

Cryoforum Session plan

Session A6: The cryosphere under a changing climate in the HKH: Findings from the *Hindu Kush Himalaya Assessment* and linkages to global policy processes

Room: Main Conference Hall

Session design: Plenary presentation and discussion

Room setup: Theatre

Session host: Philippus Wester, Regional Programme Manager – Mountain Knowledge and Action Networks, ICIMOD

Rapporteurs: Udayan Mishra and Sanhita Sahasrabudhe (ICIMOD)

Key questions

1. Key findings of the *Hindu Kush Himalaya Assessment* report on the cryosphere in the Hindu Kush Himalaya (HKH) under a changing climate, discussed in conjunction with the most recent studies
2. Linkages of the “International forum on the cryosphere and society” with global policy processes
3. Objectives and overall programme of the international forum

Session B1.1: Role of the cryosphere in the hydrological cycle

Room: (TBC)

Session design: Keynote presentation and panel discussions

Room setup: Stage with five chairs and theatre arrangement for the audience

Session host: Santosh Nepal, Water and Climate Specialist, ICIMOD

Rapporteurs: Saurav Pradhananga and Nisha Wagle (ICIMOD)

Theme

The cryosphere plays an important role in regulating and modulating different components of the hydrological cycle. Cryospheric components such as snow, glaciers, and permafrost sustain water flow to downstream areas for different uses. Since millions of people living in downstream areas depend on cryospheric services for agriculture, domestic water uses, and hydropower, it is important to have a good understanding of upstream cryospheric conditions

and changes. The impact of climate change is already visible in the form of shrinking glaciers and changes in melt runoff patterns and, subsequently, the hydrological regime. In addition, extreme hydro-climatic events are occurring more frequently, causing increasing floods events. All these changing events are affecting water security in the region and impacting socioeconomic development. This session will discuss the role of the cryosphere in maintaining the hydrological cycle and how climate change will affect water availability in the future.

Key questions

1. What is the role of the cryosphere in maintaining the mountain hydrological cycle?
2. How are the glaciers in the HKH region changing?
3. How will climate change affect cryospheric processes and downstream water availability?

Session B 1.2: Climate modulation with a focus on particulate pollution and its impact on the cryosphere

Date: 28 August 2019

Time: 15:15–16:30 (please upload your slides in the morning, latest by lunch time on the day of the session)

Room: (TBC)

Session design: Panel presentation, moderated panel discussion, Q&A session with audience

Room setup: Panel tables on stage, microphones

Session hosts/chairs: Inka Koch, Glacio-hydrologist, ICIMOD, and Kundan Lal Shrestha, Assistant Professor, Kathmandu University

Rapporteurs: Praveen Kumar Singh and Abhijit Vaidya (ICIMOD)

Theme

One-fifth of the world's population is dependent on the water sources of High Mountain Asia such as snow and glacier ice, which provide important temporary water storage. Amplified warming at altitude leads to faster loss of these reservoirs, which are not being replenished fast enough, leading to irreplaceable loss of significant water resources for people downstream. Pollutants such as greenhouse gases and light-absorbing particles like black carbon (BC) modulate the climate in the high-altitude mountains. BC particles have a direct impact on snow and ice since the particles not only absorb solar radiation in the atmosphere more significantly than greenhouse gases but also accelerate melting when deposited on the cryosphere. Additionally, BC particles in the air affect cloud formation and thus climatic circulation patterns and precipitation. While knowledge gaps remain regarding deposition and transport pathways, the sources of the incomplete combustion of fossil fuels that produce BC particles lie largely in the region, with India's and China's industrial fumes close by as well as very localized sources that could all

be mitigated through changing policies. Once BC particles are deposited, they do not pose as much of a health risk but the effects on the cryosphere are long term, damaging a fragile environment that is of immense significance to people. This session aims to define research gaps that could be more efficiently tackled through collaborative efforts, to highlight known hotspots of vulnerability of the cryosphere to changing climatic variables and pollutants, and to bridge the gap between science and society.

Key questions

1. Where are the geographical hotspots of snow and ice most vulnerable to changes in air temperature, precipitation, and pollution?
2. Which research gaps need special focus and can be tackled through collaborative efforts?
3. How can we reach out, enforce policy change, and raise awareness among the public?

