Accelerating Change: Flood Hazard-Disaster Databases in the Indian Himalayan Region

Executive Summary

The Problem: Increasing Disaster Risk in Mountain Regions and a Gap in Historical Disaster Knowledge

Disaster statistics for mountain regions reveal a concerning trend of increasing event occurrence, injuries and fatalities, and socio-economic impacts. This reflects increases in population, infrastructure exposure and vulnerability, as well as increasing hazard frequency and magnitude. Amplifying future concerns are complex/contested climate change trajectories and their impact on hazard processes. In response, a much better evaluation of future risk is required, and this needs an improved understanding of historical disaster impacts and losses. Closing this gap will support improved disaster risk reduction, climate change adaptation and sustainable infrastructure planning and development goals, underpinning improved wellbeing and livelihood.

The Time for Action, Surging to 2030: Accelerating Implementation of Flood Hazard-Disaster Databases in the Indian Himalayan Region

The UNDRR 'Sendai Framework for Disaster Risk Reduction 2015-2030' (SFDRR) is driving global efforts to stem disaster losses and build resilience via a targeted approach. Since 2015 the SFDRR has continued to mature from an elaborate framework statement to that of a growing implementation effort, now with a 'Surge to 2030'. India as a signatory of the SFDRR, and member of the pan-national Asia-Pacific Ministerial Conference on Disaster Risk Reduction, has embraced calls to develop and implement methodologies for the compilation of improved disaster loss data to reduce future disaster impacts, particularly in high-risk flood locations such as the Indian Himalaya. Whilst India can utilise multiple existing global, national, and state disaster databases, it is accepted that these are not necessarily comprehensive, interoperable, accessible, or sufficiently localised. Accordingly, there is a need for new partnership efforts to deliver disaggregated and sub-national flood disaster data.

Key Policy-Practice Options

(1) Enhancing Knowledge in the Kullu District & Himachal Pradesh: Using 'HiFlo-DAT' to revise disaster management plans and the HVRA database; engage local communities in two-way knowledge sharing; and review planning requirements for infrastructure projects (State and National)

(2) Indian National Disaster Management Policy & Practice Development: Undertake policy review on flood database curation, application and governance; consider the integration and hierarchy of Indian disaster databases; and undertake dedicated review of LLOF and GLOF floods

(3) Upscaling of Historical Flood Databases across the IHR: Via partnerships and an array of data sources

BOX 1

Key Policy-Practice Options

Key Findings

A review of DRR policy positions reveals a strong international (e.g., Sendai Framework Priority 1) and Indian strategic commitment to the development of methodologies for the assembly of disaster loss databases tailored to national/local needs, utilising partnerships, innovative technologies and benefitting from a greater local knowledge.

The bi-lateral (India-UK) 'HiFlo-DAT' (**Hi**malayan **Flo**od **Dat**abase, for disaster risk reduction) is a major new open-access contribution to this agenda, forged by cross-sector partnership. Initially adopting a case study approach, in both the Kullu District, Himachal Pradesh (primary location), and the Chamoli District, Uttarakhand (transferability trial location), it brings:

- **An Internationally Grounded Method** for the assembly and analysis of historical flood event/disaster data, aligned to the Indian Himalaya
- **Substantial New Knowledge** of 128 historical floods, at 59 locations in the Kullu District, over 175 years (1846-2020), derived from English-language documents in India, the USA and the UK. Providing and evidence base for enhanced local DRR and sustainable development
- **Confidence in the Transferability of 'HiFlo-DAT' Method**. The Chamoli District trial demonstrates the method can be successfully transferred and upscaled to additional and more remote locations across the Indian Himalaya, especially when both documentary and local knowledge accounts are used.

Background

The Problem & Rationale: Disaster Risk in Mountain Regions and the Importance of Assembling Disaggregated Hazard-Disaster Databases to Reduce Future Losses

Why are Mountain Regions Important?

