). Documented asset damage total **₹230.13 crore** was used qualitatively to justify higher business and rehabilitation costs.
- **Category estimates:** derived from sector knowledge and PDNA practice: business downtime, tourism and agricultural cold-chain losses are typically the largest non-utility impacts after prolonged outages in a tourism-and-agriculture dependent state. Numbers are **medium-scenario** planning estimates (plausible central case).
- **Indirect multiplier: 20%** of subtotal to capture secondary economic effects (lost wages, reduced commerce, supply chain impacts).
- **Time horizon:** estimates cover **short to medium term** impacts (immediate emergency + up to 12–24 months). They do not attempt to monetize long-term resilience deficits, permanent business closures, or non-market social costs (mental health, biodiversity).

9.3 Recovery Needs:

A consolidated summary of recovery needs and their associated costs is presented in **Table 6**.

Table 6: Summary of recovery needs

Description	Unit	Cost per unit (in INR Cr.)	Recovery Cost (INR Cr.)
Substation / Transformers, that have been completely damaged / washed out during flood, works-out to be to acquire different Ratings of these Transformers, average cost of Rs. 250000/- per unit to be incurred (Average cost taken for Transformers from 25 -500 KVA)	426	0.025	10.65
Substation / Transformers, that have been partially damaged during the flood. To repair such damaged Substations / Transformers, cost of Rs.170000/- per unit to be incurred.	470	0.017	7.99
No. of Tubular Poles & Structures, used for transmission of HT & LT power have been totally damaged across. The cost per Unit to furnish these Poles & Structures works out to be Rs. 15500/-.	7325	0.00155	11.35375
Nos. of Tubular Poles & Structures, used for transmission of HT & LT power that have been partially damaged. The cost per Unit to furnish these Poles & Structures works out to be Rs. 10850/-.	7139	0.001085	7.745815
In case of 11 kV Line, overall, number of CKM that have been totally damaged, the cost to be incurred per CKM for totally damaged 11 kV Lines works out to be Rs. 8.50 Lakhs.	878.1077	0.085	74.63915
In the case of the 11 kV Line, number of CKM have been partially damaged. The cost to be incurred per CKM for partially damaged 11 kV Lines works out to be Rs. 5.50 Lakhs.	813.547	0.055	44.7450
In the case of the LT Line, the cost to be incurred per CKM for totally damaged LT Lines works out to be Rs. 4.5 Lakhs	1351.533	0.045	60.819
In the case of the LT Line, the cost to be incurred per CKM for partially damaged LT Lines works out to be Rs. 3.85 Lakhs.	1096.242	0.0385	42.2053
Distribution structures fully damaged	52	0.00155	0.0806
Distribution structures partially damaged	36	0.001085	0.03906

Description	Unit	Cost per unit (in INR Cr.)	Recovery Cost (INR Cr.)
Civil work of power distribution section (in cubic mtr)	3770.715	0.001163	4.38534
Power cables in km	0.95	0.00061	0.000579
Total Recovery cost			**264.65**

Table 7 outlines the damages and losses faced by the Himachal Pradesh State Electricity Board (HPSEB) during the floods that occurred between 29 June and 30 October 2025. The damage and loss estimates are derived from the cost data book (2023-2024) provided by HPSEBL. A district-wise summary of damages, losses, recovery costs, and Build Back Better investments across 12 districts of Himachal Pradesh is presented in the following table. The consolidated assessment of the power sector across 12 districts indicates total damages of **Rs. 230.13 crore** and economic losses of **Rs. 50.52 crore**. The recovery needs have been estimated at **Rs. 264.65 crore**, while the requirements for build-back-better cost are projected at **Rs. 317.58 crore**.

Table 7: Power Sector Losses, Recovery and Build Back Better at a Glance in Rupees Crores

Sr. No.	District	Damage	Loss	Restoration	Add: BBB
1	Shimla	30.02	18.19	34.52	41.43
2	Solan	33.22	10.74	38.20	45.84
3	Sirmour	47.24	420.99	54.33	65.19
4	Kinnaur	2.01	0.9	2.31	2.77
5	Lahaul Spiti	0.08	0	0.09	0.11
6	Kullu	15.01	0.49	17.26	20.71
7	Mandi	29.89	29.73	34.38	41.25
8	Chamba	25.3	16.98	29.09	34.91
9	Hamirpur	15	11.36	17.25	20.70
10	Una	10.87	23.7	12.50	15.00
11	Kangra	20.64	6.11	23.74	28.49
12	Bilaspur	0.85	3.87	0.98	1.18
Total		**230.13**	**543.06**	**264.65**	**317.58**

Short-Term Measures (which the Department has already covered adequately)

- Restore electricity first to hospitals, shelters, water pumps, and other critical facilities.
- Use mobile diesel generators and temporary solar units for backup power.
- Activate feeders that are confirmed safe and undamaged without delay.

- Isolate damaged circuits to stop cascading failures.
- Set up temporary bypass lines with jumper connections and portable towers.
- Re-string distribution lines in valleys and remote areas using insulated conductors.
- Dewater flooded substations before testing and re-energizing equipment.
- Test insulation of switchgear and transformers after drying and cleaning.
- Protect substations with sandbags or earthen banks against further flooding.
- Deploy mobile or compact substations in severely affected blocks.
- Apply load-shedding protocols to balance limited generation with demand.
- Temporarily cut non-essential feeders.
- Manage demand with staggered schedules and rotational load supply.
- Restore power step by step to avoid overloading and ensure safety.

Long Term Measures

- Build climate-resilient grid infrastructure with elevated transmission towers and reinforced foundations on landslide-prone slopes.
- Lay underground cables in urban areas and use insulated aerial bunched conductors in rural valleys to reduce hazard vulnerability.
- Integrate smart grid technologies with automated fault detection and sectionalizing switches to shorten outage duration.
- Retrofit critical substations with raised plinths, waterproof switchgear enclosures, and improved drainage systems.
- Use hazard mapping to guide relocation or retrofitting of substations in geologically unstable zones.
- Retrofit public buildings and health facilities with solar PV and hybrid battery systems for autonomous backup.
- Develop community-level microgrids with modular retrofitting capacity to reduce reliance on vulnerable transmission corridors.
- Promote decentralized energy systems to strengthen resilience and sustainability in hazard-prone districts.

Build Back Better Strategies

In severely affected districts such as Sirmaur, Solan, Mandi, Kullu, Chamba and Shimla, extensive toe erosion destabilized slopes, resulting in collapse of utility poles and disruption of electrical distribution. To restore reliability, relocation of electrical infrastructure to geotechnically stable sites is essential, ensuring freedom from erosion and landslide susceptibility. Integration of slope stabilization measures, erosion control systems, and resilient design standards will strengthen durability of assets. This approach enhances power sector resilience, safeguards communities, and supports sustainable recovery by embedding risk-informed planning and disaster-resilient reconstruction practices into restoration efforts, thereby reducing vulnerability to future hydro-meteorological hazards.

Recurrent heavy rainfall and landslides demand rectification of vulnerable power infrastructure through foundation reinforcement, structural retrofitting, and capacity enhancement of transmission and distribution systems. Restoration must integrate hydro-geological risk mapping, slope stabilization near substations, and seismic-resistant tower design to ensure operational reliability. Priority actions include underground cabling in high-risk zones, redundant feeder lines, and climate-adaptive grid standards to minimize service disruption. Strengthening transformer foundations, pole anchorage, and micro-hydro resilience measures will secure continuity of electricity supply. These interventions reduce vulnerability, safeguard critical services, and reinforce socio-economic stability in rainfall-prone mountainous terrain.

Application of modern technologies such as drone-assisted line stringing, LiDAR-based corridor surveys, and remote sensing for terrain mapping enables safe and efficient operations in hilly regions and valleys. These tools support geotechnical stabilization near substations, seismic-resistant tower design, and rapid inspection of damaged assets. Incorporating climate-adaptive grid standards, redundant feeder systems, and smart monitoring platforms ensures service continuity, reduces vulnerability, and secures reliable electricity supply across challenging mountainous terrain.

Key Recommendations

In Himachal Pradesh, recurrent heavy rainfall and landslides demand resilient energy solutions to safeguard essential services. Establishing small-scale solar grid systems at hospitals and district headquarters will ensure uninterrupted power supply, while community-based solar micro plants provide decentralized, self-reliant generation. Expanding solar street lighting enhances evacuation routes and public safety, and deploying prefabricated solar units, solar chargers, and solar lighting systems enables rapid restoration in disaster-hit zones. Integrating solar pumps supports water supply recovery, and training-based solar lamps strengthen household-level resilience. Structured capacity-building programs will equip local technicians and communities to operate and maintain solar infrastructure sustainably. Collectively, these measures reduce dependency on vulnerable transmission lines, secure continuity of critical services, and establish a decentralized, sustainable disaster recovery framework tailored to Himachal Pradesh's climatic challenges.

Establishing microgrid solar infrastructure across Himachal Pradesh is essential to ensure decentralized and reliable backup power for critical lifeline facilities. Banjar Valley ecologically sensitive solar project can serve as a model for sustainable deployment in fragile terrain. District-level identification of feasible sites for solar grid installation will provide standby systems for hospitals, district headquarters, water supply, and communication centers. These grids must be standalone, independent of conventional transmission lines, and equipped with high-capacity battery storage to guarantee continuity during outages. Prefabricated solar units, community-based micro plants, and structured capacity-building programs will strengthen disaster preparedness and secure uninterrupted essential services. Frequent disruption of distribution supply lines during disasters highlights the need for resilient energy and communication systems. Establishing parallel networks with redundancy ensures faster restoration and reduces risks of power shedding or tripping during winter season as load increases. Telecommunication, though temporarily supported by diesel-powered generators, but requires continuous supply for long-term stability. In recurring disaster regions, creation of local networks or wireless systems is essential to maintain seamless connectivity with district headquarters. Integrating solar-based standalone systems equipped with reliable battery backup offers a sustainable alternative, independent of lined power, thereby securing uninterrupted communication and critical lifeline services during adverse conditions.

In regions of Sirmaur, Solan, Mandi, Kullu, Chamba and Shimla, frequent power disruption severely impacts pumped water supply schemes, making restoration of these critical power supply lines a priority. During winter, increased demand leads to tripping and local shedding, further straining essential services. Current reliance on parallel path supply networks is inadequate due to limited load capacity. To ensure resilience, deployment of redundant and standby supply systems integrated with solar-based microgrids and battery storage is recommended. This will provide reliable backup, reduce dependency on fragile transmission lines, and secure uninterrupted operation of pumping schemes and lifeline infrastructure in disaster-prone districts.

The unprecedented extreme rainfall events in the state have altered the natural flow paths of rivers and streams, resulting in an exponential rise in High Flood Level (HFL). This sudden change has severely impacted the existing distribution systems, which were earlier designed and positioned above the reference HFL level (2023+FOS). The damage highlights the vulnerability of current alignments and necessitates immediate rerouting of distribution infrastructure to safer elevations and geologically stable corridors. Future planning must incorporate dynamic HFL assessments, redundancy in supply lines, and parallel backup networks to ensure uninterrupted service delivery. By integrating resilient routing strategies with adaptive design standards, the state can safeguard critical lifeline infrastructure against recurring hydrological hazards.

PRODUCTIVE SECTOR

10. LIVELIHOOD SECTOR

Agriculture, Horticulture, Animal Husbandry, Fisheries, Tourism

The economy of the State has shown a shift from agriculture sector to industries and services as the percentage contribution of agriculture in total Gross State Domestic Product has declined from 70.37 per cent in 1950-51 to 35.06 per cent in 1990-91, 17.16 per cent in 2011-12 and 14.74 per cent in FY2023-24.

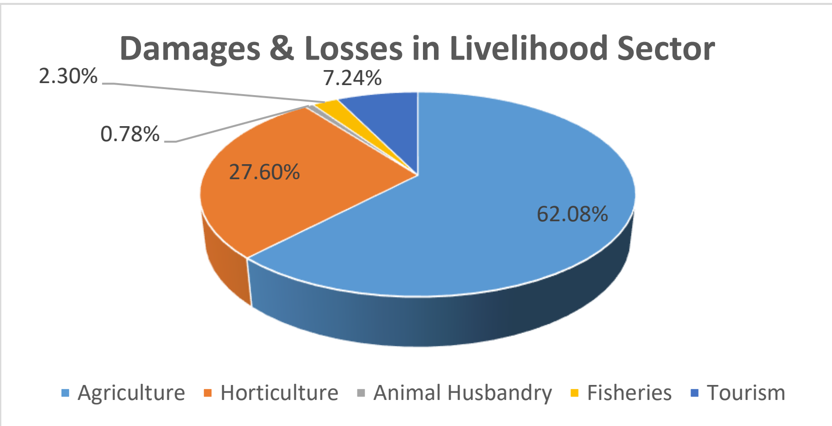
The share of secondary and tertiary sectors which were 7.41 and 22.22 per cent respectively in 1950-51 increased to 26.50 and 38.44 per cent in 1990-91, 43.81 and 39.03 per cent in 2011-12 and 39.98 and 45.28 per cent in FY2023-24.

However, the declining share of the agriculture sector does not affect the importance of this sector in the State economy as the growth in the primary sector of the State economy is still determined by the trend in agriculture and horticulture production. It is one of the major contributors to the total domestic product and has an overall impact on other sectors via input linkages, employment, trade transportation etc.

Impact of 2025 Floods on the Livelihood Sector of Himachal Pradesh – Brief Note

The 2025 floods have caused severe and multifaceted disruption to livelihoods in Himachal Pradesh, particularly in rural and hill communities dependent on natural resource–based activities.

Sub- Sector	Total Damages & Losses (Rs. In Lakhs
Agriculture	53773.37
Horticulture	23904.09
Animal Husbandry	676.04
Fisheries	1992.94
Tourism	6269.34
Total	**86615.78**



Agriculture suffered extensive land degradation, crop losses and destruction of farm infrastructure, pushing thousands of small and marginal farmers into income insecurity and debt stress. High-value vegetable growers and horticulture farmers experienced sharp cash flow losses, while delayed Rabi and Kharif cycles affected seasonal employment and food security.

The floods caused extensive damage to Himachal Pradesh's horticulture sector, particularly affecting orchards, nurseries and high-value vegetable plantations. Large areas of apple, stone fruits, citrus and off-season vegetable crops were either uprooted, waterlogged or buried under debris and silt, leading to loss of standing crops, reduced plant vigour and long-term decline in productivity. Damage to protective infrastructure such as fencing, irrigation channels, polyhouses and storage facilities further disrupted post-harvest handling and market supply chains. As horticulture is a primary income source for many hill households, the destruction of perennial orchards has resulted in sustained income losses, increased vulnerability and delayed recovery timelines extending over multiple seasons.

The floods severely impacted the animal husbandry sector through loss of livestock, destruction of cattle sheds, fodder stocks and grazing lands, and disruption of veterinary services. Many households experienced mortality of cattle, sheep, goats and poultry, while surviving animals suffered from stress, injuries and increased disease incidence due to unhygienic and waterlogged conditions. Fodder scarcity and damage to stored feed compelled distress sale of livestock, reducing long-term productive assets and milk output. The combined impact has significantly affected dairy-dependent livelihoods, reduced daily income for rural families and intensified financial stress among small and marginal livestock rearers.

The fisheries sector also faced significant setbacks due to damage to ponds, raceways and hatcheries, loss of fish stocks and sedimentation of water bodies, reducing both production and revenue and affecting ancillary workers.

Tourism and allied services saw sharp livelihood losses due to damaged connectivity, reduced visitor inflow and closure of local enterprises, impacting informal workers such as guides, transport operators and homestay owners.

Wage labourers, especially those dependent on agriculture, construction and tourism, experienced prolonged periods of unemployment, leading to increased vulnerability among SC/ST households and women-headed families. The floods also accelerated distress migration from affected areas, disrupted local markets and weakened household resilience.

Overall, the disaster has deepened livelihood fragility, underscoring the need for integrated recovery measures combining income support, restoration of productive assets, employment generation and climate-resilient livelihood diversification to ensure sustainable socio-economic recovery.

Recovery Response

Beyond immediate losses, the disaster exposed structural vulnerabilities in hill-based production systems, fragile infrastructure and climate-sensitive markets.

A recovery response limited to compensation risks the repetition of cycles of loss. Himachal therefore requires an integrated recovery strategy that restores assets while simultaneously transforming sectors toward climate resilience and accelerated, diversified growth. To rebuild livelihood sectors through a **"Build Back Better" framework** that combines rehabilitation of productive capacity with climate-resilient redesign, value-chain strengthening and inclusive economic revival.

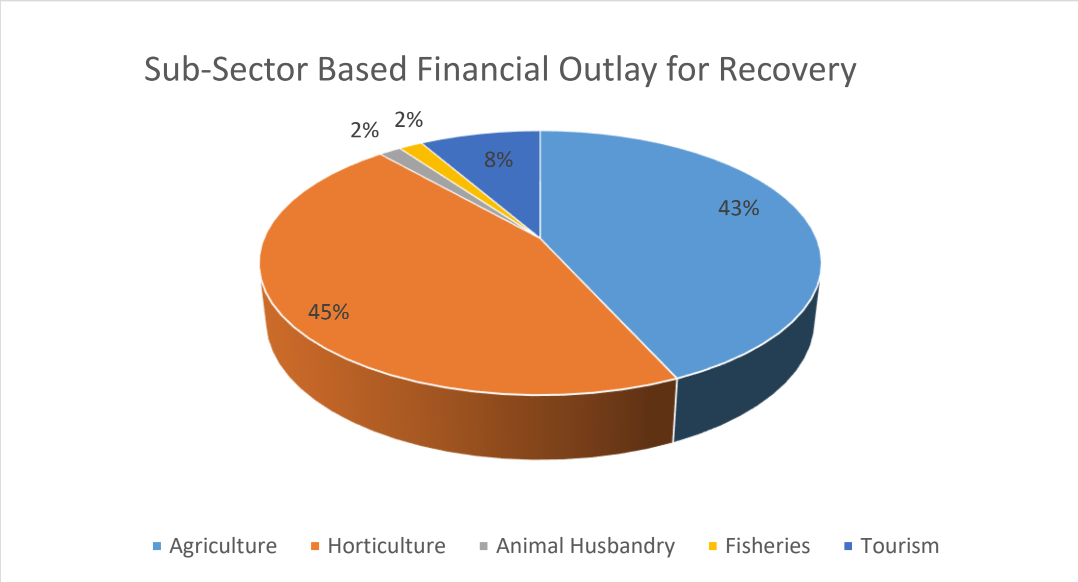
Strategic Framework for Recovery

Restore and Stabilise (0–12 months)	Rebuild and Modernise (1–3 years)	Transform and Accelerate (3–5 years)
• Reclaim degraded agricultural land through desilting, terrace reconstruction and soil conditioning. • Rejuvenate damaged orchards and livestock shelters with subsidised inputs and immediate repair support. • Restore fisheries ponds, hatcheries and raceways; support restocking and feed provisioning. • Repair tourism infrastructure and provide temporary livelihood support to affected workers. • Scale up insurance coverage and credit restructuring to stabilise farmer incomes.	• Promote climate-smart agriculture: short-duration crops, micro-irrigation and improved seed varieties. • Expand protected cultivation, high-value vegetables and organic horticulture clusters. • Strengthen dairy systems through improved fodder development, veterinary services and cooperative models. • Introduce climate-resilient aquaculture including carp polyculture and stabilised trout systems • Upgrade tourism circuits with eco-tourism, homestay networks and digital promotion platforms	• Shift production systems to high-value, diversified, market-linked value chains. • Promote agri-processing, cold chains and logistics infrastructure. • Institutionalise climate-resilient infrastructure (slope stabilisation, drainage and watershed management). • Build capacities through training, digital advisory platforms and climate-risk monitoring systems. • Encourage private investment and entrepreneurship in rural tourism and agri-allied sectors.

Total Financial Outlay for Recovery

Sub- Sector	Financial Outlay for Recovery (Rs. In Lakhs)	%
Agriculture	45291.78	43%
Horticulture	47395.17	45%
Animal Husbandry	1602.24	2%
Fisheries	1700	2%

Tourism	8708.39	8%
Total	**104697.58**	**100%**



Sector-wise Impact & Strategic Response

A. Agriculture

Impact:

- Large-scale land degradation and erosion
- Crop losses affecting food security and farmer incomes
- Disruption of cropping cycles and employment

Sustainable Recovery Strategy:

- Restore cultivable land through terrace reconstruction, desilting and soil conditioning
- Promote climate-smart cropping patterns (short-duration, flood-tolerant varieties)
- Expand micro-irrigation and water harvesting
- Strengthen subsidies for inputs and crop insurance coverage

Accelerated Growth Path:

- Shift from low-value monocrops to diversified, high-value cereal-vegetable systems
- Promote precision farming, hydroponics and polyhouse cultivation
- Integrate digital advisory systems and weather-based crop management

B. Horticulture

Impact:

- Damage to orchards, nurseries and high-value vegetable crops
- Loss of income for fruit and vegetable growers
- Reduced quality and productivity of perennial plantations

Sustainable Recovery Strategy:

- Rejuvenation of damaged orchards through replanting and canopy management
- Strengthening slope stabilisation and protective infrastructure
- Subsidised planting material and training for orchard recovery
- Expand insurance penetration

Accelerated Growth Path:

- Promote off-season vegetables, protected cultivation and organic production
- Encourage cluster-based horticulture zones
- Value addition through cold chains, grading, storage and processing facilities
- Branding of Himachal fruits and vegetables for national + export markets

C. Animal Husbandry

Impact:

- Loss of livestock, fodder and shelters
- Reduced milk production and rising veterinary costs
- Distress sale of animals and loss of draught power

Sustainable Recovery Strategy:

- Reconstruction of cattle sheds and fodder storage structures
- Emergency livestock replacement and health coverage
- Strengthening mobile veterinary services and vaccination drives

Accelerated Growth Path:

- Promote semi-intensive models
- Strengthen dairy cooperatives and milk collection systems
- Integrate fodder development with pasture restoration
- Expand insurance penetration and breed improvement programmes

D. Fisheries

Impact:

- Damage to ponds, raceways and hatcheries
- Loss of fish stock and income instability
- High vulnerability of trout farming systems

Sustainable Recovery Strategy:

- Repair of damaged ponds and restocking subsidies
- Support for feed, seed and working capital
- Biosecurity and disease control protocols

Accelerated Growth Path:

- Promote faster-recovery carp fisheries for livelihood stabilisation
- Climate-resilient trout farming (controlled raceways, temperature monitoring)
- Develop cold chains and processing facilities
- Encourage cooperative marketing and input-sharing clusters

E. Tourism

Impact:

- Damaged connectivity and tourism infrastructure
- Decline in tourist arrivals and informal employment
- Livelihood losses in hospitality and allied services

Sustainable Recovery Strategy:

- Restoration of roads, public amenities and tourism infrastructure
- Temporary livelihood support for affected workers
- Reparation of heritage sites and eco-tourism locations

Accelerated Growth Path:

- Promote eco-tourism, agri-tourism and experiential tourism

- Strengthen homestay networks and local entrepreneurship
- Digitally promote new tourism circuits
- Incentivise sustainable tourism models in fragile zones

Cross-Cutting Strategic Way Forward

a) Integrated Livelihood Recovery Model

- Converge schemes such as MGNREGA, PMKSY, MIDH, PMMSY, RKVY and State Plan funds
- Ensure community participation in planning and implementation

b) Climate-Resilient Infrastructure

- Invest in slope stabilisation, drainage management, flood-resistant farm structures
- Watershed and catchment management to reduce future runoff damage

c) Financial Security & Risk Transfer

- Expand crop, livestock and fisheries insurance
- Interest subvention and credit restructuring for affected households
- Livelihood grants for small entrepreneurs

d) Skill Development & Innovation

- Training for new livelihood models (hydroponics, organic farming, dairy value addition)
- Use of digital tools and extension services for market access

Expected Outcomes

- Restoration of productive capacity within 2–3 years
- Enhanced resilience of livelihoods to climate shocks
- Shift towards high-value, sustainable economic activities
- Stabilisation of household incomes and reduced distress migration
- Regained confidence of private investment in rural sectors

Cross-Cutting Enablers

- Financial Security: Expanded insurance, interest subvention and KCC support
- Institutional Convergence: Integration of MGNREGA, MIDH, PMMSY, RKVY and State Funds
- Climate Resilience: Watershed development, slope stabilisation, disaster preparedness
- Skill Development: Training in sustainable and high-value livelihood models

Policy Recommendation:

Adopt a **Multi-Sector Sustainable Recovery & Growth Framework** with phased investments, coordinated institutional support and a resilience-first strategy to reposition Himachal Pradesh as a model hill economy capable of withstanding future climatic shocks while sustaining accelerated growth.

10.1 Agriculture

An Overview of Agriculture and Sub- Sectors

Himachal Pradesh has a geographical area of 55,673 square kilometres (Sq Km). Out of the total geographical area, 11.49 per cent of the area comes under Net Sown Area and around 24.55 per cent is under forest coverage. Land put to non-agriculture uses is around 7.98 per cent, fallow lands 1.53 per cent, Barren and uncultivable land 16.73 per cent.

Agriculture is the main occupation of the people of Himachal Pradesh and has an important role in the economy of the state. It provides direct employment to about 53.95 per cent of total workers of the State. About 14.70 per cent of the total GSVA came from Agriculture and its Allied sectors during FY2024-25.

Land Holding Pattern

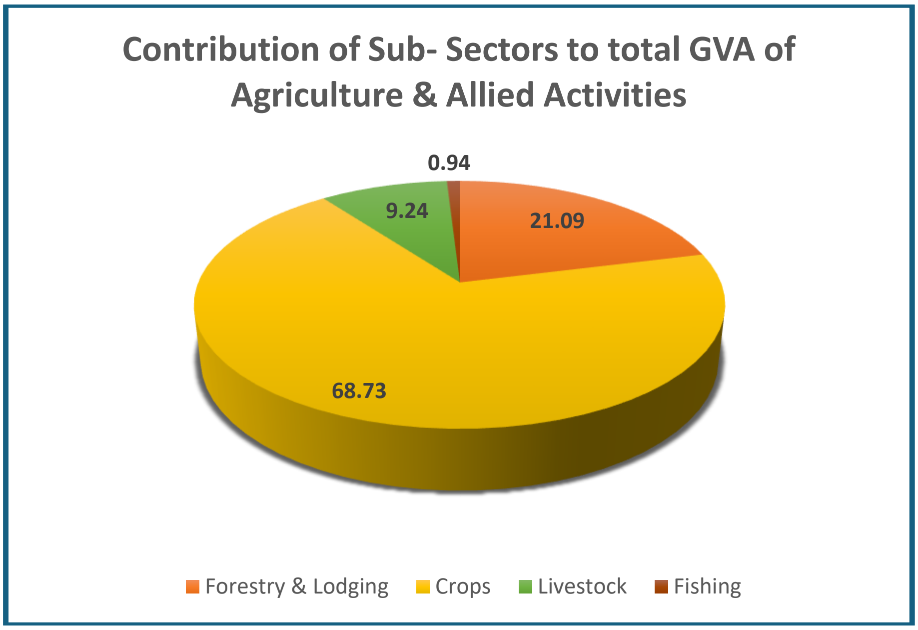
Out of the total geographical area of 55.67 lakh hect, area of operational holding is about 9.44 lakh hect. and operated by 9.97 lakh farmers. The average holding size is about 0.95 hect. Distribution of land holding according to 2015-16 Agriculture Census shows that 88.85 per cent of the total holdings belong to Small and Marginal farmers, about 10.85 per cent holdings are owned by Semi Medium and Medium farmers and only 0.30 per cent by large farmers.

Size Class (Hectare)	No. of Holdings (lakh)	Area Operated (lakh hectares)	Average Size of Holdings (hectares)
Marginal (Below 1.0)	7.12	2.85	0.40
Small (1.0-2.0)	1.73	2.42	1.39
Semi Medium (2.0-4.0)	0.82	2.23	2.72
Medium (4.0-10.0)	0.26	1.46	5.62
Large (10.0 and Above)	0.03	0.47	15.67
Total	**9.97**	**9.44**	**0.95**

Source: Agriculture Department, Government of Himachal Pradesh

There has been a sustained growth of primary sector contribution to the State economy over the years. The contribution of agriculture and allied sector to GSVA at current prices has increased 53 per cent from ₹20,838 crore in FY2020-21 to ₹31,879 crore in FY2024-25 (Advance Estimates (AE)).

Contribution of Agriculture sub-sectors to total Agriculture and Allied sector GVA for the year 2024-25



Rainfed agriculture accounts for approximately 80 per cent of the farmed land in the state. Rice, Maize and Wheat are important cereal crops of the State. Soyabean and Sunflower in Kharif and Rapeseed/Mustard and Toria are important oilseed crops in the Rabi season. Mash, Moong, and Rajmash in Kharif season and Gram and Lentil in Rabi are the important pulses crops of the State. The Agro -climatic conditions in the state are congenial for production of cash crops like Seed Potato, off-season Vegetable and Ginger. The State Government is emphasizing the production of off-season vegetables, potatoes, ginger, pulses and oilseeds besides increasing the productivity of cereal crops, through timely and adequate supply of inputs, demonstration and effective dissemination of improved farm technology, bringing more area under efficient use of water resources and implementation of Wasteland Development Projects.

However, agriculture in Himachal Pradesh suffers from certain limitations:

- *One of the reasons is that the area under cultivation cannot be extended to any appreciable extent. Reclamation of land on slopes of hills for cultivation of food grains is neither economical nor beneficial.*
- *Another reason is that reclamation of land from the hills increases the menace of soil erosion. Thus, the potential for expanding output through area expansion is relatively limited.*

Hence, emphasis is on increasing productivity levels besides diversification towards high value crops. Due to an increasing shift towards commercial crops, the area under food grain production is gradually decreasing, the area which was 853.88 thousand hectares in 1997-98 has declined to 688.69 thousand hectares in 2023-24.

Given the terrain and climate of HP (hill state, temperate zones in many districts), there is good potential for high-value crops, niche horticulture, organic/natural farming and agro-tourism linkage. Improving irrigation, adopting climate-resilient technologies, better market linkages and value-added processing could boost farmer incomes. With mechanisation and consolidation (or cluster farming/ farmer-producer organisations) there is scope to reduce fragmentation and boost scale.

Key Policies

1. Agricultural Policy of Himachal Pradesh (2010)
    - Emphasises sustainable agriculture, diversification, irrigation expansion, organic farming and small-holder empowerment.
    - Highlights terrain-specific challenges (small holdings, hillside fields, rain-fed areas) and sets thrust areas: soil & water conservation; cash-crop production; extension services.
2. Schemes of the Department of Agriculture, Himachal Pradesh
    - The state has a list of schemes covering seeds, fertilizers, plant protection, extension, irrigation, mechanisation, organic farming and more.
    - Example: The "Him Unnati" scheme announced for 2023-24 (via HP Agriculture Website) focuses on farmer welfare.
3. State Initiatives for Diversification & Technology
    - Policies support micro-irrigation, protected cultivation, organic farming promotion.
    - Digital agriculture/digitisation of farmer database, farm advisory using ICT

Impact of disaster in the Agriculture Sector

Item	Fully Damaged Area Land (in Bigha)	Fully Damaged Area Land (Rate per Bigha in Rs)	Partially Damaged Land (in Bigha)	Partially Damaged Land (Rate per Bigha in Rs)	Damage Estimate of Land (In Lakhs

	1	2**	3	4**	(1*2)+(3*4)
Maize	9463.59	177000	837.9	91000	17513.04
Paddy	7010.99	177000	404.63	91000	12777.66
Millets	22.76	177000	3.75	91000	43.7
Ragi	19	177000	0.5	91000	34.09
Kharif Pulse	652.75	177000	7.5	91000	1162.2
Tomato	352.72	177000	135.5	91000	747.61
Capsicum	31.2	177000	38	91000	89.8
Cauliflower	605.63	177000	47	91000	1114.73
Peas	255.7	177000	190.37	91000	625.83
Ginger	16.06	177000	10.5	91000	37.98
Oilseed	147.5	177000	6	91000	266.54
Total	**18577.89**		**1681.65**		**34413.17**

The 2025 monsoon season brought extreme rainfall, cloudbursts, flash floods, and landslides across Himachal Pradesh, causing unprecedented disruption to agriculture. The disaster impacted both high-value horticulture and staple kharif crops, undermining household incomes, food security, and future cropping capacity.

10.1.1 Overview of Damages

Land Damage Concentration Pattern

Observation	Implication
Damage heavily concentrated in maize & paddy belts	Large area of subsistence farmers affected
Vegetables moderately affected	Some income recovery possible via targeted support
Minor cereals least affected	Not critical to total value recovery

This suggests:

- 92% of damaged land is fully destroyed, showing this is structural devastation rather than superficial damage.
- The problem is not just productivity loss but loss of physical cultivable capacity.
- Maize and Paddy together account for 88% of total land damage value. This indicates extreme vulnerability of HP's staple grain zones
- Recovery planning must prioritise maize & paddy dominated regions first.
- Failure to restore these zones affects food security and household resilience.