Session B1.3: Cryosphere and hydropower sustainability in the HKH region

Room: TBC

Session design: Moderated panel discussion

Session hosts: Ramesh Vaidya, Senior Advisor – Water and Air, ICIMOD, and Nirjan Rai, Policy Entrepreneurs Inc., Nepal

Rapporteurs: Nisha Wagle and Karen Marie Oseland (ICIMOD)

Theme

This session is being organized in the context of emerging and evolving discussions on the cryosphere's contributions to society. Technically feasible hydropower potential in the HKH region is estimated at more than 500 GW. However, a systematic review published in 2019 by ICIMOD scientists concludes that “the energy sector is likely to suffer [globally] due to additional risk and loss of potential opportunities due to cryospheric changes.” It is therefore uncertain how much of the 500 GW plus potential in the HKH region would be viable and environmentally sustainable in the context of climate change impacts on streamflow variability, hydro-meteorological and geophysical extremes, sediment load changes, and potential glacial lake outburst flood (GLOF) risk. The purpose of this session is to invite scientists from the HKH countries for a panel discussion on how knowledge about water availability from cryospheric sources could improve the process of planning for hydropower development in the HKH region. The session will also discuss cryospheric change-induced hydrological and geophysical risks to hydropower potential and its development and operations in the HKH region.

Key questions

1. What are the issues concerning cryospheric changes and their impacts on hydropower potential and its development and operations in the HKH region?
2. What are the risks to hydropower potential in the HKH region due to streamflow variability? How does it relate to cryospheric changes? What risk mitigation measures would you like to suggest?
3. What are the risks to hydropower development and operations in the HKH region due to geophysical extremes? How does it relate to cryospheric changes? What risk mitigation measures would you like to suggest?
4. What are the risks to hydropower development and operations in the HKH region due to hydro-meteorological extremes? How does it relate to cryospheric changes? What mitigation measures would you like to suggest?
5. What are the risks to the operation of hydropower plants due to sediment load dynamics? How does it relate to cryospheric changes? What mitigation measures would you like to suggest?
6. Based on your research on how past and current projects have engaged with communities with regard to sharing of benefits, how successful have the mechanisms of sharing revenue (royalty-based) and holding equity shares (local people as equity investors) been in hydropower projects?

Session B1.4: Irrigation, agriculture, and domestic use

Room: (TBC)

Session design: Panel presentation

Room setup: Stage with five chairs and theatre arrangement for the audience

Session hosts: Abid Hussain, Food Security Economist, ICIMOD, and Amina Maharjan, Migration Specialist, ICIMOD

Rapporteurs: Lipy Adhikari and Sandhya Thapa (ICIMOD)

Theme

Agriculture and livestock still remain the main sources of food security and livelihoods in the HKH region. Meltwater from glaciers and snow significantly contribute to water bodies in the ecosystem. For instance, around 60% of river flow in the Indus River is contributed by

meltwater. Overall, around 130 million farmers in the Indus and Ganges basins substantially depend on meltwater for their food security and livelihoods.

Growing urbanization, industrialization, and changes in land use patterns in agriculture add stress on water resources, particularly meltwater. Such pressures are likely to widen the water supply–demand gap in a region where most urban centres are already facing water insufficiency. To add to this, climate change–induced rise in temperature has accelerated the melting of glaciers and increased extreme events such as erratic precipitations, frequent floods, prolonged droughts, changes in monsoon patterns, and GLOFs. These developments have resulted in high variability in water availability for agricultural and domestic use. There is therefore an urgent need to understand the dynamics of meltwater availability and its implications for present and future water use planning.

Key questions

1. How important is meltwater for agriculture, domestic use, and livelihoods in the HKH region?
2. What are the potential risks and opportunities associated with meltwater contribution to livelihoods in upstream and downstream areas?
3. What are the measures taken by communities, the government, and other stakeholders to cope with the risks associated with meltwater contributions?
4. How is variability in the availability of meltwater impacting women and marginalized communities in both upstream and downstream areas?

