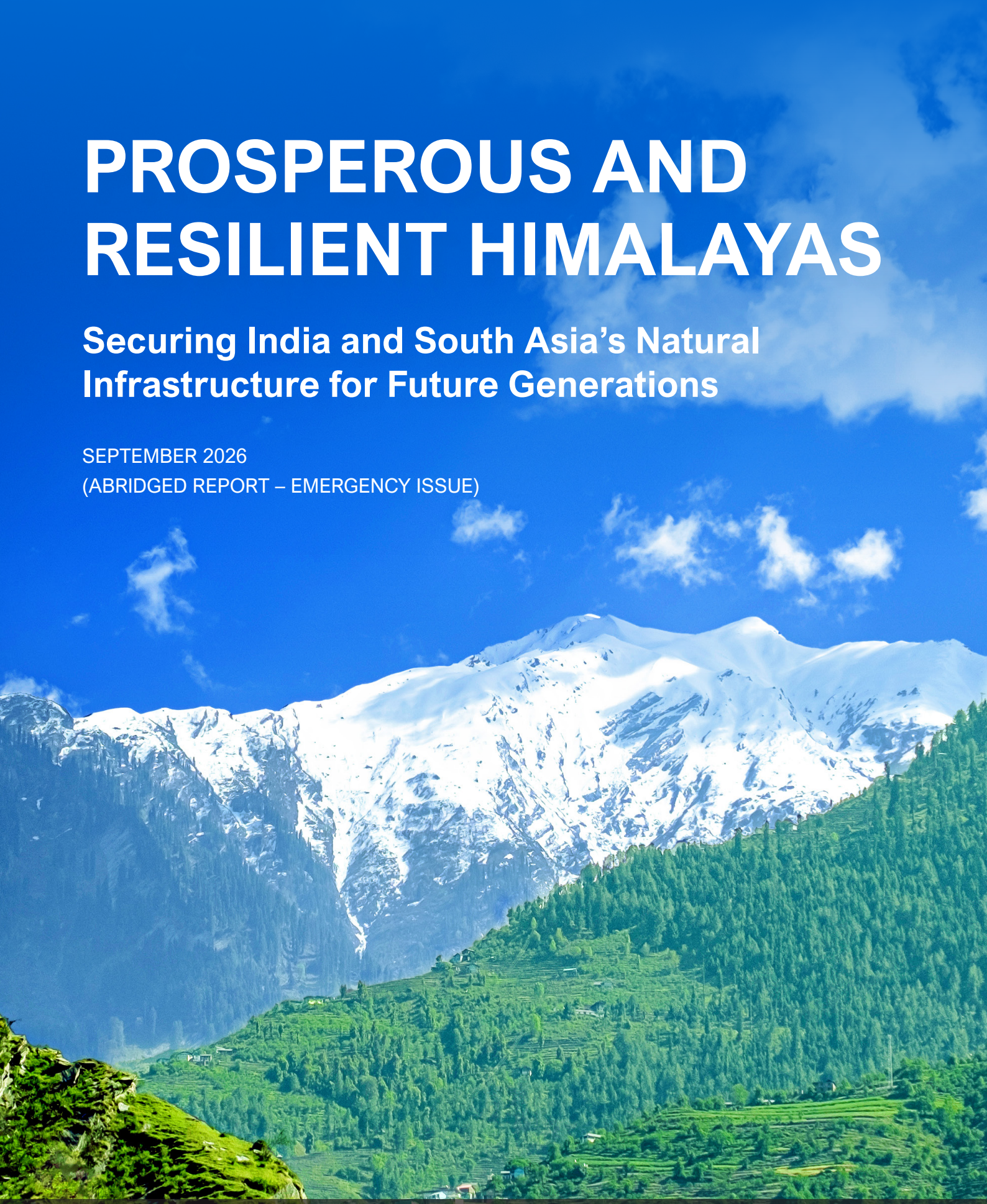
PROSPEROUS AND RESILIENT HIMALAYAS

Securing India and South Asia's Natural Infrastructure for Future Generations

SEPTEMBER 2026

(ABRIDGED REPORT – EMERGENCY ISSUE)



SYSTEMIQ

INTEGRATED MOUNTAIN INITIATIVE

G.B. Pant National Institute of Himalayan Environment

Photo taken on the Bharmour to Chamba Highway (Himachal Pradesh) by Aneesh Kotru

THE WIND HORSE:

THE FORCE FOR HIMALAYAN RENEWAL

Across the Himalayas, prayer flags carry hopes across mountains and valleys. Their five colours represent sky, air, fire, water and earth, a reminder that resilience comes from the balance and connection between systems. As the wind carries these hopes across the mountains, so must knowledge, action and commitment move across communities, institutions and ecosystems. The future of the Himalayas depends on finding our strength in these connections, and acting together to protect the whole.

Systemiq

SYSTEMIQ is a global systems change company that works with government, business, finance and civil society to address complex economic and environmental challenges.

Integrated Mountain Initiative

IMI is a civil society-led network working across the Indian Himalayan Region to bring mountain priorities into national policy and development debates.

G.B. Pant National Institute of Himalayan Environment (NIHE)

NIHE is India's primary national scientific institution focused on the Indian Himalayan Region, housed within the Ministry of Environment, Forest and Climate Change.

We are grateful to the International Centre for Integrated Mountain Development (ICIMOD) for its valuable technical contributions to this report. Its expertise, research and regional perspective have helped strengthen our understanding of the Himalayan system and the challenges and opportunities facing the region. We particularly appreciate the time and insight shared by the ICIMOD team in co-developing concepts, reviewing and contributing to the analysis. This work was supported and made possible by The Rockefeller Foundation.

FOREWORD

Arushi Chopra
Senior Director,
Systemiq

Jeremy Oppenheim
Founder & Senior
Partner, Systemiq

Our thoughts are with the communities across Nepal and the wider Himalayan region who have lost so much in the disaster of August 2026. This report was already underway before that event, but we share this abridged version now, ahead of its full publication in October, in the hope it contributes to the resilience-building this region urgently needs.

The Himalayas are approaching a tipping point, with millions of lives and livelihoods hanging in the balance. Glaciers are melting faster than they were a decade ago, and as they retreat, they are leaving behind unstable lakes held back by little more than loose rock and ice, above valleys where millions of people live. India alone has 56 glacial lakes rated very high risk. At the same time, the region is nearing “peak water” by mid-century, the point when river flows stop rising and start declining, with profound implications for water security.

Glaciers, rivers and hazards do not recognise national borders, and neither do the consequences when disaster strikes. We have focused this work on the Indian Himalayas, recognising that meaningful progress will ultimately require cooperation across the wider region.

This focus is also economically consequential. Our analysis finds the Himalayas underpin over 20% of India’s GDP, making them a piece of the country’s national economic infrastructure, one on which the water, food and economic security of hundreds of millions of people ultimately depend.

The heart of the challenge is a growth model that puts pressure on Himalayan systems, extracting value without retaining and reinvesting enough in the natural systems that create it. This report sets out a resilient growth model built for mountain conditions: securing the natural foundations the region depends on, building resilience to shocks that are now unavoidable, and finding sustainable ways to grow, so the region generates enough value to reinvest in the nature that sustains it.

Ten critical transitions anchor this model, offering an average adjusted return of roughly 8x per rupee invested, once their ecological, social and economic value is counted together.

The Himalayas have long been a source of resilience and renewal for the people who call them home. Securing a prosperous and vibrant future for the region will take collective action, no single actor can do it alone. We hope this report is a step toward that.