Damage to Crops

Item	Fully Damaged Produce (in Bigha)	Fully Damaged Produce (Rate per Bigha in Rs)	Partially Damaged (Produce in Bigha)	Partially Damaged Produce (Rate per Bigha in Rs)	Total Damage Estimate of Produce (In Lakhs)
	1	*2***	*3*	*4***	*(1*2)+(3*4)*
Maize	4556.26	4600	20430.59	1920	601.86
Paddy	1486.65	5160	6078.35	2150	207.4
Millets	15.26	2345	77.25	977	1.11
Ragi	6	3518	101.5	1466	1.7
Kharif Pulse	404.31	5760	385.39	2400	32.54
Tomato	217.12	136800	349.35	56960	496
Capsicum	22	49220	52.2	18400	20.59
Cauliflower	2478.18	74880	3938.41	31200	3084.44
Peas	275.7	46640	244.37	19440	176.09
Ginger	17.5	33600	9.06	14000	7.15
Oilseed	24	2302	142	960	1.92
Grand Total	**9502.97**		**31808.46**		**4630.79**

The consolidated assessment indicates that a total of 9,502.97 bighas of cropped area was fully damaged, while 31,808.46 bighas were partially damaged across cereals, vegetables, pulses, oilseeds, and commercial crops. The most severely affected crops include maize, paddy, cauliflower, tomato, peas, and kharif pulses, reflecting both the scale of cultivation and their vulnerability to intense rainfall and slope failure.

Low-value cereals occupy large areas but contribute modest value losses. Vegetables occupy smaller areas but account for massive financial loss. High-value vegetable crops, particularly cauliflower (67%), dominate economic losses despite occupying smaller areas. This indicates that while cereal belts suffered extensive area damage, the most acute livelihood impacts are concentrated among vegetable growers, necessitating prioritised compensation, replanting support, and climate-resilient production strategies.

Maize and paddy together constitute the largest share of total crop and land damage, accounting for more than half of the overall losses, with maize alone recording ₹601.86 lakh in produce loss and ₹17,513.04 lakh in land damage. High-value vegetable crops also suffered severe impacts: cauliflower recorded ₹3,084.44 lakh in produce loss, followed by tomato at ₹496 lakh and peas at ₹176.09 lakh, representing a major setback for household incomes in mid-hill farming systems.

Item	Total Damage Estimate of Plants lost	Damage Estimate of Land (In Lakhs	Plant & Land Damage (Rs. Lakhs)
Maize	309.04	17513.04	17822.08
Paddy	370.78	12777.66	13148.44
Millets	0.66	43.7	44.36
Ragi	0.49	34.09	34.58
Kharif Pulse	16.51	1162.2	1178.71
Tomato	68.35	747.61	815.96
Capsicum	9.69	89.8	99.49
Cauliflower	78.32	1114.73	1193.05
Peas	42.38	625.83	668.21
Ginger	7.44	37.98	45.42
Oilseed	4.61	266.54	271.15
Grand Total	908.26	34413.18	35321.44

The total estimated damage to crop plants in Himachal Pradesh is ₹908.26 lakh (₹9.08 crore), reflecting severe losses across major Kharif crops due to the 2025 floods and landslides. Paddy and maize account for nearly three-fourths of the total crop loss, indicating widespread destruction of staple food grains in vulnerable river valley and terraced farming areas. Significant damage was also recorded in high-value vegetable crops such as cauliflower, tomato, and peas, particularly in the lower hill districts, while pulses, capsicum, and ginger suffered localized losses.

However, for estimating damages and losses, the cost of the plants are put under damages and the loss of revenue from the produce is put under losses. The total estimated loss in agricultural produce across all crops amounts to ₹4,630.79 lakh, while the estimated cost of land is significantly higher at ₹34,413.17 lakh. The disproportionate contribution of land damage—nearly 88% of total loss—highlights that the disaster's most severe long-term impact lies in the degradation of the agricultural land base rather than seasonal crop loss.

The scale of land destruction suggests that recovery will require heavy earth-moving machinery, reconstruction of terraces, repair of small-scale irrigation channels, and extended soil fertility restoration using organic amendments and technical support. Field consultations indicate that many of the fully damaged lands will not be cultivable for at least one production cycle, delaying re-cultivation to the 2026 Kharif season in the most affected areas. These losses have particularly serious implications for small and marginal hill farmers, who depend on a single cropping season and whose livelihoods are highly sensitive to disruptions of this magnitude.

Damages to Infrastructure

The 2025 floods and landslides caused significant destruction to agriculture-related infrastructure across Himachal Pradesh, with total estimated losses of ₹2,650.1 lakh (₹26.5 crore). Intense rainfall, slope failures, and debris flows led to widespread damage to fencing systems, solar-powered irrigation units, community water structures, and agricultural service buildings across multiple districts.

District	Fence (in Sq.Meters)	Solar Panel (in KW)	Water Storage Tank (in cbm)	Community Water Strucures (in cbm)	Physical Infrastructure - Building (in Sq. Meters)	Sum of Esimated Loss in Value - Infrastructure and Equipment (in Lakhs)
Chamba	804	1	18			1176.5
Kangra	3150	3	9	339	151	1162.9
Kullu	950		20			11.0
Mandi	2435	3	3	131	117	155.1
Shimla	1550	1			200	48.8
Sirmour	602	3		30		26.7
Solan				192		57.7
Grand Total						**2650.1**

The largest losses were recorded in Chamba, Kangra, and Mandi, where extensive fencing collapse, damage to solar panels, and destruction of water storage and distribution structures severely impacted farming operations. Other districts such as Shimla, Sirmour, Solan, and Kullu also experienced substantial infrastructure damage, particularly to buildings and community irrigation assets.

Damage to fencing has left agricultural land exposed to wildlife intrusion—an already critical issue in the state—potentially threatening crop recovery during the upcoming agricultural season. Similarly, the loss of solar irrigation units restricts access to affordable water supply, forcing farmers to rely on costly alternatives or remain without irrigation support. The destruction of community water structures has disrupted small-scale irrigation networks essential for hillside farming, delaying replantation and increasing vulnerability during the recovery period. Damage to agricultural buildings further hampers extension services, local input distribution, and storage capacity.

Consolidated Damage Assessment

Description	Amount Rs. Lakhs
Damages to Plants	908.26
Damages to Land	1530.302
Land Washed Away	32882.87
Damages to Infrastructure	2650.1
Total	**37971.532**

Loss Assessment

Cultivation Pattern Sowing-Harvest Calender

Crop / Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maize					S	S			H	H		
Paddy (Rice)				S	S	S				H		
Millets (Cheena/Kangni/Foxtail)						S	S		H	H		
Ragi (Finger Millet)						S	S			H		
Pulses (Moong)						S		H	H			
Pulses (Urad)						S			H			
Pulses (Rajmash)						S			H	H		
Tomato		S	S	S	S	H	H	H	H			
Capsicum (Shimla Mirch)		S	S	S	S		H	H	H	H		
Cauliflower (Early)					S	S		H	H			
Cauliflower (Mid)							S	S		H	H	
Cauliflower (Late)	H	H							S	S		

Crop / Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Peas (Rabi)			H	H						S	S	
Peas (Off-season)	S	S			H	H						
Ginger			S	S							H	H
Oilseeds (Mustard)		H	H							S		
Oilseeds (Sesame)						S	S			H		

The sowing–harvest calendar combined with the pattern of crop and land damage reveals that the 2025 disaster has caused not only crop loss but a structural interruption of the agricultural cycle in Himachal Pradesh. Realistic recovery will take between 12 and 24 months, depending on damage severity and restoration efficiency. Sustainable recovery requires coordinated investment in land rehabilitation, seasonally aligned planning, and climate-resilient agricultural practices.

Given this time frame the losses accrued to the sector will be more than just the damages calculated.

Losses in Agriculture

Type of Losses	Amount in Rs. Lakhs
Damage to crop / produce	4630.79
Losses due to non-cultivation	13892.37
Wage Loss	1909.48
Total Losses	**20432.64**

Losses are calculated based on yield and the rates as per NABARD / State rates. The losses under "non-cultivation" has been computed for two years. Wage loss has been computed only for a year as from next year they will have work in preparing land for cultivation and planting.

As shown by the Table on Cultivation pattern:

- The 2025 disaster has disrupted at least one full agricultural year for most farmers.
- Land degradation has created a recovery bottleneck; even when sowing windows exist, fields are often unusable.
- The most realistic recovery window for meaningful production was the Rabi 2025–26 season, provided restoration occurred before October.
- Failure to restore land before this period shifts full recovery to Kharif 2026 or beyond

Realistically, this would mean a loss of a minimum of two years of revenue. The losses have been calculated on a revenue loss of two years. 11359 people have been involved for a period of 34 days for the current cultivation cycle. The wages, at Rs 500/- per day, will also be lost for a year. Hence, the total losses to the Agriculture Sector have been computed to Rs. 15801.85 lakhs.

Consolidation of Damages & Losses

Description	Amount Rs. Lakhs
Damages to plants	908.26
Damages to Land	1530.3015
Land Washed Away	32882.8653
Damages to Infrastructure	2650.1
Total Damages	37971.53
Damage to crop / produce	4630.79
Losses due to non-cultivation	13892.37
Wage Loss	1909.48
Total Losses	20432.64
Damages & Losses	**58,404.1668**

On consolidation of the damages and losses, the total loss faced by the sector stands at Rs 58404.04 lakhs. Of this, a major share (60%), is the cost of land washed away/ fully damaged.

Socio-Economic Impact of the 2025 Disaster on Agriculture in Himachal Pradesh

1. Impact on Rural Livelihoods
Loss of income: Severely reduced seasonal incomes of small and marginal farmers who rely on maize, paddy, vegetables, and horticulture as primary income sources.
Multiple-season distress: Damage to 20,000+ bigha of agricultural land means many households will lose income not just this year but for 2–3 cropping cycles, especially where terraces collapsed or fields were buried.
Decline in wage labour availability: Farm labourers, especially migrant workers and women, faced reduced employment opportunities due to crop failure, delayed sowing, and damaged fields.

2. Impact on Food Security
Reduction in local food availability: Major loss of maize and paddy — key household consumption crops — increases dependence on market supplies.
Price fluctuations: Shortages of vegetables (cauliflower, peas, and tomatoes) caused local price spikes, reducing affordability for low-income households.
Nutritional vulnerability: Reduced availability of diverse vegetables affects household nutrition, especially for children and elderly members.

3. Social Impact
Psychological stress and uncertainty: Farmers experiencing repeated crop failures and land loss reported high levels of anxiety regarding debt, future livelihoods, and rebuilding.

Increased outmigration: Young farmers, already unsure about agriculture due to earlier disasters, are more likely to migrate to urban centres, contributing to rural depopulation.

4. Impact on Infrastructure & Local Economy

Damaged irrigation systems and rural roads slowed both farm operations and market access.

Collapse of local agri-value chains: Middlemen, transporters, and small traders faced significant income losses due to lower volumes of produce.

Credit stress: Farmers with existing loans for polyhouses, irrigation pumps, orchards, and livestock now face repayment challenges, increasing the risk of indebtedness.

5. Impact on Vulnerable Groups

Landless households: Dependent on wage labour, they faced income loss, increased debt, and food insecurity.

Small and marginal farmers: Comprising over 85% of Himachal's farmers, they suffered the highest shock due to smaller safety nets.

Communities in remote areas: Often located in hazard-prone terrain, they struggled with delayed relief, limited market access, and lower recovery support.

6. Long-Term Socio-Economic Risks

- Permanent loss of cultivable land in some valleys may push families out of agriculture.
- Increased dependence on government relief due to disrupted livelihoods.
- Degradation of community-managed resources (kuhls, common grazing land) may reduce resilience to future shocks.
- Erosion of traditional cropping patterns as farmers shift away from riskier hillside agriculture to less profitable but safer alternatives.

Beyond immediate crop damage, it threatens livelihoods, household food security, social stability, and medium-term economic prospects. Recovery requires **targeted interventions** combining financial aid, land restoration, social protection measures, and climate-resilient agriculture to prevent long-term impoverishment of affected communities.

Recovery Needs

Priority	Action Area	Rationale
1	Land Rehabilitation	88% of total losses are land-based
2	Irrigation & Fencing Repair	Enables immediate cultivation and asset protection
3	Seed & Input Distribution	Prevents loss of additional cropping seasons
4	Employment & Wage Recovery	Supports vulnerable labour households
5	Financial Relief	Reduces farmer debt stress
6	Climate Resilience	Prevents future cycle disruptions

Calculation of Recovery costs: NABARD unit cost schedules and the Unit Cost (Investment Activities) guidance used to set planning envelopes. (NABARD unit cost docs are the primary reference for investment & recurring costs).

Himachal Pradesh Scale of Finance and production notes (CSKHP Palampur / State agri department direction to compute HP-specific cost of cultivation).

Intervention	Explanation	Amt in Lakhs
Restoration/ Reclamation of Agricultural Land and Soil	Reclamation of Partially Damaged Land (desilting, removal of Debris, soil testing)	336.33
Compensation for land lost	Based on values given by Dept of Agriculture	32882.86
Compensation for Crop Loss	This is taken only for a year, the actual quantity of produce lost during the floods	4630.79
Restoration of Production Capacity	Replanting Costs. Based on NABARD norms	908.25
Restoration of Incomes	Relief Package for Income loss (1% of total loss of revenue divided across 24 months for small and marginal farmers)	1389.24
Restoration of Infrastructure	Immediate repair of all damaged infrastructure	3000.00
Promoting Risk Transfer Mechanisms	Premium for Insurance Packages	24.32
Waiver of Interest component of loans under KCC and Crop Loans	SLBC is considering Moratorium period of 6 months. However, they are unlikely to waive the interest component, which will just add to the burden of the already debt-ridden small and marginal farmers. It is recommended that the Government supports in payment of the interest	500.00

Intervention	Explanation	Amt in Lakhs
Capacity Building for climate resilient farming	Farmers able to plan climate resilient cropping patterns through Capacity Building, Farm Schools, enhanced extension activities	80.00
Technology up-gradation	Piloting 10 Hydroponics Units @ 15 lakhs/ unit	150.00
Long-Term Agricultural Resilience and Sustainability	Promotion of agroforestry, contour farming, and vegetative barriers in hilly terrain.	140.00
	• Development of resilient cropping systems	100.00
	• Strengthening digital monitoring including developing early warning systems	150.00
	• Construction of slope-stabilized terraces and land	1000.00
Total For Reconstruction and Recovery		45291.78

The total Amount required for sustainable recovery is Rs. 45291.78 lakhs or 452.92 crores.

The immediate package is relief-heavy, resilience-light and has the potential to risk "repair-and-repeat" cycles after each monsoon disaster. However, the risk reduction component for ensuring slope stability will be addressed under the DRR section of the PDNA document.

Recovery Framework

Period	Goal	Key Milestones
0–6 months	Stop further degradation, enable some Rabi 2025–26 sowing	Light/partially damaged land desilted & stabilised
6–18 months	Restore majority of damaged land & cropping	Kharif 2026 in most affected villages on track
18–36 months	Build resilience and complete structural works	Terraces, drainage, micro-irrigation and climate-smart practices in place

Recovery Component	Specific Activity	Timeline	Converging Government Schemes
Land Desilting & Clearance	Removal of silt & debris from partially damaged fields (1,682 bigha)	0–6 months	SDRF, MGNREGA
Bund & Terrace Stabilisation	Temporary + permanent structures	0–12 months	MGNREGA, NABARD RIDF

Soil Testing & Conditioning	Lab testing + nutrient correction	0–6 months	State Soil Health Scheme, RKVY
Full Land Reclamation	Terrace reconstruction of fully damaged land	6–18 months	NABARD RIDF, PMKSY, MGNREGA
Drainage & Water Management	Contour drains, check slopes	6–18 months	PMKSY, MGNREGA
Replanting & Input Support	Seeds, fertilisers, seedlings	6–18 months	State Agri Dept, RKVY, MIDH
Crop Insurance Coverage	PMFBY premium support	6–18 months	PMFBY
Slope Stabilisation & Bio-Engineering	Vetiver, stone toe walls	18–36 months	PMKSY-Watershed
Water Harvesting Structures	Farm ponds, kuhls, tanks	18–36 months	PMKSY, NABARD RIDF
Protected Cultivation	Polyhouses, low tunnels	18–36 months	MIDH (HMNEH), RKVY
FPO & Market Strengthening	Aggregation & value chain linkages	18–36 months	NABARD PO Scheme, RKVY-RAFTAAR

The restoration of agricultural land and soil emerges as one of the most urgent recovery priorities in the aftermath of the 2025 floods and landslides. The disaster caused widespread accumulation of silt, debris, and boulders on agricultural fields, alongside extensive land degradation in areas affected by slope failure and erosion. The recovery activities outlined in this table focus on enabling farmers to regain access to cultivable land while restoring soil productivity in a phased and sustainable manner.

Impact of Recovery

The recovery interventions proposed for the agriculture sector are expected to significantly *restore* the productive capacity of farming communities severely affected by the 2025 floods and landslides in Himachal Pradesh. By reclaiming agricultural land buried under silt, debris, and boulders, and by rehabilitating fields eroded or destabilized by landslides, the programme will enable farmers to regain access to their primary livelihood asset. The restoration of soil fertility and stabilization of slopes will further ensure that reclaimed lands become productive again, allowing households to resume cultivation safely and without the fear of recurring land slips. For many families who lost an entire cropping season, this foundational restoration will provide the first step toward rebuilding both food security and economic activity.

Supporting farmers with essential inputs—such as seeds, fertilizers, planting materials, and basic agricultural implements—will accelerate the resumption of cropping cycles and prevent prolonged income disruption. Access to short-duration and climate-resilient varieties will enable faster recovery and reduce vulnerability to future weather-related shocks. The rehabilitation of small-scale irrigation systems, including Kuhls, check dams, and water harvesting ponds, will ensure reliable water availability and reduce the risk of secondary crop losses. Restored irrigation infrastructure will not only revive farming activities but also strengthen community-level resilience in the face of increasing rainfall variability and climate-induced hazards.

Livelihood-oriented measures such as compensation, input subsidies, insurance settlement support, and short-term employment opportunities for land reclamation will provide immediate relief to the most vulnerable groups, including small and marginal farmers, sharecroppers, and women-led households. These interventions will cushion families against financial distress, reduce reliance on negative coping strategies, and help communities rebuild confidence in returning to normal agricultural activity. In the longer term, capacity-building initiatives, crop diversification, agroforestry, and digital monitoring systems will support sustainable recovery, enhance local knowledge on risk-resilient farming, and ensure that communities are better prepared for future disasters. Together, these interventions will not only restore agricultural production but also strengthen the social and economic resilience of rural communities across Himachal Pradesh.

10.2 Horticulture

Profile of the Horticulture Sector

The Government of Himachal Pradesh has identified the Horticulture sector as one of the growth engines in the economic development of the State. In Himachal Pradesh, the area under Horticulture crops increased from 792 Hectares in 1950-51 to 2,36,950 hectares in 2023-24. The area under Horticulture in the state contributes 26 per cent of the total Agriculture area (8, 91,926 hectares), whereas the sector contributes 22 per cent in terms of the value of the produce (Agriculture crops value ₹16,076 crore including vegetables, Horticulture crops value ₹4,461.59 crore in 2023-24).

Apple is the most important fruit crop of Himachal Pradesh, which constitutes about 49.06 per cent of the total area under fruit crops and about 79.51 per cent of the total fruit production during FY2023-24. The area under apple has increased from 400 hectares in 1950-51 to 3,025 hectares in 1960-61 and 1,16,240 hectares in FY2023-24. Between FY2007-08 and FY2023-24, the area under apple has seen a growth of 21.4 per cent. The area under temperate fruits other than apples has increased from 900 hectares in 1960-61 to 27,373 hectares in FY2023-24. The overall fruit output in FY2023-24 was 6.37 lakh tones. The total fruit production in FY2024-25 up to 31st December, 2024 was 5.92 lakh tones.

Sectoral Policies

1. Orchard Development & Production Policies

- Horticulture Development Mission (HDM): Rejuvenation of old orchards, high-density plantation (HDP), and climate-resilient varieties.
- Diversification Policy: Promotion of kiwi, pomegranate, citrus, persimmon, figs, and low-chill apples in lower elevations.
- MIDH (Mission for Integrated Development of Horticulture): 40–50% subsidy for drip irrigation, trellising, planting material, protected cultivation.

2. Nursery & Planting Material Policies

- Strengthening state and private nurseries, certified planting material, and clonal rootstock production.
- Regulation of sapling quality, nursery sale rates, and virus-indexing protocols.
- Expansion of tissue-culture and rootstock import for HDP apple production.

3. Water, Irrigation & Climate Resilience

- Micro-Irrigation Scheme: 50–70% subsidy for drip, sprinkler, fertigation units.
- Community Water Schemes: Solar pumps, lift irrigation, gravity-fed village reservoirs.
- Weather Protection: Subsidy for anti-hail nets, frost protection, shade nets; expansion of automatic weather stations.

4. Post-Harvest, Cold Chain & Market Infrastructure

- HPMC Modernisation: Upgrades to pack houses, CA stores, grading lines, processing plants.
- Cluster-Based Development (CBD): Collection centres, pre-cooling units, and cold storages at cluster level.

- Market Intervention Scheme (MIS) for Apple: Government procurement of C-grade apples to stabilise prices.
- Support for FPOs, common facility centres (CFCs), and value-addition units (juice, dehydration, pulping).

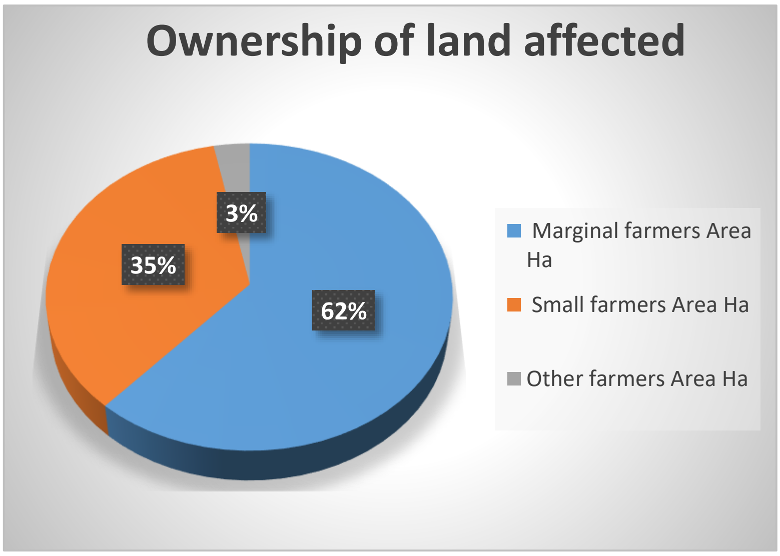
5. Credit, Insurance & Risk Management

- Universal Kisan Credit Card (KCC) access for orchardists.
- PMFBY coverage for apple; push to expand insurance to citrus, stone fruits, kiwi.
- Interest subvention for timely repayment; special packages in disaster years.
- Incentives for climate-smart orchard investments through AIF, NHB, NABARD.

Himachal's horticulture policy framework is comprehensive—targeting productivity, resilience, nursery quality, irrigation security, cold-chain expansion, and financial protection.

Impact of Floods and Landslides of 2025 on the sector

A total of 7,874.62 hectares of land was damaged, of which 62% belonged to marginal farmers, 35% to small farmers, and only 3% to large farmers. While these figures reflect the overall land ownership pattern in the state, they also highlight the need for a targeted and compassionate approach to support the most vulnerable farmers in rebuilding their livelihoods.



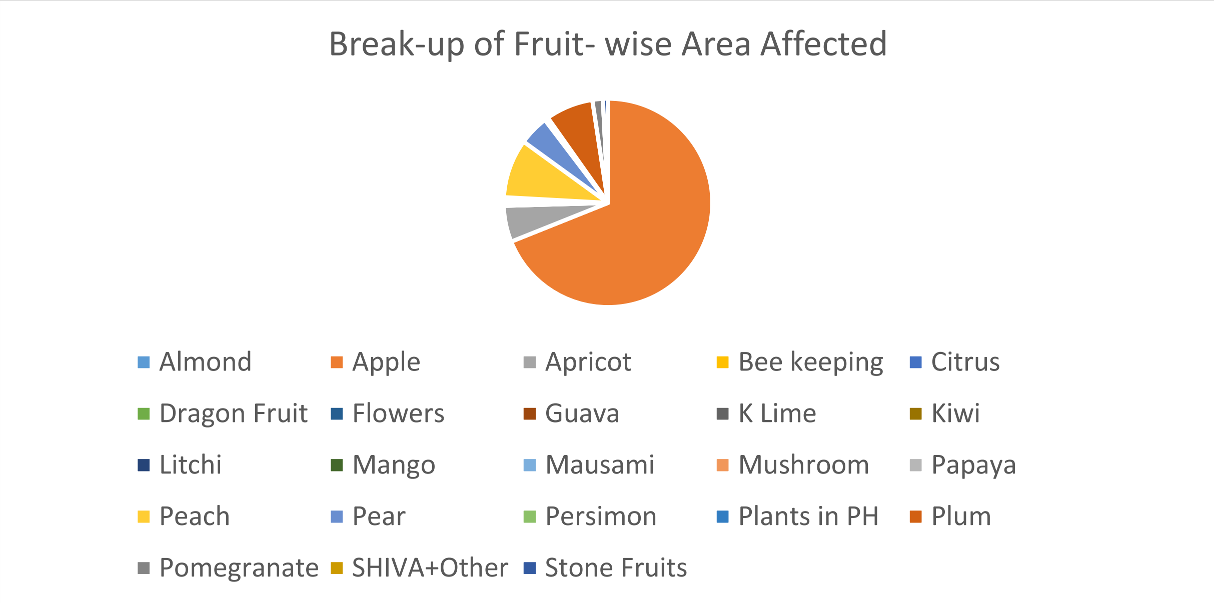
The 2025 extreme rainfall, landslides, and flash floods caused severe disruptions to the horticulture sector—the backbone of Himachal Pradesh's rural economy. The impacts were multidimensional, affecting trees, production, income, infrastructure, and long-term productivity.

Economic Impact of Damages

Process adopted for calculating damages

- The data has been collected through multiple sources:
  - Data of Trees fully/ partially damaged, quantitative and qualitative loss of yield have been taken from the Memorandum as the data from DMIS was not conclusive
  - The land affected and washed away were taken from DMIS
- The cost of damages are also based on the Memorandum as this is based on the Harbans Formula for damage assessment.
- The lack of standardisation in data made it difficult to assess the units damaged, there by the cost. Hence, the cost of damages to infrastructure has been based on the damage data provided in the DMIS.

Of the total area of 7874.62 ha affected, 68% was under apple cultivation, closely followed by Peaches (9%) and Plums (7%). The remaining was distributed across the other fruits and floriculture.



The damages to land and produce have been computed as shown in the table below:

Damages in Quantitative Terms

District	Total area affected Ha	No. of trees completely destroyed	No. of Trees partially damaged	Fruit Crop Quantitative loss (MT)	Fruit Crop - Qualitative loss (MT)
All Fruits	113	190	3	10	43
Almond	1	30	50	0	0
Apple	5346	135577	57311	10944	2678
Apricot	436	132	235	0	0
Bee keeping	0	0	0	0	0
Citrus	28	1050	440	8	22
Dragon Fruit	0	20	0	0	0
Flowers	0	0	0	0	0
Guava	18	3634	1100	21	16
K Lime	14	75	0	22	0

District	Total area affected Ha	No. of trees completely destroyed	No. of Trees partially damaged	Fruit Crop Quantitative loss (MT)	Fruit Crop - Qualitative loss (MT)
Kiwi	3	215	180	6	1
Litchi	10	0	0	0	0
Mango	28	940	160	8	13
Mausami	1	0	0	1	0
Mushroom	0	0	0	0	0
Papaya	0	0	0	0	0
Peach	708	220	257	0	0
Pear	361	40	60	163	40
Persimon	43	2325	50	142	105
Plants in PH	0	0	0	0	0
Plum	572	145	252	19	0
Pomegranate	126	3318	195	404	300
SHIVA+Other	0	0	0	0	0
Stone Fruits	61	7345	534	3	0
Grand Total	**7869**	**155256**	**60827**	**11751**	**3218**

`Damages in Monetary Terms (Rs. Lakhs)

District	Fruit Tree Loss Value (in Lakh Rs.)	Fruit Crop Loss Value (in Lakh)	Fruit Crop Qualitative Loss Value (in lakh)	Total Cost of Crop Damages in Rs. Lakhs
All Fruits	4.96	8.75	6.90	20.61
Almond	0.80	0.00	0.00	0.80
Apple	4820.67	2009.91	487.89	7318.47
Apricot	3.72	0.00	0.00	3.72
Bee keeping	0.00	3.00	0.00	3.00
Citrus	1.35	1.87	5.90	9.12

Dragon Fruit	0.20	0.00	0.00	0.20
Flowers	0.00	0.00	0.00	0.00
Guava	8.92	5.32	4.87	19.11
K Lime	3.75	12.50	0.00	16.25
Kiwi	20.75	0.81	0.03	21.59
Litchi	0.00	0.00	0.00	0.00
Mango	0.65	1.23	7.80	9.68
Mausami	0.00	0.21	0.00	0.21
Mushroom	0.00	1.00	0.00	1.00
Papaya	0.00	0.00	0.00	0.00
Peach	5.17	0.00	0.00	5.17
Pear	0.50	39.66	5.50	45.66
Persimon	10.92	51.41	23.47	85.80
Plants in PH	0.00	4.10	0.00	4.10
Plum	4.57	3.89	0.00	8.46
Pomegranate	13.75	211.21	126.91	351.87
SHIVA+Other	0.00	0.00	0.00	0.00
Stone Fruits	170.21	0.86	0.25	171.32
Grand Total	**5070.89**	**2355.73**	**669.52**	**8096.13**

The June–September extreme-weather period overlaps with the **peak growth, harvest and post-harvest phases** of Himachal's major horticultural crops (apple, stone fruits, vegetables, nuts, floriculture). The losses indicate substantial shocks that alter short-term performance and long-term structural trends of the sector.

The horticulture sector—central to Himachal's rural economy, providing livelihoods for over **3 lakh households**—recorded **significant losses** in area, productivity, and infrastructure. These damages have **multi-year implications**, particularly for perennial trees.

Tree Damage and Crop Loss
The extreme rainfall caused widespread:

- Uprooting of fruit-bearing trees
- Limb damage, and branch snapping
- Fruit drop at pre-harvest stage
- Surface soil erosion and orchard destabilisation

Impacted crops included apple (largest area), pear, plum, peach, cherry, and emerging areas of pomegranate and litchi. The damage during fruit growth and harvest stages led to substantial reduction in marketable yield, deterioration of fruit grade, and spoilage.

Damages to Structures

Infrastructure	Unit	Number	Damages in Rs Lakhs
Fencing	Metres	76653	344.37
Solar Panel	KWs	45	21.87
Drip Irrigation	Meters	5825	2.92
Water Storage Tanks	Nos.	433	7.20
Retaining Wall	Sq Mtrs	480	31.19
Community Water Structures	Nos.	426	5.00
Buildings damaged	Nos.	596	23.90
Water Pumps	Nos.	2	0.70
Polyhouses	Sq. Mtrs	36553	219.32
Polysheet	Sq. Mtrs	18080	11.57
Bee Boxes	Nos.	208	8.32
Total			**676.36**

Total Damages (Trees, Crop and Infrastructure) in Monetary Terms

Description	Amt in Rs. Lakhs

Damage to Trees	5070.89
Damage to Crop	2355.73
Loss of Crop Value	669.52
Total Crop	**8096.13**
Fencing	344.37
Solar Panel	21.87
Drip Irrigation	2.92
Water Storage Tanks	7.20
Retaining Wall	31.19
Community Water Structures	5.00
Buildings damaged	23.90
Water Pumps	0.70
Polyhouses	219.32
Polysheets	11.57
Beeboxes	8.32
Total Infrastructure	**676.36**
Total Damages	**8772.49**

Losses

The losses were calculated as loss of revenue for 5 years based on the Harnbans formula for yield and the total wage loss for the same period.

Detail	Unit	Cost/ Unit	No. of Years lost	Total Loss (Rs. Lakhs)
Crop Loss	Crop Value lost/ year	3025.25	5	15126.23
Wage loss @ Rs. 500/ day	Person Days/ Year	107579	5	5.37895
Total Losses				**15131.6**

Damages & Losses Consolidated

Type	Amount in Rs. Lakhs
Trees and Crops Damaged	8096.13
Infrastructure Damaged	676.36
Losses (Calculated for 5 Years)	15131.6
Total Damages & Losses	**23904.10**

Impact of the Damages and Losses on Horticulture in Himachal Pardesh

a. Severity and Multi-Year Effects

- Loss of mature trees reduces orchard productivity for **3–7 years**, depending on fruit type.
- Damage to planting pits and contour bunds increases future vulnerability.
- Young plantations (below 5 years) suffered disproportionately due to poor anchorage on wet soils.

