

# Cryosphere Initiative

Monitoring the cryosphere resources  
of the Hindu Kush Himalaya



The Hindu Kush Himalaya (HKH) contains the largest expanse of snow, glaciers, and permafrost outside of the polar regions. This vast accumulation of snow and glaciers acts as a natural water reserve, contributing significantly to the flows of the 10 major Asian river systems.

Often referred to as the water tower of Asia, the HKH is highly sensitive to climate change. The cryosphere – areas where water is in its solid form, such as glacier ice, permafrost, and snow – is perhaps the most sensitive component of the region's natural systems. It is imperative that we monitor and address cryosphere-related challenges if we are to secure the future of the HKH.

## Cryosphere Initiative

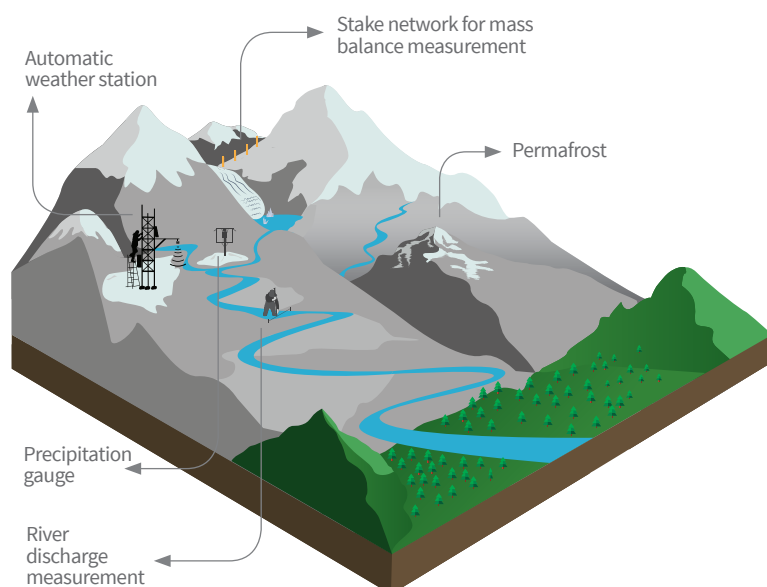
ICIMOD has been working on cryosphere issues since the late 1980s, but the nature of cryosphere research was limited to small-scale remote research on glacial lakes and glacial lake outburst floods. This meant limited data on cryosphere changes in the region.

In 2011, ICIMOD started its full-fledged Cryosphere Initiative to make a coordinated effort to promote cryosphere research and monitoring activities in the HKH, which include remote sensing-based, in-situ, and modelling-based studies. We are working towards an improved understanding of cryosphere change and fostering regional and international collaboration for research and policy uptake.