Lord Nicholas Stern
CH, FRS, FBA , Professor of Economics and Chair, Grantham Research Institute on Climate Change and the Environment, LSE

The Himalayas are the Third Pole, and unlike the Arctic or Antarctic, this pole has hundreds of millions of people living beneath it. This is national and international infrastructure, and the ecological system underpinning it is approaching a tipping point. Protecting it is the foundation on which the region’s future prosperity depends, and that prosperity extends well beyond India’s borders, to the food, water and economic security of communities across South Asia and the wider world who depend on what these mountains provide. It is time to drive towards a new model of economic growth, one that strengthens both the communities and the natural systems on which they depend.

Dr. Pema Gyamtsho
Director General, International Centre for Integrated Mountain Development (ICIMOD)

The Hindu Kush Himalaya is changing rapidly. Glaciers are retreating, permafrost and high-mountain slopes are becoming increasingly unstable, and communities and infrastructure downstream face growing risks from complex and cascading hazards. Recent events have shown that these risks extend well beyond glacial lake outburst floods. They do not respect national borders, and no single country can address them alone. This report makes a strong case for coordinated action, including bringing the private sector behind resilient action. Cross-border monitoring, shared risk information and early-warning systems, and joint investment in resilience are becoming essential for safeguarding lives, livelihoods and economies across the region.

Dr. Indra D. Bhatt
Director, GBPNIHE, Ministry of Environment, Forests and Climate Change

The Himalayan region is critical to India’s water, biodiversity, climate, and ecological security. Protecting these fragile mountain ecosystems through science, innovation, and community participation is essential for building a resilient, sustainable, and prosperous future for the region. Urgent action is needed to address severe ecological degradation and emerging risks. In this context, a systems investment approach is timely for promoting research, innovation, ecosystem-based approaches, and community partnerships to safeguard ecosystem services, strengthen climate resilience, and support sustainable development across the region.

20%+ of India's GDP is underpinned by the Himalayas

400M+ tourist visits to the Indian Himalayan Region in 2025, roughly 8 times its resident population

~1/3rd of Himalayan glacial melt is linked to black carbon from South Asia

10 critical transitions identified, with roughly **8x** adjusted returns

18% of India's land is Himalayan, yet the region accounts for ~35% of disasters

CONTENTS

1. A SYSTEM AT RISK: APPROACHING CASCADING TIPPING POINTS

High Mountain Asia is a landscape like no other. Whilst it is the spiritual and cultural heartland for billions living in the region, it is also the third pole, the youngest mountain range on Earth and therefore among its most seismically active, averaging 4,500 metres in elevation. Parts of it are warming 2-3X faster than the global average[1], reshaping the cryosphere and producing a new category of hydro-cryological disasters. And unlike the Arctic or Antarctic, this pole sits inside a live human system: every hazard here is immediate, not slow, and threatens millions of people who are some of the most exposed, least protected populations on the planet.

Figure 1: The Himalayas are the world's Third Pole, and are at the tipping point with the rate of glacier loss having doubled in the last century

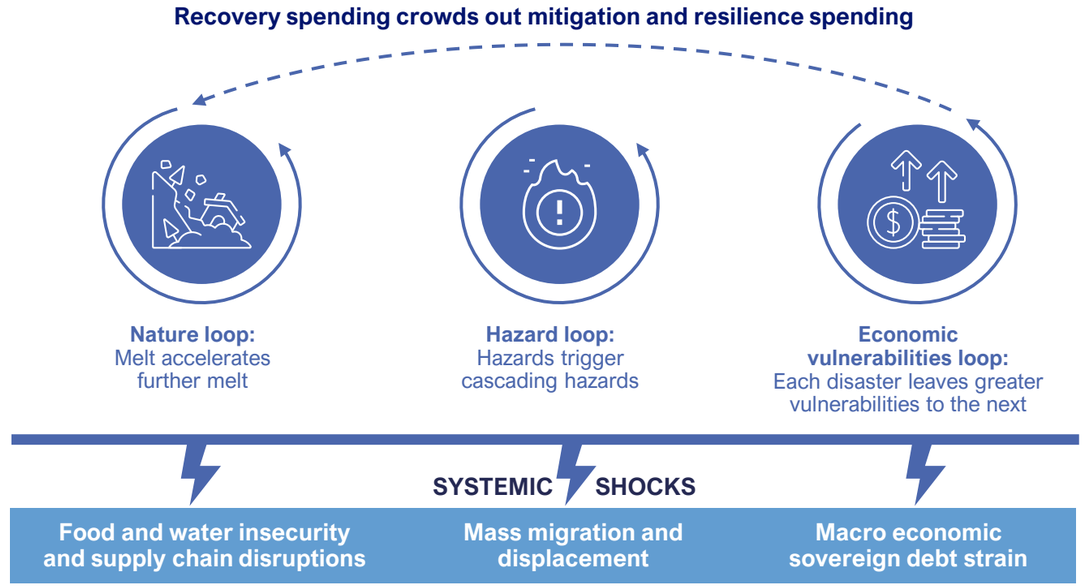
PRELIMINARY DATA	ARCTIC	ANTARCTICA	HIMALAYAS
GLACIAL AREA LOST *Since little Ice Age*	~10%	*No long-term historical reconstruction published*	**>40%**
DIRECT SUSTENANCE *Food, water*	~4 Million	~5,000	**~2 Billion**
BIODIVERSITY HOTSPOTS	None	None	**4 out of 36 In the world**
RESEARCH FUNDING	Trillions *Spent on research between 2007-2016	Billions *Received for Antarctica in 2010	Millions *Received by the only pan-Himalayan body

The third pole is being hit by cascading tipping points through three reinforcing loops. ***The nature loop:*** warming-induced glacial retreat exposes darker rock, lowering the surface's **albedo** (its ability to reflect sunlight) and causing it to absorb more heat, which accelerates the very melt that exposed it. Initially, faster melting adds more water to downstream rivers. But as glaciers shrink, the ice reserve diminishes, eventually reaching **"Peak Water"**: the point at which glacier meltwater runoff reaches its maximum, after which shrinking glaciers provide progressively less water downstream. This is expected across most Himalayan river basins by mid-century, with up to 80% of current glacier volume at risk by 2100[2]. As these natural systems destabilise, the frequency and intensity of disasters (initially floods, then droughts) rises. ***The hazard loop:*** once a hazard strikes, it can cascade rapidly, as we saw on August 26, 2026 on the Nepal-Tibet border, a glacier collapse became a landslide, then a dam, then a flood, in under two hours. Four disasters in one, each faster and harder to stop than the last. This brings us to the ***economic vulnerability loop:*** the emergency spending required after each disaster crowds out investment in nature and resilience, leaving the region less equipped for the next shock. We are seeing this in Nepal, where reconstruction following the disaster could cost around 10% of GDP. That heightened vulnerability then feeds back into the natural and hazard loops, reinforcing the cycle.

1 Doblas-Reyes, F.J. et al. (2021), "Linking Global to Regional Climate Change", in Masson-Delmotte, V. et al. (eds.), Climate Change 2021: *The Physical Science Basis*, IPCC Sixth Assessment Report, Working Group I, Cambridge University Press, pp. 1363–1512, doi:10.1017/9781009157896.012.