These factors also contribute to declines in future production, not just seasonal shortfalls.

b. Infrastructure Damage

Horticulture infrastructure suffered serious damage, including:

- Field channels, irrigation lines, and HDPE/LIS systems in farms owned by the Department
- Farm access paths, link roads, footpaths, and retaining walls
- Packing houses, CA/ULP stores, grading lines, and collection centres
- Nurseries, polyhouses, shade nets, and farm fencing

The damage to road networks disrupted farm-to-market logistics, increased transport costs, and caused post-harvest losses, especially for perishable fruits.

c. Reduced Marketable Production

The disaster reduced availability of quality fruit. Apple yield dropped due to premature fruit fall and grade deterioration, reducing growers' price realization. The other fruits were also impacted in terms of quality resulting in a significant decline in overall market arrivals, leading to short-term price volatility and low farm gate rates.

Loss of Income for Growers

Orchardists faced income reduction due to:

- Loss of fruit-bearing trees (long-term income loss)
- Lower rates for downgraded fruit sold at farm gate
- Higher costs for picking, sorting, and transporting via damaged roads

Loss of farm income has direct negative effects on:

- Household cash flow
- Ability to invest in orchard management
- Purchase of inputs (FYM, sprays, fungicides, implements)

- Schooling and healthcare expenditure

This contributes to short-term financial stress and longer-term indebtedness.

Impact on Small and Marginal Growers

Smallholders (less than 1 ha of orchard area), comprising **over 80%** of horticulture households, experienced:

- Higher relative loss of orchard assets
- Limited financial reserves to withstand a "lost season"
- Reduced ability to repair infrastructure
- Increased vulnerability to debt cycles

Environmental Impacts

- Severe soil erosion degraded orchard topsoil, reducing fertility.
- Landslides destabilized thousands of orchards near slopes.
- Sedimentation in fields reduced water infiltration capacity.
- Increased pest/fungal outbreaks (scab, rot) due to persistent humidity.

The environmental degradation will affect crop quality, water access, and orchard sustainability for years.

Long-Term Implications

1. Multi-year reduction in fruit productivity, especially for apple.
2. Shift in cropping patterns, with growers opting for vegetables
3. Increase in cost of cultivation due to rehabilitation needs.
4. More demand for resilient technologies—hail nets, sprinkler/drip irrigation, polyhouses, disease-resistant rootstocks.

A structured recovery plan focusing on infrastructure restoration, orchard rehabilitation, climate-resilient technologies, and financial support is essential to rebuild the sector and safeguard rural livelihoods.

Overall Trend Implication for Himachal Horticulture shows a need to move from traditional, climate-exposed, ageing orchards and open-field fruit systems to Climate-resilient, high-density, protected, diversified horticulture, needing:

- Stronger slope stabilization works
- Extensive irrigation and drainage rehabilitation
- Better road and packhouse infrastructure
- Crop insurance expansion
- Scientific orchard rejuvenation
- Early warning & orchard-level micro-weather advisories

Reconstruction and Recovery Costs

Orchard Replanting Cost Estimates

All replantation cost estimates assume the following components:

i. Planting material (saplings)
Pit digging
FYM / Soil amendments

ii. Basal fertilizers & micronutrients
iii. Plant protection (1st-year)
iv. Mulching / staking / tying
v. Drip irrigation (per ha)
Trellis / support system
Labour: planting + carrying inputs
vi. Transport of saplings and materials
vii. Fencing (standard farm fencing)
viii. Contingency
– Typically 5% (NABARD/MIDH standard)
ix. Conversion of NABARD per acre to per hectare
x. 1 hectare = 2.471 acres. Used in pomegranate, citrus, mango, etc.

Replantation Costs as per NABARD Approved Costs

Crop	Area affected in Ha	Replanting Cost/ Ha Rs. Lakhs	Total Replanting Cost Rs. Lakhs
All Fruits	113	2	226
Almond	1	2.4	2.4
Apple	5346	5	26730
Apricot	436	2.3	1002.8
Citrus	28	2.3	64.4
K Lime	14	2	28
Guava	18	2.4	43.2
Kiwi	3	5.5	16.5
Litchi	10	3.5	35
Mango	28	3	84
Mausami	1	2.3	2.3
Peach	708	2	1416
Pomegranate	126	4.12	519.12
Plum	572	2	1144
Pear	361	2.8	1010.8

Persimmon	43	3	129
Dragon Fruit	0	8.5	0
Stone Fruits	61	2.2	134.2
Total	**7869**		**32587.72**

Reconstruction Costs

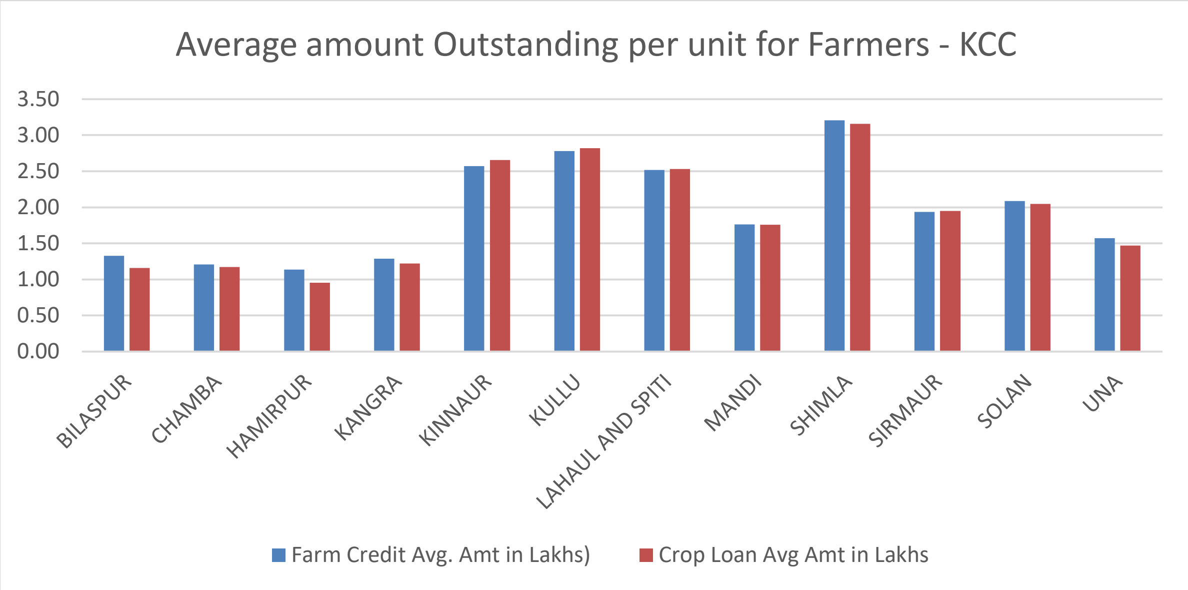
Costs for reconstruction have been based on Market rates.

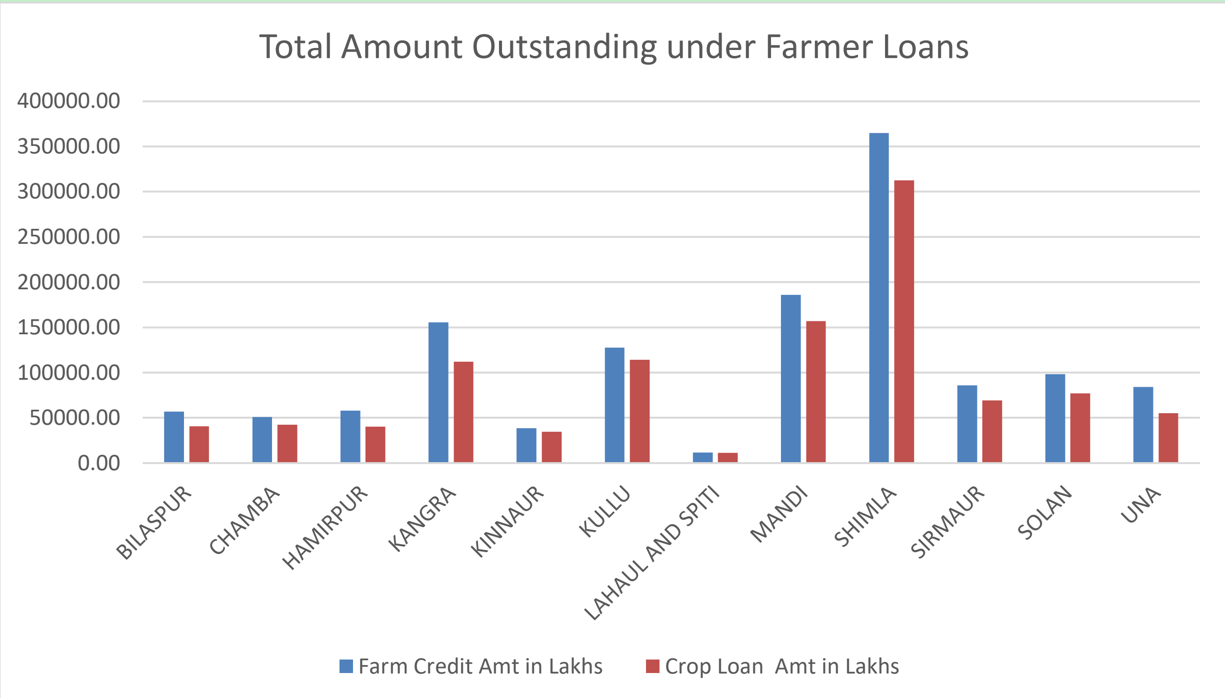
Infrastructure	Unit for costing	Total damaged	Cost/Unit	Total Cost Lakhs
Fencing	Mtrs	76653	500	383.265
Solar Panel	KWs	45	48600	21.87
Drip Irrigation	sq mtrs	5825	40	2.33
Water Storage Tanks	Nos	7	10	70
Retaining Wall	Sq. Mtr	480	8000	38.4
Community Water Structures	Nos	2		5
Buildings damaged	Nos	569		23.9
Water Pumps		2	0.25	0.5
Polyhouses	Sq. Mtr	36553	1400	511.742
Polysheet	Sq. Mtr	18080	50	9.04
Bee Boxes	Nos	208	5000	10.4
Total				**1076.447**

There has been considerable damages to the infrastructure in terms of fencing, solar panels, water storage facilities, retaining walls, irrigation facilities and poly houses.

Prevailing Financial Stress on Horticultural /Agricultural farmers

An Analysis of the KCC and Farm Loans outstanding as on end Sept- 2025





Himachal shows significant **agricultural credit exposure** under KCC and crop loans, particularly in the most affected horticulture districts.

Key Findings from Credit Data (KCC & Crop Loans)

- High Credit Exposure in Most Affected Districts
- Districts with the largest orchard damage are also those with the highest outstanding KCC loans:

Repayment Risk is Highest in Apple–Stone Fruit Belts

Apple and pomegranate/stone-fruit belts carry:

- Deep orchard damage
- High crop loan outstanding
- Multi-year income delays
- Rising Financial Vulnerability
- Many farmers depend exclusively on orchard incomes.
- Loss of current crop + loss of future income poses a high NPA risk

Policy Problem

The current credit architecture does not align with the realities of horticultural disasters:

- KCC repayments are annual, but orchard recovery needs 3–7 years.
- KCC limits do not reflect replantation costs (₹2.5–4 lakh/ha).
- Interest burden accumulates during non-yield years.
- No dedicated mechanism exists for orchard disaster credit restructuring.

These gaps risk pushing thousands of orchard households into:

- distress borrowing,
- partial sale of land,
- out-migration, and
- long-term financial exclusion.

Policy Recommendations

1. Announce a KCC Moratorium for Affected Districts (6–12 Months)

- Suspend repayment obligations for crop loans and KCC.
- Prevents immediate defaults and ensures liquidity.

2. Convert Existing KCC Short-Term Loans Into Term Loans

- Tenure: 3–5 years
- Grace period: 12 months minimum
- Aligns repayment with recovery of young orchards.

3. Interest Subvention for Disaster-Affected Blocks

- Effective interest rate: 4% (or 0% for first year).
- Applied to both KCC and restructured term loans.

4. Launch a Relief Credit Window

- ₹1 lakh working capital per farmer
- No collateral for holdings <2 ha
- Target: small & marginal orchardists

5. Introduce 'Orchard Replantation Credit Line' Under AIF or NHB

- Loan size: ₹2–6 lakh/ha
- Tenure: 7 years
- Interest: 5–6% (with subsidy)

6. Promotes climate-resilient varieties and rootstocks.

7. Expand Coverage of Horticulture Insurance

- PMFBY + add-on covers for orchard infrastructure (trellis, nets, pumps).
- Government subsidies for premiums: ₹5,000–7,000/ha.

Himachal Pradesh's horticulture recovery requires synchronized credit restructuring, targeted financial relief, and long-term investment support. Both GoHP and MoA&FW must act quickly to safeguard rural livelihoods, reduce default risks, and rebuild a more climate-resilient orchard economy.

Recovery Needs

Recovery needs stem from:

- **Orchard destruction:** Uprooting and death of mature apple, stone-fruit, citrus, kiwi, and pomegranate trees.
- **Multi-year economic loss:** Tree crops take 3–7 years to return to full bearing.
- **Infrastructure damage:** Fences, pumps, water tanks, retaining walls, collection centres.
- **Farm access damage:** Paths, culverts, terrace failures, soil slips.
- **Nursery loss:** Reduced supply of certified saplings needed for replanting.
- **Disruption of pollination systems:** Loss of bee boxes.
- **Financial stress:** High KCC exposure limiting farmers' ability to self-finance recovery.

These factors make horticulture recovery substantially more expensive than seasonal agriculture.

Immediate Recovery Needs

Intervention Area	Actions	Rationale	Lead Agency
1. Orchard Clearance & Stabilisation	• Launch debris-removal & pruning campaigns (cash-for-work). • Remove uprooted trees, stabilise slopes, fill pits.	Clears orchards for next season; provides immediate livelihood support.	DoH, PRIs, NGOs
2. Replantation	• Provide support for replantation	Reestablishment of orchards	DoH, MGNREGS
3. Irrigation Restoration	• Repair priority pumps, LIS, HDPE pipes. • Deploy mobile pumping units.	Supports survival irrigation for stressed trees; prevents further yield loss.	IPH Dept., DoH
4. Nursery Salvage & Sapling Production	• Salvage state nurseries; fast-produce certified saplings.	Critical due to large replantation need (7,869 ha affected).	DoH, UHF Nauni

Intervention Area	Actions	Rationale	Lead Agency
5. Direct Farmer Support	• Income support (₹500/month for small & marginal). • Wage support through MGNREGA.	Offset immediate income shock; orchardists lost entire seasonal income.	GoHP, RDD
6. Financial Relief	• 6-month interest waiver on KCC loans. • Moratorium on term loans.	Reduces distress borrowing and defaults.	Banks, SLBC
7. Disease & Pest Control	• Emergency sprays for rot/scab; advisory on humid-weather outbreaks.	High humidity increased disease pressure.	DoH, KVKs
8. Access & Logistics	• Restore farm paths, temporary bridges on orchard routes.	Ensures market access during harvest.	PWD, PRIs
9. Deentralised support for Enhancing Shelf-life	• Set up Collection Centres with Chilling capacity at FPO Levels	Ensures safe storage of perishable produce	DoH, NABARD
10. Cold Storage Facilities	• Set up Cold Storage Plants at District Level	Reduces losses during critical times	DoH, NABARD

Reconstruction and Recovery Plan and Costs

Intervention for Recovery	Rs. In Lakhs	Agencies / Schemes
Replanting Cost	32587.72	MIDH (Mission for Integrated Development of Horticulture) – Area Expansion; Rejuvenation; HDP plantations + State Horticulture Development Mission (HDM)
Launch debris removal + pruning campaigns with cash-for-work (immediate livelihood support)@ 5000/ha	393.45	MNREGA (convergence) + State Disaster Mitigation Fund (SDMF) + Horticulture Dept – Orchard Management Scheme
Repairs/ Reconstruction of Damaged Infrastructure	1076.447	MIDH – Infrastructure, RKVY, State Infrastructure Development Scheme, AIF
Income Supplement @ 500/month for 33479 small and marginal farmer for 5 years	10043.7	State Horticulture Livelihood Support Programme (new) + SMAM / Convergence with Direct Benefit Support

Interest Waiver of Loans for 6 months @ 6000 PA for 75% of small and marginal farmers	1506.555	State Interest Subvention Scheme + KCC Relief Package (SLBC/Banking Dept)
Insurance Premium @ Rs. 5000/ ha for small & Marginal farmers	267.3	PMFBY (Pradhan Mantri Fasal Bima Yojana) + State Share of Premium Subsidy
Setting up 8 Collection Centres (2 - 5 MT/ day) with pre-cooling @ Rs. 40 lakhs	320	MIDH – Post-Harvest Infrastructure + AIF (Agriculture Infrastructure Fund) + FPO Support Schemes
Setting up 3 Cold Storage Units 8 Collection Centres (1000 MT/ day) with @ Rs. 400 lakhs each	1200	NHB (National Horticulture Board) Cold Chain Scheme + AIF + PPP/Cooperative Models
Total	**47395.172**	

A total of Rs 47395.172 lakhs is required for the immediate recovery of the Horticulture Sector.

Recovery Framework

Period	**Goal**	**Interventions**
Short-Term Social Impact (0–6 Months)	Stabilizing Livelihoods and Meeting Immediate Needs	• Cash-for-work activities for debris removal and pruning provide instant income support to small and marginal orchardists, preventing distress migration. • Restoring irrigation pumps and clearing orchard access routes reduces stress, enhances mobility, and sustains surviving trees. • Nursery salvage efforts protect local planting material sources and secure jobs for women and youth. • Direct income support, wage work, and emergency pest/disease control measures help restore psychological stability and community morale.
Medium-Term Social Impact (6–24 Months)	Rebuilding Economic Security and Strengthening Local Systems	• Replanting orchards and restoring damaged horticulture infrastructure rebuilds the economic base of rural households. • Strengthened nurseries and soil rehabilitation generate local employment and support livelihood diversification. • Targeted input support (fertilizers, FYM, micronutrients) and wage programs help smallholders recover faster, reducing inequality. • Improved water systems, fencing, and slope stabilization increase the resilience of villages and reduce risks from future climatic events.

		• Community institutions (FPOs, monitoring committees) gain capacity, improving transparency and collective decision-making.
Long-Term Social Impact (2–7 Years)	Resilience, Higher Incomes, and Sustainable Rural Development	• Climate-resilient orchard systems (HDP apple, trellised kiwi, pomegranate, citrus) increase long-term income stability and reduce climate vulnerability. • Diversification into high-value crops enhances household profitability and supports rural poverty reduction. • Investments in packhouses, cold chain, and market infrastructure strengthen value chains and raise farmgate prices. • Women's involvement in nurseries, processing, and FPOs promotes gender empowerment and greater household decision-making power. • Expanded uptake of insurance, KCC credit, and formal banking enhances the financial inclusion of orchard households. • Long-term improvements in income and stability support education, nutrition, and health outcomes, improving overall human development.

Impact of Recovery

In view of the magnitude of losses and the unique nature of perennial horticulture, a comprehensive Horticulture Recovery Package of **₹473.95 crore** has been formulated. The package addresses short-term needs such as debris clearance, pruning, irrigation restoration, and livelihood support; medium-term priorities including orchard replantation, infrastructure repair, insurance support, and credit relief; and long-term resilience-building through cold-chain development, cluster-based collection centres, and climate-smart orchard systems.

The proposed recovery interventions have been aligned with existing State and Central schemes including MIDH, State Horticulture Development Mission, PMFBY, MNREGA, NHB, AIF, and State Interest Subvention programmes. This ensures optimal convergence, avoids duplication, and maximises impact per rupee invested.

Given the high dependence of rural households on horticulture, the severe credit exposure under KCC and crop loans in disaster-affected districts, and the multi-year nature of orchard recovery, timely approval and implementation of this package is critical. It will:

- Stabilise farmer incomes and livelihoods;
- Prevent debt distress and out-migration;
- Restore productive orchard area and essential infrastructure;
- Strengthen post-harvest systems and market access;
- Build long-term climate resilience of the horticulture sector.

10.3 Animal Husbandry & Livestock Management

Livestock sector is critical for the rural economy, especially the small and marginal farmers as this sector not only contributes to farmer's income but also is their best insurance against any natural calamity. Livestock and poultry have proved to be life saviours in many distress conditions, especially in cases of drought and other natural calamities for the rural poor. Livestock subsector accounts for 1.36 per cent of total GSVA and 9.24 per cent of agriculture and allied sector GSVA in FY2024-25.

The total livestock population in the State stood at 44.13 lakh, and that of poultry population was 13.42 lakh. In Himachal Pradesh, cattle form the largest share of the livestock population comprising 18.28 lakh of the total population, followed by Goats, Sheep and Buffaloes.

Livestock plays a vital role in Himachal Pradesh's hill economy, contributing to nutrition, draught power, and household income in mixed farming systems. However, census data reveals a decline in large ruminants and equines and a growth in poultry and small livestock, reflecting structural changes in livelihoods, land use, and market orientation.

Trend Analysis: Livestock Composition in Himachal Pradesh (2007–2019)

Key Quantitative Patterns

Category	**2007**	**2012**	**2019**	**% Change (07–19)**	**Trend**
Crossbred Cattle – Bulls	1.41 lakh	1.59 lakh	1.07 lakh	–24%	↓
Crossbred Cattle – Cows	6.52 lakh	8.25 lakh	9.62 lakh	+47%	↑
Indigenous Cattle – Bulls	7.42 lakh	5.70 lakh	3.49 lakh	–53%	↓↓
Indigenous Cattle – Cows	7.34 lakh	5.95 lakh	4.10 lakh	–44%	↓↓
Buffalo – Male	0.58 lakh	0.60 lakh	0.42 lakh	–28%	↓
Buffalo – Female	7.03 lakh	6.56 lakh	6.05 lakh	–14%	↓
Sheep	9.01 lakh	8.05 lakh	7.91 lakh	–12%	↓
Goats	12.41 lakh	11.19 lakh	11.08 lakh	–11%	↓
Equines (Horse, Mule, Donkey)	0.39 lakh	0.46 lakh	0.34 lakh	–13%	↓
Yaks	1,705	2,921	1,940	+14%	slight ↑ (fluctuating)
Poultry	8.09 lakh	11.04 lakh	13.42 lakh	+66%	↑↑

Factors driving the shifting trends

a. Structural Shift in Cattle Composition

- The indigenous cattle population has nearly halved in 12 years, reflecting declining interest in low-yielding breeds.
- In contrast, crossbred cows increased significantly (+47%), showing the success of breed improvement and AI programmes, and a shift toward dairy-oriented farming.
- However, the decline in crossbred bulls signals mechanisation and reduced use of animals for draught power, especially in apple-growing and irrigated belts.

b. Rise of Poultry and Micro-Livestock

- Poultry increased by two-thirds (66%) between 2007 and 2019 — the fastest-growing subsector. This reflects growing market orientation, urban demand for eggs/meat, and government support for backyard poultry and layer farming. Poultry offers quick income turnover and fits women's microenterprise models, especially under NRLM and NABARD-linked schemes.

c. Declining Male Animal Population

Across species, male populations (bulls, buffalo males, equines) show sharper decline than females. This points to:

- Reduced dependence on draught power.
- Selective retention of females for productive (milk) value.
- Increasing use of AI and mechanical farming instead of breeding bulls.

Himachal's livestock sector is transitioning from traditional large-animal husbandry to market-oriented small livestock and poultry systems. The last decade shows Himachal Pradesh's livestock sector evolving from subsistence-oriented, mixed herding systems toward specialised dairy and poultry-based livelihoods, shaped by mechanisation, access to larger market, changing aspirations, and shrinking pastures.

State Policies in the Sector

The Animal Husbandry (AH) sector is central to rural livelihoods in Himachal Pradesh, supporting dairy, meat, wool, backyard poultry, yak-based systems, and pastoralism. It plays a significant role in income diversification, women's empowerment, and climate resilience. The State's AH policies focus on breed improvement, health services, fodder development, processing, and market support.

1. Breed Improvement & Production Policies

- Expansion of Artificial Insemination (AI) and door-to-door breeding services.
- Promotion of indigenous and high-yield breeds (Sahiwal, Gir; high-yield buffaloes).
- Strengthening state sheep & goat breeding farms (Garsa, Kaza, Kangra).
- Genetic improvement programs for Gaddi, Chegu, Pashmina, and traditional pastoral livestock.

2. Dairy Development Policies

- State Dairy Development Programme: modern milk chilling units, BMCs, and cooperative strengthening through Milkfed.
- Incentives for clean milk production, cattle shed improvement, and feed/fodder supplementation.
- Convergence with Rashtriya Gokul Mission and National Dairy Plan for genetic enhancement.

3. Veterinary Health & Disease Control

- Free state-wide vaccination for FMD, HS, BQ, ET, PPR under a universal immunization policy.
- Up-gradation of veterinary hospitals, dispensaries, mobile health units, and diagnostic labs.
- Livestock Insurance Scheme with subsidized premiums for cattle, buffalo, yak, sheep, goats, and equines.
- Emergency response: mobile vet teams, fodder camps, and relief in snowbound and disaster-hit areas.

4. Fodder & Pasture Development

- Expansion of fodder cultivation, seed distribution, silage pits, and chaff cutters.
- Pasture development and silvi-pasture on community lands in convergence with Forest Dept.
- Winter fodder security policies for tribal districts (Lahaul-Spiti, Kinnaur).

5. Poultry, Sheep, Goat & Rabbitry Promotion

- Backyard poultry units with hardy breeds (Vanaraja, Grampriya) targeted at women & landless households.
- Support for commercial poultry with housing, equipment, and biosecurity.
- Strengthening of rabbitry (Angora wool) in cold regions.
- Cluster support for sheep/goat rearing, including health camps and infrastructure for pastoralists.

6. Yak, Equines & High-Altitude Livestock

- Breeding programmes for yak in high-altitude areas (Kibber, Kaza, Kinnaur).
- Veterinary and feed support for mules, ponies, pack animals used in orchard and tourism logistics.
- Special winter stocking and migratory route protection for pastoralists.

7. Value Chain, Processing & Marketing Policies

- Assistance for mini-dairies, paneer/curd units, milk collection centres, and chilling infrastructure.
- Strengthening of wool procurement & grading centres.
- Promotion of livestock-based entrepreneurship through Agriculture Infrastructure Fund (AIF) and RKVY.

8. Credit, Subsidy & Welfare Policies

- Universal access to Kisan Credit Card (KCC) for livestock farmers.
- Subsidies under National Livestock Mission (NLM), NABARD schemes, and AH&DD GoI programmes.
- Special assistance for SC/ST, women, BPL households, and disaster-affected farmers.

9. New & Emerging Policy Directions

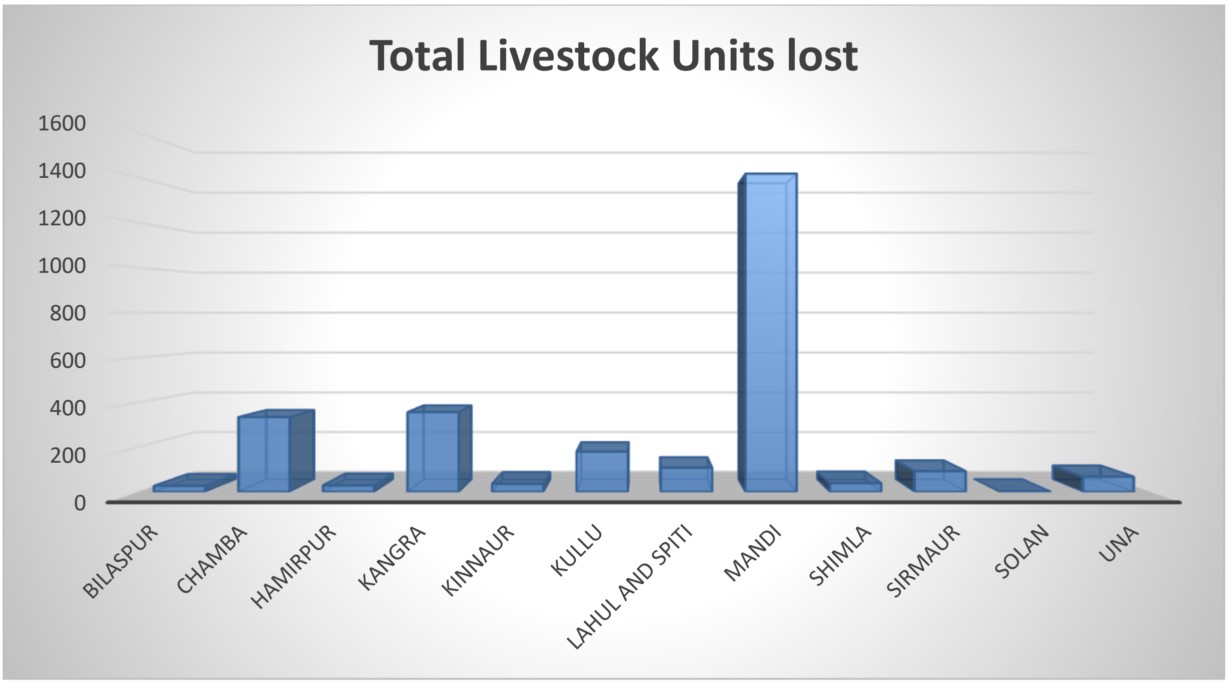
- Digitalization of veterinary services and tele-veterinary advisory.
- Expansion of climate-resilient livestock and heat-tolerant breeds.
- Strengthened disease surveillance and cold-chain for vaccines.
- Promotion of value-added dairy products (cheese, flavoured milk, probiotic lines).
- Tribal livestock cluster development.

Impact of Floods and landslides of 2025

Number of Livestock Lost as per KOBO

District	Yak	Pigs	Cows	Bulls	Goats	Buffaloes	Sheep	Hens	Total Units
Bilaspur	1	4	7	2	8	5	0	0	27
Chamba	0	0	9	0	237	3	86	0	335
Hamirpur	0	0	11	1	1	16	0	0	29
Kangra	0	0	67	4	170	20	96	0	357

Kinnaur	0	0	12	0	9	0	15	0	36
Kullu	0	0	25	2	117	14	22	0	180
Lahaul and Spiti	0	0	50	0	18	0	40	0	108
Mandi	8	0	192	16	333	13	103	751	1416
Shimla	0	0	30	2	2	2	2	1	39
Sirmaur	5	0	38	10	34	5	1	0	93
Solan	0	0	1	0	0	1	0	0	2
Una	0	0	3	10	25	2	20	8	68
State Total	**14**	**4**	**445**	**47**	**954**	**81**	**385**	**760**	**2690**



The largest number of livestock units lost have been in Mandi, Kangra, Chamba and Kullu, the most affected districts.

Economic Impact of Damages

Process adopted for calculating damages and losses

a) The data of livestock and poultry lost have been collected through KOBO as a separate exercise, other than the DMIS

b) Damages are based on the approved rates of livestock and its products for the year 2025 – 26

c) Although there has been damages to cattle-sheds, they have been included under the purview of the Housing Sector

d) Damages to infrastructure have been based on the estimates provided in the data collected through DMIS

Unit Cost	27000	10000	18220	15000	3000	20000	10000	300	
District	**Yak**	**Pigs**	**Cows**	**Bulls**	**Goats**	**Buffaloes**	**Sheep**	**Hens**	**Total Damages Rs. Lakhs**
Bilaspur	0.27	0.40	1.28	0.30	0.24	1.00	0.00	0.00	3.49
Chamba	0.00	0.00	1.64	0.00	7.11	0.60	8.60	0.00	17.95
Hamirpur	0.00	0.00	2.00	0.15	0.03	3.20	0.00	0.00	5.38
Kangra	0.00	0.00	12.21	0.60	5.10	4.00	9.60	0.00	31.51
Kinnaur	0.00	0.00	2.19	0.00	0.27	0.00	1.50	0.00	3.96
Kullu	0.00	0.00	4.56	0.30	3.51	2.80	2.20	0.00	13.37
Lahul and Spiti	0.00	0.00	9.11	0.00	0.54	0.00	4.00	0.00	13.65
Mandi	2.16	0.00	34.98	2.40	9.99	2.60	10.30	2.25	64.69
Shimla	0.00	0.00	5.47	0.30	0.06	0.40	0.20	0.00	6.43
Sirmaur	1.35	0.00	6.92	1.50	1.02	1.00	0.10	0.00	11.89
Solan	0.00	0.00	0.18	0.00	0.00	0.20	0.00	0.00	0.38
Una	0.00	0.00	0.55	1.50	0.75	0.40	2.00	0.02	5.22
State Total	3.78	0.40	81.08	7.05	28.62	16.20	38.50	2.28	177.91

Damages to Infrastructure

Level of Damage	No of Units	Damage (Rs. Lakhs)
Minor Damages	8	16.3
Major Damages	14	110
Totally Damaged	3	57
Total Damages	**25**	**183.3**

The minor damages reported are largely the loss of parts of the retaining walls. The major damages reported are damages to the buildings which render it inhabitable till major repair works are undertaken. The totally damaged buildings are inhabitable and require complete rebuilding.