Session B2.1: Changing cryosphere and tourism: A sustainable tourism development agenda

Room: (TBC)

Session design: Panel presentation

Room setup: Panel set up and theatre

Session hosts: Anu Kumari Lama, Tourism Specialist, ICIMOD, and Denis Samyn, Glaciologist, ICIMOD

Rapporteurs: Sunayana Basnet, Nabina Lamichhane, and Reeru Shrestha (ICIMOD)

Theme

The cryosphere is indispensable for people and their wellbeing. In particular, the services and functions derived from the cryosphere are important for sustainable tourism development in the

HKH region. Mountain tourism as a recreational activity in particular relies on snow cover, glaciers, and meltwater, which are highly subject to weather variability and climate. The recently released *Hindu Kush Himalaya Assessment* indicates significant changes in climate across the HKH, both in terms of warming at higher elevations and in the occurrence of extreme weather. Even if we are able to limit global warming to 1.5°C at the end of this century, warming will likely be at least 1.8 °C in the HKH mountains. This would mean accelerated melting of glaciers and severe implications on human society, especially with respect to water availability and increased disasters.

The changing cryosphere and interlinked tourism scenario pose challenges to the sustainable tourism development agenda. Tourism and cryospheric services are inherently interlinked with destination resilience and the wellbeing of the broad tourism society.

Changes observed in the cryosphere bring cascading effects on destination, tourism activity, service, and business. Yet, little is known regarding their interlinkages and dynamics. This session aims to build an understanding about a broad range of knowledge on tourism and cryospheric service linkages by reconnecting the tourism society with the cryosphere and its services.

The session is guided by the following three key questions that help explore and navigate issues and prospects linked with tourism and cryospheric service linkages. It will also be aimed at formulating action points for informing the sustainable tourism development agenda.

Key questions

1. Explore: What are the issues and prospects related to tourism and cryospheric service linkages at the science, policy, and practice levels?
2. Navigate: How do we navigate linkages among diverse stakeholders when thinking about tourism and cryospheric service linkages?
3. Act: What are the priority action areas and how we can implement the sustainable tourism development agenda?

Session B.2.2: Economics of cryospheric change in the HKH region

Session design: Panel discussion

Room setup: Panel setup

Session hosts: Golam Rasul, Chief Economist, ICIMOD, and Nilhari Neupane, Socioeconomic Analyst, ICIMOD

Rapporteurs: Binaya Pasakhala (ICIMOD)

Theme

The mountain cryosphere, which includes glacier, snow cover, and permafrost, provides fresh water and multiple ecosystem services to people residing both in mountains, as well as, downstream. The cryosphere is a major source of water for hydropower, surface and groundwater irrigation, agriculture, drinking water supplies, livestock production, forestry, fisheries, and tourism.

A recent comprehensive assessment of glaciers in HKH concluded that the trend of glacier changes in the Himalayan region, i.e. thinning, retreating, and losing mass, is increasing at a higher rate and this trend is expected to continue in the future. Changes in the physical systems of the cryosphere are expected to have an impact on society and economy in diverse ways. These changes can affect human society directly through changes in hydrology, streamflow, ground water recharge, air temperature, disasters, living conditions, infrastructure and transportation, and indirectly through the effects on changing ecosystems and their services. Its ramifications can extend beyond the mountain region and affect densely populated river basins of the HKH region.

The economic and social costs of cryospheric change could be massive, affecting water availability, food and energy security, livelihoods, and living conditions and settlements. Economic and social loss and damage due to cryospheric change-induced disasters is expected to increase, as it can lead to damages on agriculture and livestock due to floods and droughts and can have negative implications on hydropower generation, transportation, tourism, and disaster-related health costs.

In fact, the effects of cryospheric changes are non-linear, interactive, and highly complex, causing direct and indirect socioeconomic impacts ranging from local and national to regional scales. Understanding the socioeconomic impacts of cryospheric change requires examining the complex linkages between the natural environment and society and their direct/indirect costs and risks at multiple scales, which is currently lacking in HKH context. Better understanding of how cryospheric change affects socioeconomic aspects of society is important for national, regional, and global actions to mitigate impacts and facilitate adaptations.