2 Jackson, M., Azam, M.F., Baral, P. et al. (2023), "Consequences of climate change for the cryosphere in the Hindu Kush Himalaya", in Wester, P. et al. (eds.), *Water, Ice, Society, and Ecosystems in the Hindu Kush Himalaya:* An Outlook, ICIMOD, pp. 17–71, doi:10.53055/ICIMOD.1030; and Nepal, S., Steiner, J.F., Allen, S. et al. (2023), "Consequences of cryospheric change for water resources and hazards in the Hindu Kush Himalaya", in the same volume, pp. 73–121, doi:10.53055/ICIMOD.1031.

Figure 2: The third pole faces cascading tipping points



What happens in the Himalayas extends far beyond the region itself. Just as the rivers from the glaciers upstream flow downstream, creating livelihoods, irrigating agriculture and thus shouldering the food and water security of 2 billion people, so do disasters travel downstream. The glacier broke off in Tibet, the brunt of the disaster was borne by Nepal, whilst we have had debris, bodies and fauna wash up in India. The Himalayas are one connected system, but its benefits and its risks are distributed far beyond the mountains themselves, with ripple effects felt in South Asia, and potentially the entire world through supply chain disruptions, climate migrations or geopolitical risk.

2. FOR INDIA: HIMALAYAS ARE NATIONAL ECONOMIC INFRASTRUCTURE

So, what does the crumbling third pole mean for India? The Himalayas are already a disaster hotspot for India: **they constitute 18% of India's land but 35%[3] of India's disasters.** The human and economic cost has already started stacking. The 2013 Uttarakhand disaster, centered on the Kedarnath valley[4], left more than 5,700 dead and missing; the 2021 Chamoli disaster killed or left more than 200 people missing; and the 2023 Sikkim glacial lake outburst flood killed at least 25. India now has close to 200 glacial lakes[5] identified as high risk and almost a quarter being 'very high risk', leaving millions exposed downstream.

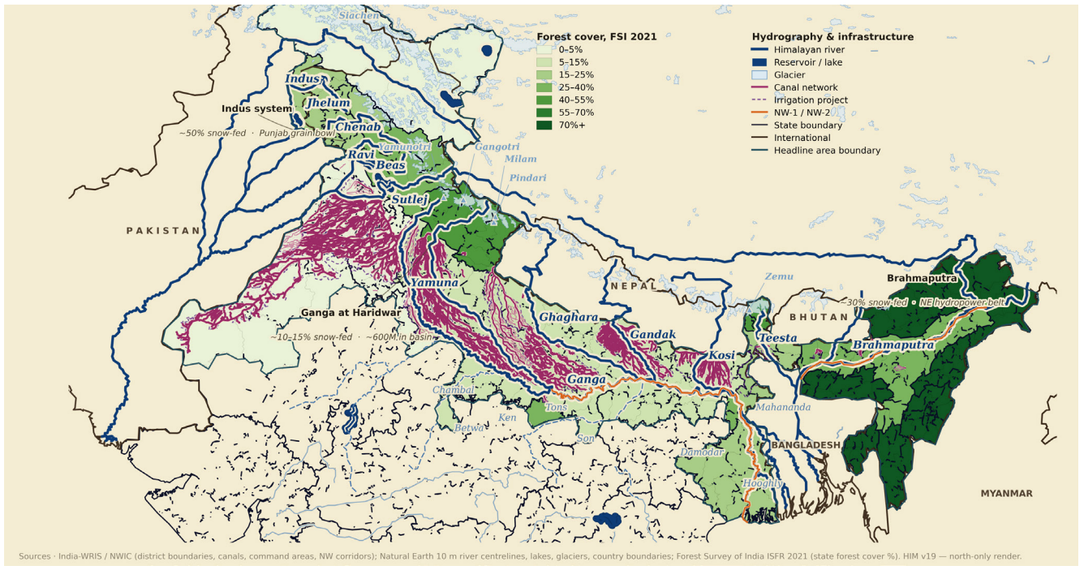
But the lesser-told story is that the Himalayas are not only a source of physical risk, but critically, a vital economic asset. Our analysis shows that the Himalayas underpin over 20% of India's GDP. The rivers that carry risk downstream also carry the water that sustains India's economy: wheat and rice across the Indo-Gangetic plain, tea in Assam and Bengal, hydropower in the Northeast, and pilgrimage economies in downstream towns.

This economic value extends far beyond the Himalayan states themselves. Our analysis suggests that the Himalayan states capture only around 5% of the GDP that the system ultimately underpins; roughly 15 percentage points accrue downstream. Yet the states that benefit most from this natural infrastructure rarely think of the Himalayas as their own, until a flood or drought reminds them otherwise.

This matters for India's *Viksit Bharat* ambition. India aims to become a developed economy by 2047, requiring sustained growth of roughly 8% a year over the next two decades. A fifth of that economic engine depends, directly or indirectly, on a mountain system that is increasingly under stress.

The Himalayas are national economic infrastructure, as much as they are India's spiritual and ecological heartland. And if that infrastructure crumbles, Viksit Bharat is at risk.

Figure 3: The Himalayan water lifeline of northern and eastern India



3 Down To Earth analysis of EM-DAT international disaster database, State of India's Environment 2024.

4 Government of India, Ministry of Home Affairs (2013), Year End Review 2013: Uttarakhand Disaster of June 2013, Press Information Bureau, New Delhi. The Government recorded 580 deaths and 5,526 people missing following the June 2013 floods, cloudbursts and landslides; contemporary Uttarakhand Government estimates subsequently treated more than 5,700 missing people as presumed dead.

5 Government of India, Ministry of Jal Shakti (2026), written reply to the Lok Sabha, 23 July 2026, citing the National Disaster Management Authority's 2025 scientific assessment of 189 high-risk glacial lakes across the Indian Himalayan Region, of which 56 were classified as "very high risk"; reported by Press Trust of India, "Government monitoring 2,485 glacial lakes in Himalayan river basins; 56 classified as very high risk", The Economic Times, 23 July 2026.

Box 1 – Methodology for calculating Himalayan-linked economic activity

This estimate quantifies the share of India's economic activity dependent on Himalayan water through three layers: **(1) direct:** GSDP of Himalayan states; **(2) indirect:** downstream agriculture, manufacturing, hydropower, and services reliant on Himalayan-fed rivers and groundwater recharge (rain-fed production excluded); and **(3) induced:** supply-chain (e.g., tractors sold from southern states to Indo-Gangetic Plains) and wage-spending effects (e.g., spent on food and services). The central estimate is ₹64.8 lakh crore (21.5% of India's FY24 GDP). This is a traceable-dependency measure, not an ecosystem-services valuation or climate-damage estimate.

Himalayan systems underpin over **20% of India's GDP**.
The rivers that flow from the Himalayas sustain the wheat and rice economies of the Indo-Gangetic Plain, tea in Assam and Bengal, hydropower in the Northeast, and pilgrimage economies downstream. This GDP is at risk as the Himalayas become a less reliable water source as we near "peak water".

Box 2 – "Peak Water" and its implications for India

The Glaciers are natural water stores, holding water as ice and releasing meltwater gradually into rivers, particularly through the dry season. As warming accelerates glacier melt, river flows initially increase. But this cannot continue indefinitely. Most Himalayan river basins are expected to reach "Peak Water" around mid-century, the point at which glacier meltwater reaches its maximum before declining as the ice reserve shrinks. On current trajectories, the Hindu Kush Himalaya could lose up to 80% of its present glacier volume by 2100.

This has profound implications for India's water security. The Himalayas feed the Indus, Ganges and Brahmaputra systems, supporting hundreds of millions of people, agriculture, cities and industry downstream. The risk is not simply less water overall, but the erosion of a natural storage system that regulates when water is available. This is particularly important in the Indus Basin, where snow and glacier melt provide more than 60% of annual river flow.