A matter of concern is that all 14 units reporting major damages and 3 units reporting total damage are also reporting land subsidence or washing away of the soil under the building foundation, terming the land “risky”. Under such circumstances, -there needs to be a case-to-case assessment to recommend either in-situ reconstruction or relocation. In the eventuality of relocation, there will be the incremental costs of land to be acquired, which has not been computed.

Total Damages computed

Total Damages	Units	Damages in Rs. Lakhs
Loss of Livestock	2690	177.91
Partial damages Infrastructure	8	16.3

Severe Damages to Infrastructure	14	110
Totally Damaged Infrastructure	3	57
Total Damages (Rs. Lakhs)	**2715**	**361.21**

The total damages estimated is Rs. 361.21 lakhs which includes the loss of livestock and the damages to state owned infrastructure.

Losses (Loss of revenue):
Losses have been computed based on the following aspects:

- Loss of income from milk has been estimated for 2/3rds of the livestock population based on the fact that they would not all have been in their lactating period.
- Taking into consideration the inter-calving period, the lactation cycle per cow/ buffalo has been taken at 300 days in a year, based on discussions with officials from AHD.
- Loss of income from eggs is based on the unit cost of eggs averaged across the summer and winter costs recommended by the Approved Rates
- Loss of income from Poultry meat has been based on all heads being culled at the end of their productive period. The rates of poultry meat is based on the approved rates
- Sale for kids is based on an average of two kids per year per goat. The rate of kids is based on approved rates.
- Economic value of sheep in the state is significantly tied to wool as well as to the animals themselves. Hence sale of sheep kids has not been computed.

Losses in Livestock rearing in Rs. Lakhs	
Loss of Income from milk (Rs. Lakhs) Cows	242.3025
Loss of Income from milk (Rs. Lakhs) Buffaloes	25.5915
Loss of Income from eggs (Rs. Lakhs)	22.192
Loss of income from Sale of poultry meat	1.368
Loss of income from Sale of kids @ 2/ year	4.86
Total Losses	**296.314**

The total losses to the animal husbandry sector is Rs 296.314 Lakhs

Consolidation of Damages and Losses

Statement of Damages & Losses	
Damages	
Loss of Livestock	177.91
Damages Infrastructure	183.3
Total Damages	**361.21**
Losses	
Loss of Income from milk(Rs. Lakhs) Cows	242.30

Loss of Income from milk(Rs. Lakhs) Buffaloes	44.10
Loss of Income from eggs(Rs. Lakhs)	22.19
Loss of income from Sale of poultry meat	1.37
Loss of income from Sale of kids @ 2/ year	4.86
Total Losses	**314.83**
Total of Damages and Losses	**676.04**

The total Damages and losses suffered in the sector is Rs 676.04 lakhs.

Socio- economic Impacts of recurrent disasters

Trend	Likely Disaster Link	Socio-Economic Implication
Decline in Indigenous Cattle (–45% to –53%)	• Grazing areas frequently damaged by landslides, reduced fodder availability, disease outbreaks after floods.	• Marginal farmers lose traditional risk-buffer animals. • Farmers with small landholdings suffer disproportionate livestock losses, since animals are both assets and sources of livelihood security. • Dependence shifts to fewer, higher-yielding (but less hardy) crossbreds.
Rise in Crossbred Cows (+47%)	• Improved productivity but higher sensitivity to stress, heat, and disease.	• Recovery costlier for farmers.
Decline in Equines (–13%)	• Roads damaged, tourism disrupted; transport animals lose economic purpose.	• Households that depended on mule/pony services (e.g., in Kullu, Chamba, Kinnaur) lose income.
Rise in Poultry (+66%)	• Short lifecycle makes it easier to recover losses	• Poultry is more resilient to economic shocks

Reconstruction and Recovery Needs

The livestock sector in Himachal Pradesh has undergone both structural transformation and climate-linked disruption over the past decade. Recurrent floods, landslides, and extreme weather events between 2013 – 2025 have caused severe damage to animal assets, shelters, and fodder systems, compounding longer-term declines seen in livestock census trends.

Given the importance of the Animal Husbandry Sector as a key driver in the economy of the state, it is essential that the recovery needs are aimed at building resilience of the sector as a whole, while also activating a targeted approach in revitalising the economic aspects impacts of the current disaster of 2025.

Reconstruction and Recovery Costs

Sl. No	Activity	Assumptions	Rs. In Lakhs
1	Rapid Restocking	Replacement of lost animals as per NABARD norms	250.00
2	Interim Livelihood support	Interim Livelihood calculated at 10% of the total losses and estimating 600 nos. of impacted people. To be paid on a monthly or six monthly basis for a period of 1 year	213.49
	Cattle Feed Kit for most vulnerable (600 nos.)	To support livestock till the farmers / cattle rearers recover income earning capacity. Rs 100/day for 3 kg Feed for 365 days	219.00
	Feed Kit for Small Ruminants (1500 nos.)	To support farmers / goat/sheep rearers recover income earning capacity. Rs 400/day for 365 days	164.25
	Feed Kit for Poultry for most vulnerable (500 nos)	As State is promoting LIT, there is no need for additional feed	0.00
3	Disaster resilient Animal Housing	Covered under Housing Sector	0.00
4	Repairs and Reconstruction of damaged Govt. Buildings	Including Relocation / land cost	200.00
5	Livestock Insurance and Risk Pooling	Insurance of all new units to be borne by govt @ Rs. 100 per unit	3.00
6	Setting up of decentralised Fodder Cultivation Units	5 Units @ 50,000/unit	2.50
7	Adopting Cluster based approach to Dairying	5 Clusters @ 5 lakhs per cluster	25.00
8	Setting up of Bulk Milk Chillers at Cluster levels	5 Units at Rs 25 lakhs/ unit as per NABARD Costs (including Building)	125.00
9	Setting up a Multi- utility Cold storage facility for Horticultural produce and meat, eggs, milk products	Setting up 5000 MT Cold Storage facility under MIDH with 50% subsidy for hilly regions	400.00
	Total		**1602.24**

The total Reconstruction and Recovery Costs is estimated at Rs. 1602.24 lakhs

The immediate thrust under this sector will be the recovery of livelihoods through restocking and repairs/ reconstruction of damaged office buildings/ veterinary centres/ veterinary hospitals and cattle-sheds.

The livestock farmers would also have taken working capital loans from the banks. There is a need to take a compassionate view on the repayment of these loans. While the SLBC has initiated their response in deciding to provide a moratorium period of six months, the interest payment for this period is not waived. There is a need to develop a win-win formula which can be reached if the interest amount for this period is paid through the SDMA. However, this has not been computed under the recovery needs.

Given the fact that dairying is moving from a subsistence level livelihood to a commercial approach, the Animal Husbandry Department can develop packages that promote such approaches that can optimise capital and operating expenses through establishing an economy of scale. The most feasible method to developing this economy of scale in cattle rearing will be by promoting cluster based approaches with cattle sheds and all other amenities geared for more number of animals. This reduces the financial pressure on individual farmers.

As a part of developing a cluster approach and to ensure minimal losses during any interruptions due to natural disasters, there is a need to promote milk storage facilities, like bulk milk chillers, at cluster levels/ decentralised milk aggregation points. This can be done in collaboration with the Milk Federation.

Damages to roads and transportation facilities had led to a break in procurement of milk, eggs and meat products for more than two months, thereby leading to a complete loss in income of people depending solely on these. The extreme fragility of these products is a challenge. In order to minimise such losses, It is recommended that Multi-utility Cold Storage facilities be set up that can cater to the requirement of the farmers dealing with milk, meat, eggs and horticultural products. Being a hilly state, Himachal Pradesh can get up to 50% subsidy under the MIDH scheme.

The operating costs of the bulk milk chillers and cold storage can be partially met through utilising renewable energy resources, which are also assessable with attractive subsidies from the Central Government

Framework for Action

Short term (0–12 months) — Emergency resilience & rapid recovery	Activity	Departments Involved
Liaising with Banks to redesign loan repayment by livestock farmers	There is an urgent requirement to engage with Banks for a farmer- friendly loan repayment package which not only looks at a moratorium period but also offers interest relief for the moratorium period. This amount can also be considered under the Recovery Needs	DAHD, SLBC, SDMA
Rapid veterinary & rescue teams	Set Up and deploy mobile veterinary units for vaccination and emergency treatment in disaster-hit pockets	State AHD mobile units & DAHD support

Temporary fodder banks & emergency feed distribution	Create district-level emergency fodder stockpiles (silage/hay blocks) and distribute via Gram Panchayats. Link MGNREGS for packing and stacking	State AHD, RD, Dairying
Livestock shelter repairs/ retrofits	Provide small grants for raising/fortifying animal sheds (elevated pads, simple drainage) so animals survive flash floods/landslides.	State AHD, RD, Dairying
Rapid restocking / small grants	Provide conditional small grants/credit for replacement of lost productive females for the most vulnerable households (target marginal & small farmers, women headed households)	SDMA, State AHD, RD, Dairying
Insurance enrolment push	Run an accelerated enrolment drive into the National Livestock Insurance arrangements with FPO/SHG intermediaries so more households get quick claim cover. Simplify enrolment at block level	NLM, DAHD

Medium Term 1 – 2 years	Activity	Departments Involved
Fodder & pasture rehabilitation programme	Establish community fodder banks, silage units, and silvi-pasture demonstration plots in degraded commons; finance via NLM fodder components and MGNREGS implementation.	DAHD, Dairying, RD
Strengthen breed strategy: conservation + productivity	Use Rashtriya Gokul Mission / RGM (and related DAHD schemes) to conserve hardy indigenous breeds while continuing targeted cross-breeding for productivity in safer zones.	DAHD, Dairying, RD
Promote Cluster Based Approach on lines of FPS	Use FPO strategy to develop a cost-effective cluster approach for management of milch cattle	DAHD, Dairying, NABARD
Set up Bulk Milk Chilling Units at Cluster level	Use FPO approach/ grant-based approach/ Yantrikaran yojana for setting up Bulk Milk Chillers at Cluster level	NLM, DAHD, MilkFed, NABARD
Poultry & small ruminant cluster development	Form women-led SHG/FPO clusters for backyard & small hardy poultry, goat fattening, with assured input credit and aggregation for markets with NLM entrepreneurship & NABARD support	NLM, DAHD, NABARD

Long Term 3 – 5 years	Activity	Departments Involved
Cold Chain/ Cold Storage Units	Set up 5000 MT single unit or multiple decentralised cold stores under the MIDH scheme for providing safe storage facilities for fragile dairy, poultry and horticultural products. There are modular prefabricated facilities that can be explored	MIDH, DAHD, Dept of Horticulture
Insurance + financial	Institutionalise subsidised livestock insurance with staggered state co-financing for the most vulnerable; promote index-linked and parametric products for fast	DAHD, Insurance Companies

resilience instruments	pay outs. Embed restocking loans in post-disaster financing	
Knowledge systems & youth engagement	Long horizon investments in veterinary colleges, community breeding centres, skills training for youth in animal-product enterprises and climate-smart husbandry. Promote agri-tourism and niche products (hill breed cheese, yak wool) to retain culture and income	DAHD, RD, NLM, SLRM, NABARD, Dept of Tourism, Private sector partners

Socio-Economic Impact of the Animal Husbandry Recovery Plan

The Animal Husbandry Recovery Plan for Himachal Pradesh is expected to generate significant socio-economic benefits by restoring household livelihoods, strengthening local value chains, and building long-term resilience in a sector that supports a large share of rural families.

The plan directly stabilises incomes for disaster-affected households through rapid restocking, interim livelihood support, and feed assistance. These measures protect the asset base of small and marginal farmers—particularly women, landless households, and tribal livestock keepers—who rely on dairy, goats, sheep, and backyard poultry as their primary source of daily cash income.

Medium-term investments in fodder units, pasture rehabilitation, and cluster-based dairying help revive milk, meat, egg, and wool supply chains. The establishment of Bulk Milk Chilling units and women-led poultry and small-ruminant clusters boosts local market activity and increases price realisation, strengthening rural enterprise and employment.

Long-term interventions—including cold-chain expansion, strengthened insurance coverage, and improved veterinary infrastructure—reduce vulnerability to recurrent floods, landslides, and market disruptions. These measures improve climate resilience of hill livestock systems while supporting higher productivity and diversification within the sector.

Overall, the recovery plan not only restores lost assets but catalyses a more resilient and economically vibrant livestock economy. It enhances household income security, supports women's economic participation, improves food systems, and strengthens the sector's contribution to the state's GSVA, positioning the livestock sub-sector for sustained and inclusive rural growth.

10.4 Fisheries and Aquaculture

Fishery is a crucial sub-sector within the primary sector of the State Economy. The government has given priority to the promotion of pisciculture, and to facilitate this, the State has introduced Himachal Pradesh Fisheries Rules 2020. The region is blessed with abundant river water, trout waters, and reservoirs, providing rich potential for fishery resources.

The State aims to significantly increase fish production through capture, culture, and culture-based capture fisheries. This expansion is intended to meet the demands of both the domestic and export markets. In addition to boosting the economy, the development of the fisheries sector is expected to create employment and income-generating opportunities particularly for the rural poor, women, and youth.

Economically significant fish species thrive in the reservoirs of dams like Gobind Sagar, Pong, Chamera, and Ranjeet Sagar. These reservoirs have become valuable assets for the local populace. The success of the fisheries sector in these areas not only contributes to the economic well- being of the community but also showcases the potential for sustainable and profitable cold-water fish farming.

About 6,310 fishermen in the State depend directly on reservoir fisheries for their livelihood. During FY2024-25, up to December, 2024, cumulative fish production was 12,637.12 MT valued at ₹197.10 crore.

Total Fish Production (MT Tonnes) and Value of Fish (in lakh)

Year	Total Production (In Tonnes)	Growth Rate	Value of Fish Produced	Growth Rate
2012-13	8560.89	-	5818.13	-
2013-14	9834.14	14.90	8057.79	38.5
2014-15	10736.11	**9.2**	9737.31	**20.8**
2015-16	11798.72	9.9	10980.92	**12.8**
2016-17	12506.85	**6.0**	12121.19	**10.4**
2017-18	12765.36	**2.1**	**15822.45**	**30.5**
2018-19	13401.68	**5.0**	17157.31	**8.4**
2019-20	14020.14	**4.6**	18443.92	**7.5**
2020-21	15288.60	**9.0**	20161.09	**9.3**
2021-22	16015.81	**4.8**	23355.82	**15.8**
2022-23	17026.91	**7.0**	24990.72	**7.0**
2023-24	17721.64	**4.08**	27323.87	**-28.1**
2024-25 (Till December)	12637.12	**-28.6**	**19710.41**	**-27.8**
CAGR	**3.3**		**10.7**	

Source: Department of Fisheries, Government of Himachal Pradesh

There has been significant rise in total fish production in Himachal Pradesh in the last decade. Fish production more than doubled between 2012-13 and 2023-24. The overall fish production increased from 8,560.89 MT in 2012 -13 to 17,721.64 MT in 2023 -24 and expected to reach 18,957.23 during FY2024-25. The value of the production also increased from ₹5,818.13 lakh from 2012-13 to 27,323.87 lakh in 2023-24.

Trout Fish Production (MT Tonnes) and Value of trout Fish (₹in lakh)

Year	Total Production (in tonnes)	Growth	Revenue from Fish Farms	Growth
2012-13	**19.18**	-	**98.48**	-
2013-14	**13.91**	**-28.0**	**114.41**	**16.2**

2014-15	**17.07**	**23.6**	**114.66**	**0.2**
2015-16	**17.63**	**3.3**	**120.3**	**5.5**
2016-17	**18.78**	**6.5**	**141.35**	**16.9**
2017-18	**10.82**	**-45.0**	**129.75**	**-8.2**
2018-19	**8.34**	**-19.2**	**118.22**	**-8.9**
2019-20	**7.71**	**-7.6**	**91.16**	**-22.9**
2020-21	**6.73**	**-12.7**	**101.72**	**11.6**
2021-22	**13.68**	**103.3**	**169.24**	**66.4**
2022-23	**6.33**	**-53.7**	**89.74**	**-46.9**
2023-24	**7.72**	**21.9**	**57.57**	**-35.8**
2024-25 (up to Dec. 2024)	**13.56**	**75.6**	138.66	**140.9**

Source: Department of Fisheries, Government of Himachal Pradesh

Fisheries, in general, is steadily expanding and maturing while Trout fisheries seem to be crisis-prone and highly climate-sensitive**.** While the overall fisheries sector in Himachal Pradesh demonstrates steady growth and increasing economic value, trout fisheries exhibit extreme volatility with repeated cycles of collapse and recovery. Trout production is highly sensitive to environmental and climatic factors, and its revenue stream remains unpredictable. This structural instability necessitates a differentiated policy approach where general fisheries can focus on expansion and market strengthening, whereas trout fisheries must prioritise climate resilience, infrastructure protection, and risk mitigation systems.

The sector is therefore transitioning from a growth-driven phase to one where resilience, risk mitigation and climate-adaptive strategies will determine sustainability.

10.4.1 Policy Frameworks of Fisheries Sector

1. Himachal Pradesh Fisheries Act, 1976

- This Act lays the foundation for regulation of inland fisheries in the state—covering licensing, prohibition of destructive fishing methods, protection of waters, etc.
- Significance: Gives the State legal authority to regulate fisheries, including private and public waters.

2. Himachal Pradesh Fisheries Rules, 2020

- These rules were made under the Act, and define waters (general waters vs. trout waters), licensing of fishing, declaration of "private waters", etc.
- Significance: Provides operational mechanisms for fisheries governance in the state—licensing, water body classification, enforcement.

3. National Policy Reference – National Fisheries Policy 2020 (Draft)

- Though a national-level policy, it is relevant for Himachal as it emphasises cold-water fisheries and mentions trout farming in high-altitude states like Himachal.
- Significance: When state policy aligns with national policy, it helps with central scheme convergence (subsidy, seed/fry, value chain support).

10.4.2 Impact of Floods 2025 on Fisheries

The floods of 2025 caused severe stock losses across trout and carp farms in several districts of Himachal Pradesh, resulting in a total estimated fish loss of 224,801.23 kg, valued at ₹1,134.08 lakh. The most significant damage occurred in trout culture units, which were heavily impacted due to their location along vulnerable river stretches and the high intensity of floodwaters. With a market rate of ₹600 per kg, trout accounted for the largest share of financial loss. Kullu district recorded the most extensive damage, losing 142,281.64 kg of trout valued at ₹853.69 lakh, reflecting near-total washout of stock from both government and private raceways. Substantial losses were also reported from Mandi (₹126.65 lakh), Chamba (₹32.06 lakh), Sirmour (₹47.70 lakh), and Kangra (₹2.40 lakh), indicating widespread disruption across the State's key cold-water aquaculture zones.

Loss of Fish Stock

Fish	District	Quantity lost in Kg	Per Kg rate	Estimated loss (in Lakhs)
Trout	Chamba	5343.05	600	32.06
	Kangra	400	600	2.40
	Kullu	142281.64	600	853.69
	Mandi	21107.62	600	126.65
	Sirmour	7950	600	47.70
Others	Chamba	856.92	150	1.29
	Mandi	63	150	0.09
Carps	Chamba	5509	150	8.26
	Kangra	18840	150	28.26
	Una	22450	150	33.68
Grand Total		224801.23		1134.08

Losses from carp culture, though relatively smaller in financial terms due to a lower per-kg value (₹150), still affected marginal fish farmers in Chamba, Kangra and Una, totalling 46799 kg and causing a loss of ₹70.20 lakh. In addition, the category labelled "Other fish species"—representing mixed-stock culture and local varieties—incurred significant losses of ₹1.38 lakh, primarily in Mandi and Chamba, where floods breached pond embankments and flushed stock downstream. These losses are particularly critical for small and household-level fish producers who depend on seasonal fish harvests as an important supplementary income source.

Damages to Infrastructure

Infrastructure	District	Totally damaged	Partially Damaged	Estimated loss (in lakh)
Ponds	Chamba	16	0	10.79
	Kangra	3	5	5.35
	Mandi	0	3	0.75
	Una	1	9	25.14
Farms	Mandi	27	35	272.73
Other Physical Assets	Chamba	24	1	135.42
	Kangra	2	2	5.50
	Kullu	31		378.22
	Mandi	10	5	5.46
	Sirmour	6		19.50
Grand Total		120	60	858.860

The floods caused significant structural and physical damage to fisheries infrastructure across multiple districts of Himachal Pradesh. A total of 120 assets were fully damaged and 60 partially damaged, reflecting widespread destruction of ponds, farms, and associated physical facilities essential for fish production. The most severely impacted component was fish farms, particularly in Mandi district, where 27 farms were totally damaged and 35 partially damaged, resulting in an estimated loss of ₹272.73 lakh. This indicates substantial disruption of trout and carp rearing operations, including the collapse of raceways, loss of water channels, and damage to farm buildings. Similarly, earthen and masonry ponds experienced severe structural breaches, with Chamba (16 ponds) and Una (10 ponds) reporting major losses, together accounting for over ₹35.93 lakh in damages. Partial pond failures in Kangra and Mandi further affected production cycles due to siltation, embankment erosion, and water leakage.

Significant losses were also recorded under other physical assets, including feed storage units, pumps, pipelines, solar aeration systems, and small buildings. Kullu district reported the highest loss in this category, amounting to ₹378.22 lakh, reflecting extensive destruction of trout farm infrastructure located along flood-affected streams. Chamba also faced major infrastructure impacts, incurring losses of ₹135.42 lakh, followed by Sirmour with ₹19.50 lakh. The combined physical damage across districts highlights the vulnerability of cold-water aquaculture infrastructure to flash floods and landslides

The reported figures reflect a cumulative infrastructure loss of ₹858.860 lakh, highlighting the scale of structural damage sustained across the fisheries sector. The destruction of ponds, raceways, intake channels, farm buildings, and essential equipment has significantly reduced the operational capacity of both government-run and private aquaculture units. This widespread damage points to an immediate requirement for systematic reconstruction and technical rehabilitation to restore production cycles. In this context, programme support under PMMSY and relevant State fisheries schemes will be critical for enabling the repair of infrastructure, rebuilding water supply systems, replenishing damaged assets, and facilitating the resumption of aquaculture activities in the affected districts.

Total Damages and Losses

Description	Rs. In Lakhs
Damages	858.86
Losses	1134.08
Total	**1992.94**

The total damages and losses for the fisheries sector is computed at Rs. 1992.94 lakhs. The losses is based on the loss of income for a year. Immediate repairs to the infrastructure and restocking with fingerlings will support recovery without the loss of an additional season.

Recovery Needs

Carp and Trout Cultivation Cycle

Species	Time to Saleable Size	Typical Sale Size	Production Cycle
Trout	10–12 months	250–300 g	Longer, temperature-sensitive
Carp	6–8 months	600–800 g	Faster, more resilient

Implications for Fisheries Planning in HP

- Trout:
  - Slower growth → higher risk exposure to floods, disease, climate shifts
  - Requires long-term planning and stable infrastructure
- Carp:
  - Faster turnover → better for quick recovery post-disaster
  - More suitable for livelihood stabilisation programmes

Policy Implications: Trout farming in Himachal typically requires 10–12 months for fingerlings to reach marketable size, making it a high-value but high-risk enterprise vulnerable to climatic shocks. In contrast, carp species attain harvestable size within 6–8 months, offering a quicker production cycle and greater resilience for livelihood recovery programmes.

The recovery plan for fisheries in Himachal Pradesh must go beyond one-time compensation and aim at three parallel goals: (1) rapid restoration of ponds, raceways and hatcheries, (2) quick livelihood recovery through fast-growing carp and improved market systems, and (3) deep structural resilience for trout and other climate-sensitive systems. By phasing interventions over 0–6 months, 6–24 months, and 2–5 years — and converging PMMSY, MGNREGA, NABARD, KCC, tourism and watershed schemes — Himachal can stabilise current losses and build a fisheries sector capable of withstanding future climate and disaster shocks.

10.4.3 Recovery Plan

Sector Recovery	Implementation Timeline	Estimated Recovery Cost (₹ Crore)
Physical Infrastructure Recovery	Short–Medium Term (0–18 months)	₹ 10.00
Biological and Production Recovery	Short–Medium Term (0–12 months)	₹ 2.00
Livelihood and Social Protection	Short-Term (0–6 months)	₹ 2.00
Institutional and Capacity Strengthening	Medium-Term (6–18 months)	₹ 1.00
Environmental and Water Quality Management	Short–Medium Term (0–12 months)	₹ 1.00
Long-Term Resilience and Sustainability	Long-Term (1–3 years)	₹ 1.00
Total		**₹ 17.00**

The Financial layout required for recovery of the Fisheries Sector is estimated at Rs.17 Crores

Detailed Recovery Plan

The Detailed Recovery plan and the means of convergence is as shown in the table below:

Recovery Sector	Key Recovery and Reconstruction Activities	Implementation Timeline	Relevant Fisheries Schemes	Estimated Recovery Cost (₹ Crore)
Physical Infrastructure Recovery	• Desiltation and debris removal from ponds, tanks, and raceways. • Repair and strengthening of embankments, inlets/outlets, and raceway walls. • Reconstruction of damaged hatcheries and nursery units (Trout & Carp). • Rehabilitation of feed mills, storage, and seed production facilities. • Construction of	Short–Medium Term (0–18 months)	PMMSY – Pradhan Mantri Matsya Sampada Yojana (Infrastructure Development Component) MMCMPY – Mukhya Mantri Carp Matsya PalanYojana (State Pond Scheme)	₹10.0 crore

	flood-resilient and raised pond structures in high-risk areas.			
Biological and Production Recovery	• Restocking of fish seed and feed support to affected farmers. • Establishment of temporary nurseries and broodstock units. • Supply of disease-free and fast-growing fish seed. • Restoration of state seed farms and nursery production systems.	Short–Medium Term (0–12 months)	PMMSY (Fish Seed Production & Aquaculture Development Component) MMCMPY – Mukhya Mantri Carp Matsya PalanYojana (Seed Multiplication and Input Supply Component)	₹2.0 crore
Livelihood and Social Protection	• Compensation for loss of fish stock, craft, and gear. • Fast-track insurance claim settlements. • Input and working capital support. • Short-term employment for pond and raceway repair.	Short-Term (0–6 months)	PMMSY (Insurance & Livelihood Support Components) State Risk Fund Scheme (50% compensation for gear and craft loss) Livelihood & Nutritional Support for Fishers (PMMSY Sub-scheme)	₹2.0 crore
Institutional and Capacity Strengthening	• Training of fish farmers on resilient aquaculture and pond engineering. • Development of SOPs for post-disaster aquaculture response.	Medium-Term (6–18 months)	PMMSY (Capacity Building & Training Component)	₹1.0 crore
Environmental and Water Quality Management	• Use of lime and bio-remediation for pond health restoration. • Safe disposal of dead stock to prevent contamination	Short–Medium Term (0–12 months)	PMMSY	₹1.0 crore
Long-Term Resilience and Sustainability	• Development of climate-resilient hatcheries and raceways in cold-water regions. • Promotion of cage culture in reservoirs and community ponds. • Digital mapping of fish farms under AGRISTACK.	Long-Term (1–3 years)	PMMSY (Resilient Infrastructure & Digital Fisheries Components)	₹1.0 crore
Total				**Rs. 17 Cr**

The total financial outlay required for recovery in the fisheries sector is Rs. 17 Crores

The proposed recovery interventions for the fisheries sector place strong emphasis on restoring and strengthening the physical infrastructure that was extensively damaged during the 2025 floods. Key activities include desiltation and debris clearance from ponds, tanks, and trout raceways, which is essential for making these structures operational again. Given the widespread embankment breaches and structural failures observed across affected districts, the recovery plan prioritizes the repair and reinforcement of pond bunds, inlet and outlet systems, and raceway walls to ensure stability and reduce vulnerability to future high-flow events. The reconstruction of damaged hatcheries and nursery units—particularly for trout and carp—forms a critical component of the recovery effort, as the loss of seed production capacity has disrupted the entire aquaculture value chain. Rehabilitation of feed mills, storage buildings, and seed production facilities is also necessary to restore the supply of essential inputs for farmers.

In high-risk areas where repeated flooding or landslide exposure was observed, the recovery strategy includes the construction of flood-resilient and raised pond structures to reduce long-term risk. These interventions are aligned with the Pradhan Mantri Matsya Sampada Yojana (PMMSY), particularly its infrastructure development components, as well as the Mukhya Mantri Carp Matsya PalanYojana (MMCMPY), which supports carp fish pond construction at the State level. The overall estimated cost for implementing these physical infrastructure recovery measures is **₹10.0 crore**, which is indicative and subject to refinement once detailed technical assessments are completed by the Department of Fisheries.

Biological and Production Recovery

The biological and production recovery component focuses on restoring the core productive capacity of the fisheries sector, which was severely disrupted by the floods. A primary intervention is the restocking of fish seed—including trout, carp, and other locally cultured species—to enable affected farmers to restart their production cycles. This will be supported by the provision of fish feed and essential inputs, which many farmers lost completely due to inundation of storage units and raceway collapse. To bridge the immediate gap in seed availability, the recovery plan includes the establishment of temporary nurseries and broodstock holding units, ensuring continuity of seed supply until permanent hatchery infrastructure is fully rehabilitated. An emphasis has been placed on supplying disease-free, fast-growing seed varieties, critical for improving survival rates and accelerating production recovery following large-scale stock losses. Additionally, the restoration of state seed farms and nursery production systems is essential for reinstating long-term seed security and stabilizing the aquaculture value chain. These activities are well supported under the PMMSY Fish Seed Production and Aquaculture Development components, as well as the Mukhya Mantri Carp Matsya PalanYojana (MMCMPY), which facilitates seed multiplication and input delivery. The estimated cost for implementing these biological and production recovery measures is ₹2.0 crore, which remains indicative pending detailed assessments from the Fisheries Department.

Livelihood and Social Protection

The livelihood and social protection component of the fisheries recovery framework aims to stabilize and support fish-rearing households who experienced immediate income loss following the widespread washout of stock, damage to craft and gear, and disruption of production cycles. A critical early intervention is the compensation for loss of fish stock and essential equipment, particularly for small and marginal fish farmers who depend heavily on aquaculture as a primary or supplementary livelihood. The plan also emphasizes fast-track settlement of insurance claims, ensuring that farmers covered under PMMSY-linked insurance schemes receive timely financial relief to offset their sudden loss of income. To enable rapid resumption of aquaculture activities, the recovery strategy includes input assistance and working capital support, allowing farmers to meet immediate operational needs such as feed purchase, minor repair works, and procurement of basic equipment. In addition, short-term employment opportunities through pond desiltation and raceway repair will provide immediate wage support while simultaneously contributing to the physical restoration of aquaculture units. These measures are anchored in the PMMSY Insurance and Livelihood Support components, supplemented by the State Risk Fund Scheme, which offers 50% compensation for gear and craft losses, and the Livelihood & Nutritional Support for Fishers sub-scheme under PMMSY. The estimated cost for implementing these livelihood-focused interventions is ₹2.0 crore, subject to refinement upon detailed verification by the Fisheries Department.

Institutional and Capacity Strengthening

The institutional and capacity strengthening component aims to enhance the long-term resilience of the fisheries sector by equipping farmers and departmental staff with the skills and systems required to prevent, manage, and recover from future hydro-meteorological disasters. A key activity under this component is the training of fish farmers on resilient aquaculture practices, including improved pond engineering, safe raceway design, water management during extreme rainfall, and measures to prevent stock escape during floods. These trainings are intended to build the technical competency of farmers to adopt climate-resilient practices and reduce vulnerability to recurrent disasters. Complementing this, the recovery strategy also includes the development of Standard Operating Procedures (SOPs) for post-disaster aquaculture response, covering rapid assessment, emergency broodstock protection, water quality monitoring, temporary holding arrangements, and early restoration protocols. Strengthening institutional processes in this manner will enable the Fisheries Department to respond more effectively to future events and provide structured assistance to affected farmers. These activities align with the PMMSY Capacity Building and Training components. The estimated cost for implementing these institutional strengthening measures is ₹1.0 crore, to be refined after detailed planning and consultations with the concerned departments.

Environmental and Water Quality Management

The environmental and water quality management component focuses on restoring the ecological conditions necessary for safe and productive aquaculture following the extensive flood-induced contamination observed in affected districts. A priority intervention is the application of lime, probiotics, and other bio-remediation agents to neutralize acidic conditions, stabilize pH levels, and regenerate the biological health of ponds and raceways that were heavily silted and exposed to organic and inorganic pollutants during the floods. These treatments are essential for restoring dissolved oxygen levels, improving water clarity, and reactivating the natural microbial balance required for healthy fish growth. Equally important is the safe disposal of dead fish stock, which is critical for preventing secondary contamination, reducing disease risks, and maintaining water quality in adjoining water bodies. Improper disposal of dead stock after flood-induced mortality can lead to pathogen proliferation and long-term ecological degradation; therefore, structured protocols and supervised disposal mechanisms form an important part of the recovery plan. These interventions are fully aligned with the PMMSY provisions for environmental management which supports pond health restoration and water quality improvement measures. The indicative cost for implementing these environmental and water remediation activities is estimated at ₹1.0 crore, subject to refinement following detailed water quality assessments by the Fisheries Department.

