IYGP Key Message

Contextualised for the Hindu Kush Himalaya (HKH) Region

Background

Glaciers are retreating at unprecedented rates, reshaping landscapes and the world as we know it. The United Nations agencies in charge of the International Year of Glaciers' Preservation have drawn up a dozen key messages, highlighting the importance of glaciers worldwide.

IYGP key message 1: Glaciers are critical to life

A glacier is a large accumulation of mainly ice and snow that originates on land and flows slowly under the influence of its own weight. Glaciers are found on every continent. They exist in many mountain regions and around the edges of the Greenland and Antarctic ice sheets. There are more than 275,000 glaciers in the world, covering an area of around 700,000 km². Glaciers are considered important water towers, storing about 170,000 km^3 of ice, which amounts to approximately 70% of the global freshwater. Glaciers are a source of life, providing freshwater to people, animals, and plants alike.

HKH CONTEXT

The region's 54,000 glaciers span 60,000 km², making it the highest concentration of glaciers outside the Poles, also called the Third Pole. These glaciers feed 12 major river basins, linked to the lives and livelihoods of over 1.9 billion people – 240 million in the mountains and 1.65 billion downstream. Glacier meltwater is vital during dry seasons, playing a key role in water security.

HKH ASK

Glaciers in the region are melting at an alarming rate, yet major knowledge gaps and scientific uncertainties continue to hinder an effective response. Urgent investment is needed to scale up glacier research and establish a sustainable funding mechanism for long-term, coordinated monitoring and modelling. Without this, our ability to predict and prepare for future glacier change will remain dangerously limited.

Policymakers must recognise the critical role glaciers play in regional water security, climate resilience, and disaster risks. Glacier change and associated hazards must be fully integrated into national and regional policies on climate, water resource management, and disaster response preparedness. This requires establishing robust monitoring systems, early warning systems, and protection strategies to manage the growing risks posed by glacier retreat and related hazards.

IYGP key message 2: Glaciers are sensitive indicators of climate change and are retreating globally due to rising temperatures.

Glaciers have generally been shrinking around the world since the mid-19th century (end of the so-called Little Ice Age). While there were occasional short-term glacier advances at different times and in different regions, they have been retreating with accelerated speed more recently as the world warms rapidly due to increasing atmospheric greenhouse gas concentrations. However, higher global temperatures lead to shorter accumulation seasons and less snowfall and more rainfall.

HKH CONTEXT

Glaciers in the HKH are melting about 65% faster than before, and even the once-resilient Karakoram glaciers are now shrinking.
Elevation-dependent warming is observed in nine out of 12 major river basins in the HKH, with the strongest amplification in the Brahmaputra Basin, meaning that most of the glaciers in the region which are at higher elevations are even more vulnerable.
Snow cover has declined in summer, winter, and there has been an average loss of 5 snow days per decade, mostly at lower elevations.
The HKH glaciers are projected to lose two-thirds of their volume by 2100 even if global warming remains below 2°C.

HKH ASK

Make glacier loss a climate risk priority by including glacier retreat indicators in national climate strategies, disaster risk reduction plans, and water resource policies.

Treat glacier loss as a cross-sectoral threat which affects agriculture, energy, infrastructure, and livelihood, and reflect that in policy planning.

Address key research gaps on glacier tipping points and use the findings as feedback loops. Support targeted research on how soot (black carbon), and shifting monsoons are accelerating ice loss. Strengthen partnerships between regional research centers and global climate institutions to improve projections of high-mountain change.

IYGP key message 3: Melting snow and ice from mountains is critical for freshwater supply in many regions.

Almost 70% of Earth's freshwater is stored as snow or ice. Runoff from glaciers, snow and ice is essential for drinking water, agriculture, industry, and clean energy production. Climate and cryosphere change impact the water cycle, including changing the amount and timing of glacier melt and snowmelt discharge, groundwater recharge and low flows, and contribute to sea level rise. As glaciers continue to shrink and snow cover changes, less water availability is expected to contribute to greater competition for water resources, especially in seasonally dry regions. Glaciers that are beyond their 'Peak Water', which is the point in time where meltwater runoff is at its maximum level, will gradually provide less and less contribution to downstream water resources.

HKH CONTEXT

Snow and glacial melt contribute over 74% to the river flow of the Amu Darya and ~40% flow of the Indus. This contribution to the flow increases in the higher elevations and drier seasons. (HIMAP 2019)
Meltwater currently sustains irrigation and hydropower in most of the basins within HKH, but projections show glacier runoff peaking around mid-century before declining.
In spring, snow and ice melt act as a natural buffer for downstream farming needs, and it is very likely that the dependency on them will increase in future.