Mountains are global assets, and whilst their complexities, sensitivities and significance are well rehearsed in scientific dialogues, this knowledge has not always sufficiently informed decision-makers who are charged with steering policy directions. Assessments by Gardner (2015), Hock *et al.* (2019), Sharma *et al.* (2019) and Adler *et al.* (2022) provide synthesis, specifying that mountain regions:

- Comprise 22% of global land surface area and 13% global human population
- Support c. 50% of the global population who directly depend on mountain goods and ecosystem services (e.g., fresh water, food, energy, timber, and minerals)
- Are biodiverse locations
- Are sometimes remote, trans-boundary settings with cascading environmental systems
- Are rich in cultural heritage
- Experience higher levels of poverty and disaster risk in many cases
- Are subject to rapid change by multiple stressors, including climate variability and change with impacts on the cryosphere, habitat degradation, conflict, globalisation, infrastructure development, tourism, urbanisation and population change. These impact exposure, vulnerability and risk to hazard processes and thus disaster incidence.

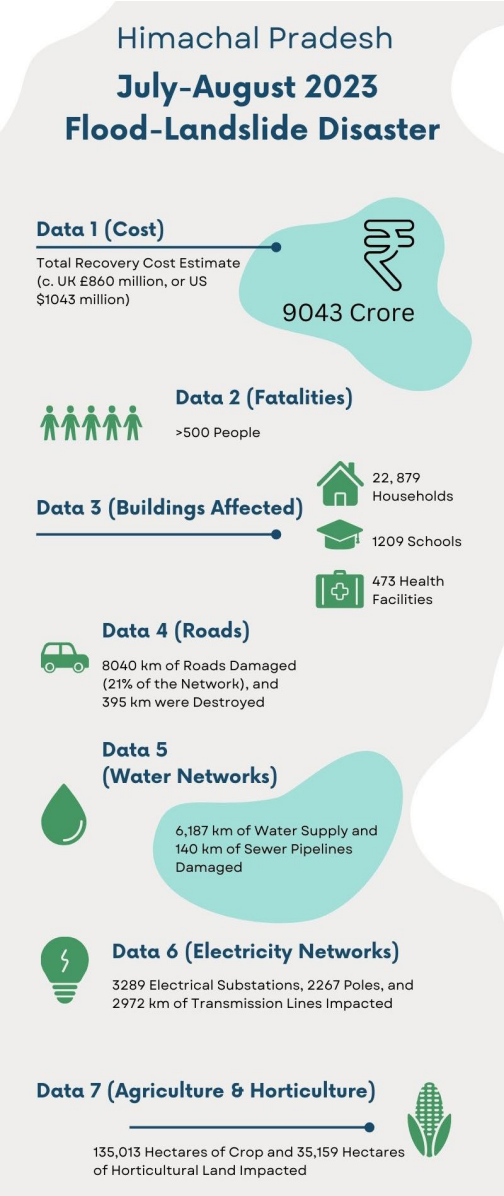
Hazards and Disaster Profile in the Indian Himalayan Region

The Indian Himalayan Region (IHR) is part of the wider Hindu Kush Himalaya (HKH). India's National Disaster Management Plan (NDMP, 2019, p42) characterises the IHR as a case *'that merit[s] special consideration'* and details the IHR as a diverse physical landscape spanning the Siwalik foothills to the Tibetan Plateau. Having an area >530,000 km², the IHR extends 2500 km across 13 States/Union Territories/Districts, with their attendant socio-cultural diversity. The IHR is home to around 77 million people (in 2011), with a further c. 900 million people on the Indo-Gangetic Plain depending on its resources (IHCAP, 2016; Sharma *et al.*, 2019).