Peak Water is therefore not simply a glacier problem. It is the progressive loss of part of India's natural water infrastructure. Building resilience will require better basin-level management, more efficient agricultural and urban water use, stronger groundwater and springshed recharge, and investment in the natural systems that store, regulate and release water across seasons.

Source: Nepal, S., Steiner, J.F., Allen, S. et al. (2023), "Consequences of cryospheric change for water resources and hazards in the Hindu Kush Himalaya", in Wester, P. et al. (eds.), *Water, Ice, Society, and Ecosystems in the Hindu Kush Himalaya: An Outlook,* International Centre for Integrated Mountain Development (ICIMOD), pp. 73–121, doi:10.53055/ICIMOD.1031.

3. HOW DID WE GET HERE?

The immediate response to a disaster like this is understandably to focus on better preparedness, early warning systems, and more suitably sited settlements. These interventions are essential, but they treat the symptom, not the condition that produced it. That condition starts with geology, and is compounded by climate change and the unique development challenge the region faces.

The Himalayas start from a position of structural disadvantage. The region's geological youth and ongoing tectonic activity make it highly seismic and landslide-prone. Global warming is now significantly compounding this, altering the natural systems the region depends on: accelerating glacier retreat, destabilising slopes, and increasing the risk of cascading hazards, largely as a result of emissions generated elsewhere.

The region is reeling from both of these pressures, and difficult terrain and landlocked geography mean that delivering basic services and infrastructure is roughly 2.5 times[6] more expensive than in the plains. This high cost, combined with a narrow revenue base, limited industrial activity and land-use restrictions tied to forest cover, leaves Himalayan states with far less fiscal room than their peers to generate growth. **That constraint narrows the range of viable growth options, increasing pressure on the natural assets and sectors immediately available.** In places, for example, this has taken the form of over-tourism, where the volume of visitors has outpaced what local infrastructure and ecosystems can support.

Yet the mountains create immense value for the wider Indian economy through their water, energy, biodiversity and tourism. Too little of that value is retained locally. Hydropower, tourism and infrastructure generate value well beyond the mountains, while many of the associated costs, ecological pressure, water stress, waste, congestion and disaster exposure, are concentrated locally.

The result is a structural mismatch. Himalayan states are responsible for stewarding natural systems of national importance, but lack the fiscal capacity to invest in them at the scale that responsibility demands, while the economic value those systems generate flows largely elsewhere.

The answer is not to stop development. It is to change the model of development: create more value locally, reduce the risks and costs of growth, and reinvest a greater share of the returns in the natural capital the economy depends on.

6 Dasgupta, P., Goldar, B. Costing for Elevation in Development Expenditure: Illustrative Evidence from India. J. Quant. Econ. 16, 811–830 (2018). https://doi.org/10.1007/s40953-017-0103-6

4. TEN CRITICAL TRANSITIONS TO BUILD A RESILIENT HIMALAYAN FUTURE

The opportunity is therefore not to choose between conservation and development, but to pioneer a mountain-specific regenerative growth model where economic prosperity, disaster resilience and ecosystem restoration **reinforce one another.**

To get to this vision, we need to follow a sequenced development pathway that's fit for the mountains.

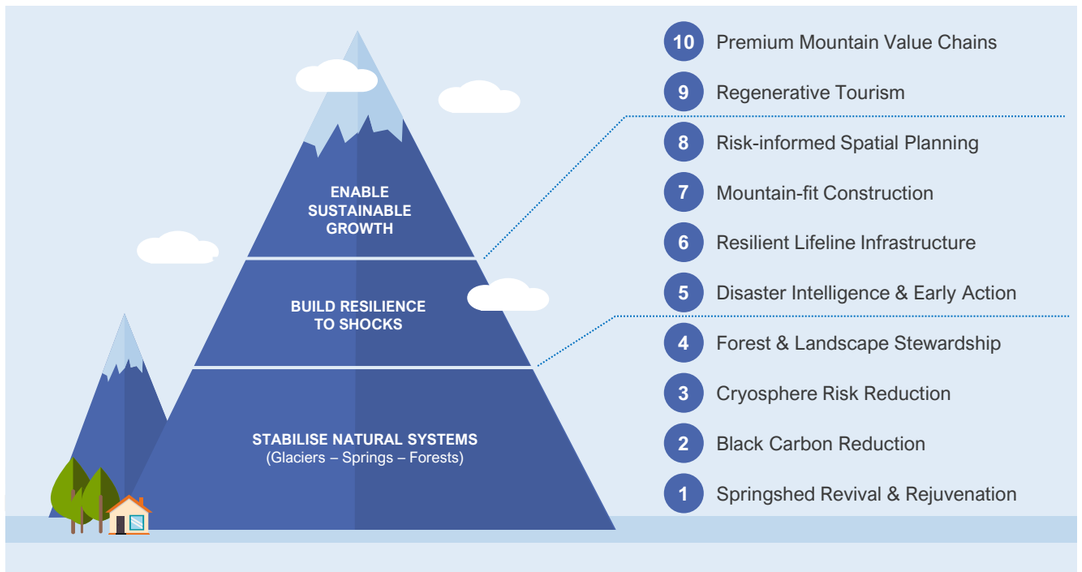
Level 1: Secures nature's foundations. Glaciers, springsheds, and forests underpin water security for over 40% of India's population. Being a public good, international finance and national ecosystem-service transfers can provide capital to protect them.

Level 2 builds resilience to shocks. Shocks are now unavoidable, but the region still lacks the intelligence needed to anticipate them. For example, only around 0.1%[7] of the Himalaya's estimated 40,000 glaciers are currently monitored, while permafrost, another critical source of instability, is even less understood. The priority is therefore to build the monitoring, early-warning and risk-mapping systems needed to anticipate hazards and guide smarter siting and preparedness before disaster strikes, rather than simply responding afterwards. This shift from response to prevention is what can break the rebuild-and-repeat cycle.

Level 3: Unlocks regenerative growth, rather than growth that depletes the natural assets on which the region depends. Tourism shows what this can mean in practice: where destinations are already under pressure, shifting from volume to value and managing demand; where natural and cultural assets are under-used, developing higher-value, lower-impact tourism that creates more local jobs and income. Bhutan offers one example of this approach, deliberately prioritising higher-value tourism over maximising visitor numbers, while using tourism revenues to support local livelihoods and conservation. The aim is to keep more of the value generated within local businesses and communities, while reinvesting a share in the natural and cultural assets that make the destination attractive in the first place.

Done right, this becomes a virtuous version of the same loop that traps the region today: growth funds conservation, conservation reduces disasters, and fewer disasters free up more to invest.

Figure 4: 10 critical transitions needed in the Himalayan region



7 Gaurav Tiwari, "Scientists flag major gap as just 0.1% of 40k Himalayan glaciers monitored", *The Times of India*, 3 September 2026.

10 CRITICAL TRANSITIONS TO GET TO A RESILIENT HIMALAYAN FUTURE

We have identified ten critical transitions that together can deliver this mountain-resilient model, offering adjusted returns[8] of roughly 8x per rupee invested.