HKH ASK

Develop adaptive water management strategies for basins dependent on meltwater. Create adaptive water management plans that account for the decreasing volume and increasing unpredictability of glacier-fed streams.

Promotion and Investment in storage systems, such as reservoirs, ice stupa, and ice reservoirs projects in Ladakh. These projects have been successful in conserving meltwater during peak flows and releasing when needed, particularly for irrigation and drinking water needs.

Increase investment in water resilience and infrastructure in vulnerable regions. Rainwater harvesting systems, efficient irrigation networks, and water-efficient technologies can help mitigate the impacts of reduced glacier runoff.

Encourage international cooperation to fund shared water management infrastructure in transboundary basins, ensuring equitable access to water resources for all countries involved.

IYGP key message 4: Melting glaciers, thawing permafrost and other cryospheric changes create new hazards and exacerbate existing hazards, increasing the risk of disasters.

Climate change is affecting the timing, frequency, and location of geohazard events with potential cascading effects. Slope stability and flood risk can be impacted by glacial recession and permafrost thaw in high-mountain and sub-artic regions. Continuous glacier retreat also leads to extreme events and new and evolving disaster risks for downstream populations and vulnerable transport and energy infrastructure, such as glacier lake outburst floods, landslides or enhanced erosion and sediment.

HKH CONTEXT

The region recorded over 489 Glacial Lake outburst floods (GLOFs) since the 1800s. These events are projected to triple in both frequency and magnitude by 2100, posing increasing risks, especially to transboundary catchments in the eastern Himalaya.

Approximately 62% of the most GLOF-vulnerable communities are in High Mountain Asia, with around 10 million people living within one km of a glacial lake.

The loss of subsurface ice, evolving permafrost–active layer systems, and thaw-induced mass wasting are escalating hazards to high-mountain settlements and infrastructure.

HKH ASK

Establish a Regional Glacier-Lake Early Warning Network to facilitate the timely sharing of data and alerts across borders. Such a network could support countries in the region in installing state-of-the-art technology in high-risk moraine-dammed lakes. Telemetric early warning systems have a proven track record of providing timely alerts in the floodplains.

We encourage countries to consider integrating GLOF early warning systems into national disaster management agencies to ensure timely alerts, enhance coordination, and enable cross-border notification protocols and harmonised evacuation planning where applicable.

We encourage integration of cryosphere hazards: glacier retreat, permafrost thaw, avalanches, GLOFs, and debris flow into national disaster risk reduction (DRR) strategies and land use planning frameworks. Countries may consider updating zoning regulations and building codes in flood and landslide-prone areas to better reflect emerging cryosphere-related risks and evolving hazard landscape.

We see the need to strengthen community-based monitoring by supporting mountain communities with micro-grants for local lake mapping and low-cost sensor use. Linking community observers directly with national early warning systems can improve timely response.

Support Interdisciplinary research on cryosphere hazards by allocating national science funding for rapid assessments of cascading risks. Explore the untapped opportunities of the use of uncrewed aerial vehicles (UAVs), ground-penetrating radar, and AI-driven modelling.

IYGP key message 5: Immediate, ambitious action to reduce greenhouse gas concentrations is needed to stabilise the climate, to preserve glaciers, and secure a sustainable future for all.

Glaciers are retreating at unprecedented rates, reshaping landscapes and the world as we know it. Despite their critical role in environmental sustainability, national adaptation policies rarely recognise the unique challenges related to glaciers. Yet, there is still (little) time to protect and preserve them by reducing greenhouse gas emissions and adopting transformative adaptation and mitigation strategies. Complementing Indigenous peoples' knowledge with other Earth observations, data, and scientific insights can provide a comprehensive, inclusive, and sound basis for policies and decisions on response measures. For glacier areas, these should include establishing protected areas, sustainable land use practices, implementing integrated water resources management and developing alert systems to cope with increased cryospheric risks.

HKH CONTEXT

The HKH region temperatures have risen by roughly 0.28 °C per decade since 1951, which is higher than the global rates, driving rapid glacier retreat.

Recent records of melt underscore urgency. Countries in the region will benefit from implementing deep emissions cuts consistent with the Paris Agreement's 1.5°C target to slow glacier loss.

Climate plans in the region rarely mention glaciers.

HKH ASK

National climate pledges need to be ambitious to explicitly limit warming over the Himalayas to 1.5°C or less and include regular reporting on glacier mass balance indicators.

Establish a regional agreement, committing member states, to harmonise carbon-pricing or renewable-energy targets, with annual high-level reviews to track progress and mobilise finance.

Adaptation strategies must explicitly address cryosphere changes and their far-reaching impacts.

IYGP key message 6: Glacier monitoring provides important data for climate adaptation and mitigation strategies, and it needs to be expanded.