Key questions

1. What are the possible economic costs and social risks of cryospheric changes on broader socioeconomic development of mountain and downstream glaciated rivers of the HKH region?
2. What are the impacts of cryosphere change in the HKH on fundamental resources such food, water and energy availability; infrastructure development; and the society and economy?

Session B2.3: Cryosphere contribution to spiritual, symbolic, cultural, and religious perceptions

Room: (TBC)

Session design: Panel presentation; moderated panel discussion

Room setup: Panel presentation with theatre

Session hosts: Rajan Kotru, Regional Programme Manager – Transboundary Landscapes, ICIMOD, and Kosar Bano, Gender and Adaptation Specialist, ICIMOD

Rapporteur: Serena Amatya and Chimi Seldon (ICIMOD)

Theme

The Himalaya has been represented in religious texts and culture as the abode of the gods and a sacred intermediary space connecting heaven and earth. Cryospheric features like snow, glaciers, and glacier lakes spread across the HKH are often endowed with sacredness and meaning, and these belief systems exert influence on the way local communities perceive and interact with their surroundings. These communities see various features of their immediate landscapes, such as snow peaks, rivers, and wildlife, as sacred, and this in turn determines land use practices, even though globalization has been weakening such links. Similar beliefs in the sacredness of mountains are held among many other communities, from Pamir in the west to Sikkim and Arunachal Pradesh in the east. Anti-dam protests in Sikkim have been documented to be intricately related to beliefs about the sanctity of these landscapes.

Despite this, the social and cultural services provided in the HKH by the cryosphere in modern times are less understood and therefore are under-discussed. Nevertheless, few case studies are conducted in the region regularly. According to the studies and anecdotal evidences, the inhabitants of these region live with unique culture, religious beliefs, and social backgrounds. Their lives and practices are centred on their beliefs, and they are destined to uphold them for their own and their community's safety and security.

HKH communities maintain their identity and culture, conserve their agrobiodiversity, and deal with threats and adversity by using their own indigenous and traditional knowledge. Oriented by a search for authenticity, spirituality, and differences, such ideals are shown to be paradoxically contested by the homogenizing and commodifying forces of globalization.

Against this background, this session will help create a better understanding of the diversity of the HKH region and open an avenue for researchers to explore this less debated and discussed area.

Key questions

1. What are the linkages between the cryosphere and sociocultural, spiritual, and religious aspects?

2. How do these contributions inspire/affect human lives?
3. How do these contributions affect men, women, and marginalized groups differently?
4. How can these beliefs and practices be value-added to renew the mountain development–human well-being connect in the face of cryospheric changes?
5. How do the prevailing beliefs and practices help overcome social and psychological issues linked to disaster?

Session 2.4: Cryosphere and livelihoods in high-mountain communities: Understanding from a socioecological systems perspective

Room: (TBC)

Session design: Human library

Room setup: Group discussion (3 groups)

Session hosts: Arabinda Mishra, Theme Leader – Livelihoods, ICIMOD, and Binaya Pasakhala, Resource Governance Analyst, ICIMOD

Rapporteurs: Karen Marie Oseland, Lipy Adhikari, and Sabarnee Tuladhar (ICIMOD)

Theme

The cryosphere's contributions are vital to the life and livelihoods of people in high-mountain areas. These communities live in the close vicinity of snow, ice, and glaciers. Any change in the cryosphere's contributions will have immediate effects on the livelihoods of high-mountain communities, including positive (livelihood opportunities) and negative effects (disaster events). However, there is little understanding about the intricate ways in which the cryosphere and mountain livelihoods are interlinked from a socioecological systems perspective.

Apart from cryospheric changes, mountain communities are also facing other socioeconomic changes such as increased connectedness, outmigration, and shift from subsistence to market economy. A better understanding of these changes and their effects on livelihoods is imperative to build the resilience of mountain communities to future risks and for sustainable livelihoods. This sessions aims to improve understanding of these dimensions – cryosphere–livelihood linkages, and the changes in the cryosphere and other socioeconomic systems and their effects on livelihoods – in high-mountain communities.

Key questions

1. How does the cryosphere contribute to the livelihoods of high-mountain communities?
2. What are the major cryospheric and other socioeconomic changes and how are these changes impacting the socioecological systems of the high-mountain communities?