	1	2	3	4	5	6	7	8	9	10
Critical transition	**Springshed revival and rejuvenation**	**Black carbon reduction**	**Cryosphere risk management**	**Forest and landscape stewardship**	**Disaster intelligence & early action**	**Risk-informed spatial planning**	**Resilient lifeline infrastructure**	**Mountain-fit construction**	**Regenerative tourism**	**Premium mountain value chains**
Why this transition is needed	Half of ~3M Himalayan springs are drying or becoming seasonal	South Asian black carbon drives ~1/3 of Himalayan glacier mass loss	Himalayan glacier mass loss was 65% faster in the last decade	Forest-fire detections rose 55% in just three years in the western Himalayas	Only ~21 glaciers are currently monitored across the HKH, including 16-17 in India; even where risks are known, science does not consistently translate into decisions	Roughly 3/4 of India's mapped landslide-prone area lies in the Himalayas	The 2023 Sikkim GLOF destroyed 31 bridges, alongside major power and infrastructure losses, with $1B illion insurance claim on the Teesta dam alone	HKH built-up area grew ~75% in just 20 years, locking in infrastructure choices for decades	~400M tourists visit the Indian Himalayas each year	Mountain commodities already represent a ~₹70,000cr market, yet fragmented value chains limit local capture
What needs to change	Restore ~1.5M affected springs, managing them as permanent water infrastructure through mapping, recharge, long-term finance and local stewardship	Cut soot across glacier-linked airsheds, starting with ~30,000+ priority brick kilns and other major controllable emitters	Move from observation to active risk management across priority catchments, combining risk reduction engineering and tested interventions	Bring ~3M ha of fire-prone forest under year-round stewardship, protecting water, soils, slopes, biodiversity and livelihoods	Scale a decision connecting existing glacier, weather, river and landslide intelligence to evacuations, closures and infrastructure shutdowns before hazards cascade	Put hazard science before development approvals across priority landscapes, using zoning, no-build areas and safer siting	Future-proof priority high-risk corridors, designing roads, bridges, power and utilities to absorb shocks and recover quickly	Apply mountain-specific design, codes and materials across buildings, combining resilience, NbS and lower-carbon local supply chains	Shift priority destinations from maximising footfall to maximising local value, managing carrying capacity and reinvesting in nature and communities	Build out priority agro-ecology and commodity strengthening aggregation, processing, branding, finance and producer value capture
	14x returns	**10x returns**	**10x returns**	**6x returns**	**10x returns**	**5x returns**	**7x returns**	**7x returns**	**8x returns**	**6x returns**

8 Refer to Methodology Box on page 18

SELECT PROGRAMMES TO FURTHER PROGRESS THESE TRANSITIONS

We have developed a programme each to action all the critical transitions

TRANSITION 1: SPRINGSHED REVIVAL – NATIONAL SPRINGS MISSION

WHY: An estimated half of the more than three million springs in the Indian Himalayas have dried up or become seasonal, threatening water security, farming and rural livelihoods. Existing efforts show that springs can be revived, but restoration remains fragmented and lacks consistent funding, standards and long-term stewardship. **Most springs remain outside a permanent system to prioritise, finance and manage them as water infrastructure.**

THE SHIFT: FROM TIME-BOUND PROJECTS TO A PERMANENT, ACCOUNTABLE WATER SERVICE

WHAT: Government-led mission securing year-round spring flows through science-based restoration, financed stewardship and monitoring.

WHERE: Priority spring-dependent Himalayan districts with greatest dry-season stress, dependence and vulnerability.

WHO: Jal Shakti, DoLR, NITI Aayog and states lead; scientists guide; communities steward and monitor.

≈14x Adjusted economic, social and ecological benefit per ₹1 invested

Assumptions: costs cover mapping, recharge and monitoring
Benefits: more water, lower coping costs, ecosystems and time saved

HOW: PRIORITISE SPRINGS, RESTORE RECHARGE, ORGANISE DELIVERY AND SUSTAIN FLOWS

01	**PRIORITISE**	Rank spring clusters by dry-season stress, dependence and ecosystem value
02	**RESTORE**	Diagnose aquifers and recharge zones using science and community knowledge
03	**ORGANISE**	Build state pipelines with named owners, shared standards and scheme convergence
04	**SUSTAIN**	Fund long-term stewardship, upkeep and monitoring, with costs of up to ~US$7,000 per spring over 25 years.

TRANSITION 2: BLACK CARBON REDUCTION – BRICK KILN TRANSITION FUND

WHY: Global warming is the main driver of glacier retreat but is largely beyond regional control. **Black carbon is a meaningful local accelerant.** Recent modelling attributes about one-third of glacier mass loss in the Himalayas to South Asian black carbon. Industry, primarily brick kilns, contributes 32-42% of South Asian anthropogenic deposition across the region. **Cutting kiln emissions therefore tackles local air pollution and glacier melt through the same plume.**

ONE PLUME, TWO CRISES: CLEANER AIR LOCALLY, LESS BLACK CARBON ON GLACIERS

WHAT: Targeted public and concessional fund to modernise brickmaking and reduce demand for fired bricks.

WHERE: Priority glacier-linked airsheds, clustering kilns using emissions, wind-flow and pollution data.

WHO: Government and financier's fund; ICIMOD targets; kiln owners, lenders, suppliers and buyers deliver.

≈10x Adjusted economic, social and ecological benefit per ₹1 invested

Costs cover kiln upgrades, finance support and monitoring.
Benefits: Lower energy costs, cleaner air, safer work, less black carbon reaching Himalayan glaciers

HOW: TARGET CLUSTERS, THEN CLEAN KILNS, IMPROVE BRICKS AND CUT DEMAND

01	**TARGET CLUSTERS**	Map kiln emissions and wind flows; aggregate owners so finance and MRV work
02	**CLEAN OR RETIRE**	Upgrade viable kilns and retire the worst; close only the residual finance gap
03	**IMPROVE BRICKS**	Scale hollow bricks and cleaner fuels to cut costs, materials and emissions
04	**CUT BRICK DEMAND**	Use procurement to scale bamboo and biomaterials, reducing the need for fired bricks

TRANSITION 9: REGENERATIVE TOURISM – HIMALAYAN TOURISM CATALYST

WHY: Tourism can be the thread that connects the Himalayan economy, from hospitality to horticulture, food, crafts, transport, wellness, culture and nature-based enterprise, whilst creating jobs for millions. Today, scale is not converting into resilience; the region receives **40 crore visits**, but primarily driven by lower value tourists (e.g., foreign visitors remain **~1%),** and no record of how much visitor spend stays local or flows into nature.

THE SHIFT: FROM FOOTFALL-LED TOURISM TO A VALUE-LED SYSTEM THAT RETAINS AND REINVESTS

WHAT: Build a coalition-backed model that develops priority destinations, shared demand generation, local enterprise pathways and reinvestment mechanisms.

WHERE: Start with three archetypes: high-pressure pilgrimage and hill-station hubs; fragile frontiers like Ladakh and upper Sikkim; and under-monetised nature and culture assets in the eastern Himalayas.

WHO: Private sector players with government, philanthropies, tourism operators, community enterprises, investors and destination management partners.