For more than 130 years, some glaciers around the globe have been systematically monitored with annual measurements in the field, and more recently by different remote sensing techniques. Yet there remain huge gaps in the monitoring of glaciers, particularly in high mountain regions. Global glacier inventories and datasets on global glacier changes provide

critical information for scientific assessments as well as for policymakers, informing decisions on adaptation and mitigation strategies. Improved observation coverage and resolution, data management, and global data sharing can enhance analyses and prediction services that support timely actions to address threats, risks, and impacts.

HKH CONTEXT

There remains a huge gap in the monitoring of glaciers, particularly in the HKH, where only ~38 glaciers have been monitored over short periods.
High-altitude meteorological and stream gauges are sparse, leaving big gaps in the understanding of melt processes and water yields.
Expanded observations (satellite and field) are urgently needed. Improved monitoring would support climate impact assessments and timely policy responses.

HKH ASK

Expand and scale up ground-based observations within the HKH through a prioritised funding mechanism and policies.
Capacitate and harness the power of the local communities to leverage their support in data collection and maintenance of the stations.
We encourage countries to make the processed data openly available so planners, hydropower operators, and disaster teams can use it without delay.

IYGP key message 7: Glaciers support the livelihoods and economies of billions around the world.

More than two billion people, including many Indigenous peoples, rely on melt from glaciers and snow for their freshwater, including for their food security, livelihood, cultural, and domestic needs. The ongoing decline in glaciers contributes significantly to global sea-level rise, with today's sea level about 20 cm higher than in 1900, posing risks to water resources for communities near and far from glaciers, as well as coastal populations. These changes also have global economic impacts, affecting many sectors like agriculture, hydropower, tourism, trade, and transportation. Preserving glaciers is essential for environmental sustainability, economic stability, and safeguarding cultural services and livelihoods.

HKH CONTEXT

Glaciers in the region are the source of 12 Major Basins, linked to the lives and livelihoods of ~1.9 billion people

In the Indus River Basin, much of the pre-monsoon irrigation comes from glacier/snowmelt, highlighting the dependence of food production on Himalayan ice.

Mountain farming, hydropower, and tourism rely on stable glacier-fed flows. Ice loss threatens water security, crop yields, and livelihoods.

HKH ASK

Prioritise the needs of glacier-dependent communities in national and regional development plans, recognising that their livelihoods, agriculture, hydropower, and water security are intricately tied to glacier-fed systems.

Recognise glaciers as vital natural infrastructure and protect them through climate action, emission reductions, and sustainable land use policies to ensure long-term water and economic security.

Mobilise targeted investments and climate finance for regions and sectors dependent on glacier meltwater, such as agriculture, tourism, and hydropower, to build resilience against glacier loss.

IYGP key message 9: Youth inclusion can drive collective action and lead the way forward.

Youth are a driving force for societal change, pushing for climate action, sustainability and dignity for all. The meaningful engagement of young people in decision-making and policymaking processes can ensure greater diversity, inclusion, and representation. Youth-led programmes, regional cooperation, inclusive governance, funding, education, innovation, and Indigenous peoples' knowledge can drive long-term solutions, achieve intergenerational climate justice, and ensure glaciers continue to stand as sentinels of our planet's past, present, and future.

HKH CONTEXT

Young people make up over one-third of the region's population, and surveys show they are eager to act.

In practice, youth leaders across Asia are already developing innovative glacier-monitoring and conservation projects. Global launch events for the International Year have emphasised elevating youth voices and solutions for mountain water and ice.

HKH ASK

Design programs and quotas to include HKH youth in glacier and water management. Expand scholarships and innovation grants for young mountain scientists and entrepreneurs.

Encourage youth-led climate clubs or networks to co-develop adaptation plans. These steps will harness youth energy and ensure their needs and ideas shape glacier policies

IYGP key message 10: Glaciers have cultural and spiritual significance.

Glaciers are considered the abode of gods and spirits by Indigenous peoples in Asia, Latin America, the Pacific, and East Africa, and are the site of rituals and festive events that have been recognised in the UNESCO List of the Intangible Cultural Heritage of Humanity. The disappearance of glaciers would result in a substantial loss of cultural heritage and spiritual connection to the landscape and nature.

HKH CONTEXT

Glaciers in the HKH carry deep cultural meanings. Snowy peaks are sacred to mountain communities across the region. In India, the Gangotri Glacier (source of the Ganges) is holy in Hindu and Buddhist traditions. In Nepal, lakes and mountains are revered as sacred places where deities reside, and people have deep respect and connection to them. Bhutan officially banned all mountaineering to protect the spiritual 'abodes of deities' on its peaks.