Long-Term Resilience and Sustainability

The long-term resilience and sustainability component focuses on building a stronger, climate-adaptive fisheries sector that can withstand future hydro-meteorological shocks. A central priority is the development of climate-resilient hatcheries and raceways, particularly in cold-water regions where trout farming is highly vulnerable to flash floods, temperature fluctuations, and sediment inflows. These upgraded facilities will incorporate improved engineering designs, elevated structures, controlled water flow systems, and protective barriers that reduce the likelihood of stock loss during extreme events. In addition, the recovery framework promotes the expansion of cage culture in reservoirs and community ponds, enabling diversification of production systems and reducing dependency on land-based infrastructure that is more susceptible to landslides and flood damage. Cage culture also provides new livelihood opportunities for small-scale fishers and enhances resource use efficiency.

Another key intervention under this component is the digital mapping of fish farms, which will be integrated into the Digital Agriculture Mission through AGRISTACK. This will enable precise geo-tagging of aquaculture units, improve monitoring of risks, streamline insurance and compensation processes, and support evidence-based planning for future resilience investments. Together, these measures will contribute to a more adaptive, diversified, and technologically strengthened fisheries sector. The proposed interventions align with the PMMSY resilience and digital components, The indicative cost for implementing these long-term resilience measures is ₹1.0 crore, subject to refinement after detailed design and technical assessments.

Sectoral Policies

The fisheries sector in Himachal Pradesh is supported by a robust policy framework comprising both State and Central initiatives aimed at enhancing fish production, strengthening livelihoods, and improving aquaculture infrastructure. These policies provide the structural backbone for post-disaster recovery and offer multiple avenues for convergence with rehabilitation and resilience-building activities identified in the PDNA.

At the core of the sectoral policy environment is the Pradhan Mantri Matsya Sampada Yojana (PMMSY), the flagship national programme that promotes holistic fisheries development through investments in aquaculture infrastructure, cold-water fisheries, fish seed production, value-chain strengthening, capacity building, livelihood support, and insurance mechanisms. With projects worth ₹26.21 crore approved for FY 2024–25, PMMSY forms the primary vehicle for restoring damaged ponds, raceways, hatcheries, nurseries, seed farms, and processing facilities. Its dedicated components for insurance, livelihood protection, and environmental management directly support post-disaster restocking, compensation, and water quality restoration.

Complementing PMMSY is the State's Mukhya Mantri Carp Matsya Palan Yojana (MMCMPY), which focuses on strengthening State-run fish farms, improving seed production capacity, supporting pond renovation, and promoting trout farming in cold-water regions. The scheme plays a critical role in restoring damaged physical assets, reviving seed multiplication systems, and enabling farmers to restart aquaculture activities after the disaster. Together with the State's investment in carp and trout seed production centres, which produced over 33 lakh high-quality fingerlings valued at ₹56.88 lakh in 2024, these initiatives ensure a reliable foundation for biological recovery.

Livelihood protection is reinforced through Fisheries Insurance and Welfare Schemes, which provide accident insurance of ₹5 lakh and 50% compensation for the loss of nets, gear, and craft under the State Risk Fund. The Saving-cum-Relief Fund Scheme, now integrated under PMMSY's Livelihood and Nutritional Support programme, provides income support to socio-economically vulnerable fishers during the lean season. In 2024–25, this programme disbursed ₹1.60 crore to 3,553 traditional fishers, providing a critical safety net in the aftermath of the disaster.

The enabling environment is further strengthened through extension and training services, which deliver farmer capacity building, technical guidance, disease surveillance, and pond and raceway advisory support across districts. These institutional mechanisms will underpin recovery efforts that require specialized knowledge on resilient aquaculture practices, climate-adaptive farm design, and post-disaster water management.

Collectively, these sectoral policies establish a strong and comprehensive framework for post-disaster reconstruction. They enable convergence across infrastructure rehabilitation, biological restoration, livelihood recovery, environmental remediation, and long-term resilience planning. The alignment of these policy instruments with the PDNA's recovery strategy ensures that reconstruction is not only rapid and inclusive but also rooted in sustainable development and climate-resilient aquaculture practices.

Impact of Recovery

The implementation of the proposed fisheries recovery interventions is expected to generate significant socio-economic and sectoral benefits, contributing directly to the restoration of livelihoods, the revitalization of local economies, and the strengthening of long-term resilience. The rehabilitation of damaged ponds, raceways, hatcheries, and associated water infrastructure will enable the rapid reactivation of aquaculture systems across the affected districts. This, in turn, will help restore production capacity, reduce prolonged income disruptions for fish-dependent households, and re-establish local supply chains that were severely affected by the disaster.

The biological recovery measures—including restocking, establishment of temporary nurseries, and provision of feed and essential inputs—will accelerate the resumption of production cycles and mitigate the risk of livelihood erosion among small and marginal fish farmers. By ensuring timely access to quality seed and restoring broodstock systems, these interventions will help the State recover a substantial share of its pre-disaster trout and carp output within one to two cycles. Early recovery of biological production will also prevent further economic losses arising from market gaps, reduced household nutrition, and declining sectoral employment.

Livelihood and social protection measures will have a direct and immediate impact on vulnerable fishing communities. Compensation for stock loss, fast-track insurance settlements, and short-term employment opportunities in farm rehabilitation will reduce negative coping strategies, prevent indebtedness, and support a smoother transition to restored production. These interventions will also help safeguard the welfare of socio-economically marginalized fishers who rely heavily on aquaculture as a primary or supplemental income source.

Environmental restoration activities will enhance water quality, reduce disease risks, and create safer and more productive aquatic environments. These improvements will contribute to a more resilient aquaculture ecosystem, ensuring that production systems are less vulnerable to recurring shocks. Over the longer term, the development of climate-resilient hatcheries, flood-resistant raceways, and diversification into reservoir-based cage culture are expected to reduce systemic risk exposure and strengthen adaptive capacity across the sector.

Overall, the recovery programme is expected to restore and stabilize fisheries-based livelihoods, re-establish economic activity in affected districts, and strengthen the sector’s capacity to withstand future climate-induced shocks. Through the integration of reconstruction measures with long-term system improvements—and by aligning investments with PMMSY, Mukhya Mantri Carp Matsya PalanYojana (MMCMPY), and State welfare mechanisms—the recovery framework will support the transition toward a more sustainable, resilient, and economically viable fisheries sector in Himachal Pradesh.

10.5 Tourism

Tourism in Himachal Pradesh

Himachal Pradesh draws visitors from across the globe. Key attractions include Shimla the “Queen of Hills” Manali, Dharamshala, Dalhousie, Spiti Valley and the great Himalayan National Park, a UNESCO World Heritage Site. The State also has a rich treasure of places of pilgrimage and of Archaeological value. While Himachal Pradesh is famous for its Himalayan landscapes and popular hill stations, many outdoor activities such as rock climbing, mountain biking, paragliding, trekking, rafting, ice skating and heli-skiing are also popular tourist attractions in the state.

Tourism is fast growing, contributing a large share to the income of the State. This boom in tourism has increased the number of hotels and resorts in Himachal Pradesh boosting economy of the State.

Sl. No.	District	Hotels/ Guest Houses	Restaurants	No. of Rooms							Travel Agencies	Photographers	Tourist Guides
				SBR	DBR	DOR	FS	TBR	TOTAL	Capacities			
1	Bilaspur	104	13	50	872	9	91	17	1,039	2,198	65	1	34
2	Chamba	326	47	115	3,883	10	130	25	4,163	8,476	75	141	206
3	Hamirpur	79	40	66	516	13	3	5	603	1,295	18	0	
4	Kangra	939	196	483	10,470	59	532	95	11,639	24,126	796	4	301
5	Kinnaur	160	9	202	1,630	103	52	38	2,025	4,750	32	0	19
6	Kullu	1,553	97	457	20,588	29	1,332	60	22,466	46,910	1,740	840	534
7	Lahaul-Spiti	136	0	218	1,488	15	28	0	1,749	3,486	45	0	26
8	Mandi	295	47	150	2,474	43	129	30	2,826	5,618	243	3	82
9	Shimla	623	171	167	9,704	249	453	23	10,596	21,705	1,830	128	409
10	Sirmaur	149	102	130	1,354	45	30	34	1,593	3,674	23	0	56
11	Solan	433	275	148	5,919	48	192	72	6,379	12,758	195	0	72
12	Una	141	28	89	1,296	12	51	7	1,455	3,140	14	0	0
13	Home Stay	4905	0	98	14648	0	445	3	200999	30881			
	Total	**9843**	**1025**	**2373**	**74842**	**635**	**3468**	**409**	**267532**	**169017**	**5076**	**1117**	**1739**

Tourism industry contributes 7.78 per cent of Himachal's GSDP (Gross State Domestic Product). This is driven by activities related to hospitality, transportation, handicrafts and other allied industries.

After the COVID-19 pandemic, domestic tourist arrivals have increased from 32.13 lakh in 2020 to 56.37 lakh in 2021 and further to 150.99 lakh in 2022 and 160.05 lakh in 2023 to 181.24 in 2024 in absolute terms.

Tourist Arrivals in Lakh

Year	Indians	Foreigners	Total
2012	156.46	5	161.46
2013	147.16	4.14	151.3
2014	159.25	3.9	163.15
2015	171.25	4.06	175.31
2016	179.98	4.53	184.51
2017	191.31	4.71	196.02
2018	160.94	3.56	164.5
2019	168.29	3.83	172.12
2020	31.7	0.43	32.13
2021	56.32	0.05	56.37
2022	150.7	0.29	150.99
2023	159.42	0.63	160.05
2024	180.41	0.83	181.24
2025 (End-Sept)	96.99	0.58	97.58

Source: Tourism Department, Government of Himachal Pradesh

10.5.1 Tourism Policies of the Government of Himachal Pradesh

1. Himachal Pradesh Tourism Development Policy

The State's flagship policy focuses on:

- Sustainable and eco-friendly tourism development
- Diversification into adventure, culture, rural, wellness, and tribal tourism
- Enhancing visitor experience through improved infrastructure and hospitality standards
- Encouraging private investment through streamlined approvals and incentives

2. Homestay Policy (Revised)

A cornerstone of community-led tourism:

- Simplified registration and quality standards
- Incentives for women, tribal households, and remote villages
- Support for upgrading facilities and linking homestays with digital platforms
- Strengthened role of HPTDC for promotion and market linkage

3. Adventure Tourism Policy

Ensures safe, regulated and high-quality adventure operations:

- Licensing and safety certification for operators
- Standard Operating Procedures for trekking, rafting, paragliding, skiing
- Mandatory equipment standards and insurance
- Pre- and post-monsoon route inspections to minimise risks

4. Eco-Tourism Policy

Implemented jointly with Forest Department:

- Controlled tourism in ecologically sensitive zones
- Community-managed nature trails, forest huts, birding routes
- Revenue sharing with local communities
- Strict limits on mass tourism and waste generation

5. Tourism Trade (Registration & Regulation) Act

Provides a regulatory backbone for the sector:

- Mandatory registration of hotels, homestays, adventure operators, guides
- Standards for hygiene, service, rates, grievance redressal
- Enforcement of safety norms and accountability
- Regular inspections and compliance mechanisms

6. Tourism Infrastructure Development Policy

Guides construction and upgrading of:

- Way-side amenities, viewpoints, ropeways
- Trekking shelters, riverfront development, parking areas
- Digital information systems and travel advisory platforms
- Convergence with Swadesh Darshan & PRASHAD schemes

7. Incentive Policies

Promote private-sector participation and sustainability:

- Capital subsidies for green hotels and renewable energy systems
- Incentives for ropeways and transport infrastructure
- Support to tourism enterprises in tribal/remote areas
- Loans through AIF and other credit schemes

Together, these policies guide a sustainable, resilient, diversified tourism revival and help reposition Himachal as a Safe and Green Mountain Destination.

Impact of the 2025 Disaster on Tourism in Himachal Pradesh

The extreme rainfall, landslides, flash floods, road collapses, and infrastructure damage during the 2025 monsoon had a severe and multi-dimensional impact on Himachal Pradesh's tourism sector. Tourism contributes nearly 7% of GSDP and is a major employer—especially in districts like Shimla, Kullu, Manali, Kinnaur, Kangra, Dharamshala, Chamba, and Spiti. The disaster disrupted mobility, safety, and visitor confidence, triggering major economic losses.

1. Immediate Impact on Tourist Arrivals

Sharp decline in tourist footfall

- Mass cancellations across all major tourist circuits.
- Tourists stranded due to sudden road blockages led to nationwide advisories urging people to avoid travel to HP.
- Peak-season arrivals (June–September) fell sharply due to safety fears and media coverage of landslides.

Loss of revenue for tourism enterprises

- Hotels, homestays, taxi operators, guides, dhabas, adventure sports, and local markets experienced losses.
- Small seasonal businesses, which depend entirely on tourism income, were worst hit.

2. Infrastructure Damage Affecting Tourism Mobility

Road network disruptions

- Major highways blocked
- Local roads to villages, trekking routes, and religious sites were washed out.

Damage to tourism infrastructure

- Parking areas, footpaths, bridges, retaining walls, viewpoints, and riverfront zones affected.
- Campsites, trekking huts, and adventure-sport bases damaged or made unusable.
- The destruction of access routes was one of the biggest reasons for the tourism downturn.

3. Economic Impact on Local Communities

Severe livelihood losses

- Tourism directly employs:
- taxi and bus operators
- hoteliers and homestays
- tourist guides
- travel agents
- photographers
- adventure-sport providers
- artisans, dhabas, porters
- women-run micro-enterprises
- Due to the disaster:
- Occupancy in hotels/homestays dropped to near-zero for several months.
- Many workers lost their only source of seasonal income.
- Women-led homestays faced months of revenue loss.

Reduced market demand

- Souvenir markets, local crafts, traditional food shops, and small traders reported immediate revenue collapse.

4. Impact on Adventure and Religious Tourism

Adventure tourism

- Trekking routes became unsafe.
- River rafting in Kullu shut down due to dangerous currents.
- Camping and paragliding witnessed cancellations

Pilgrimage tourism

- Access to temples and monasteries was disrupted.
- Decline in yatra routes affected religious-tourism-linked local economies.

5. Long-Term Impacts

Loss of visitor confidence

- Repeated disasters in recent years have increased caution among tourists and operators.
- HP risks losing market share to safer hill destinations unless recovery is accelerated.

Higher rebuilding costs

Tourism infrastructure in hill states is expensive to restore due to:

- road-cutting
- slope stabilization
- drainage
- retaining walls
- riverbank protection

Pressure on small businesses

- Many small tourism operators depend on loans for vehicles or homestay upgrades. Loan repayments became difficult due to loss of income.

Erosion of brand image

- Media images of landslides and stranded tourists affected Himachal's perception as a safe tourist destination.

6. Environmental Impact Affecting Tourism

- Landslides increased sedimentation and altered river-scape tourism spots.
- Forest trails blocked, campsites buried or washed away.

The 2025 disaster caused a significant setback to Himachal Pradesh's tourism sector, with declines in footfall, large-scale loss of income, infrastructure damage, safety concerns, and long-term erosion of visitor confidence. Recovery will necessitate an integrated package addressing roads, safety, communication, resilient infrastructure, and livelihood support for tourism-dependent households.

Recovery has also opened up opportunities for Resilient Tourism Rebuilding. The disaster highlights the need for:

- Climate-resilient tourism infrastructure
- Better slope stabilization and drainage
- Diversification of tourism circuits (beyond saturated Shimla-Manali axis)
- Green tourism policies and carrying-capacity regulation
- Strengthening homestay networks with disaster preparedness
- Early warning systems for tourists

- Insurance schemes for tourism enterprises
- Damages and Losses

Major Constraint faced in Assessing Damages and Losses: Despite extensive damages across the tourism sector during the disaster, it was not possible to arrive at a comprehensive estimate of total losses due to significant gaps in data reported through the DMIS. A key reason appears to be the misunderstanding at the field level that only damages to *government-owned infrastructure* must be reported, since these are typically considered eligible for compensation under the PDNA.

However, the PDNA is intended to assess damages and losses across the entire sector—public, private, and community-owned. The objective is not merely to estimate compensation requirements, but to generate a complete picture of sector-wide impacts that can guide a holistic and evidence-based recovery and reconstruction plan. Inadequate reporting therefore limits the ability to design appropriate interventions, mobilize resources, and restore livelihoods dependent on tourism.

District-Wise Damages (as per DMIS)

District	Category of facility	Hotels	Hostels/ Convention Centres	Restaurant/ Cafes	Offices/ Information Centres
Chamba	Quasi- Govt	3			
	Govt				
	Private				
Kangra	Quasi- Govt	3			
	Govt	3			2
	Private				
Kullu	Quasi- Govt	1			2
	Govt				
	Private				
Mandi	Quasi- Govt				
	Govt		2		
	Private	2			
Shimla	Quasi- Govt	1			
	Govt				2
	Private				
Sirmour	Quasi- Govt	3			
	Govt				
	Private				
Solan	Quasi- Govt	17			
	Govt				
	Private				

Una	Quasi- Govt	1			
	Govt				
	Private				
TOTAL		**34**	**2**	**0**	**6**

Cost of Damages

District	Estimated Damages to Structure in Rs.Lakhs	Estimated damages to Equipment/ Furniture in Rs. Lakhs	Total
Chamba	1500.00		1500.00
Kangra	79.50		79.50
Kangra	169.34		169.34
Kullu	635.00	15.00	650.00
Mandi	210.00	80.00	290.00
Shimla	1439.00		1439.00
Sirmour	546.00		546.00
Solan	1023.54		1023.54
Solan	141.00		141.00
Una	60.02		60.02
Grand Total	**5803.39**	**95.00**	**5898.39**

Total Damages: 5898.39 lakhs

The damages would have been much higher if there was data available from the private and community-owned establishments.

Estimation of Losses

Type of Loss	Unit	Avg income /day in Rs	Period of Loss in days	Total Loss Rs. Lakhs
Loss of Income	Rs/ Day	75000	365	273.75
Staff Salaries/ mth (54 employees @ 15000/month)	Rs. / month	8.1	12	97.2
Total				**370.95**

There were 6 establishments, 1 in Kullu, 2 in Mandi, 2 in Shimla and 1 in Solan that were reported to be fully damaged and non-functional. Of these, the establishment in Kullu was a hotel –cum- Arts & Crafts Centre that did a brisk business, earning up to a lakh per day during the season. There were also two Information Centres, of which the losses could not be monetised as they were only dealing with information.

Consolidated Damages and Loss

Sl No	Details	Amount Rs. Lakhs
1	Damages to Infrastructure	5803.39
2	Damages to Equipment/ Furniture	95
Damages		5898.39
1	Loss of Income	273.75
2	Loss of Wages	97.2
Losses		370.95
Grand Total		**6269.34**

As noted earlier, the actual losses to the tourism sector are likely to be significantly higher than reported, as damages to privately owned and community-run establishments were not captured in the available data. During consultations with private tourism businesses in Kullu, operators highlighted not only the complete collapse of visitor inflow but also the growing difficulty in servicing their capital and working-capital loans taken from various banks. They expressed the need for Government support to ease their financial burden and prevent long-term distress.

Most districts in Himachal Pradesh have active Travel and Tourism Associations, which represent a wide range of sectoral interests. It is recommended that these associations be formally recognised as key stakeholders in tourism planning, disaster response, and recovery processes.

Beyond travel agencies, the tourism ecosystem also includes transport unions, tourist guides, photographers, shopkeepers, and dhaba operators—groups that are directly dependent on visitor footfall. These stakeholders have also suffered substantial damage and income loss, yet currently lack an institutional platform to raise their concerns or access support. Given that many of them do not have the financial resilience to withstand repeated disasters, as seen in recent years, it is essential that the department's policies and strategies adopt an inclusive, community-centred approach. Such an approach will strengthen the overall goal of promoting sustainable, resilient tourism development in Himachal Pradesh.

Priorities for Recovery

Sl No	Objective	Pathways
1	Restore Mobility and Safety	• Accelerated restoration of roads, bridges, rural tourism routes, trekking paths, and signage. • Establish Tourist Safety & Information Units in key districts for advisories, helplines, and rapid communication. • Identify and Deploy slope stabilization, drainage improvements, and geo-technical protection at chronic hazard sites.

Sl No	Objective	Pathways
2	Rebuild Tourism Infrastructure	• Reconstruct riverfront areas, viewpoints, parking zones, footpaths, and cable bridges. • Repair and upgrade damaged adventure-sport infrastructure (paragliding, rafting, trekking camps). • Develop disaster-resilient tourism nodes with retaining walls, gabions, early-warning systems, and safe shelters.
3	Support Tourism Livelihoods	Provide income support and temporary wage employment for tourism-dependent households. Offer soft loans / interest subvention to taxi operators, homestays, and small tourism enterprises. Launch a Homestay Restoration Grant/Soft Loan for partially damaged units Develop an ecosystem that is sensitive to and well aware of disaster management
4	Strengthen the Tourism Value Chain	Promote Himachal as a safe and resilient destination through targeted campaigns once connectivity improves. Diversify circuits to emerging destinations Expand eco-tourism, village tourism, apple/fruit trail circuits, and cultural tourism. Develop
5	Build Long-Term Climate Resilience	Introduce Green Tourism Guidelines: carrying-capacity assessment, waste management, slope safety. Mandatory disaster-resilient construction norms for hotels and homestays. Promote off-season tourism (wellness, heritage, rural experiences) to reduce seasonal pressure. Integrate IMD forecasts and real-time warnings into travel advisories and district operations
6	Digital Transformation of Tourism Sector	Introduce Apps for not only providing real-time information to tourists but for also promoting safe tourism through regulating inflows

Immediate Reconstruction and Recovery Activities

Sl No	Activity	Budget Rs. Lakhs
1	Rebuild Tourism Infrastructure	5803.39
2	Replacement of critical Equipment/ Furniture	95
3	Compensation/ Relief Package of Rs. 5000/month for 6 months for 6000 accredited and affected stakeholders like owners of Hotels/ Homestays/ Restaurants/ Adventure Centres/ Guides/Photographers/ Transport providers	1980
4	Revival Grants to SHGs/ Youth Entrepreneurs/ Artisans/ Homestays	300

5	Green & Resilient Infrastructure including climate -proofing	300
6	Developing an integrated Portal for regulating and promoting safe tourism	50
7	Capacity Building for Disaster Awareness among various stakeholders	30
8	Stabilisation Projects in Tourist Zones	150
	Total	**8708.39**

The total amount required for Reconstruction and Recovery of Tourism Sector is Rs. 8708.39 lakhs

Convergence with State Policies

- The State policies do directly support recovery needs and should be leveraged wherever possible:
- Restoring safe tourist mobility (infrastructure policy)
- Strengthening safety and regulation of treks, rafting & paragliding (Adventure Policy)
- Rebuilding homestays and community tourism assets (Homestay Policy)
- Expanding tourism to new, safer, less congested circuits (Diversification Policy)
- Enforcing resilience, waste management, and slope protection (Eco-Tourism & Sustainability Guidelines)
- Providing a framework for investment and PPPs (Incentive Policies)

Recovery Framework

Short Term Strategies		
Restore Access, Safety & Livelihoods	Immediate Infrastructure Restoration	• Clear landslides, reopen major roads & tourist corridors • Repair essential tourism infrastructure • Safety Stabilization • Mark unsafe zones; install temporary warning systems.
	Livelihood Protection for Tourism Workers	• Wage support & income relief for affected guides, taxi drivers, homestay owners, dhabas, and porters. • Soft loans/ interest subvention for homestays, taxis, small tour operators
	Regulation for Safe Operations	• Disaster Awareness and Disaster Management courses (hospitality, safety, first aid) during downtime • Temporary ban on risky treks, rafting sections, and paragliding points until inspected. • Mandatory inspection & certification for rafting operators, paragliding pilots, trekking routes. • Safety Audits of Tourism related Infrastructure
Medium Term Strategies		
Rebuild Infrastructure & Diversify Tourism	Rebuilding & Upgrading Tourism Assets	• Reconstruct damaged riverfronts, parks, view decks, ropeways, and access roads. • Repair/Rebuild adventure tourism infrastructure • Standardized design templates for: • homestays, • trekking huts, • campsites, • parking structures, • Convenience centres & wayside amenities.

	Diversification of Tourism Products	• Eco-Tourism • Forest trails, birding circuits, nature interpretation centres. • Village & Rural Tourism • Homestay expansion aligned with carrying capacity. • Fruit & Farm Tourism • Apple blossom trails, orchard walks, food tasting. • Wellness, Ayurveda & Yoga Tourism • Cultural Tourism • Festivals, temple circuits, local craft markets.
	Strengthening the Tourism Workforce	• Certification programmes for guides, adventure operators, hospitality staff. • Tie-ups with IIT Mandi / NID / IHMs for training in: • digital marketing, • safety equipment, • eco-tourism management, • homestay quality enhancement
	Strengthening Institutions & Regulations	• Establish a Tourism Disaster Response Cell. • Introduce Tourism Safety Regulations for river proximity, slope development, and building codes. • Licensing & quality rating framework for homestays and adventure operators
Long Term Strategy		
Build a Climate-Resilient Tourism Economy	Climate-Resilient Tourism Infrastructure	• Geo-technical stabilization at high-risk tourism zones. • Adopt Nature-based solutions like bioengineering, contour trenching, watershed protection. • Climate-resilient building standards for hotels, homestays & resorts: • mandatory slope safety certification • flood-resistant designs • earthquake-safe retrofitting
	High-Value Tourism Infrastructure Development	• Ropeways & cable cars to reduce traffic pressure and improve safety • Integrated Tourist Terminals & Transport Hubs • Heritage Circuit Restoration • Old Shimla, temples, monasteries, forts • Large-scale wayfinding & interpretation system across the state.
	Digital Transformation of Tourism	• HP Tourism App integrating route status, weather, bookings, permits, alerts. • E-registration & digital licensing for taxis, homestays, and adventure operators. • Data-driven carrying capacity for over-visited zones (Manali, Shimla, Kullu).
	Sustainable Tourism & Carrying Capacity Management	• Regulating tourist numbers in fragile zones. • Waste management & solid waste reduction in hotspots. • Incentivising Green Hotels, renewable energy, low-waste homestays.
	Tourism Marketing & Brand Repositioning	Rebrand Himachal as a "Safe, Green & Resilient Mountain Destination." Long-term campaigns targeting: • Adventure • Wellness • Culture • Off-season tourism • Position new circuits to reduce pressure on Shimla & Manali.

The Core Problem: The "Volume-Based" Model is Broken and Dangerous

Himachal Pradesh's current tourism model is largely **volume-based**: it focuses on maximizing the number of visitors, especially during peak seasons (summer and major holidays). This model is inherently vulnerable:

- **Environmental Cost:** It creates immense pressure on fragile ecosystems—generating waste, straining water resources, causing traffic congestion, and leading to unplanned construction on unstable slopes.
- **Economic Vulnerability:** Revenue is concentrated in a few months. A single disaster (like the 2025 monsoon) or a pandemic can wipe out an entire year's income for many.
- **Poor Visitor Experience:** Overcrowding degrades the very beauty and tranquillity people come for, leading to a "race to the bottom" in terms of quality.
- **Climate Risk Amplification:** Concentrating activity in the monsoon period puts thousands of tourists and residents at risk during the very time when landslides and floods are most likely.

The Solution: The Shift to "Value-Based" Tourism

This shift means earning more revenue from **fewer, higher-value tourists** who stay longer, spend more locally, and have a lighter environmental footprint. The goal is quality over quantity.

Here's how the proposed strategies achieve this, inspired by **Nepal and Bhutan**:

1. Learn from Nepal and Bhutan

- **Bhutan's "High-Value, Low-Impact" Model:** Bhutan famously mandates a Minimum Daily Package for most tourists in the form of "Sustainable Development Fee". This isn't just a revenue mechanism; it's a filter. It automatically attracts visitors who are culturally curious, environmentally conscious, and willing to pay for a curated, high-quality experience. The revenue funds free healthcare and education, directly linking tourism to national well-being.

- **Nepal's Niche Market Expertise:** Nepal has masterfully moved beyond just trekking to become a global hub for adventure tourism (rock climbing, mountain biking), eco-tourism (community homestays in Annapurna and Makalu), and spiritual tourism. They have successfully distributed tourism benefits beyond Kathmandu and Pokhara to rural communities.

2. Promote Specific "Value-Based" Tourism Types

- **Eco-Tourism:** This isn't just a buzzword. It means:
  - **Certified Homestays & Eco-Lodges:** Promoting small-scale, locally-owned accommodations built with traditional and sustainable materials.
  - **Guided Nature Walks & Bird Watching:** Employing local naturalists, reducing the need for large infrastructure.
  - **Strict Carrying Capacity:** Limiting the number of visitors to ecologically sensitive areas like specific meadows, lakes, or forest patches.
- **Agri-Tourism:** This directly links tourism to climate-resilient livelihoods.
  - **Apple Orchard Stays:** Allowing tourists to experience harvest seasons.
  - **Traditional Cuisine Workshops:** Using locally grown, organic produce.
  - **Heritage Agriculture Tours:** Showcasing the unique terrace farming systems. This provides farmers with a direct, alternative source of income, making them less vulnerable to crop failure.
- **Cultural Tourism:** This focuses on the state's living heritage.
  - **Festival Tourism:** Promoting visits during local, non-monsoon festivals.
  - **Village Tourism:** Creating curated experiences in less-visited villages, preserving handicrafts (like Kullu shawls, Kinnauri handicrafts) and generating distributed income.

3. Develop "Shoulder Season" Tourism

This is a key operational tactic to de-congest the monsoon and stabilize the economy.

- **What are the Shoulder Seasons?** The periods just before and after the peak summer and monsoon seasons—typically **March to May (Spring)** and **September to November (Autumn)**.
- **Why it's a Game-Changer:**
  - **Climate Resilience:** It moves tourist traffic away from the high-risk monsoon period.
  - **Economic Stability:** It extends the earning period for tourism businesses from 3-4 months to 6-8 months, providing a more stable year-round income.
  - **Enhanced Experience:** The weather during these seasons is often excellent—clear skies, blooming flowers in spring, and golden landscapes in autumn.
- **How to Market It:**
  - **Create "Shoulder Season" Brands:** "Himachal Spring Blossoms" or "Autumn Gold Trails."
  - **Target Specific Demographics:** Spring breaks for cultural tours, autumn for photographers and trekkers.
  - **Offer Incentives:** Work with hotels and tour operators to create attractive packages for these periods.

The "Big Picture" Impact of This Shift

By adopting this resilient model, Himachal Pradesh can:

- **Reduce Physical Risk:** Fewer people in hazardous zones during the monsoon.
- **Distribute Economic Benefits:** Wealth generation moves from a few honeypot destinations (like Shimla and Manali) to rural and remote communities.
- **Incentivize Conservation:** A liveable snow leopard or a pristine forest becomes more valuable as a tourist attraction than as a piece of land for a hotel, aligning economic interests with ecological preservation.
- **Build a Unique Brand:** It allows Himachal to compete not on price, but on the uniqueness and sustainability of its experience, creating a powerful, lasting global brand.

Expected Outcomes

- Restoration of tourist arrivals to pre-disaster levels within 12–18 months.
- Improved livelihood security for 3 lakh+ tourism-dependent households.
- Reduction in tourist accidents and infrastructure failures.
- Diversified tourism economy less dependent on Shimla–Manali circuit.
- Climate-resilient tourism model aligned with Himachal Vision 2030.
- Stronger brand image as a safe, sustainable, high-value mountain destination

10.5.2 Funding & Convergence Strategy

Use multiple funding windows to finance the strategy:

- Swadesh Darshan 2.0 (destination development)

- PRASHAD (pilgrimage circuits)
- NESID / NIDHI (North-East & Himalayan tourism infrastructure)
- AIF (tourism infrastructure loans)
- MNREGA (trekking route repairs & eco-tourism trails)
- State Disaster Mitigation Fund
- PPP & CSR partnerships
- World Bank / ADB climate resilience funds

Social Impacts of Recovery

The recovery of the tourism sector has significant social impacts, particularly for the thousands of households whose livelihoods depend on visitor inflows. Restoring mobility, reviving homestays, reopening adventure routes, and re-establishing market activity helps stabilise incomes for taxi drivers, guides, photographers, artisans, women-led enterprises and seasonal workers who were severely affected by the disaster.

Recovery efforts also reduce distress migration, rebuild community confidence, and create renewed opportunities for youth engagement in hospitality and tourism services. Importantly, a people-centred recovery—through income support, skills training, and safer infrastructure—strengthens social resilience, restores dignity for affected families, and helps communities regain a sense of security and normalcy after prolonged disruption

Suggestive Action: Improving Damage Assessment in Tourism Sector

Improving Tourism Sector Damage Reporting under PDNA & DMIS

The recent disaster highlighted significant gaps in the reporting of tourism-related damages in Himachal Pradesh. Despite widespread impact across hotels, homestays, adventure tourism sites, trekking routes, and tourism-dependent businesses, very limited data entered the DMIS system. This restricted the ability of the PDNA to generate a complete picture of the sector's losses and to inform a comprehensive recovery plan.