≈8.0x Adjusted economic, social and ecological benefit per ₹1 invested

Assumptions: Costing for destination baselining, pooled marketing, circuit design, local enterprise support and standards
Benefits: Higher forex earnings, ~5x value-per-visitor ambition, local economy, investment in nature and infrastructure

HOW: DEFINE THE MODEL, BUILD DESTINATIONS, GROW VALUE AND REINVEST

01	**PRIORITISE DESTINATIONS**	Identify priority destinations and classify them by archetype, pressure, visitor mix, local value capture
02	**SHAPE DEMAND**	Build shared standards and pooled marketing so demand reaches destinations that are ready for the right visitors
03	**LIFT LOCAL VALUE**	Develop multi-day circuits, premium experiences, homestays, guides, food, craft, wellness and nature enterprises
04	**CLOSE THE LOOP**	Track water, waste, mobility and ecological pressure; ring-fence revenues for nature, infrastructure and communities

TRANSITION 8: MOUNTAIN FIT CONSTRUCTION – RESILIENT, NATURE-BASED SETTLEMENTS

WHY: The HKH is building fast: **built-up area grew almost 75% from 2000-2020, 1.7x faster than population**. Much of this demand is met through fired brick, cement, steel and concrete, which can raise freight, dust, emissions and local air pollution, while often fitting poorly with mountain climates and hazards. **Local systems exist, but remain fragmented and underused because supply chains, standards, approvals, skills and buyer confidence are weak.**

THE SHIFT: FROM SCATTERED LOCAL PRACTICE TO A TRUSTED, MODERN MOUNTAIN CONSTRUCTION PATHWAY

WHAT: Coalition testing viable local and hybrid construction, then building standards, supply chains, skills and demand.

WHERE: Himachal Pradesh and Uttarakhand, initially targeting hill towns, tourism, public buildings, housing and reconstruction.

WHO: ICIMOD, CSFEP and Systemiq with state agencies, builders, producers, researchers, buyers and funders.

≈7x Adjusted economic, social and ecological benefit per ₹1 invested

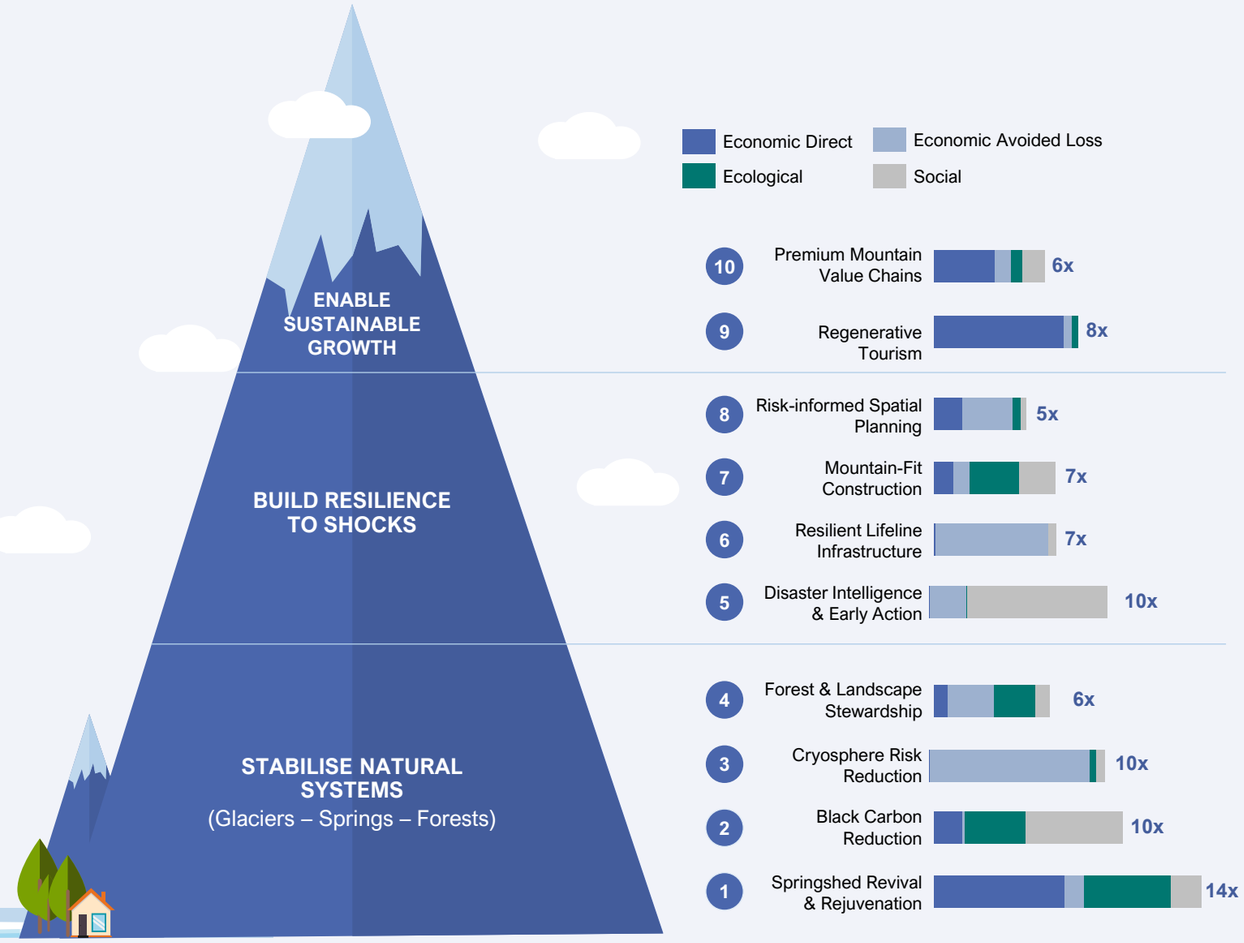
Assumptions: costs cover mapping, pilots, material testing, standards, processing and skills
Benefits: local value/jobs, avoided freight and dust, lower BC/PM pressure and safer buildings

HOW: TEST WHAT WORKS, BUILD THE ENABLING SYSTEM, THEN SCALE ADOPTION

01	**MAP**	Map activity, materials, buyers, value chains and policy gaps
02	**TEST**	Prioritise viable material-region-building combinations and design 2-3 pilots
03	**BUILD**	Develop standards, processing, skills, procurement and demonstration assets
04	**ADOPT**	Anchor demand through public buildings, tourism, housing and reconstruction

MOUNTAIN-SPECIFIC GROWTH MODEL:
10 PROGRAMMES; PORTFOLIO OFFERS 8x ADJUSTED RETURNS

Early analysis suggests every US$1 invested generates an estimated 8x adjusted returns across economic value, ecological gains, social benefits and avoided disaster losses. That is a conservative estimate, adjusted downwards for additionality and permanence risk. Full methodology, including how each benefit is counted and what has been excluded to prevent double counting, is summarised in Box 3.



Box 3 – Reading the 8x adjusted return figure

Each transition represents a broader system shift. To make these shifts actionable, we have identified an illustrative programme that could help kick-start each transition and modelled the costs and benefits of delivering that programme at scale.

The return shown therefore represents the societal benefit-cost ratio of the illustrative programme, not the value of the full transition itself. Across the ten programmes, the average adjusted return is approximately **8x for every ₹1 invested.**

Benefits are assessed across four categories: **economic direct** (income, productivity and local economic value); **economic avoided loss** (damage and disruption avoided); **ecological** (climate, pollution, biodiversity and ecosystem benefits); and **social** (health, safety, time savings and inclusion).

The analysis uses source-backed programme costs and benefits, discounted over time, and then applies conservative adjustments for additionality and permanence. Benefits are separated where possible to reduce double-counting across categories.

These figures are intended as screening-level estimates for prioritisation, not investment cases. Each programme would require further local design, costing, risk assessment and validation before deployment.

Source: SYSTEMIQ (2026c), Integrated Blueprint of Programmes. Return estimates are source-backed benefit-cost ratios using visible programme-level benefit and cost inputs, with counterfactual and permanence adjustments; site-level investment requires validation of expected annual losses, costs, buyer terms, inventories and overlap partitions.