Hazardous environmental processes are common owing to the interplay between seasonal monsoonal climate, fragile lithology, steep topography and active seismicity. Notable are floods, landslides, droughts and earthquakes (IHCAP, 2016; Vaidya *et al.*, 2019). Disaster statistics and their recent trends, alongside predicted future cryosphere changes in the Himalaya as a whole (Hock *et al.*, 2019), are cause for concern, underlining a need for effective disaster risk reduction, informed by robust historical data. We illustrate this point across two scales (HKH and State level in the IHR).

FAST DATA 1

Himachal Pradesh 2023 Disaster Metrics (HPSDMA, 2023)



HKH (Vaidya *et al.*, 2019, using data from CRED EM-DAT, 1980-2015, at a whole country level incorporating the HKH) detail:

- 21% of global disasters, and 36% of major events were in Asia
- In India: 438 recorded climate/hydro-meteorological/geophysical events and 140,292 fatalities
- Increasing decadal trends of event occurrence, numbers killed and economic losses (1980 to 2010), reflecting deteriorating societal exposure and vulnerability, alongside increasing hazard frequency and magnitude.

Himachal Pradesh, IHR Is prone to high frequency/high magnitude disaster impacts. Particularly notable was the **July-August 2023 flood-landslide disaster in Himachal Pradesh**. HPSDMA (2023) headline loss data are shown in **Fast Data 1**.

The Historical Flood Database Gap in the Indian Himalayan Region

Existing state, national, and international disaster databases provide some coverage of past floods in the IHR (e.g., HPSDMA HVRA [India], IMD Disastrous Weather Events [India], NDMIS [India], CRED EM-DAT [Belgium], Dartmouth Flood Observatory [USA], Munich Re NatCatSERVICE [Germany], and UNDRR DesInventar with Uttarakhand entries). All are subject to several limitations which impact their application in effective sub-national level and flood specific DRR. Constraints may include:

- Restrictive inclusion criteria, focusing on the largest/most devastating events
- Bias to record only contemporary events, rather than also systematically assembling data on past events
- Restricted timespan of data entries (typically mid/late 20th Century onwards), which are too narrow to capture a meaningful array of flood event magnitude and frequencies, thus inhibiting the identification of flood risk
- Aggregated/missing/over generalised data entries, which are not always sufficiently specific in regard of hazard process or location, to bring about targeted/informed DRR and development
- A lack of co-ordination between agencies, resulting in poor harmonisation of data
- Compiled databases not always being fully open-access (some are closed-access), with key metadata absent.

Reflections

In rising to this challenge, our experience is that assembling a more comprehensive database of disaggregated, sub-national level, historical flood events/disasters, is entirely possible and brings great value to DRR. However, success needs coordination for the assembly of now globally dispersed data, spanning analogue and digital sources of varying preservation quality and collection completeness. Accessing historical materials also requires research teams to navigate a plethora of data accessibility and cost constraints, which may inhibit DRR.

Data gaps in the Indian Himalaya may also reflect the loss of local documents in past hazard events. Distant (sometimes replicate) and alternative documentary sources contribute to reducing this knowledge gap.

Hazard: *'A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation'*

Disaster: *'A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more…losses and impacts…The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources'*

Disaster Risk Reduction (DRR): *'Is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development. Disaster risk reduction is the policy objective of disaster risk management, and its goals and objectives are defined in disaster risk reduction strategies and plans'*

Disaster Loss Data: *'A set of systematically collected records about disaster occurrence, damages, losses and impacts'*

Disaggregated Data: These are location specific, local, decentralised, segregated and granular data