To address these gaps, the following recommendations are proposed:

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1. Clarify Reporting Requirements to District-Level Teams

- Issue a formal circular from the Tourism Department and SDMA clearly stating that **PDNA requires assessment of damages across the entire sector**, including:
  - Private infrastructure (hotels, resorts, homestays)
  - Community-owned assets (eco-tourism sites, village tourism huts)
  - Tourism businesses (rafting/trekking operators, guides, campsites)
  - Adventure tourism infrastructure
- Emphasise that **DMIS reporting is not limited to government assets**.

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2. Create a Dedicated Tourism Damage Reporting Template

- Design a simple, one-page template for district tourism officers covering:
  - Facilities damaged
  - Number of units affected
  - Estimated cost of damage
  - Loss of income and visitor footfall
  - Impact on employment
- Ensure the template is aligned with PDNA methodology (Damages, Losses, Needs).

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3. Build Capacity of Tourism Officials at District & Block Level

- Conduct short training sessions on:
  - PDNA principles

- Damage classification
- Estimating losses (income/day, occupancy, visitor flows)
- Reporting through DMIS

- Engage tourism associations (hoteliers, homestays, adventure operators) in the process.

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4. Strengthen Coordination with Private Tourism Stakeholders

- Establish a **Tourism Disaster Reporting Cell** during disasters.
- Mandate District Tourism Officers to collect data from:
  - Hotel & Restaurant Associations
  - Homestay Associations
  - Adventure Tourism Operators
  - Taxi Unions
  - Local tourism committees
- Introduce Whatsapp/Google Forms-based quick assessment tools.

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5. Integrate Tourism into the State's Disaster Management Protocols

- Include the Tourism Department explicitly in district-level Incident Response Teams.
- Assign clear roles for:
  - Facility verification
  - Tourist safety
  - Route status updates
  - Local tourism damage data entry into DMIS.

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6. Develop a GIS-Enabled Tourism Asset Inventory

- Prepare a digital inventory of:
  - Hotels & homestays
  - Tourist attractions
  - Adventure parks & trekking routes
  - Viewpoints, riverfronts, parking zones
- This baseline will enable faster and more accurate loss estimation after disasters.

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7. Improve Incentives for Accurate Reporting

- Encourage districts to complete tourism damage reporting by linking it to:
  - Access to state-level reconstruction support
  - Prioritisation in tourism infrastructure upgrades
  - Inclusion in recovery packages (e.g., homestay grants, adventure resumption support)

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8. Establish a Rapid Assessment Protocol for Future Disasters

- Create a 48-hour rapid tourism assessment checklist for:
  - Road access
  - Adventure route safety
  - Hotel and homestay impacts
  - Tourist strandedness
  - Immediate loss of business
- Integrate it with the Tourism Emergency Response Framework.

Conclusion

Strengthening tourism-sector reporting through clearer guidelines, improved templates, stronger coordination with private stakeholders, and better training will ensure that future PDNAs capture the full extent of damages and losses. This will enable the Government of Himachal Pradesh to design effective, evidence-based recovery and reconstruction interventions that support both the tourism sector and the livelihoods that depend on it.

10.6 FORESTRY

10.6.1 Introduction

The 2025 floods and landslides in Himachal Pradesh had a widespread impact across the state's forested landscapes, affecting 11 districts in varying degrees of severity. A total of 582 sites were assessed under the Post-Disaster Needs Assessment, covering diverse ecological zones ranging from dense primary forests to moderately dense, mixed, degraded, and scrubland categories. The damage was not confined to forest cover alone; it extended to critical wildlife habitats and fragile riverbed ecosystems, underscoring the interconnected nature of environmental losses.

The affected forest area spans multiple hectares, with dense and mixed forests in districts such as Kinnaur, Shimla, Mandi, and Sirmaur experiencing severe destruction, while scrubland and degraded forests in Hamirpur and Solan showed widespread moderate damage. These losses have direct implications for slope stability, soil conservation, and water regulation, which are vital for both ecological balance and community resilience.

Importantly, the disaster also disrupted wildlife sites, including habitats of iconic species such as the Ibex in Kinnaur and the Snow Leopard, the state animal, in Chamba and Kinnaur. The destruction of these habitats threatens biodiversity conservation efforts and highlights the urgent need for integrated recovery measures that address both forest regeneration and wildlife protection. The geographic spread of damages thus reflects not only the scale of ecological disruption but also the pressing requirement for district-specific strategies to restore forests, conserve biodiversity, and strengthen resilience against future climate-induced disasters.

10.6.2 Impact Overview

1. Geographic Spread

The disaster's footprint extended across **11 districts**, with **582 sites assessed**. Damage was recorded in diverse forest categories:

- **Dense/Primary forests** in Kinnaur, Shimla, and Mandi faced severe destruction.
- **Mixed forests** in Chamba, Solan, and Sirmaur showed widespread partial damage.
- **Scrubland and degraded forests** in Hamirpur, Bilaspur, and Solan were moderately affected.
- **Riverbed ecosystems** in Kangra, Solan, and Kinnaur suffered erosion and destabilization.

District	Sites	Total Area (ha)	Affected Area (Ha)	Wildlife Sites	Direct Damages
Bilaspur	1	15	3	0	39,75,000
Chamba	230	98,628.09	1,592.47	9	2,74,81,42,300
Hamirpur	22	85.38	2.3	1	43,93,325
Kangra	27	5,626.86	35.25	0	3,21,37,500
Kinnaur	37	1,58,009.06	109.96	20	9,61,72,500
Kullu	28	9,979.36	204.85	0	16,97,03,750
Lahul and Spiti	3	273.02	1.01	0	14,04,360
Mandi	92	3,703.00	249	8	38,94,47,147

Shimla	63	10,654.44	447.25	0	68,70,56,050
Sirmaur	52	416.34	85.91	0	6,14,85,375
Solan	27	1,705.65	9.83	1	1,42,01,625
TOTAL	**582**	**2,89,096.20**	**2,740.84**	**39**	**4,20,81,18,932**

IMPACT OVERVIEW	
District Area Reported (in ha)	2,89,096.20
Total Sites	582
Area Affected (Ha)	2,740.84
Wildlife Sites	39

Wildlife habitats were directly impacted. The **Ibex in Kinnaur** and the **Snow Leopard (state animal) in Chamba and Kinnaur** were among the species whose habitats were disrupted. Smaller sites also reported losses of ungulates and bird habitats. These damages highlight the interconnected nature of forest ecosystems, biodiversity, and community resilience.

2. Nature of Damage

- **Forest Cover:** Large tracts of dense and mixed forests destroyed or destabilized.
- **Soil Systems:** Severe erosion and slope destabilization, particularly in riverbed zones.
- **Wildlife:** Fragmentation of habitats, loss of monitoring infrastructure, and disruption of corridors.
- **Community Interface:** Orchards, grazing lands, and forest-dependent livelihoods affected.

Severity factors applied in the PDNA model classify damages as:

- **Total Destruction (Factor 1.0)** – complete loss of forest cover and habitat.
- **Severe Destruction (Factor 0.7)** – extensive damage requiring full restoration.
- **Moderate/Partial (Factor 0.3)** – partial damage, requiring repair and stabilization.
- **Minor/No Damage (Factor 0.0)** – negligible impact.

3. District-Level Highlights

District	Key Damage	Wildlife Impact	Priority Needs
Hamirpur	Moderate damage in scrubland/mixed forests	Limited	Soil conservation, plant replacement
Sirmaur	Severe destruction in Rajgarh, Paonta Sahib	Multiple sites	Forest restoration, slope stabilization
Solan	Riverbed destruction, mixed forest losses	Moderate	Reforestation, wildlife monitoring
Kinnaur	Severe damage in Kanam, Kalpa; Ibex & Snow Leopard habitats	High	Habitat restoration, biodiversity corridors

Shimla	Large-scale mixed forest destruction (Chopal, Rampur)	Moderate	Climate-resilient reforestation
Mandi	Severe destruction in Jogindernagar, Khauli	Moderate	Soil conservation, slope stabilization
Chamba	Wildlife habitat loss (Snow Leopard)	High	Wildlife conservation, monitoring
Kangra	Riverbed erosion, scrubland damage	Limited	Riverbed stabilization
Bilaspur	Moderate scrubland damage	Limited	Soil conservation
Lahaul & Spiti	Localized damage (Keylong, Jispa)	Moderate	Secondary forest restoration
Kinnaur (extended sites)	Multiple overlapping severe sites	High	Integrated slope & habitat recovery

4. Damage Estimation Factors: Rates as per Himachal Pradesh Forest Department - Schedule of Rates (Control Panel)

FOREST RESTORATION RATES (Per Hectare)	
Forest Type	Rate (INR)
Dense/Primary	7,50,000
Moderately Dense	5,00,000
Mixed/Normal	5,00,000
Open/Degraded	3,50,000
Scrubland/Others	2,50,000
TREE REPLACEMENT RATES	
Tree Size	Rate (INR)
Large (>30cm)	8,000
Medium (15-30cm)	8,000
Small (<15cm)	5,000
Weighted Average	3,000

5. Calculating Recovery Needs:

As there is no standard way to calculate losses due to impact on forests and environment, we have taken help of AI to create this. For Climate Adaptation (12%) and DRR (8%), we get ₹50.48 crore and ₹33.66 crore, respectively. Adding those to the subtotal gives ₹504.85 crore. Then, we apply overheads (40% total), which adds ₹201.94 crore, bringing the total recovery needs to ₹706.78 crore. For losses, we use a 30% ecosystem service loss for the low scenario, and calculate medium and high scenarios as well.

Recovery needs cost table — Forest & Environment:

Below is a consolidated recovery-needs cost table for the Forest & Environment chapter you uploaded. We have used the direct restoration totals from the table of damage estimation, (forest restoration, tree replacement, plant replacement, soil conservation, wildlife habitat and monitoring) as the recovery base, then added climate-adaptation and DRR components (as specified in the chapter) and applied the project overheads as per standard rates. All intermediate calculations are shown so one can trace the numbers.

Base direct restoration (sum of chapter line items) = ₹420.70 crore (≈ ₹42,070.49 lakhs).

Component	Calculation	Amount (₹ crore)	Amount (₹ lakhs)
A. Direct restoration (chapter totals)	Forest restoration + tree replacement + plant replacement + soil conservation + wildlife habitat + monitoring	420.70	42,070.49
B. Climate adaptation (12% of A)	0.12 × A	50.48	5,048.46
C. Disaster Risk Reduction (8% of A)	0.08 × A	33.66	3,365.64
D. Subtotal (A + B + C)	—	504.85	50,484.59
E. Project overheads (sum = 40% of D)	PMU 15% + M&E 7% + Technical 5% + Contingency 8% + Community engagement 5% = 40% × D	201.94	20,193.84
F. Total recovery needs (D + E)	—	**706.78**	**70,678.43**

Total recovery needs ≈ ₹706.78 crore (≈ ₹70,678.43 lakhs).

Short justification and methodology:

- Direct restoration (A) — taken directly from the chapter's district-level totals (forest restoration, tree replacement, plant replacement, soil conservation, wildlife habitat and monitoring). This is the immediate technical cost to restore ecological assets and repair direct damages to environmental infrastructure and habitats.
- Climate adaptation (B, 12% of A) — the chapter explicitly prescribes a 12% allocation for climate-resilient measures (species selection, adaptive planting techniques, water/soil conservation upgrades). Applying this as a percentage of the restoration base ensures adaptation measures are mainstreamed into every restoration activity rather than treated as an afterthought.
- Disaster Risk Reduction (C, 8% of A) — the chapter recommends DRR investments (early warning, buffer zones, community fire/flood management). An 8% uplift on the restoration base funds structural and non-structural DRR measures that reduce future vulnerability.
- Project overheads (E, 40% of D) — the chapter lists PMU (15%), M&E (7%), Technical Supervision (5%), Contingency (8%) and Community Engagement (5%). These are applied to the subtotal (restoration + adaptation + DRR) because overheads and contingency are typically budgeted on the full program cost to cover management, quality assurance, technical inputs, community mobilization and unforeseen items.

10.6.3 Recovery Needs

The recovery of Himachal Pradesh's forest and environment sector requires a multi-layered approach that balances immediate restoration with long-term resilience. The PDNA framework identifies three critical pillars of recovery: Base Recovery, Climate Adaptation, and Disaster Risk Reduction (DRR).

Together, these measures ensure that restoration efforts not only replace what has been lost but also strengthen ecological systems against future hazards.

A. Base Recovery – Direct Restoration of Forests, Soil, and Wildlife Habitats

The first and most urgent priority is base recovery, which focuses on repairing direct damages to forest ecosystems, soil structures, and wildlife habitats. This includes:

- Forest Regeneration: Replanting native species in dense, mixed, and degraded forest areas. Restoration must be tailored to site-specific conditions, ensuring that ecological balance is maintained.
- Soil Stabilization: Immediate soil conservation measures such as terracing, gabion walls, and vegetative cover to prevent further erosion and landslides.
- Wildlife Habitat Restoration: Rebuilding damaged habitats, including corridors for species such as the Ibex in Kinnaur and the Snow Leopard in Chamba and Kinnaur, to reduce fragmentation and ensure continuity of biodiversity.
- Community Interface: Supporting forest-dependent livelihoods (orchards, grazing, medicinal plants) through eco-restoration programs that integrate local participation.

Base recovery is the foundation of resilience, ensuring that forests regain their ecological functions of slope stabilization, water regulation, and biodiversity conservation.

B. Climate Adaptation (12%) – Climate-Resilient Species, Slope Stabilization, and Water Conservation

Given the increasing frequency of climate-induced disasters, recovery must embed climate adaptation measures. Allocating 12% of recovery costs to adaptation ensures that forests are rebuilt to withstand future shocks. Key actions include:

- Climate-Resilient Species: Introducing tree and plant species that are drought-resistant, flood-tolerant, and suited to Himalayan ecosystems. This reduces vulnerability to erratic rainfall and temperature fluctuations.
- Slope Stabilization: Engineering interventions such as bio-engineering, vegetative barriers, and controlled drainage systems to stabilize fragile slopes and prevent recurrent landslides.
- Water Conservation: Integrating watershed management, check dams, and rainwater harvesting into forest recovery plans to secure water availability for both ecosystems and communities.
- Ecosystem-Based Adaptation: Using natural systems (forests, wetlands, grasslands) as buffers against climate risks, thereby reducing reliance on hard infrastructure.

Climate adaptation ensures that recovery is not just reactive but forward-looking, embedding resilience into the very design of restored ecosystems.

C. Disaster Risk Reduction (8%) – Early Warning Systems, Buffer Zones, and Community-Based DRR

To prevent future disasters from causing similar levels of damage, 8% of recovery investments must be directed toward disaster risk reduction (DRR). This includes:

- Early Warning Systems: Establishing real-time monitoring of rainfall, landslides, and river flows, integrated with forest management systems.
- Buffer Zones: Creating protective green belts along rivers, streams, and vulnerable slopes to act as natural barriers against floods and erosion.

- Community-Based DRR: Training local communities in hazard preparedness, forest fire management, and eco-friendly construction practices. Community participation ensures sustainability and ownership of DRR measures.
- Integration with Policy: Embedding DRR principles into forest management plans, district disaster management strategies, and climate action frameworks.

By mainstreaming DRR into recovery, Himachal Pradesh can reduce vulnerability, protect ecological assets, and safeguard communities against future hazards.

Together, Base Recovery, Climate Adaptation, and DRR form a holistic recovery framework. Base recovery restores what has been lost, climate adaptation prepares ecosystems for future shocks, and DRR ensures that risks are systematically reduced. This integrated approach aligns with the Build Back Better (BBB) principle, ensuring that Himachal Pradesh's forests emerge stronger, safer, and more resilient than before.

10.6.4 Strategic Recommendations

11.4.1 Integrated Restoration

- Combine forest regeneration with slope stabilization and soil conservation.
- Promote confined masonry and eco-friendly construction in forest-adjacent communities.

11.4.2 Wildlife Corridors

- Establish biodiversity corridors to reconnect habitats of Ibex and Snow Leopard.
- Strengthen monitoring systems with GIS and community participation.

11.4.3 Community Engagement

- Adopt owner-driven reforestation using local species and materials.
- Involve local communities in plantation drives, soil conservation, and monitoring.

11.4.4 Technology Use

- Employ drones and GIS for damage mapping and recovery tracking.
- Use 3D slope analysis for planning in vulnerable districts.

11.4.5 Capacity Building

- Train forest staff, masons, and contractors in BBB and multi-hazard resilient practices.
- Build awareness campaigns on disaster-safe construction and ecological conservation.

11.4.6 Financial Mobilization

- Leverage CAMPA, state disaster funds, and international climate finance.
- Integrate recovery with CSR and eco-tourism initiatives for sustainable funding.

10.6.5 Financial Summary: Restoration & Conservation Costs

FINANCIAL SUMMARY (INR)		
Forest Restoration	57,77,71,957	*57.78 Cr*
Tree Replacement	1,43,93,03,560	*143.93 Cr*
Plant Replacement	1,77,08,34,638	*177.08 Cr*
Soil Conservation	39,83,69,178	*39.84 Cr*
Wildlife Conservation	2,18,39,600	*2.18 Cr*
DIRECT DAMAGES	**4,20,81,18,932**	**420.81 Cr**

10.6.6 Conclusion

The Forest & Environment sector has sustained **multi-dimensional damages** in the 2025 floods and landslides. Recovery must go beyond physical restoration to embed **climate adaptation, disaster risk reduction, and biodiversity conservation**. By adopting **Build Back Better principles**, leveraging community participation, and mobilizing diverse financing, Himachal Pradesh can rebuild its forests as resilient ecological assets. This will safeguard both the Himalayan environment and the livelihoods of communities who depend on it.

10.6.7 Detailed Cost Estimation for Recovery of Forest & Biodiversity Sector

District	Sites	Total Area	Affected Area	Wildlife Sites	Forest Restoration	Tree Replacement	Plant Replacement	Soil Conservation	Wildlife Habitat	Wildlife Monitoring	Direct Damages
Bilaspur	1	15.00	3.00	0	2,25,000	0	37,50,000	0	0	0	39,75,000
Chamba	230	98,628.09	1,592.47	9	28,10,20,250	98,72,42,050	1,21,06,37,500	25,74,60,000	1,14,67,500	3,15,000	2,74,81,42,300
Hamirpur	22	85.38	2.30	1	3,22,575	37,60,000	2,75,000	0	750	35,000	43,93,325
Kangra	27	5,626.86	35.25	0	40,76,250	1,09,86,250	1,56,87,500	13,87,500	0	0	3,21,37,500
Kinnaur	37	1,58,009.06	109.96	20	1,73,17,500	3,52,50,000	1,87,50,000	2,09,75,000	31,80,000	7,00,000	9,61,72,500
Kullu	28	9,979.36	204.85	0	4,21,48,750	3,18,42,500	4,96,87,500	4,60,25,000	0	0	16,97,03,750
Lahul and Spiti	3	273.02	1.01	0	1,50,600	3,760	12,50,000	0	0	0	14,04,360
Mandi	92	3,703.00	249.00	8	7,81,59,482	7,20,74,500	17,98,39,638	5,32,67,928	60,00,600	1,05,000	38,94,47,147
Shimla	63	10,654.44	447.25	0	13,97,73,550	29,66,17,000	23,20,65,000	1,86,00,500	0	0	68,70,56,050
Sirmaur	52	416.34	85.91	0	1,28,55,875	2,35,000	4,81,41,250	2,53,250	0	0	6,14,85,375
Solan	27	1,705.65	9.83	1	17,22,125	12,92,500	1,07,51,250	4,00,000	750	35,000	1,42,01,625
TOTAL	**582**	**2,89,096.20**	**2,740.84**	**39**	**57,77,71,957**	**1,43,93,03,560**	**1,77,08,34,638**	**39,83,69,178**	**2,06,49,600**	**11,90,000**	**4,20,81,18,932**

11. CROSS CUTTING SECTORS

11.1 Disaster Risk Reduction

Basic Profile of the Sector

Disaster Risk Reduction (DRR) is a cross-cutting sector fundamental to the sustainable development of Himachal Pradesh. The state's topography makes it inherently vulnerable to a range of natural hazards, including earthquakes, landslides, cloudbursts, and floods. The 2018 cloudbursts which signalled the drastic climate change impact with over 50% variation in inter-district rainfall pattern, the devastating flash floods and landslides of 2023 that destroyed infrastructure and livelihood ecosystem, have continued in 2025 unequivocally demonstrating that existing risks are being amplified by climate change, leading to more frequent and intense extreme weather events. The baseline includes initiatives under the Himachal Pradesh State Disaster Management Plan and the work of the State Disaster Management Authority (HPSDMA). However, the scale of the 2025 disaster indicates significant gaps in risk governance, early warning systems, community preparedness, and resilient infrastructure, underscoring the urgent need to strengthen the DRR framework as a core component of the recovery process.

Disaster Risk Reduction (DRR) is the foundational cross-cutting sector that ensures the long-term sustainability and safety of all development efforts in Himachal Pradesh. The catastrophic 2018, 2023 and 2025 monsoons have served as a stark reminder that the state's complex topography, coupled with the escalating impacts of climate change, creates a rapidly evolving risk landscape. While initiatives under the State Disaster Management Plan provide a baseline, the scale of this disaster revealed critical systemic gaps. This chapter outlines a strategic recovery framework aimed not at reconstructing the past, but at **building a more resilient future** by strengthening the very systems designed to understand, mitigate, and manage disaster risk.

Sectoral Policies in DRR

The DRR sector is guided by a robust policy framework, including the Disaster Management Act, 2005, the National Disaster Management Policy, the Himachal Pradesh State Policy on Disaster Management, and the Himachal Pradesh State Disaster Management Plan, and is aligned with the global Sendai Framework for Disaster Risk Reduction. These mandates emphasize a fundamental paradigm shift from reactive relief to **proactive risk-informed governance and development.**

11.1.1. Socio-Economic Impact and Systemic Gaps Analysis

The 2025 disaster underscored several critical weaknesses in the state's DRR architecture, which amplified the socio-economic impact on communities:

- **Inadequate Risk Knowledge:** The lack of a high-resolution, updated, multi-hazard risk atlas hampered predictive planning and targeted mitigation.
- **Multi-Agency Collaboration:** To effectively manage disaster response, and to strengthen resilience, it’s crucial to leverage the role of various agencies. Key players include IMD, CWC, GSI, NCS, ISRO/NRSC/SAC, IITM, State SEOC/DEOC, telecom providers, and PRIs. Their integration helps with data sharing, setting thresholds, and SOPs, while ensuring multi-channel alerts through platforms like WhatsApp, IVRS, sirens, and radio. Last-mile actionable messaging and governance MoUs with funding will further strengthen timely and effective alerts.
- **Fragmented early warning systems:** Current alerts for landslides, cloudbursts, flash floods, GLOFs, and earthquakes are siloed across agencies and tools, resulting in

delays, non-standard thresholds, and limited last-mile delivery. It is unfortunate that the kind of effort that has been put in into cyclone predictions and related EWS is not brought into cloudbursts and flash floods. This must shift to an integrated, multi-hazard, end-to-end EWS with:

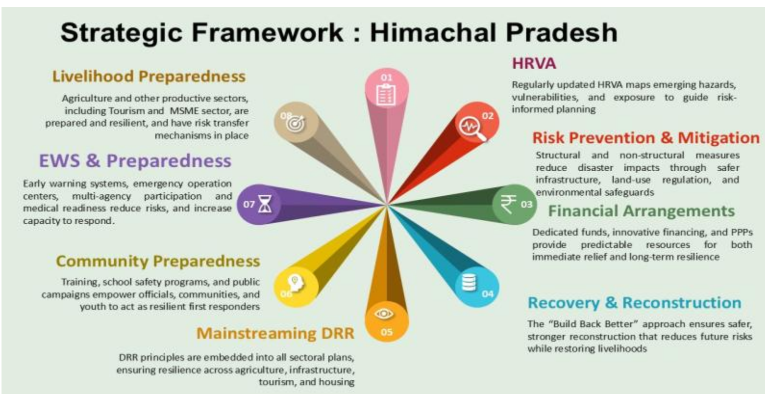
  - **Upstream science and detection:** IMD/IITM for mesoscale rainfall and cloudburst nowcasting; CWC for real-time river telemetry and flood forecasting; GSI for landslide monitoring and zonation; NCS for seismic alerts; ISRO/NRSC/SAC for high-resolution hazard and damage mapping, cryosphere and GLOF analytics.
  - **Data integration and governance:** A state EWS backbone and DMIS that ingests feeds via standard protocols (CAP), unified thresholds, and common SOPs; MoUs for 24/7 data-sharing, joint ops rooms linking SEOC/DEOCs to national centers, and routine interoperability drills.
  - **Last-mile, actionable delivery:** Multi-channel, multilingual alerts with redundancy (cell broadcast, siren towers, IVRS, SMS, radio/TV, WhatsApp, community volunteers), geo-targeted warnings down to gram panchayat clusters, and protective-action guidance tailored to local risk (evacuation routes, safe shelters, road closures).
  - **Reliability and resilience:** Power and telecom backup at SEOC/DEOCs, satellite communication failover, village-level alert captains (PRIs/SHGs), and periodic performance audits to track reach, timeliness, and user comprehension.

- **Gaps in Community Preparedness:** While response mechanisms were activated, the scale of the event overwhelmed local capacities, indicating a need for deeper community integration and training.

- **Erosion of Public Confidence:** The failure of some mitigation structures and warnings has impacted trust, highlighting the need for more reliable and science-based risk reduction measures.

11.1.2. Disaster risk reduction strategic framework for Himachal Pradesh (2025–2028)

The strategic framework for Disaster Risk Reduction (DRR) in Himachal Pradesh is built on eight interlinked pillars that respond to the evolving risk landscape shaped by climate change, extreme monsoon events, and systemic vulnerabilities. The 2025 monsoon disaster, with damages exceeding ₹10,000 crore, has underscored the urgency of shifting from reactive relief to proactive, multi-sectoral resilience building. This framework integrates technical expertise, community needs, and institutional coordination, with a strong call for support from Government of India agencies. An eight-step strategy is suggested for resilience building and reducing risks in the state. Visually this is represented as:



B.1 Hazard, risk and vulnerability analysis

- **Update scope:** A miso-scale, state-wide HRVA refresh, building multi-hazard layers (cloudbursts, flash floods, GLOFs, landslides, earthquakes), exposure of lifelines, and social vulnerability of high-risk groups. The earlier one was in 2016.
- **Climate signals:** Integrate rainfall variability, glacier retreat, permafrost change, and active thrust dynamics (MBT–HFT corridor).
- **GoI interventions:**
  - **GSI:** Seasonal landslide inventory; active fault mapping; micro-seismic zonation; slope failure diagnostics between MBT–HFT[8]; district risk atlases.
  - **IMD/IITM:** Cloudburst-prone area mapping; mesoscale diagnostics; high-intensity rainfall thresholds.
  - **ISRO/NRSC/SAC:** GLOF baselining; cryosphere and permafrost studies; high-resolution terrain change detection.
- **Institutional ask:** Set up a dedicated **GSI Camp Office in Shimla** (under Regional Office Chandigarh) to meet sustained landslide investigation needs across HP.

B.2 Risk Prevention and Mitigation

- **Structural measures:** Earthquake-resilient retrofitting of schools/hospitals; modern slope stabilization and tunnelling; flood control (embankments, check dams, watershed measures).
- **Non-structural measures:** Risk-sensitive land use and zoning; scientific debris/muck management; stream dredging to address raised beds (with environmental safeguards); resettlement using unutilized, low-ecological-value forest land through legal mapping and safeguards.
- **MoEFCC: Regulatory facilitation for riverbed dredging and eco-compliant resettlement.** ***MoEFCC needs to streamline environmental clearances, standardize dredging protocols, and support integrated resettlement plans that meet ecological safeguards*****.** Practically this means issuing clear guidance on *when and how* riverbed dredging can proceed (survey standards, sediment handling, disposal/reuse options), mandating Environmental Impact Assessments and monitoring plans, and tying approvals to *eco-compliant resettlement* that minimizes floodplain loss, restores riparian vegetation, and compensates affected households with livelihood support and habitat restoration measures. The Ministry would also require periodic environmental monitoring and public disclosure of dredging impacts and mitigation outcomes.
- **GSI: Site-specific landslide mitigation designs and land use planning in high-susceptibility zones.** ***GSI would deliver technical landslide hazard products and engineered mitigation designs, and support land-use zoning to reduce exposure.*** Activities include producing landslide susceptibility and inventory maps, conducting geotechnical investigations, and preparing *site-specific* slope stabilization designs (retaining structures, drainage, bioengineering, rock-anchoring) tailored to local geology and seismicity. GSI's role also covers developing landslide risk codes, advising on *land-use restrictions* (no-build buffers, relocation

[8] **Main Boundary Thrust (MBT)** is a major south-verging thrust fault system within the Himalayan orogenic wedge that separates older, higher Himalayan rocks from younger, lower Himalayan sequences. **Himalayan Frontal Thrust (HFT)**, also known as the **Main Frontal Thrust (MFT)**, is the youngest and southernmost thrust marking the boundary between the Himalayan foothills and the Indo-Gangetic Plain. These thrusts are part of the stacked thrust system (including the Main Central Thrust, MCT) that accommodates north–south shortening from the India–Eurasia plate collision

corridors) in high-susceptibility zones, and building capacity for monitoring and early-warning systems to trigger targeted evacuations and maintenance works.

- **CWC: Floodplain and terrace mapping; basin-wise mitigation strategies.** ***CWC would produce basin-scale floodplain/terrace maps and translate them into integrated, basin-wise mitigation plans combining structural and non-structural measures.*** This includes developing high-resolution inundation and terrace maps using 1D/2D hydraulic models, creating Flood Inundation Atlases, and integrating these maps into real-time forecasting and advisory systems. Basin-wise strategies would prioritize interventions—river training, floodplain restoration, retention basins, improved reservoir operation, and community-level preparedness—while aligning with land-use planning, early warning dissemination, and inter-state coordination for transboundary basins. Outputs would be operational tools for planners and emergency managers (inundation maps, forecast products, and prioritized investment lists) to reduce flood risk across entire catchments.
- **Key takeaways: MoEFCC** focuses on *regulatory clarity, environmental safeguards and resettlement standards*; **GSI** provides *technical hazard mapping, engineered mitigation and zoning advice*; **CWC** supplies *hydraulic mapping, forecasting tools and basin-level mitigation roadmaps*—together forming a coordinated, science-based approach to river, slope and flood risk management.
- **Priority corridors:** Landslide-prone routes (e.g., Shimla–Kinnaur highway) to adopt modern engineering, bioengineering, and tunnel-based bypasses where feasible.

B.3 Mainstreaming DRR in development

a. Integration into Planning

Disaster Risk Reduction must be embedded into the very fabric of Himachal Pradesh's development agenda. Rather than being treated as a stand-alone activity, DRR is integrated into all major state planning processes to ensure resilience across sectors.

- ***State Development Plans:*** *Every sectoral plan—agriculture, health, education, housing, and industry—incorporates risk reduction measures. For example, agricultural development programs include crop diversification and soil conservation to reduce vulnerability to floods and landslides.*
- ***Infrastructure Projects:*** *Roads, bridges, hydropower plants, and water supply schemes are designed with hazard-resistant standards. In landslide-prone districts such as Kinnaur and Chamba, slope stabilization and bio-engineering techniques are mandatory for new road projects.*
- ***Tourism Policies:*** *Tourism hubs like Manali, Shimla, and Dharamshala are highly exposed to hazards. DRR integration ensures safe tourist infrastructure, regulated construction in hazard-prone zones, and emergency preparedness plans for hotels and resorts.*

b. Climate Change Adaptation (CCA)

Climate change is intensifying the frequency and severity of disasters in Himachal Pradesh, making it essential to link DRR with climate resilience programs.

- ***Integration:*** *DRR strategies are aligned with climate adaptation initiatives such as watershed management, glacier monitoring, and afforestation.*
- ***Examples:***
    - *Early warning systems for cloudbursts and flash floods in districts like Kullu and others.*
    - *Climate-resilient crops and livelihood diversification programs for farmers in Kangra and Mandi.*

- *Relocation planning for communities exposed to glacial lake outburst floods (GLOFs) in high-altitude regions.*
- *Capacity Building of all key line departments inclusion of Climate Change Adaptation in governance. HIPA also must include CCA into its training modules from governance perspective so that officials are aligned with climate change related challenges and know what steps to take to mitigate the impacts of climate change.*

- ***Outcome:*** *This synergy strengthens long-term resilience by addressing both immediate disaster risks and future climate impacts.*

c. Tools for Mainstreaming

To operationalize DRR integration, practical tools are mandated across government schemes and projects.