5. MISSING LINK: FINANCING AND SCALING THE TRANSITION

Total investment[9] in the Himalayas has been ~$34B annually. Not only is investment intensity low (i.e., 25% of GDP vs. national average of 31%), but the public sector share is unusually high (40% vs. national average of 25%), consistent with persistently limited private investment. Some of this reflects the genuinely higher costs and risks of operating in mountain terrain, but much is addressable through better coordination, stronger data and project pipelines, and mechanisms to prepare and de-risk investment.

Within this already constrained investment, too little reaches the natural infrastructure on which the wider economy depends: springs, forests, watersheds, glaciers and landscapes. Three actions are needed to fix this mismatch:

A. Rebalance public spending towards natural infrastructure: Public investment should place greater weight on the natural systems that underpin resilience and economic activity. This means scaling proven approaches to springshed restoration, where programmes such as Dhara Vikas Yojna in Sikkim have demonstrated improvements in spring discharge and agricultural productivity; investing in locally actionable glacier protection, particularly black carbon reduction in priority airsheds; and integrating nature-based solutions into infrastructure planning, where watershed management, vegetation and drainage can reduce disaster risk while improving water security. The aim is not to replace hard infrastructure, but to ensure it is sited appropriately and built in a disaster-proof way, and to also ensure that natural infrastructure is treated as an essential part of the public infrastructure portfolio.

B. Build the enabling environment to crowd in private investment: Private capital can play a much larger role in sectors where the Himalayas have a comparative advantage, including **regenerative tourism, premium mountain commodities, higher-value agriculture and clean energy**. But this requires an enabling environment that reduces both real and perceived risk: clearer land and permitting processes, stronger local human capital, better decision-grade data and investable project pipelines. Where returns remain sub-commercial but the wider economic and ecological benefits are high, **concessional capital can absorb early-stage risk and crowd in commercial finance**, as it has done in sectors such as renewable energy. Philanthropic capital can play a complementary catalytic role by funding shared assets such as data, technical capacity and project preparation that individual investors cannot justify funding alone.

9 Investment is measured as gross fixed capital formation. Investment intensity is calculated as gross fixed capital formation divided by GDP. Himalayan figures are aggregated from state-level data; Annexes that will be published later will explain the methodology and years covered.

10 Systemiq (2026), Resilient Himalayas: Investment Gap Analysis, based on Reserve Bank of India, Handbook of Statistics on Indian States 2024–25 and State Finances: A Study of Budgets. Systemiq analysis finds state capital outlay across the core Himalayan state set at 6.67% of GSDP, approximately 3x the major-industrial-state benchmark. See also Dasgupta, P. and Goldar, B. (2018), "Costing for Elevation in Development Expenditure: Illustrative Evidence from India", Journal of Quantitative Economics, 16(3), pp. 811–830, doi:10.1007/s40953-017-0103-6, which estimates the cost of providing health, education and infrastructure in hill areas at approximately 2.5 times that in plains

Box 4 – Creating the enabling environment for capital flow: “The Himalayan Intelligence System”

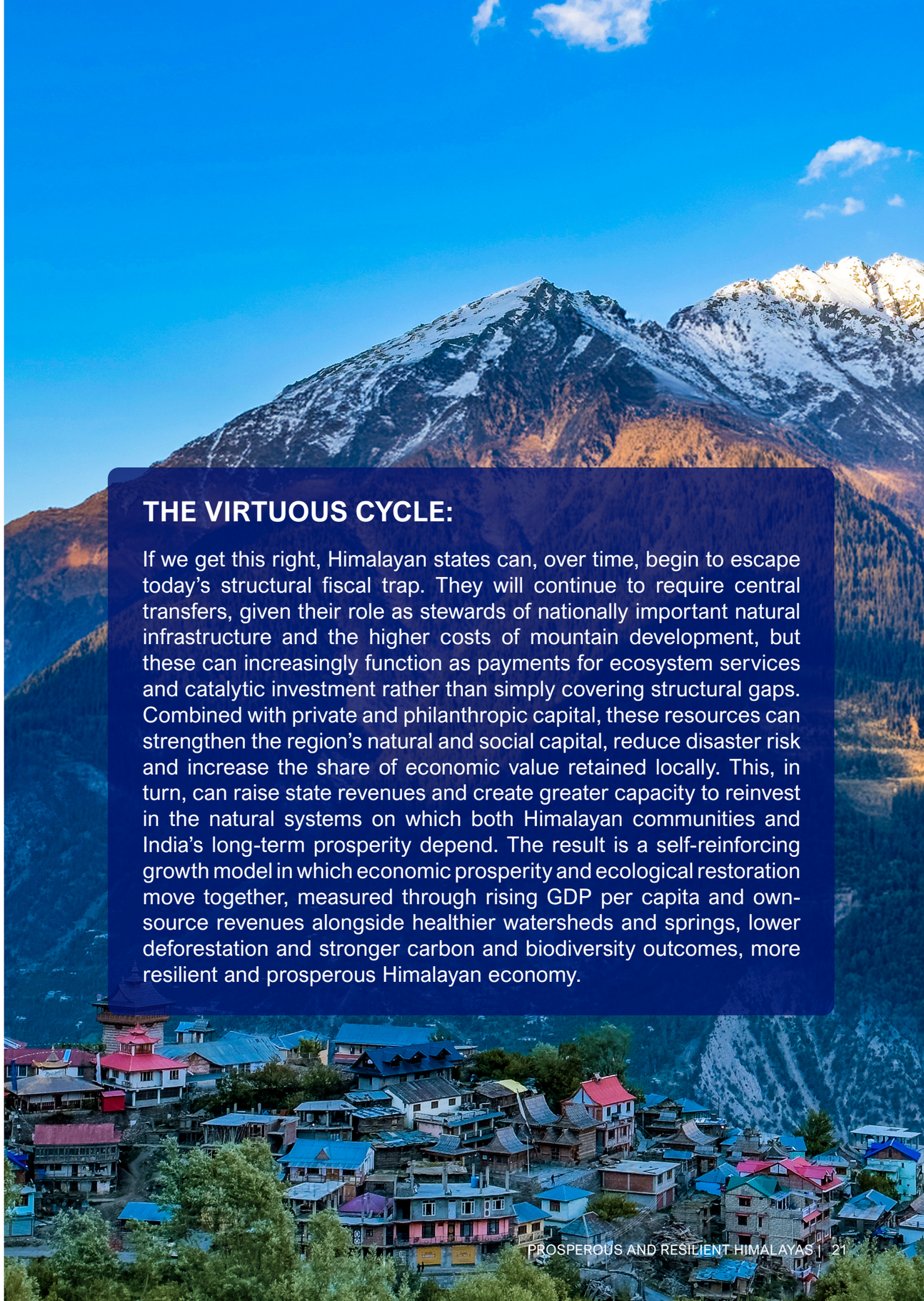
For investors, Bloomberg is not a data source alone. It picks up data from multiple disparate data sources to help investors make sense of the financial system, enabling more confident decision-making. The Himalayan Intelligence System is designed to do the same thing for a different class of decisions.

The data required to answer these questions exist across ICIMOD, ISRO, IMD, NDMA, state departments and academic institutions. What does not exist is the platform that connects them intelligently. Building this digital public good is the first move in the enabling infrastructure.