The loss of ice is therefore experienced as a cultural loss. Indigenous beliefs often link glacier health to community welfare.
Traditional prophecies also predict ultimate ruin of things when these sacred glaciers disappear. As glaciers melt, communities feel a sense of ruin and disconnection from ancestral lands.

HKH ASK

Recognise and integrate local and indigenous knowledge and practices within adaptation and mitigation strategies, and finally upscale them as part of mountain policies.

Involve local community members, religious and cultural leaders in glacier monitoring activities.

Funding for cultural heritage projects can also help preserve this rich knowledge. Glacier policies should be sensitive to HKH cultural values, not only ecological facts.

IYGP key message 11: Glaciers are a crucial testimony of the Earth's history.

In their ice, glaciers contain an important record of the past climate and environment. The disappearance of glaciers results in the irreversible loss of unique archives of human, environmental, and climate history. Ice memory should be preserved as a scientific heritage and historical record for future generations. As glaciers retreat and disappear, sensitive and unique ecosystems are being lost, and with them, the globally important biodiversity and essential ecosystem services that support life.

HKH ASK

Support for expanding glacier monitoring and ice-core research in the HKH. This means funding field expeditions and data-sharing networks.
Establish regional ice-core labs and collaborate across HKH countries to fill gaps.
Use glacier data in national climate models and adaptation plans.
By treating glaciers as natural archives, policymakers can better justify their protection and the science that underpins it.

IYGP key message 12: Glacier shrinkage unveils new post-glacial landscapes and ecosystems.

New landscapes are emerging where glaciers have retreated or vanished. The emergence of post-glacial landscapes is generating new terrestrial, marine and freshwater ecosystems, and compels us to redefine our connection to these lands. Subsequent claims for the newly available land resources are often unclear and contested, calling for urgent management and protection strategies that deal with the governance of these new environments.

HKH CONTEXT

Alpine meadows, shrubs, and pioneer species are expanding upward as glaciers retreat. These emerging ecosystems influence water and carbon cycles (e.g. capturing runoff, storing CO_2). In short, melting glaciers both create new natural habitats and transform existing ones.

HKH ASK

Treat post-glacial landscapes as opportunities and risks and invest in research and stewardship of post-glacial terrains, ensuring that ecological succession, biodiversity, and natural hazard risks are well understood and managed.

Integrate watershed management, which can protect emerging wetlands and alpine meadows as water filters and habitat. Support research on mountain biodiversity to guide conservation in deglaciated zones.

In adaptation plans, include nature-based solutions that harness the ecological services of post-glacial ecosystems.

IYGP key message 13: Vanishing glaciers are impacting mountain tourism.

Rapid glacial recession is impacting high mountain tourism and recreation in many regions around the world, with impacts on culture and livelihoods. Glaciers act as 'pathways' into the high mountains, utilised by climbers to access high peaks. As glaciers become shorter and thinner, access becomes more difficult and hazardous. This can result in spatial shifts as people select different alpine routes, or in some cases, switch to aircraft access.

HKH CONTEXT

The glaciers of the HKH are not only critical water towers for the region but are also integral to the tourism and mountaineering economy. Across the region, iconic trekking routes and mountaineering expeditions either pass through glaciers, lead directly to glaciers as destinations, or rely on them as base camps for high-altitude ascents. These journeys draw thousands each year, sustaining local economies and shaping the cultural fabric of mountain communities. But this vital sector is increasingly under threat. Glaciers in the HKH are retreating rapidly, and with that, the landscape of mountain tourism is changing. Shorter snow seasons and increasingly erratic weather are making trekking and climbing routes less predictable and harder to access. The rise of supraglacial ponds on debris-covered glaciers has introduced new risks for those traversing through these glaciers. Hazards such as glacial lake outburst floods (GLOFs) have already damaged trails, destroyed infrastructure, and placed both locals and visitors in danger.

For many high mountain communities, tourism is a lifeline. As glaciers thin and hazards grow, both economic opportunities and cultural heritage are placed at risk. Protecting the cryosphere in the HKH is not only about safeguarding water and ecosystems, but also essential for preserving the identity, safety, and future of mountain tourism and the people who depend on it.

HKH ASK

Countries in the region need to integrate cryosphere risks into national tourism and economic planning. This will require fit-for-purpose tourism strategies that reflect the realities of a changing cryosphere, linking climate projections with route management, infrastructure investment, and visitor safety.

Sustainable livelihoods for mountain communities must be supported by diversifying income through eco-tourism, cultural tourism, conservation, and climate roles. It's vital to include mountain voices in climate policy discussions. Strengthen education and awareness on cryosphere change within the tourism sector. Develop training and certification programs for tourism professionals that include climate risk awareness, glacier safety, and environmental stewardship.