3. What is the pathway to build resilience and develop the capacities of high-mountain communities to deal with cryosphere-related future risks?

Session C.1: Glacial lake outburst floods (GLOFs): At-risk communities and mitigating measures

Room: TBC

Session design: Panel

Room setup: Panel tables on stage, microphones

Session hosts/chairs: Finu Shrestha, ICIMOD (Chair); Aisha Khan, MGPO, Pakistan; Sonam Lhamo, NCHM, Bhutan; Shresth Tayal, TERE, India; Deepak KC, UNDP, Nepal; Nie Yong, IMHE, CAS, China; Hedyatullah Arian, Kabul University, Afghanistan

Rapporteurs: Reēju Shrestha and Yathartha Dhungel (ICIMOD)

Themes

GLOF events not only cause morphological changes along the river channel but also affect the livelihoods of downstream communities. The transboundary risks from potential GLOF events has increased because of global warming. Furthermore, rapid socioeconomic growth has led to the establishment of many new settlements and infrastructure such as hydropower plants, bridges, and roads along river valleys, increasing the risks posed by GLOFs.

GLOF events are difficult to predict, but the associated risks can be mitigated and managed. Up-to-date research on glacial lakes, regular monitoring, implementation of mitigation measures, and installation of early warning systems can reduce the impacts of GLOF hazards and the risk to downstream areas. Community-based GLOF risk reduction approaches should be carried out to create awareness, prepare for an effective action, and respond to hazards. This session will focus on the state of the knowledge on potentially dangerous glacial lakes across the HKH region; on GLOF risk assessment; communities exposed to GLOF risks; and current and possible mitigating measures.

Key questions

1. What is the state of the knowledge on potentially dangerous glacial lakes in the HKH?
2. What is the state of the knowledge on GLOF risk assessment?
3. Who are the people most vulnerable to GLOFs and where are they located?
4. How do the vulnerable populations perceive GLOF hazards?
5. What are the mitigation measures implemented to reduce risk and hazards, and how are the vulnerable communities involved in such mitigation approaches?

Session C. 2: Collapsing permafrost in the HKH: Dynamics and consequences in a warming world

Session design: Moderated panel discussion

Session hosts: Denis Samyn, Glaciologist, ICIMOD, and Dorothea Stumm, Independent Consultant, Switzerland

Rapporteurs: Tika Gurung and Kabi Raj Khatiwada (ICIMOD)

Theme

In the HKH region, millions of people live surrounded by permafrost or in areas potentially subject to changes in permafrost. Permafrost is any ground material (rock or soil) that remains frozen at or below 0 °C for two or more years. The existence and characteristics of permafrost depend on the climatic setting, topography, surface cover, and subsurface material.

Permafrost stabilizes rock cliffs, moraines, and debris-covered slopes by building cohesion and preventing the build-up of hydrostatic pressure. The area underlain by permafrost in the mountainous parts of the HKH is very likely to be significantly larger than that covered by glaciers. Permafrost reacts sensitively to climate change because of the tight coupling of atmosphere and subsurface temperature. Atmospheric warming in the order of 4 °C is expected throughout much of the HKH in the 21st century and will most likely result in widespread and persistent thawing of the permafrost, with manifold consequences for the environment.

Although the extent of permafrost thawing remains poorly understood, what we know is cause for concern. For example, the permafrost that underlays high-altitude rangelands forms a layer that improves retention of water in the near-surface layers, making it available to vegetation during summer as the topmost layer of the permafrost thaws. When permafrost disappears, however, the water can drain freely and the ground becomes drier, with consequent drastic changes in rangeland diversity, composition and productivity.

Although not formally quantified, gigatons of greenhouse gases are trapped within the HKH permafrost. When temperature increases, thawing the permafrost, the once-trapped gases are released back into the atmosphere as either carbon dioxide or methane, adding to the already alarming atmospheric concentrations of greenhouse gases.

With its impacts on climate, hydrology, ecosystems, and slope stability, expanded permafrost thawing will, directly or indirectly, affect communities, habitats, livelihoods, and economies, with currently unknown or poorly addressed effects. Despite our awareness of all the above key issues, knowledge on permafrost in the HKH is very limited and regional expertise is sparse. This session intends to illustrate and explore gaps and initiate discussion on permafrost dynamics and thawing impacts.