## What motivates us?

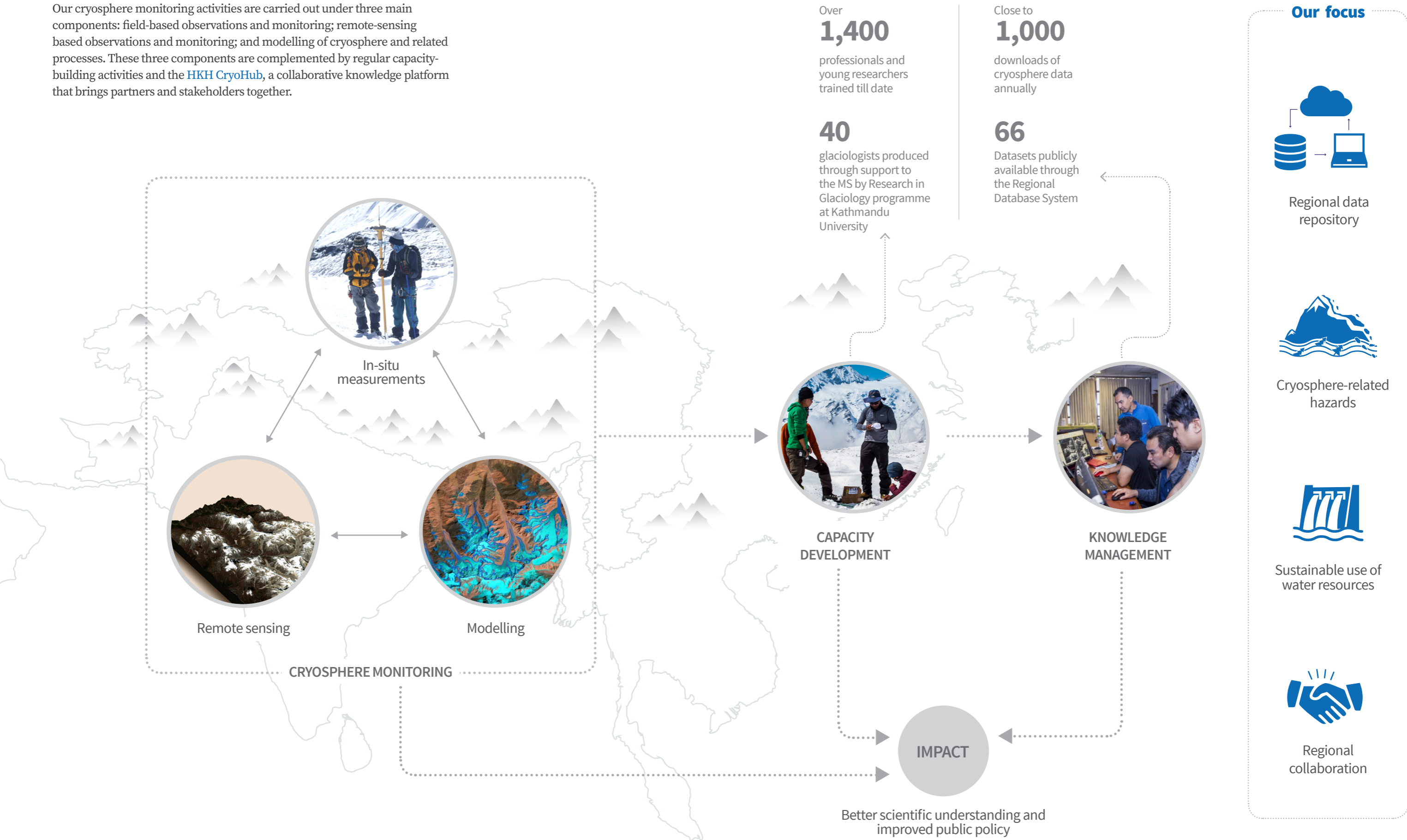
Over the coming decades, glacier and snow-covered areas and volumes will decrease and permafrost will continue to thaw in most areas in the HKH because of climate change. The region is predicted to lose a resounding 36% of its glacier volume by 2100 in a 1.5°C world. Changes in the cryosphere will impact glacier melt runoff and increase the risk of glacial lake outburst floods – posing grave challenges to water, food, energy, and livelihood security.

Cryosphere research needs to be scientifically rigorous and be conducted cooperatively if we are to understand the cryosphere's rapid melt rate and mitigate adverse impacts.



Cryosphere monitoring approach

Our cryosphere monitoring activities are carried out under three main components: field-based observations and monitoring; remote-sensing based observations and monitoring; and modelling of cryosphere and related processes. These three components are complemented by regular capacity-building activities and the HKH CryoHub, a collaborative knowledge platform that brings partners and stakeholders together.



## What we do

We work with regional experts and partners to improve understanding of cryosphere change across the HKH and its impact on water resources. We collaborate with stakeholders to monitor changes in the cryosphere and address emerging issues through research and policy advocacy. We are involved in wide-ranging interventions across the HKH:

Partnering with institutions and governments to strengthen cryosphere monitoring programmes and partners' capacities

Collaborating with internationally renowned scientists and institutions to transfer knowledge and skills, thereby strengthening cryosphere monitoring in the region

Working closely with social scientists and community members to explore the linkages between cryosphere and society from physical and social perspectives

Supporting long-term cryosphere monitoring through in situ measurements, remote-sensing observations and monitoring, and modelling of cryospheric and related processes

Training young glaciologists from the region and encouraging their involvement in conducting monitoring activities in collaboration with local partners

Co-producing scientific knowledge and facilitating data and knowledge exchange through the HKH CryoHub, a collaborative regional cryosphere hub

## Our impact and achievements

Conducted pioneering work on glacial lakes leading to several risk mitigation projects in the region (such as [the report on the status of glacial lakes in the HKH](#))

“Status and Change of the Cryosphere in the Extended Hindu Kush Himalaya Region” is the most downloaded chapter of the 2019 *Hindu Kush Himalaya Assessment* (as of September 2020)

Published glacier inventories for Bhutan and Nepal, along with [The status of glaciers in the Hindu Kush-Himalayan region](#), which are useful for hydrological modelling and understanding water availability scenarios

Enhanced ICIMOD's [data repository](#) on regional changes in glaciers, snow, ice, permafrost, glacial lakes, high mountain hydrology, and meteorology, with close to 1,000 downloads by users in 2019

Improved understanding of cryosphere contributions for stakeholders, including the hydropower sector, by organizing trainings, consultations, and workshops

Cryosphere monitoring programmes set up in Afghanistan, Bhutan, Nepal, and Pakistan, complementing the better established monitoring systems of China and India

Trained around 1,400 professionals and young researchers working on the cryosphere, with an emphasis on promoting women scientists

Trained 40 glaciologists from India, Nepal, and Pakistan through support to the MS by Research in Glaciology programme at Kathmandu University



### For further information

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