BOX 2

***UNDRR 2017* & Wider Definitions of Key Terminology**

Policy Perspectives on DRR & Disaster Loss Databases

The International and Indian DRR Policy Environment

International Disaster Risk Reduction (DRR) goals and their convergence and coherence with wider 2030 Agenda agreements to tackle global challenges, such as climate change, financing for development, new urban agenda, inequalities, and sustainable development are well established in the policy landscape. Internationally, the UNDRR 'Sendai Framework for Disaster Risk Reduction 2015-2030' (SFDRR) is the key pivot driving efforts to stem disaster losses and build resilience via a targeted approach. Since 2015 the SFDRR has continued to mature from an elaborate framework statement to that of a growing implementation effort (i.e. 'Words into Action'), now with a 'Surge to 2030'. International progress check points have included activities such as the Sendai Framework Monitor, Global Assessment Report (e.g., GAR 2022), GAR Special Reports, Sendai Framework Mid-term review (2023), and Global Platforms (e.g., Geneva, GP2025). Pan-national partnerships bring further focus to regional implementation, and relevant here is the 2024 Manila Asia-Pacific Ministerial Conference on Disaster Risk Reduction, which agreed the latest Asia-Pacific Action Plan (2024-2027).

India, a signatory of the SFDRR, has adopted a hierarchical governance structure, principally comprising National, State and District disaster management authorities. Their legal basis derives from the Disaster Management Act 2005 and the National Policy on Disaster Management 2009, which have a strong focus on prevention, mitigation, preparedness, response, relief and recovery. This was updated by the Disaster Management (Amendment) Act 2024, which now defines a 'disaster database', mandates the maintenance of state level disaster databases, which input to a national disaster database. It also gives greater recognition of the need for resilience.

International Calls for Improved Disaster Loss Data

Deeply embedded in these policy positions has been a drive to develop and implement methodologies for the compilation of disaster loss data to help reduce future disaster impacts. This is central to SFDRR Priority 1 *'understanding disaster risk'*, inclusive of *'the collection, analysis, management and use of relevant data and practical information and ensure its dissemination…'* (clause 24a).

Recognising the need to develop disaster databases to effectively serve DRR policy making and risk informed development planning and investment, we highlight selected recent international perspectives, thereby grounding the policy options delivered in this science policy briefing.

- **Disaster Risk Reduction in India (ADPC & UNDRR 2020):** Provides a snapshot of the state of DRR in India in 2019. In the context of SFDRR Priority 1, it recognises that *'The Government of India has highlighted the importance of building a robust information database to inform…development'*. However, it is concluded: *'Despite these initiatives and stakeholders involved, risk and disaster information in India has remained fractured across various agencies, ministries and administrative levels, with little cross-compatibility and harmonization which limits comprehensive analysis of risks in the country'*

- **Data and Digital Maturity for Disaster Risk Reduction (UNDRR & UNDP, 2022):** Articulates that data systems with links to government leadership are more likely to be effective; they need to be context specific *'tailored to national and local requirements'*, and that *'disaster data collection at sub-national levels and decentralized levels is critical for sustainability of data systems and to support national agencies'*

- **The Report of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 (UNDRR, 2023a):** Details that in building national and local capacities, improved access to high-quality disaggregated data, with understanding of both historical and future losses are key to effective DRR and development policies, strategies and plans. Going forward one call is for: *'intersectoral approaches to data generation, management and analytics…to develop sophisticated and robust disaster risk information that integrates knowledge from across disciplines, domains and scales, and produces insights relevant to multiple sectors. Scientific and academic*

partnerships are important to achieving this, as are the standardization and circulation of data among government agencies and in different sectors'

- **Closing Climate and Disaster Data Gaps: New Challenges, New Thinking (UNDRR, 2023b):** Establishes that data gaps and lack of standardisation/ structure, aggregation at a national level, and bias towards disasters with the greatest human and economic costs skew knowledge of disaster patterns and trends. Such hinders disaster impact analyses and the ability to undertake efficient and effective DRR. For example, it suggests hotspot locations warrant data disaggregation to enable location specific understanding and action, especially where traditional co-existence with flood risk is no longer functional alongside climate change, and notes: *'Flood risk has geographic dimensions…Highlight[ing] the importance of developing strategies that can be designed specifically for various contexts such as…high mountain areas'*

- **Asia-Pacific Ministerial Conference of Disaster Risk Reduction, Co-Chairs Statement (UNDRR, 2024):** Considers a strategic area to be *'strengthening the collection and use of quality data from innovative technologies and integration of local, indigenous, and traditional knowledge'*. Herein prevailing challenges include disaggregation of data; protocols for data assembly, accessibility, sharing and interoperability; digitalisation of historical data; the need for more localised and granular data; and the continued importance of open data. It also recognised that effective action will draw upon data from past events.