- ***Mandatory Disaster Impact Assessments (DIA):***
  - *Every new major project—whether a road, dam, housing scheme, or tourism facility—must undergo a DIA to evaluate potential disaster risks.*
  - *Example: A hydropower project in Kinnaur must assess risks of landslides, seismic activity, and flash floods before approval.*
- ***DRR Checklists for Government Schemes:***
  - *Standardized checklists guide officials to integrate DRR measures into schemes like housing, education, health, and rural development.*
  - *Example: A housing scheme checklist requires earthquake-resistant design, safe site selection, and access to evacuation routes.*
  - *In education schemes, school safety audits and evacuation drills are mandatory.*

B.4 EWS and Disaster Preparedness

a) Early warning systems

Dense multi-hazard observation network — Deploy a valley- and watershed-scale mix of automatic weather stations (AWS), Doppler radars, river and lake level gauges, soil-moisture sensors and seismic stations to enable integrated detection of cloudbursts, flash floods, landslides, GLOFs and earthquakes. These data streams must feed a unified operations centre that runs nowcasts, short-range NWP and hydrodynamic models to produce *impact-based* alerts and inundation footprints for downstream communities. Multi-channel last-mile communication (SMS, IVR, community radio, sirens, village volunteers) and pre-mapped evacuation routes ensure warnings translate into timely action**.**

b) Emergency systems

SEOC/DEOC capability upgrades — Equip State and District Emergency Operations Centres with GIS dashboards, satellite communication backups, standardized SOPs, and interoperable data feeds so situational awareness is continuous during network outages. Community response capacity is strengthened through Aapda Mitra volunteer training (life-saving rescue, basic first aid, local coordination) and by institutionalizing annual multi-agency mock drills that test evacuation, sheltering and logistics. Medical surge readiness includes pre-positioned emergency stockpiles, rapid triage protocols, and targeted training for ASHA and frontline health workers to manage mass-casualty and infectious-disease risks during disasters.

c) GoI interventions: The focus needs to be on same rigour and commitment that has strengthened cyclone related EWS and mitigation for risk reduction in hilly terrains. Bringing in technology, innovations and engaging multi-system / multi-departmental partnerships would help strengthen EWS in the Himalayan mountains.

IMD and IITM: Observation and forecasting enhancements — Expand AWS and radar coverage in mountain valleys, improve short-range nowcasting for extreme rainfall and cloudburst detection, and develop district-level rainfall thresholds and action protocols so meteorological alerts trigger pre-agreed local responses and evacuations.

CWC: Hydromet telemetry and basin forecasting — Strengthen real-time river and reservoir telemetry, establish a dedicated flood-forecasting cell for Himachal Pradesh and produce basin-wise inundation atlases and dissemination chains that link forecasts to district administrations and SEOCs.

NCS and MoES: Seismic network densification and EEW — Add dense seismometers in high-risk corridors and pilot P–S differential early warning systems adapted to Himalayan propagation characteristics; integrate seismic alerts into district SOPs for immediate protective actions (drop-cover-hold, evacuation, halt of critical operations).

ISRO NRSC SAC: Space-based situational awareness — Provide near-real-time damage and hazard mapping, cryosphere and glacial-lake monitoring, and terrain-deformation analytics (InSAR/PS-InSAR) to detect precursory slope movement and evolving GLOF risk; make these products available to SEOCs and line departments for rapid decision making.

Implementation notes: Prioritize interoperability (common data formats, APIs), local ownership (village-level alert committees), and maintenance plans (power, calibration, spare parts). Combine structural investments with community drills and clear, rehearsed trigger thresholds so technical warnings reliably produce lifesaving action.

B.5 Community Preparedness

- **Programs:** Universal school safety (audits, drills, retrofits); DRR Clubs (UGC/NIDM) in colleges and universities; PRI/SHG first responder training; annual district/block drills led by DEOCs.
- **Support mechanisms:** CSR-backed CBDRR initiatives; NGO engagement through State IAG with thematic working groups; multilingual awareness campaigns embedded in monsoon season plans.

B.6 Livelihood Preparedness

- **Agriculture:** Climate-resilient crops, soil conservation, localized advisories, and crop/livestock insurance in Kangra, Mandi, Lahaul-Spiti.
- **Tourism:** Operator training for on-road first response, evacuation protocols, and seasonal risk advisories; risk-sensitive business continuity planning.
- **Risk transfer:** Government-led or PPP disaster insurance pilots for farmers, small businesses, and property owners; parametric covers aligned to rainfall/river thresholds.

B.7 Recovery and reconstruction

- **Build Back Better:** Hazard-resistant reconstruction of roads, bridges, health/education infrastructure; engineered slope stabilization; tunnel-first feasibility on chronic failure stretches.
- **Community-centric recovery:** In-situ housing in safe zones; psychosocial support; inclusive planning with vulnerable groups; policy alignment with ground realities through engagement with Environment & Forests.

- **Livelihoods embedded in R&R:** R&R cannot be restricted to rebuilding of government assets and buildings. For recovery to be truly meaningful, R&R funding windows must open up to supporting livelihood initiatives and restoration of economic activities. Livelihood restoration is a core R&R deliverable—agri-input grants, tourism enterprise revival, market access restoration, and targeted insurance payouts; time-bound recovery packages linked to EWS-enabled reopening. R&R funds must be made available to the Productive Sector.
- **Long-term recovery:** Risk-informed relocation from high-hazard belts; eco-sensitive tourism; resilient agriculture; connectivity and healthcare strengthening in remote districts.
- **GoI interventions:** Revision of Restoration and R&R norms by **MHA/NDMA**, consolidating assistance windows into prescriptive, normative packages; earmarked R&R funds mirroring Mitigation Fund architecture.

B.8 Financial arrangements

- **Dedicated funds:** Operationalize State and District Mitigation Funds; enhanced utilization of NDMF for long-term slope stabilization, retrofitting, watershed resilience.
- **Innovative finance:** CSR for community preparedness and non-structural measures; PPP for landslide-resistant highways and resilient hydropower; risk financing through insurance pilots.
- **External support:** Leverage World Bank's HP READY for power, roads, water supply, and risk financing; align multi-year DRR budgeting (e.g., ₹500 crore over 2025–2028) with district-wise allocations and annual phasing.
- **Budget lines:** Retrofitting, EWS densification, DEOC/SEOC upgrades, community and livelihood restoration embedded within R&R.

Note on Ministry-wise action anchors

- **Ministry of Mines (GSI):** Shimla Camp Office; MBT–HFT slope failure diagnostics; active fault mapping; landslide monitoring and EWS; land use planning; zonal mitigation strategies.
- **Ministry of Earth Sciences (IMD, IITM, NCS):** Cloudburst investigations and hazard mapping; expanded meteorological network; seismic monitoring; micro-seismic zonation; earthquake EWS based on P–S differential; research gap filling.
- **Ministry of Jal Shakti (CWC):** Observation network densification; flood forecasting; floodplain/terrace mapping; HP flood forecasting unit; GLOF hazard monitoring.
- **Ministry of Space (ISRO/NRSC/SAC):** Real-time post-disaster impact analysis using high-resolution data; GLOF modeling; permafrost and cryosphere studies; terrain change and deformation analytics.
- **MHA/NDMA:** Norms revision for Restoration and R&R; prescriptive assistance packages; earmarked funds for R&R; Climate Adaptation Plan provisioning and guidance.

11.1.3. Recovery & Reconstruction Framework from the perspective of DRR

Recovery Measure	Local Example	Expected Outcome
Build Back Better Principle	Reconstructing roads and bridges in Kinnaur and Chamba with earthquake-resistant designs; stabilizing slopes along the Shimla–Kinnaur highway; rebuilding schools and hospitals with safety standards.	Safer infrastructure, reduced vulnerability to earthquakes and landslides, continuity of essential services.
Funding Mobilization	Use of SDRF/NDRF for immediate relief; mobilization of funds after the 2023 monsoon	Timely financial support, diversified funding

	floods for highway repair and hydropower restoration; pipeline project HP READY with World Bank support; insurance schemes for farmers.	sources, strengthened resilience through innovative financing.
Community-Centric Recovery	In-situ reconstruction of homes in safe zones in Kinnaur; livelihood restoration for farmers in Kangra and tourism operators in Manali/Dharamshala; psychosocial support programs; engagement with Dept. of Environment & Forests to revise norms misaligned with ground realities.	Faster economic recovery, stronger community ownership, policies aligned with local needs, improved social resilience.
Long-Term Recovery	Relocation of settlements from high-risk landslide zones; promotion of eco-sensitive tourism in Shimla and Dalhousie; introduction of climate-resilient crops in Mandi and Kangra; improved connectivity and healthcare in Lahaul-Spiti.	Sustainable development, reduced exposure to hazards, diversified livelihoods, improved access to services in remote areas.

11.1.4. Financial Arrangements

D.1. Dedicated Funds

Himachal Pradesh relies on the State Disaster Response Fund (SDRF) and the National Disaster Response Fund (NDRF) for immediate relief and rehabilitation. These funds are activated during floods, landslides, earthquakes, or other emergencies. In addition, the state is mandated to create a State and District Mitigation Fund to finance long-term risk reduction measures such as slope stabilization, retrofitting of schools, and watershed management. The state needs to dig more into the NDMF funds. Roping in CSR funds for some of the non-structural mitigation will help release more funds into structural mitigation efforts.

D.2. Innovative Financing

Beyond government allocations, innovative financing mechanisms are encouraged:

- **Insurance Schemes:** Crop insurance for farmers in Kangra and Mandi, livestock insurance in Lahaul-Spiti, and property insurance in urban centers like Shimla as a pilot project. PPP or sovereign led models also may help.
- **Public-Private Partnerships (PPP):** Collaboration with private companies for resilient infrastructure projects, such as landslide-resistant highways or hydropower plants with enhanced safety features.
- **International Aid & Development Partners:** Projects like HP READY (Resilient Himachal Development Project) with World Bank support aim to strengthen disaster resilience through external funding and technical expertise, especially in critical sectors such as Power, Roads, Water Supply and Risk Financing.

D.3 Budget Allocations

Annual state budgets include **dedicated DRR budget lines** to ensure continuity of funding. For example, allocations are made for:

- Retrofitting government buildings in seismic zones.
- Expanding early warning systems in flood-prone districts.
- Training and capacity building for disaster response teams.

These financial arrangements ensure that Himachal Pradesh is not dependent solely on ad-hoc relief but has **systematic, predictable, and diversified funding sources**. This allows the state to respond quickly to disasters, invest in long-term resilience, and reduce economic losses over time.

11.1.5. Institutional & Governance Framework

E.1. Roles & Responsibilities

- **State Disaster Management Authority (SDMA):** Provides overall policy direction, approves state-level DRR plans, and coordinates with national agencies.
- **State Executive Committee (SEC):** Implements SDMA decisions, ensures departmental compliance, and manages emergency operations.
- **District Disaster Management Authorities (DDMAs):** Lead disaster management at the district level, prepare district disaster management plans, and coordinate local response.
- **Line Departments:** Each department (Health, Education, PWD, Forests, Tourism, etc.) **integrates DRR into its sectoral policies and projects**.

E.2 Coordination Mechanisms

- **Inter-departmental Committees:** Regular meetings between departments to align DRR activities.
- **Joint Task Forces:** Formed during emergencies for search, rescue, and relief operations. These must be regularly tested through mock-drills and simulation exercises at local, district and state levels.
- **Vertical Coordination:** Ensures smooth communication between state, district, and village levels. An improved DMIS along with other communication channels can be used as a tool to achieve this.
- **Horizontal Coordination:** Promotes collaboration across sectors (e.g., Health + Education for school safety programs).

E.3 Stakeholder Engagement

- **NGOs & Civil Society:** Play a vital role in awareness campaigns, community training, and relief distribution. The State Inter Agency Group (State IAG) needs to be actively involved. Sectoral and thematic sub-groups can inform policies and community level initiatives. (Example, where government may find it difficult to penetrate community barriers, NGOs can support explaining things to community.)
- **Private Sector:** Hydropower companies, tourism operators, and construction firms are encouraged to adopt DRR standards.
- **Academic Institutions:** Universities like Himachal Pradesh University (Shimla) and IIT Mandi contribute research, hazard mapping, and training.
- **Community Groups:** Panchayati Raj institutions and self-help groups act as grassroots partners in preparedness and recovery. Civil Society and CSR groups can be encouraged to take up Community Based Disaster Risk Reduction programs at district level (CBDRR).

E.4. Monitoring & Evaluation

- **Periodic Audits:** Regular reviews of disaster management plans at state and district levels.
- **Performance Indicators:** Metrics such as number of trained volunteers, functional early warning systems, and resilience of critical infrastructure.

- **Lessons Learned:** Documentation of past disasters (e.g., 2023 monsoon floods) to improve future strategies.
- **Plan Revision:** Updating DRR strategies every 3–5 years to reflect new risks and climate realities.

11.1.6. Capacity Building & Awareness

F.1 Training Programs

Capacity building starts with training officials, first responders, engineers, teachers, and community leaders. In Himachal Pradesh, this includes specialized courses on earthquake-resistant construction for PWD engineers, search and rescue training for police and fire services, and emergency medical response training for health workers. These programs ensure that technical and frontline staff are equipped to act effectively during disasters.

F.2 School Safety Initiatives

Schools are both vulnerable and critical during disasters. Programs across all districts integrate DRR into the curriculum, conduct evacuation drills, and retrofit school buildings to meet seismic safety standards. Teachers and students are trained in basic emergency response, making schools safer while spreading awareness to families and communities. Colleges and Universities may be engaged in DRR-CCA Clubs.

F.3. Public Awareness Campaigns

Awareness campaigns use radio, TV, social media, and community meetings to spread information about hazards and preparedness. For example, during the monsoon season, campaigns in Kullu and Mandi warn residents about landslide-prone areas and safe evacuation routes. Seasonal advisories for tourists in Manali and Dharamshala also help reduce risks during peak travel periods.

F.4 Knowledge Management

Documenting lessons learned from past disasters is essential. Himachal Pradesh maintains records of events like the 2013 Kinnaur landslides and the 2023 monsoon floods, and the havoc caused in 2025 - using them to improve future strategies. Partnerships with IIT Mandi, Himachal Pradesh University, and NGOs support hazard mapping, research, and dissemination of best practices. Knowledge hubs and digital platforms make this information accessible to planners, communities, and practitioners.

11.1.7. DRR Implementation Budget – Himachal Pradesh (2025–2028)

A budget estimate for executing the key Disaster Risk Reduction (DRR) activities is outlined in the next table. This is designed to be realistic, modular, and adaptable to annual planning cycles.

Implementation and funding guidance

- **Priority sequencing**: fund HRVA and EWS upgrades first to sharpen targeting and triggers; follow with high-priority structural mitigation (schools, hospitals, slope works) and community preparedness measures.
- **Stacking approach**: use grants and MDB technical assistance for studies and pilots; combine concessional MDB loans and state co-finance for large civil works; mobilize private capital via blended finance and PPPs for retrofits and O&M.

- **Local revenue and sustainability**: establish municipal resilience levies and earmarked maintenance budgets; use MGNREGA and community labour to reduce costs and build ownership.
- **Bankability and governance**: create a Resilience Financing Cell to prepare standardized project templates, cost-benefit analyses, procurement packages and O&M plans to attract investors and expedite approvals.
- **Risk reduction plus risk transfer**: pair capital investments with parametric insurance or catastrophe bonds to protect fiscal space and accelerate recovery after extreme events.
- **Interoperability and operations**: mandate common data standards, APIs and a single situational-awareness dashboard linking IMD, CWC, SEOCs and district administrations; define clear trigger thresholds and SOPs for last-mile action.

DRR Implementation Budget Himachal Pradesh 2025–2028

Component	Key Activities	Estimated Cost INR Crore	Primary Funding Sources	Additional Funding Options
1. HRVA Update	Multi-hazard mapping; vulnerability & exposure profiling; community validation workshops; socio-economic risk analysis; GIS database creation	**25**	SDMF; NDMF; EAPs	NAFCC grants; MDB technical assistance; CSR/philanthropy; state budget
2. Risk Prevention and Mitigation	Retrofitting schools and hospitals; slope stabilization (bioengineering + structural); river training and flood control; ecosystem restoration; prioritized investment list with O&M plans	**300**	NDRF; SDRF; World Bank / MDB loans; PPP; CSR	ADB/AIIB concessional loans; blended finance (VGF + private capital); green/resilience bonds; NABARD credit; municipal levies
3. Mainstreaming DRR	Disaster Impact Assessment roll-out; DRR checklists for sectors; integration into sectoral plans and building codes; training for line departments	**15**	State budget; UNDP / UNICEF technical assistance, EAP	MDB TA grants; bilateral technical cooperation; academic partnerships
4. Preparedness Systems EWS and Emergency	Dense AWS/radar/seismic/river telemetry; integrated EWS platform; SEOC/DEOC GIS and satcom upgrades; multi-channel last-mile alerts; Aapda Mitra training; annual multi-agency drills; medical surge stockpiles and ASHA training	**120**	IMD/CWC program funds; SDRF, GSI, EAP, National Center for Seismology (NCS)	GCF/GEF grants; MDB resilience grants; CSR for community systems; parametric grants
5. Community Preparedness	School safety programs; DRR clubs; community evacuation planning; mock drills; Aapda Mitra volunteer networks; local alert committees	**20**	SDRF; district budgets	CSR; philanthropy; community co-finance (MGNREGA labour)
6. Livelihood Resilience	Climate-resilient agriculture; crop and livestock insurance facilitation; tourism safety training; alternative livelihoods and market linkages	**40**	Agriculture Dept; CSR; PPP; CSS, NDRF, EAP, Centrally sponsored schemes	NABARD schemes; microfinance; donor grants for value chains

7. Recovery and Reconstruction	Build Back Better reconstruction; resilient housing and infrastructure; community-centric recovery planning; planned relocation packages with livelihood support	**150**	NDRF; HP READY; state budget	MDB reconstruction loans; GCF adaptation grants; insurance payouts
8. Financial Arrangements	Creation of Mitigation Fund; design of PPP frameworks; preparation of bankable project templates; resilience bond readiness	**20**	State budget; private sector contributions; EAP, NDRF	Green/resilience bonds; blended finance facilities; development impact bonds
9. Institutional Strengthening	DDMA capacity building; DMIS upgrades; inter-agency coordination protocols; maintenance and calibration plans for observation networks	**20**	State budget; technical assistance	MDB TA; bilateral capacity grants; academic partnerships
10. GoI Technical Interventions	IMD/IITM AWS and radar expansion; CWC real-time telemetry and basin forecasting; NCS/MoES seismic densification and P–S EEW pilots; ISRO/NRSC InSAR and cryosphere monitoring	**40**	Central ministry program budgets (IMD/CWC/NCS/ISRO)	MDB technical cooperation; GEF for cryosphere; bilateral science grants
11. Risk Transfer and Contingency Financing	Parametric insurance pilots; catastrophe bonds; contingency credit lines; capitalization of reserve funds	**20**	State contingency reserves; NDRF contingency windows	Insurance-linked securities; multilateral risk pools; donor contingent grants

Total Estimated Cost ₹770 Crore. Total Estimated Budget (2025–2028): ₹ 770 Crores. Actual costs may vary depending on final detailed plan. This is a multi-year estimate aligned with recovery and resilience planning. It can be phased annually (e.g., ₹200 Cr in Year 1, ₹250 Cr in Year 2, etc.). Each line item can be broken down further into district-level allocations if needed.

11.2 Environment, Climate Change and Biodiversity

Basic Profile of the Sector

Himachal Pradesh, a Himalayan state with 66% forest cover and over 3,200 plant species and 5,700 animal species, is both a biodiversity hotspot and a critical ecological asset for India[9]. The state is the source of major river systems like the Satluj, Beas, Ravi, and Chenab. Its fragile mountain ecosystems, glaciers, rivers, and forests provide essential ecosystem services—water security, carbon sequestration, and livelihoods. However, the 2025 monsoon disaster underscored how climate change is amplifying risks: erratic rainfall, glacier retreat, forest fires, and biodiversity loss are converging to threaten both human development and ecological integrity.

Between 2021–2025, Himachal Pradesh suffered economic losses of ₹46,000 crore due to climate-linked disasters including floods, landslides, and forest fires[10]. Rising temperatures (projected increase of up to 3°C by 2050) and accelerated glacier melt in districts like Kinnaur, Lahaul-Spiti, and Kullu are reshaping hazard profiles, increasing risks of Glacial Lake Outburst Floods (GLOFs)[11]. Forest fire alerts surged from 714 in 2022–23 to over 10,000 in 2023–24, showing how warming and drying conditions are intensifying ecological stress.

Sectoral Policies

The Environment, Climate Change, and Biodiversity sector is guided by a comprehensive and multi-layered policy framework that acknowledges the unique fragility and marginality of the Himalayan ecosystem. At the state level, this includes the Himachal Pradesh Environment Policy Guidelines, which explicitly address these vulnerabilities, and the State Action Plan on Climate Change (SAPCC), which is aligned with the National Action Plan on Climate Change (NAPCC) to mainstream climate resilience into development. Nationally, the sector is governed by the National Environment Policy, 2006, the Forest (Conservation) Act, 1980, and the Biological Diversity Act, 2002, the latter being operationalized through the initiatives of the Himachal Pradesh State Biodiversity Board to conserve its rich genetic resources. Furthermore, the state's efforts are congruent with global commitments under the Paris Agreement on climate change, the Sendai Framework for Disaster Risk Reduction, and the Convention on Biological Diversity. Collectively, these policies and frameworks underscore the imperative of conserving natural resources, maintaining ecological balance, and integrating climate and disaster resilience into all development planning.

Socio-Economic Impact and Systemic Gaps

- **Glacier Retreat & Water Security:** The Himalayan cryosphere is undergoing unprecedented change, with major glaciers in the Satluj, Beas, and Chenab basins showing significant retreat. This directly threatens the state's water security, as evidenced by the **State of India's Environment Report indicating that over 70% of traditional water springs—the primary source of drinking water and irrigation for rural communities—are drying up or becoming seasonal.** This hydrological instability poses a dual threat: creating immediate water scarcity for villages while simultaneously increasing the long-term risk of Glacial Lake Outburst Floods (GLOFs). For energy infrastructure, this translates into **reduced and erratic river flows, jeopardizing the operational efficiency and financial viability of Himachal's extensive hydropower network, which has an installed capacity of over 10,000 MW and is a critical revenue source for the state.**

[9] https://www.teriin.org/projects/green/pdf/HP-Biodiversity.pdf

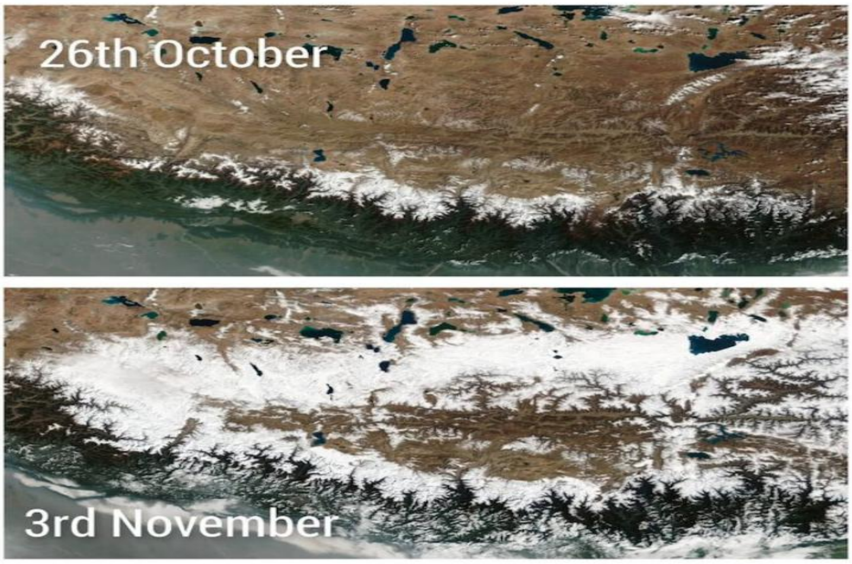
[10] https://www.devdiscourse.com/article/science-environment/3674992-himachal-pradesh-faces-climate-challenges-report-highlights-losses-future-strategies

[11] https://thenewshimachal.com/2025/10/himachals-development-story-faces-climate-test-report-warns-of-rising-temperatures-and-glacier-melt/

- **Agriculture & Livelihoods:** The agrarian economy, which supports nearly **70% of the state's population,** is highly vulnerable to climate shifts. With approximately **80% of the state's farmland being rain-fed**, crop yields are directly at the mercy of increasingly erratic monsoon patterns. Climate variability is not just reducing productivity through droughts and unseasonal rains but is also altering the lifecycle of pests and pathogens. For instance, the **apple belt, a cornerstone of the state's economy, has seen a significant shift and a reduction in yield due to insufficient winter chilling hours and increased incidence of diseases like apple scab**, directly impacting the livelihoods of thousands of farmers.

- **Tourism:** The tourism sector, a vital economic pillar contributing **approximately 7.8% to the state's GDP and providing significant direct and indirect employment,** faces an existential threat from climate change. **Reduced and unreliable snowfall in key destinations like Manali, Kufri, and Dalhousie has severely impacted the winter sports season, leading to cancellations and shorter revenue windows for hotels and allied services.** Furthermore, the increasing frequency of extreme weather events, such as cloudbursts and landslides during the peak summer season, disrupts travel plans, damages tourism infrastructure, and erodes the state's reputation as a safe and predictable destination, thereby threatening the long-term sustainability of this critical sector.
- **Biodiversity Loss**: Habitat fragmentation, forest fires, and invasive species are eroding biodiversity heritage sites and sacred groves. Extensive loss of forest cover due to landslides and land erosion. Preliminary estimates indicate damage to over 5,000 hectares of forest land, including loss of valuable timber, non-timber forest produce (NTFP), and natural carbon sinks.

- **Fiscal Stress**: Climate-linked disasters have compounded fiscal deficits, limiting investment in resilience.[12]. The loss of timber, medicinal plants, and other NTFPs represents a direct economic loss to the state and local communities. The cost of slope stabilization now required due to forest loss runs into hundreds of crores



Satellite imagery captures the dramatic changes Cyclone Montha created with massive amount of snow across the Himalayas – Tibet with the onset of 2025 Winter (Image credit: https://x.com/KiranKS/status/1985966345872421277/photo/1)

Strategic Framework for Recovery & Resilience

a) Climate Change Adaptation

12 https://www.outlookindia.com/national/fund-crunch-from-centre-impeding-himachals-growth-and-climate-preparedness-himachal-pradesh-cm-sukhwinder-singh-sukhu

- Glacier monitoring and cryosphere-specific risk assessments.
- Climate-resilient crops and livelihood diversification in Kangra, Mandi and others.
- Relocation planning for GLOF-prone communities in Lahaul-Spiti.

b) Biodiversity Conservation

- Strengthen Protected Areas (30% of state area) and biodiversity heritage sites[13] TERI.
- Promote community-based conservation (sacred groves, eco-tourism).
- Expand afforestation with native species to restore degraded lands.

c) Pollution & Ecosystem Health

- Enforce stricter controls on mining, construction, and waste management.
- Integrate watershed management with climate adaptation.

d) Governance & Finance

- Establish a **State Climate and Biodiversity Fund** leveraging CSR and PPP.
- Mainstream **Disaster Impact Assessments (DIA)** into all infrastructure projects.
- Strengthen inter-departmental coordination for cascading hazards

Recovery & Reconstruction Priorities

Measure	Local Example	Expected Outcome
Glacier & Cryosphere Monitoring	IIT Mandi-led glacier studies in Kinnaur	Early warning for GLOFs, water security
Forest Fire Management	Satellite-based alerts, community fire brigades	Reduced biodiversity loss, safer livelihoods
Eco-sensitive Tourism	Regulation in Shimla, Manali, Dalhousie	Sustainable tourism, reduced ecological footprint
Biodiversity-based Livelihoods	NTFP & medicinal plants in Chamba	Income diversification, conservation incentives

Timeline of suggestive Actions:

Early Recovery	0-6 months	High	• Emergency stabilization of eroded slopes using bio-engineering; • Clearing of critical river passages to restore natural flow • Assessment of contaminated sites
Medium to Long Term	1 – 5 years	High	• Large-scale afforestation and grassland development using native species • restoration of watersheds and springs • Mapping and securing of critical ecological corridors for biodiversi

[13] https://www.teriin.org/projects/green/pdf/HP-Biodiversity.pdf

Strategic Recovery Framework:

The following framework outlines the prioritized interventions, budget estimates, and implementation details for integrating environmental resilience into the state's recovery process.

Reconstruction/ Recovery Measures	Overall Budget (₹ Crore)	Line Department	Funding Sources	Timeline
1. Ecosystem Restoration & Slope Stability				
Bio-engineering for Slope Stabilization (Priority Landslides Zones)	Align with PWD budget – 450 crores	Forest Dept. / Soil Conservation Dept. / PWD	NDRF / CAMPA	36 months
Large-Scale Afforestation & Climate-Resilient Van Mahotsav	300 crores	Forest Department	State Plan / CAMPA / Green India Mission	60 months
2. Water Security & Climate Resilience				
Spring-shed and Watershed Rejuvenation Programme	500 crores	IPH Dept. / Forest Dept.	MGNREGA / State Plan / Climate Funds	48 months
3. Biodiversity Conservation & Policy				
Securing and Restoring Critical Wildlife Corridors	150 crores	Forest Department	Compensatory Afforestation Fund	24 months
Mainstreaming Environment & Climate Risk in Development Planning	50 crores	Dept. of Environment, Science & Tech	State Plan	18 months
Total Estimated Budget	1,450 crores			

Rationale and Breakdown of Approximate Costs:

1. **Bio-engineering for Slope Stabilization (₹ 450 Crore):**
    - **Rationale:** With thousands of landslides reported, this is a priority. Bio-engineering (using live vegetation with structural elements) is labor-intensive and requires specialized planting material.
    - **Cost Basis:** Approx. ₹ 9-10 lakh per hectare for comprehensive treatment. Targeting ~5,000 hectares of critically vulnerable slopes.
2. **Large-Scale Afforestation (₹ 300 Crore):**
    - **Rationale:** To compensate for extensive forest loss and enhance carbon sinks. Requires native, climate-resilient saplings, and long-term maintenance.
    - **Cost Basis:** Approx. ₹ 1 lakh per hectare for raising a dense plantation over 5 years. Targeting ~30,000 hectares.

3. **Spring-shed and Watershed Rejuvenation (₹ 500 Crore):**
    - **Rationale:** Critical for long-term water security. Involves catchment treatment, groundwater recharge structures, and spring development.
    - **Cost Basis:** A comprehensive watershed program can cost ₹ 40-50 lakh per watershed. This budget accounts for hundreds of critical micro-watersheds and spring-sheds across the state.
4. **Securing Critical Wildlife Corridors (₹ 150 Crore):**
    - **Rationale:** Habitat fragmentation is a major threat. Funds are for restoring forest connectivity, creating underpasses/overpasses where infrastructure intersects corridors, and anti-poaching measures.
    - **Cost Basis:** High-cost interventions like land acquisition (if needed), specialized planting, and engineering structures.
5. **Mainstreaming Environment & Climate Risk (₹ 50 Crore):**
    - **Rationale:** A "soft" component for capacity building, developing technical guidelines, decision-support systems, and monitoring frameworks.
    - **Cost Basis:** Covers consultants, training programs, software, and stakeholder workshops across departments.

Important Note: These are **preliminary and indicative estimates**. A final, authoritative costing must be derived from detailed project reports (DPRs) prepared by the respective line departments, which include precise quantities, designs, and schedule of rates. This total of **approximately ₹ 1,450 Crore** serves as a robust placeholder for the PDNA 2025, highlighting the significant investment required for a green and resilient recovery.

2. Implementation Mechanism

A coordinated, multi-stakeholder approach is essential for the successful execution of this green recovery strategy.

- **Lead Nodal Agency: Department of Environment, Science & Technology**
- **Key Line Departments:**
    - **Forest Department:** Ecosystem restoration, afforestation, biodiversity conservation.
    - **Department of Soil and Water Conservation:** Slope stabilization and watershed management.
    - **WRD Department:** Spring-shed development and water resource management.
- **Key Partners:** MoEFCC, G.B. Pant NIHES, UNDP, World Bank, State Biodiversity Board, and local NGOs/CBOs.
- **Primary Funding Sources:** CAMPA, NDRF, State Plan.
- **Secondary/Convergent Funding Sources:** MGNREGA, National Adaptation Fund for Climate Change (NAFCC), Green Climate Fund, and Corporate Social Responsibility (CSR) funds.

3. Impact of Recovery

The strategic investments outlined in this framework are designed to deliver foundational co-benefits across sectors, ensuring long-term resilience:

- **Enhanced Natural Buffers:** Restored forests and stabilized slopes will reduce soil erosion and mitigate the impact of future landslides and floods, directly protecting downstream infrastructure and communities.
- **Secured Livelihoods:** Improved health of ecosystems will revive sustainable agriculture, horticulture, and NTFP-based incomes, providing economic stability to rural communities.
- **Long-term Water Security:** Rejuvenated springs, watersheds, and aquifers will ensure a reliable year-round water supply for drinking, irrigation, and hydropower, buffering against climate-induced scarcity.
- **Climate Mitigation & Compliance:** Afforestation and forest conservation will enhance carbon sequestration, supporting Himachal Pradesh in meeting its climate commitments under state and national policies.