What decision-grade outputs look like

District Collector – Govt *Which road closes – and when?*	Corridor risk score: ‘NH-7, 78% landslide risk in 6 hrs, 1,200 people downstream.’
State Jal Board – Govt *Which springs do we restore first?*	Springshed ranked by urgency, recovery – matched employment schemes
Insurer / Reinsurer – Private *Where can we price parametric cover?*	Hazard exposure + asset inventory + historical loss data
Agri / Forestry Company – Private *Where do we invest in sourcing?*	Overlay climate risk, springshed health and road access to identify stable zones
Development Finance – DFI / CSR *Where is capital safe to deploy?*	Investability scorecard: risk, programme presence + delivery capacity / landscape

C. Unlock citizen funding turning affection into stewardship: The Himalayas have an unusually strong emotional connection with Indians across the country, through pilgrimage, culture, tourism and a shared sense of the mountains as a national asset. The opportunity is to convert that affection into changed behaviour, advocacy, volunteering and, potentially, citizen giving. This means building sustained public storytelling around Himalayan resilience, particularly for younger generations, using children’s content, popular culture, media and trusted public figures. For example, Ram Mandir Nidhi Samarpan Abhiyan was able to raise $500m+ from millions of citizen contributors when a cause is deeply resonant, trusted and connected to visible outcomes.



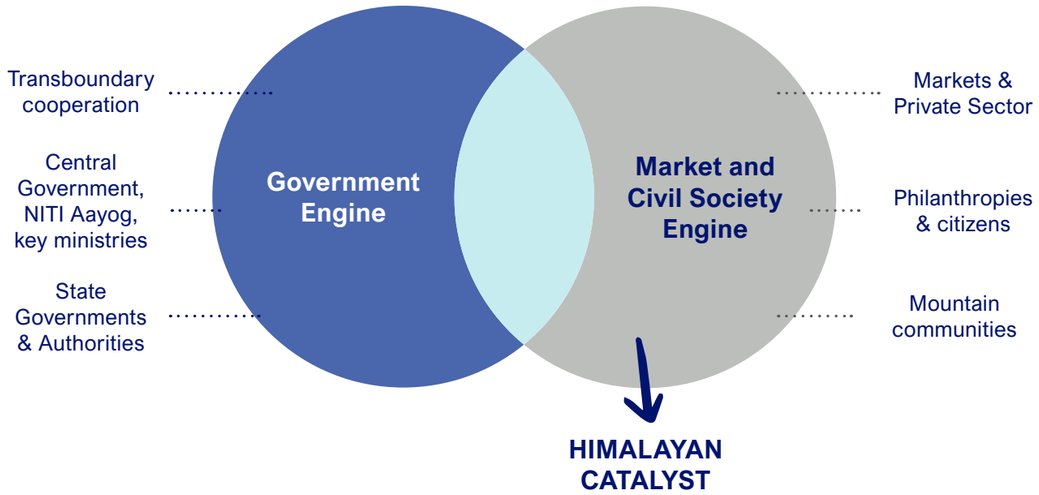
THE VIRTUOUS CYCLE:

If we get this right, Himalayan states can, over time, begin to escape today’s structural fiscal trap. They will continue to require central transfers, given their role as stewards of nationally important natural infrastructure and the higher costs of mountain development, but these can increasingly function as payments for ecosystem services and catalytic investment rather than simply covering structural gaps. Combined with private and philanthropic capital, these resources can strengthen the region’s natural and social capital, reduce disaster risk and increase the share of economic value retained locally. This, in turn, can raise state revenues and create greater capacity to reinvest in the natural systems on which both Himalayan communities and India’s long-term prosperity depend. The result is a self-reinforcing growth model in which economic prosperity and ecological restoration move together, measured through rising GDP per capita and own-source revenues alongside healthier watersheds and springs, lower deforestation and stronger carbon and biodiversity outcomes, more resilient and prosperous Himalayan economy.

6. INSTITUTIONAL ARCHITECTURE NEEDED TO SUSTAIN THE TRANSITIONS

Dual engines need to be activated to make progress on 10 critical transitions and the barriers holding them back

Figure 5 – Himalayan institutional architecture



A. Government Engine: Three levels of governance are needed to make this work. Nationally, the immediate opportunity is to revive and strengthen NITI Aayog's Himalayan Council. And over the next year build the base for a Himalayan focused institution with the combined mandate across conservation, disaster resilience and sustainable growth. The institution needs to be:

- Backed by the Government of India, with States leading implementation
- Connected to capital and public budgets
- Lean, permanent and technical
- Built around data, delivery and accountability
- Responsive to local governance (Gram Panchayat) planning and execution capacity

Regionally, existing bilateral water-sharing arrangements can provide a practical starting point for deeper cooperation on natural capital, shared hazard data and early warning. Tri-partite discussions among India, Nepal and Bhutan should also start to take hold, whilst the **Alpine Convention** amongst others offers a longer-term model for more formal Himalayan cooperation.

B. Market and Civil Society Engine – The Himalayan Catalyst: This is not about attracting large-scale industries into the region that will further compound the problem, but about creating regenerative growth and livelihoods for local communities. A philanthropic and private-sector counterweight, the Himalayan Catalyst works in close coordination with the government to turbo-charge efforts across priority sectors such as regenerative tourism, mountain commodities. This also means building the enabling environment needed to crowd in investment: a skilled workforce, stronger institutional capacity, and decision-grade data that allows governments, investors and communities to act on risk and opportunity rather than react to it.

7. PRACTICAL NEXT STEPS OVER NEXT 12 MONTHS

1. **Reactivate the NITI Aayog Himalayan Council and initiate the design of a dedicated Himalayan institution.** With PMO backing, re-establish the Council as the senior coordination mechanism for the region, while beginning the process of designing a dedicated institution with the mandate, capabilities and financing architecture needed to drive long-term Himalayan resilience and growth, and coordinate this agenda at the regional and international level.

2. **Use the transition period to demonstrate what works.** While the institution is being established, focus on three high-return transitions where science, capital and implementation can be brought together: **Black Carbon Reduction, Mountain-fit Construction and a Himalayan Disaster Intelligence and Early Action system** using latest AI models. Together, these can demonstrate how coordinated action can reduce emissions, build resilience and enable earlier action against increasingly unavoidable shocks, while generating measurable outcomes at scale.

3. **Mobilise the private sector around regenerative growth, starting with tourism.** Launch a private-sector led **Himalayan Tourism Catalyst** to bring leading tourism companies, investors and states together around a more regenerative model of tourism. Tourism is both **one of the sectors most exposed to Himalayan disasters and one of the sectors with the greatest potential to drive local value creation, jobs and investment in natural capital.** Done well, it can turn the region's greatest economic asset into a force for its stewardship.

This work will be formally launched at IMI's Sustainable Mountain Development Summit in Srinagar in mid-October, bringing together Himalayan states and senior government leaders, with participation from Nepal and Bhutan. A dedicated transboundary conclave will use the moment to begin building a wider Himalayan coalition around shared risks, priorities and solutions.

The opportunity is to turn shared understanding into collective action: a mountain-specific growth model, carried by governments, communities, science and capital. Like prayer flags across a mountain pass, each actor has a role; together, we can turn vulnerability into a virtuous cycle of resilient, locally retained prosperity.

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SYSTEMIQ | INTEGRATED MOUNTAIN INITIATIVE | G.B. PANT NIHE

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The project engaged stakeholders through formal consultations, key-informant interviews and working sessions across policy, science, finance, business and mountain practice. Affiliations are shown where clear.

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PROSPEROUS AND RESILIENT HIMALAYAS