Reflections

The collective position is one of advocating the value of disaggregated, sub-national, locally generated, accessible and high-quality databases specific to disaster type and a country's needs. India can directly and indirectly (via international coverage) utilise multiple existing disaster databases, but these are not necessarily comprehensive, interoperable or accessible. Accordingly, there is a need for enhanced and integrated efforts; such has been widely identified and indeed most recently acknowledged by APMCDRR (2024), the Indian Disaster Management (Amendment) Act 2024, and UNDRR (2025). The opportunity and challenge now facing India's agencies, communities and partners is to enact this required step-change for the curation (with continual updating) and application of Indian disaster database records, in a way which is both effective and timely, to bring lasting societal benefits at the earliest opportunity.

'HiFlo-DAT' Flood Database

'HiFlo-DAT' Overview

The 'HiFlo-DAT' (**Hi**malayan **Flo**od **Dat**abase, for disaster risk reduction) interdisciplinary research project has been a long-term bi-lateral (India-UK) endeavour. It has brought together local communities, government authorities, NGOs and international academic organisations. It has adopted a case study approach focusing on: (1) Kullu District, Himachal Pradesh (primary location) and (2) Chamoli District, Uttarakhand (transferability trial location). Utilising consultative partner workshops, participatory village community workshops (Chamoli District) and extensive analysis of documentary archives, it has generated substantial new knowledge of historical flood events. This enables revised appraisal of past flood characteristics, and a stronger foundation for effective DRR and development.

Here, as an open-access contribution (see additional resources) we present the findings from the Kullu District (Kullu and Manali Tehsils: 3561 km² or 0.67% of the IHR), demonstrating the significant contribution of 'HiFlo-DAT' to this disaster afflicted district. Moreover, we highlight a transferable methodology for the assembly, analysis, and application of disaggregated/sub-national flood disaster loss data applicable to the whole IHR and beyond.

'HiFlo-DAT' Method (Kullu)

The overall approach was highly consultative, aligned to international best practice, and project managed to bring high quality outcomes. The key phases considered database design, data selection and capture, data review, and data entry and validation:

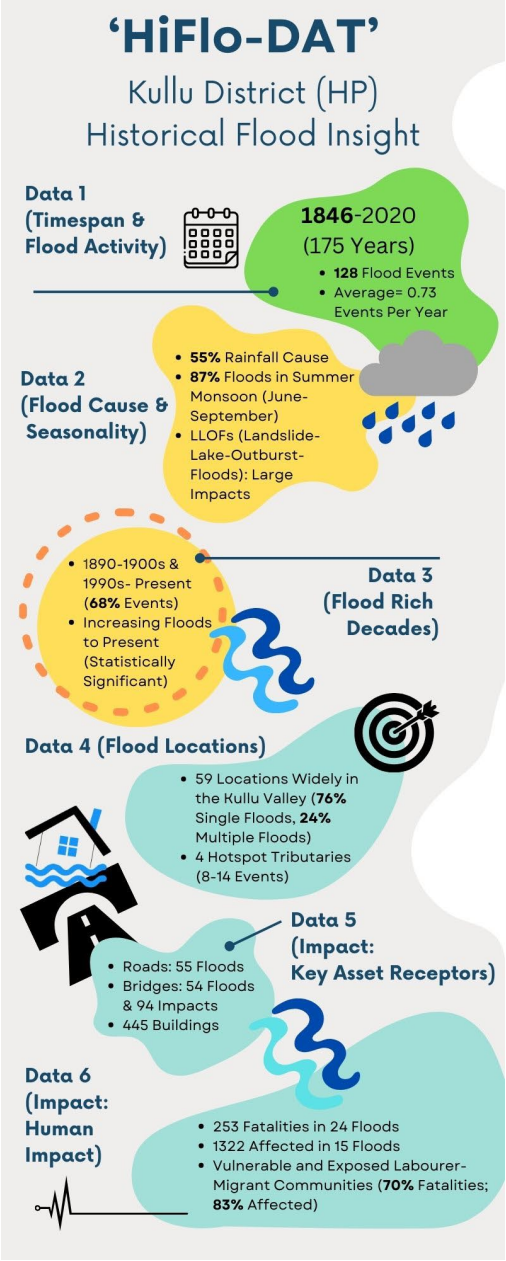
- **Grounded Database Design:** Delhi workshops involving government agencies and NGOs distilled user aspirations for a simple/intuitive format; a comprehensive set of data fields, with both global and local alignment; accessible file types; and online hosting. This was nested in appraisal of existing global hazard/disaster databases. 'HiFlo-DAT' is shared via MS Excel (textual data) and Google Earth (locational data). The database architecture is categorised (n= up to 95 categories) delivering a full spectrum of event information, including: database management/source citation, timing, location, causation, environmental and societal impacts and the event management lifecycle
- **Extensive Documentary Source Selection and Capture:** Reviewed private and public collections in India, UK and USA (2013-2020); key being the PMML (Prime Ministers' Museum and Library- Delhi) and British Library (London). Focusing on English-language newspapers (national and regional), government reports and academic literature, these provide overlapping coverage 1835-2020 (185 years). Key sources included: The Times of India (1838-present); The Civil and Military Gazette (1845-1963); and The Tribune (1881-present)
- **Diligent Data Review:** Collectively >160,000 files were reviewed by the research team, to identify evidence of flood processes/impacts in the study area. Consistency was achieved using guiding protocols and log sheets, followed by a cross-check- resulting in a final n= 220 sources
- **Robust Data Entry and Validation:** A two-phase process included raw (un-merged) entry of accounts to MS Excel (308 entries from 220 sources: 29,047 cells), and then synthesis of fragmentary/ editorially influenced source accounts into a 'merged' flood (F-event) database (128 floods: 10,139 cells). This is necessary given an individual source may provide details of multiple floods in time and space, whilst also recognising that knowledge of a discrete flood (F-event) is often a synthesis of one or more sources. Both phases were subject to consistent rules, and fully cross-checked.

'HiFlo-DAT' Kullu District Historical Flood Insight

'HiFlo-DAT' brings new understanding of historical flood occurrence and impacts in the Kullu and Manali Tehsils of the Kullu District, subject to the fidelity of its sources. It substantially improves upon existing documentary compilations of past floods (**Table 1**) in terms of event frequency, timespan, and depth of information. Highlights are given in **Fast Data 2**.

FAST DATA 2

'HiFlo-DAT'
Kullu District Historical Flood Insight



'HiFlo-DAT' Transferability (Chamoli District Trial)

Whilst 'HiFlo-DAT' was developed in the Kullu District, it is important that it provides capacity to be successfully deployed across the IHR and beyond. As independent proof-of-concept, the method was taken to the high-altitude/remote Dhauliganga catchment in the Chamoli District (Uttarakhand) in 2023. This location was selected to bring multi-event historical context to the large-scale February 2021 disaster, which may otherwise dominate local disaster risk reduction narratives, locations, and policy. Herein we note:

- **Diversified Data Collection Methods:** Like the Kullu District approach, we explored documentary archives (including travel and mountaineering literature); this time prioritising digital resources for accessibility, particularly via the British Library, supplemented by review of hardcopy materials held by the Chamoli District Government in Gopeshwar. In addition, we hosted pilot workshops in four mountain villages to explore local knowledge of past hazard-disaster events
- **Successful Outcomes:** Interim results (not yet published), cement growing policy positions showcasing the elevated value of local knowledge, given fewer accounts emerged from documentary records in this very remote location. This suggests that not all locations have the same quantity and quality of historical documents, reflecting different settlement and governance histories. This underscores the value of a multi-methods approach
- **Confidence in Transferability of 'HiFlo-DAT':** Both the data collection methods (expanded for the remote location), and the database architecture worked effectively and efficiently, and included new team members for whom this activity was a first. This trial brings confidence that with appropriate team expertise and project resources, the transferability of the 'HiFlo-DAT' methodology is both beneficial and achievable.

Policy Options

Enhanced Knowledge in the Kullu District and Himachal Pradesh

'HiFlo-DAT' offers immediate benefits to evidence-based decision making for policy and practice evolutions (**Table 2**) to guide DRR, sustainable development, and resource allocation. Policy & practice options include:

- **Revision of State & District Disaster Management Plans:** Regarding the flood hazard profile and vulnerability analysis of labourer/migrant communities engaged in large construction projects
- **Revision of the State HVRA Database:** To include the 'HiFlo-DAT' flood locations and impacts, with consideration of user accessibility and future updating
- **Sharing Historical Knowledge with/by Local Communities:** Partnering with NGOs/academia to foster better disaster resilience via education, awareness, action and citizen participation (e.g., community-led data sharing)
- **State/National Policy Review of Planning Requirements for Major Infrastructure Projects:** To mandate assessment of historical hazard occurrence and future flood risk, to inform development mitigation/adaptation design. This may include associated land use zoning, early-warning systems, and resilient structural design. Partnership arrangements with technical specialists will assist planning submission, review and compliance
- **State Upscaling of 'HiFlo-DAT':** to cover the entire Kullu District and State. This would be a very large multi-year task.

TABLE 1

Key Existing Databases of Historical Floods in the Kullu District (data up to July 2020)

Database	Area Extent	Timespan	Number of Entries in Kullu District	Number of Entries in Manali/Kullu Tehsils
Kullu DDMA	District	1988-2003	9	5 (1995-2003)
HPSDMA HVRA	State	?	c. 10	c. 10
IHCAP	State	1950-2014	Up to 44	?
IMD	National	1967-2020	c. 25	c. 15 (1994-2019)
ADRC	Global	1998-present	1	1 (2003)
DFO	Global	1985-present	7	3 (1994-2003)
CRED EM-DAT	Global	1900-present	5	3 (2003-2012)

Indian National Disaster Management Policy & Practice

- **National Policy Review on Sub-National/Disaggregated Flood Disaster Databases:** To consider the merit and cost-benefit of developing revised guidelines for States/Districts on the systematic and multi-disciplinary recording, analysis and sharing of historical (and contemporary) disaster impact/loss data, for the benefit of future generations. Using 'HiFlo-DAT' (or other) this may include standard requirements on the data types/categories, mode of recording, analysis and sharing. 'HiFlo-DAT' also reveals that hydro-geomorphological analysis of contemporary floods could be extended, bringing risk management benefits
- **National Policy Review on Harnessing Disaster Data for DRR:** A wealth of pre-existing data exists, but it is not always available/employed. Developing approaches to systematically utilise contemporary digital data and tools (e.g., social media, traditional media, apps, and AI) about hazard events is a frontier opportunity. Similarly, the digitalisation and improved accessibility to historical archive collections remains to be optimised in service of DRR
- **Cross-linkage and Harmonisation of Indian Disaster Databases:** Several important Indian State and National collections (e.g., CWC, IMD, NDMIS) probably have untapped scope for DRR. Evaluating how these national data sources may engage with each other, and more so how they may be informed by sub-national/disaggregated databases, will likely bring valuable benefits
- **Historical LLOFs/GLOFs *(Landslide and Glacial Lake Outburst Floods)*:** Develop more detailed understanding of these high-magnitude historical events to inform future policy.