Conclusion

The Environment, Climate Change, and Biodiversity sector is not peripheral but central to Himachal Pradesh's resilience. The ₹46,000 crore losses in four years highlight the urgency of integrating ecological safeguards into recovery. By linking biodiversity conservation, climate adaptation, and disaster risk reduction, Himachal Pradesh can build a climate-resilient, ecologically secure future.

12. RESILIENT RECOVERY IN A CHANGING CLIMATE: SECURING HIMACHAL PRADESH'S FUTURE

12.1 The Window of Opportunity for a Resilient Himachal

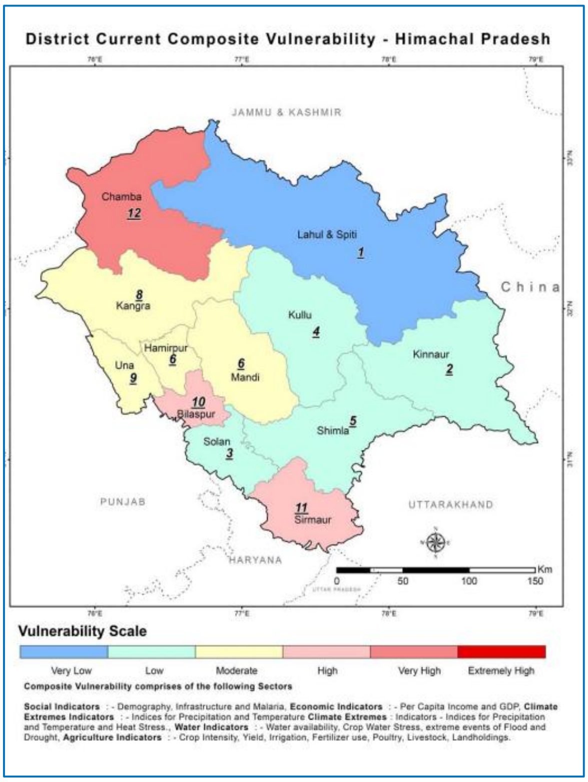
The devastating 2025 monsoon that prompted this PDNA is a stark reminder of Himachal Pradesh's acute vulnerability to a new era of climate-amplified extreme events. This recovery process presents a critical, time-bound window of opportunity. We can choose to simply replace what was lost, rebuilding the vulnerabilities of the past, or we can Build Back Better by integrating climate resilience into the very fabric of reconstruction. The recovery from the current disaster must be planned with the unequivocal scientific evidence of long-term climate change in mind. Here, we provide a strategic framework for ensuring that every rupee invested in recovery also buys reduced risk and enhanced adaptive capacity for the future.

12.2 The Inescapable Context: A State on the Climate Frontline

Himachal Pradesh's climate is shifting from a stable foundation to a source of systemic risk. Recovery efforts that ignore this new reality will inevitably lead to repeated losses.

12.2.1 The Scientific Evidence: A Trajectory of Heightened Risk

- Historical Shifts (1951-2013): Data shows a significant decline in annual rainy days and a rise in warm nights, indicating a trend toward longer dry spells and warmer conditions, which destabilize slopes and intensify the hydrological cycle.
- Future Projections: By end-century, the state is projected to warm by 2.5°C to 5.0°C, with the most significant increases in high-altitude regions. While total monsoon rainfall may increase, it will fall in shorter, more intense bursts, directly fueling the flash floods and landslides we are witnessing. Crucially, winter and pre-monsoon rains are projected to decline, threatening water security.



In picture: District level Composite Climate Vulnerability map of Himachal. Source: "Climate Change Impacts and Vulnerability Assessment in Himachal Pradesh", GIZ 2018, Edited by Sh.. D.C. Rana IAS & others

12.2.2 The Disaster-Climate Nexus: A Vicious Cycle

The recent disaster is not an isolated event but a symptom of this changing climate. The combination of:

- Intense Rainfall: Projected increases in extreme precipitation events.
- Drier Spells: Preceding dry periods that reduce soil cohesion.
- Warming Temperatures: Accelerating glacial melt and permafrost thaw in high altitudes. ...creates a perfect storm for the devastating slope failures, riverbank erosion, and flash floods that have caused the current devastation.

12.3 From Assessment to Action: Mainstreaming Resilient Recovery

The recovery process must be reconceived not as a return to the status quo, but as a strategic upgrade of the state's infrastructure, ecosystems, and communities to withstand future shocks.

3.1. Principle 1: Climate-Proofing Physical Infrastructure

The reconstruction of roads, bridges, and buildings must adhere to new, climate-resilient codes.

- Roads & Highways: Move beyond simple re-laying of tarmac. Integrate advanced drainage, bio-engineering for slope stabilization, and redesigned culverts and bridges with higher hydraulic capacity to accommodate future peak flows. Avoid rebuilding in identified high-risk zones (e.g., old landslide scars, active floodplains).
- Water Infrastructure: Rebuild damaged water supply schemes to be drought and flood-resilient. This includes diversifying water sources, protecting intake structures from flash floods, and using resilient materials for pipelines.
- **Power and Communications:** Bury cables where possible, **especially in landslide-prone zones,** harden transmission towers, and ensure backup power for critical early warning and communication systems.

3.2. Principle 2: Investing in Nature-Based Solutions

Ecosystems are the first line of defense. Their restoration is a cost-effective recovery strategy.

- Watershed Restoration: Prioritize the restoration of forests, grasslands, and wetlands in the catchment areas of damaged regions. This helps in water retention, reduces runoff velocity, and stabilizes slopes.
- Reviving Spring Systems: The disaster has likely altered groundwater aquifers. Integrate spring-shed management and rainwater harvesting into the recovery plan to secure drinking water sources for affected communities, making them resilient to both droughts and contaminated surface water.
- Riverbank Protection: Use bio-engineering (willow planting, geotextiles with vegetation) instead of, or in conjunction with, concrete retaining walls to restore riparian buffers, which absorb flood energy and reduce erosion.

3.3. Principle 3: Building Resilient Livelihoods

Recovery of the economy must focus on climate-smart sectors.

- Agriculture & Horticulture: Provide support for farmers to transition to climate-resilient crop varieties and water-efficient micro-irrigation systems. For apple growers, facilitate the shift to new varieties suitable for changing chill patterns and provide insurance products tailored to climate risks.

- Tourism: Rebuild the tourism sector with a focus on sustainability and risk reduction. Develop and promote off-season tourism, ensure new infrastructure is located in safe zones, and train communities in disaster response to protect visitors.
- Skill Development: Train affected youth in green jobs related to climate-resilient construction, ecosystem restoration, and renewable energy maintenance.

3.4. Principle 4: Strengthening Governance and Early Warning Systems

A resilient recovery requires a smarter system of governance.

- Enforce Land-Use Planning: Use the PDNA's momentum to strictly enforce land-use and zoning regulations, preventing reconstruction in high-risk areas. This will require political courage but is non-negotiable for long-term safety
- Last-Mile Early Warnings: Rebuild and enhance the early warning system to ensure it is multi-hazard (landslides, floods, GLOFs) and reaches the last person in the most remote village with clear, actionable messages.
- Community-Based Disaster Risk Management (CBDRM): Empower local communities with training, equipment, and resources to be first responders and active participants in risk reduction planning.

12.4 A Framework for Action: Linking Recovery to Long-Term Adaptation

The table below provides a concrete framework for aligning immediate recovery actions with long-term strategic goals.

Sector	"Build Back Better" Recovery Action	Long-Term Adaptation Goal
Transport	Reconstruct roads with improved drainage, bio-engineered slopes, and bridges designed for future flood volumes.	A climate-resilient transport network that ensures connectivity during and after extreme events, supporting economic stability.
Water & Sanitation	Rebuild water schemes with protected intakes, diversified sources, and promoted rainwater harvesting in affected communities.	Water security for all, resilient to both droughts and floods, reducing vulnerability to water-borne diseases.
Housing & Settlement	Relocate settlements from high-risk zones; reconstruct houses with disaster-resilient designs and materials in safer locations.	Reduced human exposure to climate risks, leading to fewer casualties and displaced persons in future disasters.
Agriculture	Distribute climate-resilient seeds, subsidize micro-irrigation, and provide access to weather-based crop insurance.	A productive, diversified, and climate-resilient agricultural sector that ensures food security and stable farmer incomes.
Environment	Launch immediate watershed restoration and afforestation programs in critically damaged catchments.	Healthy, functioning ecosystems that act as natural infrastructure, buffering communities from climate impacts.

12.5 On the Cross Roads: Rebuilding Vulnerable Past or Constructing Resilient Future

The devastating 2025 monsoon is not an isolated event but a symptom of a new climate reality. Himachal Pradesh stands at a crossroads, where the choice is between rebuilding the vulnerable past or constructing a resilient future. This recovery must be a transformative leap, not a incremental step. It demands a paradigm shift from reactive disaster response to proactive climate adaptation, embedding resilience into the very DNA of the state's development planning.

Drawing from the immediate principles for recovery outlined earlier, the following five strategic pillars outline a long-term pathway for a climate-resilient Himachal Pradesh:

Pillar 1: Mainstream Climate Resilience into Governance and Finance

1. **Enact a Himachal Pradesh Climate Resilience Act:** Legislate a framework that mandates climate risk assessments for all infrastructure projects, land-use planning, and public investments. This will ensure that "Build-Back-Better" is not a slogan but a legal requirement.
2. **Implement Climate-Responsive Budgeting:** Integrate climate vulnerability and adaptation metrics into the state budget. Allocate specific, trackable funds for adaptation, ensuring that every department, from PWD to Agriculture, has a climate resilience mandate and budget. Learn from Bhutan's system of screening all development projects for climate risks.
3. **Establish a State-Level Climate Resilience Mission:** A dedicated, high-powered mission with cross-departmental authority can drive the integration of climate action, breaking down silos and ensuring coordinated implementation.

Pillar 2: Build Nature-Based and Engineered Resilience for Infrastructure

1. **Adopt "Sponge Country" Principles for Mountains:** Inspired by **China's "Sponge City"** concept, promote "Sponge Catchments." This involves:
   - **Re-greening with Native Species:** Large-scale afforestation using deep-rooted native species to bind soil and absorb excess water.
   - **Reviving Traditional Water Systems:** Restoring *kuhls* (traditional irrigation channels), *khatris* (water recharge pits), and creating check dams to slow down runoff and recharge aquifers.
   - **Permeable Surfaces and Bio-Swales:** Mandate permeable materials in road construction and urban areas to reduce surface runoff.
2. **Develop Landslide-Resilient Infrastructure Codes:** Partner with global experts from **Japan and Switzerland** to develop and enforce a new "Himalayan Infrastructure Safety Code." This includes:
   - **Advanced Slope Stabilization:** Use of soil nailing, gabion walls, and terracing with geosynthetics.
   - **Zoning and "Set-Back" Laws:** Legally enforce safe distances for construction from riverbanks and unstable slopes, informed by high-resolution landslide hazard zonation maps.
   - **"Avoidance" as a Strategy:** Relocate critical infrastructure and communities from "No-Build Zones" identified as perpetually high-risk.

Pillar 3: Forge a People-Centric, Technology-Enabled Early Warning System

1. **Achieve "Last-Meter" Connectivity for Warnings:** Move beyond "Last-Mile." Integrate Common Alert Protocol (SACHET) with community sirens, dedicated public address systems in villages, and ensure alerts are in local dialects. Empower Panchayats as the nodal point for receiving and acting on warnings.
2. **Deploy an "Internet of Things (IoT) Sensor Web":** Install a dense network of low-cost, solar-powered sensors on slopes, riverbanks, and bridges to monitor soil moisture, vibration, and water levels in real-time. This provides granular, hyper-local data, a practice being pioneered

in the **European Alps**. Technical collaboration with experts from Japan, Switzerland and European Alps might help Himachal. Innovation challenges also may bring in new ideas (e.g. how do we make the electric poles play a dual purpose as sensors of potential landslides.)

3. **Develop Impact-Based Forecasting:** Collaborate with the IMD to move beyond "how much it will rain" to "what the rain will do." Forecasts should clearly state the likely impact on specific valleys and river systems, enabling precise pre-emptive actions.

Pillar 4: Promote Climate-Smart, Diversified Livelihoods

1. **Incentivize Climate-Resilient Agriculture:** Promote a shift to less water-intensive crops (e.g., from paddy to millets), support protected cultivation (polyhouses), and develop drought and flood-resistant seed varieties. Provide crop insurance directly linked to weather indices.
2. **Foster a "Circular Bio-Economy":** Leverage the state's natural assets for sustainable livelihoods. This includes promoting organic horticulture, sustainable tourism, and value chains around non-timber forest products (NTFPs) like medicinal plants.
3. **Build a Resilient Tourism Model:** Learn from Nepal and Bhutan to shift from volume-based to value-based tourism. Promote eco-tourism, agri-tourism, and cultural tourism that distributes benefits locally and reduces pressure on fragile ecosystems. Develop and market "Shoulder Season" tourism to de-congest the monsoon period. ***(See Note in Tourism Sector)***

Pillar 5: Secure Innovative Financing for Resilience

1. **Create a "Himachal Resilience Fund":** Seed the fund with state resources and aggressively tap into national and international climate finance, including the **Green Climate Fund** and **Adaptation Fund**.
2. **Issue a Sovereign Green Bond for States:** Himachal can be a pioneer in issuing a "Green Bond" specifically earmarked for funding climate-resilient infrastructure and nature-based solutions.
3. **Leverage Disaster Risk Financing:** Explore parametric insurance products for the state and its farmers, where payouts are triggered automatically by pre-defined weather events (e.g., rainfall exceeding 300mm in 24 hours), ensuring immediate liquidity for response.

Conclusion: A Call to Lead

The disaster that struck Himachal Pradesh is a profound tragedy, but it also lays bare the unsustainable trajectory of development in a climate-changed world. This PDNA must be the catalyst for a fundamental shift. By championing a resilient recovery, we can honour the losses suffered by ensuring that the rebuilt Himachal Pradesh is not only restored but is safer, greener, and more resilient than before. This is not merely a cost; it is the most critical investment in the state's future. Let us ensure that this recovery becomes a national model for turning a disaster into an opportunity for transformative, climate-smart development.

Himachal Pradesh now has the opportunity to become a global leader in mountain climate resilience. This "Way Forward" is a call for visionary leadership, collaborative action, and sustained investment. By embracing these strategies, Himachal can transform its vulnerability into strength, ensuring that its people, its priceless ecosystems, and its unique culture not only survive but thrive in the face of future climate challenges. The time for transformative action is now.

13. IMPLEMENTATION & MONITORING

13.1 Introduction

The Monsoon of 2025 has left Himachal Pradesh with a profound humanitarian and developmental crisis, marked by the tragic loss of 468 lives and widespread destruction of infrastructure, livelihoods, and ecosystems. The estimated damages, currently under detailed assessment, underscore the acute vulnerabilities of the Himalayan region to intensifying hydro-meteorological hazards. This Post Disaster Needs Assessment (PDNA) 2025 provides the foundational analysis of these damages and losses.

The ongoing Recovery and Reconstruction (R&R) process from 2023 has been a testing ground for institutional response, community resilience, and the "Build Back Better" principle. While significant progress has been made in restoring critical infrastructure like roads and bridges, challenges persist in housing reconstruction, livelihood regeneration, and the integration of long-term risk reduction into development. The 2025 disaster compounds these challenges, making it imperative that the recovery strategy for this new event is not conceived in isolation. It must be a refined, accelerated, and more resilient iteration of the ongoing efforts, firmly anchored in climate adaptation and sustainable development.

This chapter outlines a comprehensive vision and actionable framework for the 2025 recovery, incorporating dedicated strategies for resource mobilization, phased implementation, and robust monitoring & evaluation, while drawing upon the experiences of the 2023 R&R.

13.2 Recovery Vision & Strategic Approach

The vision for the 2025 recovery is to **"Catalyze a climate-resilient, inclusive, and sustainable recovery in Himachal Pradesh by restoring and enhancing the social, economic, and infrastructural fabric of affected communities, while systematically reducing future disaster risk through risk-informed development."**

This vision will be operationalized through a five-pillar strategic approach:

1. **Risk-Informed Citizen-Centric Reconstruction:** Shifting from asset-centric to people-centric recovery. This involves empowering Gram Panchayats through the *Strengthening Risk-Informed Development Planning* model, providing them with technical resources (like GIS-based risk maps) and finances to lead local-level planning. Recovery interventions will be co-designed with communities, integrating traditional knowledge on housing, agriculture, and water management with scientific DRR measures.
2. **Ecology-Sensitive Infrastructure Redevelopment:** Mandating that all reconstruction—be it roads, bridges, water schemes, or housing—adopts *Himalayan Context-Specific Design Codes*. This includes rigorous slope stability measures, improved drainage, use of bio-engineering techniques, and avoidance of critical hazard zones. The cumulative environmental impact of infrastructure projects will be a key planning parameter.
3. **Economic Diversification for Livelihood Resilience:** Addressing over-dependence on tourism and monoculture horticulture by promoting a *Diversified Livelihood Basket*. Recovery funds will be leveraged to support local agro-processing, eco-tourism, digital entrepreneurship, and skill development in climate-resilient practices. Strengthening local market linkages and village-level infrastructure is crucial to reduce external dependency.
4. **Institutional Strengthening for Recovery Governance:** Establishing a dedicated, empowered *Recovery Management Unit (RMU)* within HPSDMA (as outlined in Section 13.5) to be the nodal body for planning, financing, and monitoring the entire multi-year recovery

program. This unit will ensure coherence, avoid duplication, and maintain focus on DRR integration.

5. **Mainstreaming Cross-Cutting Priorities:** Ensuring that *Gender Equality, Social Inclusion (GESI)*, and *Environmental Sustainability* are not standalone components but are woven into the design of every sectoral recovery intervention, from housing to livelihoods.

13.3 Resource Mobilization Strategy

The recovery strategy for the 2025 disaster will be primarily resourced through the financial mechanism established under the Post Disaster Needs Assessment (PDNA). The estimated recovery needs, as quantified in this report, will be formally submitted to the Ministry of Home Affairs (MHA), Government of India, for approval and allocation of funds under the National Disaster Response Fund (NDRF)/National Disaster Mitigation Fund (NDMF). In accordance with the funding norms for calamities of severe nature, the financing pattern will be in the ratio of 75:25 between the Central Government (NDRF) and the State Government. The State Government of Himachal Pradesh is committed to arranging its 25% share through its budgetary resources, including the State Disaster Response Fund (SDRF), to ensure the timely and complete implementation of the recovery plan.

To ensure optimal utilization of resources and avoid overlap, a strict **"No Duplication" principle** will be enforced across all recovery interventions. A dedicated cell within the proposed Recovery Management Unit (RMU) will be tasked with conducting a meticulous cross-verification exercise. This will involve mapping all proposed PDNA-funded recovery activities against ongoing and pipeline projects financed under various State and Central Government schemes (e.g., PM Awas Yojana, Jal Jeevan Mission, PMGSY, MGNREGA, State Horticulture Missions). The recovery plan will explicitly exclude any components already covered under these existing programmatic budgets. This exercise will ensure that PDNA resources are solely directed towards filling critical gaps, addressing residual damages, and financing additional resilience measures that fall outside the scope of normal development schemes, thereby guaranteeing additionality and maximizing the impact of every rupee allocated for disaster recovery.

13.4 Implementation Framework & Phased Timeline

Implementation will be structured, phased, and adaptive, coordinated centrally by the RMU but executed in a decentralized manner. The recovery activities will start from the approval of funds to the state and on receipt of the first instalment under this PDNA.

- **Phase 1 – Immediate Recovery (0-12 Months):** Focus on restoring critical lifelines (road connectivity, power, water), providing transitional shelter, initiating cash-for-work programs, and supporting immediate livelihood needs (e.g., agricultural inputs). *Alignment with 2023 Lessons:* This phase will avoid delays in beneficiary identification seen previously by using verified PDNA data.
- **Phase 2 – Medium-Term Reconstruction & Rehabilitation (0-2 Years):** The core implementation phase for permanent housing, reconstruction of public infrastructure (schools, health centers), major road/bridge works, and comprehensive livelihood restoration programs. *Alignment with 2023 Lessons:* Housing designs will be standardized yet adaptable, with faster approval processes. Infrastructure projects will have mandatory DRR audits.
- **Phase 3 – Long-Term Resilience Building (2-5 Years & Beyond):** Focus on economic diversification, full implementation of risk-informed land use planning, strengthening early warning systems, and large-scale ecosystem restoration (afforestation, landslide stabilization). This phase ensures recovery transitions into sustainable development.

Institutional Framework for Implementation: The RMU will create and manage Sectoral Implementation Cells (for Housing, Infrastructure, Livelihoods, etc.) that will work directly with line departments. At the district level, the DDMA, chaired by the Deputy Commissioner, will be the implementation hub, coordinating with line departments and district level task forces.

13.5 Monitoring, Evaluation & Learning (MEL) System

A robust, real-time MEL system is non-negotiable for accountability, adaptive management, and demonstrating results to funders.

- **Digital Platform:** The SEOC's DMIS already covers recovery action under the P&R 2023. This will be finetuned, improved and strengthened to be a unified platform to move from capturing of damages to recovery tracking. The system will track physical and financial progress, beneficiary details, and project photos for all recovery interventions.
- **Key Performance Indicators (KPIs):** KPIs will be set for each sector and pillar, including not just output (e.g., houses built, km of roads repaired) but also outcome indicators (e.g., % of households with improved access to markets, reduction in perceived risk, increase in diversified income sources).
- **Third-Party Social Audits & Community Monitoring:** Beyond government reviews, periodic independent audits will be conducted. Community-Based Monitoring Committees, especially involving women, and grievance redressal systems will provide ground-level feedback on quality and inclusion.
- **Evaluations:** A **Mid-Term Review** will assess progress and allow for course correction. A **Final Impact Evaluation** at the end of Phase 2 will measure the recovery's effectiveness against its resilience and development goals.
- **Knowledge Management:** The MEL system will systematically document lessons, challenges, and innovative solutions, creating a repository to inform future disaster management and development planning in the state.

13.6 Institutional Mechanism: The Recovery Management Unit (RMU)

Learning from the coordination challenges in multi-year programs, the establishment of a permanent **Recovery Management Unit (RMU)** within HPSDMA is critical. Its functions will include:

1. **Program Management:** Overall coordination, planning, and oversight of multiple programs under the recovery initiatives.
2. **Financial Management & Convergence:** Pooling and channeling funds, leveraging external funding and technical support, tracking expenditures, and driving convergence across schemes.
3. **Technical Support:** Providing sectoral experts to departments and districts for designing resilient projects.
4. **MEL:** Operating the DMIS and coordinating all monitoring and evaluation activities.
5. **Grievance Redressal:** Managing a transparent mechanism for addressing community complaints.
6. **Communication:** Regularly updating all stakeholders on progress.

The RMU will have a dedicated team of technical and managerial staff and will be governed by a Steering Committee chaired by the Chief Secretary.

13.7 Conclusion

The path to recovery from the 2025 disasters is a defining opportunity for Himachal Pradesh. It is a chance to move beyond mere restoration and to reimagine development in the Himalayas through the lens of climate resilience and sustainability. By adopting a holistic strategy that prioritizes resource mobilization, decentralized yet coordinated implementation, and stringent monitoring, the state can ensure that the immense efforts and investments lead to a truly resilient future. The experiences of the 2023 R&R are not just a backdrop but a vital guide, ensuring that the 2025 recovery is more efficient, equitable, and enduring. The commitment must be to build not just back, but *forward*, securing the social, economic, and ecological wellbeing of Himachal Pradesh for generations to come.

14. GLOSSARY OF KEY TERMS & ACRONYMS

PDNA / Disaster-Risk Concepts

Term / Acronym	Full Form	Definition
PDNA	Post-Disaster Needs Assessment	A structured, multi-sector process that quantifies damage, losses, and recovery needs.
Damage	Damage	Physical destruction of assets valued at replacement or repair cost.
Losses	Losses	Economic flow disruptions such as lost income and service interruption.
Recovery Needs	Recovery Needs	Resources required to restore and improve assets and systems post-disaster.
BBB	Build Back Better	Reconstruction approach that improves standards and reduces future risks.
Hazard	Hazard	Potentially damaging physical event such as landslides, floods, cloudbursts.
Exposure	Exposure	People and assets located in hazard-prone areas.
Vulnerability	Vulnerability	Conditions that increase susceptibility to disaster impacts.
Risk	Risk	Potential loss when hazards interact with exposed and vulnerable systems.
Multi-hazard	Multi-hazard	Presence of multiple interacting hazards in a region.
Relief / Response	Relief / Response	Immediate life-saving and safety actions after a disaster.
Resilience	Resilience	Ability to withstand, adapt and recover from disasters.
DRR	Disaster Risk Reduction	Structured actions to reduce disaster risks, vulnerabilities, and enhance community resilience.
Climate-adaptive measure		Intervention designed to withstand changing climate risks.
KAVACH	Safe Construction Handbook	A government-issued handbook providing guidelines on disaster-resilient, safe hillside and rural construction practices.

Institutional & Financial Terms

Term / Acronym	Full Form	Definition
NDMA	National Disaster Management Authority	Central apex body guiding DM policies and PDNA methodology.
HPSDMA	Himachal Pradesh State Disaster Management Authority	Leads PDNA work and disaster coordination in the state.
DDMA	District Disaster Management Authority	Oversees district-level disaster management and data collection.
SEOC	State Emergency Operation Centre	State-level emergency coordination and monitoring centre.
DEOC	District Emergency Operation Centre	District-level command and control centre.
SDRF	State Disaster Response Fund	Fund for immediate relief and response actions.
NDRF	National Disaster Response Fund	Central support fund for post-disaster financing.
DM Act 2005	Disaster Management Act, 2005	Legal framework for disaster management institutions in India.
SAPCC	State Action Plan on Climate Change	State climate adaptation and mitigation plan.
CAMPA	Compensatory Afforestation Fund Management and Planning Authority	Finances eco-restoration and green recovery actions.
PWD	Public Works Department	Government agency responsible for planning, constructing, and maintaining public infrastructure such as roads, bridges, and buildings.
IMCT	Inter-Ministerial Central Team	Central government team assessing state disaster impacts and recommending financial assistance.
MSCT	Multi-Sectoral Central Team	Expert team analysing sectoral damages, scientific causes, and long-term mitigation measures.
MD	India Meteorological Department	National agency providing weather forecasts, climate data, and early warning services.
SHGs	Self Help Group	Community-based group supporting savings, credit, livelihoods, and disaster resilience activities.
NGOS	Non-Governmental Organisation	Independent organisation supporting communities through relief, recovery, development, and advocacy.

CHCs	Community Health Centre	Rural health centres offering specialist services and secondary-level medical care.
PHCs	Primary Health Centre	Basic rural health centres providing primary care and essential medical services.
MoEFCC	Ministry of Environment Forest and Climate Change	Ministry managing environment, forests, wildlife conservation, and national climate actions.
UNDP	United Nations Development Programme	UN agency supporting development, resilience, governance, and post-disaster recovery efforts.
NABARD	National Bank For Agriculture and Rural Development	National institution financing agriculture, rural development, livelihoods, and infrastructure projects.

Hazard & Climate Terms

Disaster Name	Meaning
Monsoon Floods	Widespread flooding caused by prolonged, intense monsoon rainfall leading to river overflow and inundation of settlements.
Flash Floods	Sudden, high-velocity floods triggered by intense rainfall or cloudbursts, particularly in steep Himalayan catchments.
Cloudburst Events	Extremely localised, high-intensity rainfall occurring in a short duration, often causing flash floods and landslides.
Major Landslides	Large-scale slope failures resulting in mass movement of earth, rock, and debris, often damaging roads, houses, and settlements.
Slope Failures	Collapse or sliding of steep hillsides due to excessive rainfall, soil saturation, unstable geology, or human interventions.
Landslip Events	Smaller-scale ground movement causing gradual or sudden displacement of land, affecting buildings and roads.
Land Subsidence	Gradual sinking or collapse of land due to water saturation, soil failure, or geological weakness.
Riverbank Erosion	Wearing away of riverbanks due to strong flows, leading to loss of land, houses, and infrastructure.
Beas River Flooding	Localised or widespread flooding specifically caused by overflow, debris flow, or surge in the Beas River system.
Glacial Lake Outburst Floods (GLOFs)	Sudden release of water from glacial lakes due to breach or failure, causing downstream flooding.
Avalanches	Rapid movement of snow and ice down steep slopes, common in higher-altitude districts like Lahaul–Spiti and Kinnaur.
Debris Flow Events	Downhill movement of water-laden debris (boulders, mud, rocks) triggered by landslides or cloudbursts.
Infrastructure Collapse Events	Damage or destruction of critical infrastructure—roads, bridges, retaining walls—due to disasters.

Hydrological Hazards	Flood-related events including river swelling, flash floods, cloudburst-driven floods.
Cryospheric Hazards	Glacier and snow-related hazards such as GLOFs and avalanches.
River Reversal / River Surge Events	Sudden rise or reverse backflow in rivers caused by slope failures or blocked channels upstream.

Hazard & Climate Terms

Term / Acronym	Full Form	Definition
Land Subsidence	-	Sinking of ground from soil failure or saturation.
GLOF	Glacial Lake Outburst Flood	Sudden flooding caused by glacial lake failure.
Eco-DRR	Ecosystem-based Disaster Risk Reduction	Using nature-based solutions to reduce hazard impacts.

Tools, Systems & Technical Platforms

Term / Acronym	Full Form	Definition
DMIS / HPDMIS	Disaster Management Information System	Platform for damage data reporting and aggregation.
Kobo	-	Mobile tool used for field verification and data collection.
AABHAS	-	Portal for dam safety alerts and monitoring.
GIS	Geographic Information System	Spatial mapping and analysis system.
LiDAR	Light Detection and Ranging	High-resolution terrain mapping tool.
InSAR	Interferometric Synthetic Aperture Radar	Satellite-based ground deformation monitoring.
Doppler Radar	-	Weather radar for high-resolution rainfall forecasting.
HRVA	Hazard, Risk and Vulnerability Assessment	Assessment of hazard zones and population vulnerability.
GPS	Global Positioning System	A satellite-based navigation system used to determine precise location, movement, and time information anywhere on Earth.
DMIS	Disaster Management Information System	Central digital system for collecting, validating, and managing disaster damage and response data.

Housing and Infrastructure Terms

Term / Acronym	Definition
Pucca House	House built with durable materials such as RCC, brick, stone.
Kutcha House	House of temporary materials such as mud walls and thatch.
Retrofitting	Strengthening buildings to improve hazard resistance.
Kath-Kuni	Traditional timber-stone Himachali construction.
Dhajji Dewari	Timber frame with masonry infill, flexible during earthquakes.
Breast Wall	Uphill retaining wall supporting cut slopes.
Retaining Wall	Structure holding back soil/rock on slopes.
Right of Way (RoW)	Total land width allocated for a road and associated works.
Muck Disposal Site	Engineered site for safe disposal of excavated debris.
Scour Protection	Measures to prevent erosion at bridge and road foundations.
Lifeline Infrastructure	Critical infrastructure essential for emergency response.

Schemes Names

Scheme Name	Type	Definition
Swaran Jayanti Ashray Yojana	State Scheme	State housing scheme providing financial assistance for construction of new houses.
Housing Subsidy Scheme	State Scheme	Financial support to eligible households for building safe, permanent residential structures.
Mukhyamantri Awas Yojna	State Scheme	Housing assistance scheme for registered construction workers under HP Welfare Board.
Mukhyamantri Vidwa Evam Ekal Naari Awas Yojana	State Scheme	Housing support for widows and single women lacking safe and permanent shelter.
Pradhan Mantri Awaas Yojana (PMAY–R/U)	Central Scheme	National mission providing pucca houses to rural and urban poor households.
SSA	Sarva Shiksha Abhiyan	National programme ensuring universal elementary education with improved access and quality.
PM POSHAN	Pradhan Mantri Poshan Shakti Nirman	Central scheme offering nutritious school meals to enhance children's health and learning.
PMGSY	Pradhan Mantri Gram Sadak Yojana	Central scheme building all-weather rural roads to improve village connectivity.
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act	Law guaranteeing 100 days of wage employment to rural households through public works.

PMMSY	Pradhan Mantri Matsya Sampada Yojana	Scheme improving fisheries through modernisation, infrastructure, productivity, and fisher livelihoods.

Livelihoods, Tourism, Agriculture

Term / Acronym	Definition
Homestay Unit	Family-run tourist accommodation providing livelihood.
Agri-value chain disruption	Losses due to crop damage and blocked market access.
Seasonal tourism flow	Tourist movement based on seasonal patterns.

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District-Level Coordination

The Chief Executive Officers of all District Disaster Management Authorities (DDMAs), under the supervision of their respective Deputy Commissioners, played a pivotal role in coordinating data collection across all sectors.

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