Wider Indian Himalayan Region/ Trans-boundary Basins

Multi-State Upscaling of 'HiFlo-DAT': Deploying to other locations is a huge task - so it would require devolved ownership, partnership working (Academia, NGOs, Government, and local communities) and financial resources to achieve this. Employing an adaptive methodology to data sources, like adopted in the Chamoli District will bring flexibility and greater success.

Policy & Practice Activity Options	Potential Key Partners	Recommended Implementation Timespan	Likely Scale of Activity	Likely Cost/ Time Investment
Action: Revision of Disaster Management Plans	SDMA, DDMA	Short-term (Next Iteration)	Small	Small
Action: Revision of HVRA	SDMA, GIS Specialist	Short-term	Small	Small
Action: Sharing Historical Knowledge in Local Communities	DDMA, NGOs, Academia, Communities	Short-term	Moderate	Moderate
Policy Review: Planning Requirements for Major Infrastructure Projects	Government Agencies, Academia, Construction Industry	Short~ Medium-term	Large	Large
Policy & Practice Review: Flood Databases and Data Harmonisation	NDMA, SDMA, DDMA, CWC, IMD, NRSC, NGOs, Academia	Medium-term	Large	Large
Policy Review: Harnessing Digital Data	Government Agencies, Academia	Medium-term	Large	Large
Investigation: Historical LLOF and GLOF	Government Agencies, Academia	Short~ Medium-term	Large	Large
Investigation: Upscaling of 'HiFlo-DAT'	NDMA, SDMA, DDMA, NGOs, Academia, Media Organisations	Short~ Long-term	Large to Very Large	Large to Very Large

TABLE 2

Policy & Practice Activity Options

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Additional Resources

KEY LINKS

BSU 'HiFlo-DAT' Project Homepage, this includes wider details of the project background, research process, and research insights. https://www.bathspa.ac.uk/projects/hiflo-dat-hazard-database/

'HiFlo-DAT' Indian Himalayan Flood Database Kullu District Film: https://vimeo.com/1037424595

'HiFlo-DAT' IJDRR Article (April 2025): https://doi.org/10.1016/j.ijdrr.2025.105336

SUPPLMENTARY RESEARCH DATA (DOI: 10.17870/BATHSPA.C.7589948)

BathSPAdata Repository Collection. Open access to the 'HiFlo-DAT' Kullu District database (Microsoft ® Excel ®) and geospatial data (Google Earth™ mapping service)

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CITATION RECOMMENDATION

BSU, DU, HPU, NIHE, UoC, UoG, VCSGUUHF (2025) 'Accelerating Change: Flood Hazard-Disaster Databases in the Indian Himalayan Region'. Science Policy Brief. Almora, Delhi, Ranichauri, Shimla (India), and Ambleside, Bath, Cheltenham (UK) April 2025.

Funder Details

We are grateful to the following for providing funding for this project portfolio:

- UGC-UKIERI 'HiFlo-DAT' (2018-2021)
- Royal Commonwealth Society - Bath and District Branch (2023)
- Bath Spa University (2012-2024, QR funding, Turing Scheme)
- University of Cumbria (2024, QR funding)
- University of Delhi

Acknowledgments

We extend our thanks to delegates in 'HiFlo-DAT' partner agency workshops (2018 and 2024, in Delhi, Kullu and Shimla), village community workshops (2023- Chamoli District) and archive organisations in India, USA and UK. We also express thanks to government authorities (HPSDMA, Kullu DDMA, and Chamoli DDMA), NGOs, and academic colleagues/students, who have been co-producers.

Disclaimer

The data collected and presented here are in full compliance with our research integrity procedures. The policy options are the viewpoints of the authorship team based on the project evidence, and do not necessarily represent those of any named institutions.

Accelerating Change: Flood Hazard-Disaster Databases in the Indian Himalayan Region

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