Key questions

1. Is there any consensus today on how to investigate in detail the warming and thawing dynamics of permafrost in the HKH? Are there national or transnational programmes currently addressing this issue?
2. The presence of rock glaciers, which can be mapped either from the field or remotely, is a clear indication for the occurrence of permafrost. Are there other such proxies that could be used widely?
3. The amount and nature of greenhouse gas emissions from permafrost in the HKH are understudied. What can we learn from the large body of research conducted in the last decade on the Tibetan Plateau?
4. What are the consequences of permafrost thawing on slope stability, and how could this phenomenon be included in risk management at the HKH scale?
5. How can scientists communicate current permafrost issues to policymakers and stakeholders so that the latter can take tangible and efficient decisions for the future?

Session D.1: Cryosphere contributions to the biosphere

Room: (TBC)

Session design: Panel presentation

Room setup: Panel setup and theatre

Session hosts: Ghana S Gurung, Country Representative, WWF Nepal, and Sunita Chaudhary, Biodiversity Consultant, ICIMOD

Rapporteurs: Pradyumna Rana and Sunita Ranabhat (ICIMOD)

Theme

The HKH is one of the most complex and important landmasses on this planet, critical to the lives of millions of people. With an estimated total ice cover of 114,800 km², the region has dominant mountain ranges such as the Himalaya and adjacent mountain ranges (with corresponding ice areas) such as the Karakoram, Tien Shan, Kunlun Shan, and Pamir. The HKH region is considered the Third Pole because it houses the largest reserves of ice and snow in the world outside the two polar regions. The region is also known as the water tower of Asia because it provides fresh water to around 1.9 billion people.

The rich cultures, traditions, and livelihood practices in the HKH region have an intricate relation with and dependency on water resources. Given the region's vast geographical mass and variety of altitudinal gradient, there are significant differences in climate, leading to the formation of many micro-climatic zones within the different altitudinal ranges. Such variations have made the HKH equally important in terms of biodiversity with diverse ecosystems, the habitat for some most charismatic species, including the snow leopard, Tibetan brown bear, giant panda, red panda, and semi-domesticated yak.

However, the 2019 [Hindu Kush Himalaya Assessment](#) revealed that even if global warming is limited to 1.5°C by 2100, this would mean a 1.8°C rise the HKH due to higher warming with increase in altitude. Under such conditions, 36% of the glacier volume in the HKH would decline, increasing the risk of disasters such as glacial lake outburst floods. This has direct implications for the highland ecosystems and wildlife. The most promising interventions to address such changes could be through nature-based solutions using an ecosystem approach in transboundary landscapes. This thematic session is designed to understand the cryosphere and biosphere interlinkages with a special focus on critical ecosystems and wildlife.

Key questions

1. What are the linkages among the cryosphere and biosphere, mega species, and species shift, and what are our experiences in this matter?
2. What are the impacts of climate change on biological resources and local livelihoods?
3. How will cryospheric change impact bird habitats and approaches in ornithology?
4. What are the impacts of cryospheric change on alpine ecology and range shifts in plants?
5. How are ecosystem services and the cryosphere linked? What is the likely future and possible interventions for enhancing socioecological resilience in the region?

Session E: Cryosphere interactions with society: Exploring bridges to the Andes

Session design: Moderated panel discussion

Room set up: Panel and theatre

Session host: Denis Samyn, Glaciologist, ICIMOD

Rapporteurs: Kripa Shrestha and Binu Maharjan (ICIMOD)

Theme

The IPCC *Fifth Assessment Report* provided evidence of accelerated changes in high-mountain cryosphere across the world. As is the case in the HKH region, irreversible loss of glaciers has been observed in the South American Andes, such as in the Chacaltaya Mountain, Bolivia, where the Chacaltaya Glacier completely vanished in 2010. There is an urgent need to recognize how the impacts of climate change on cryosphere will affect water resources and, consequently, local communities and biodiversity. Millions of Andeans and a variety of ecosystems partially or directly depend on glacial meltwater for their subsistence during the dry season. A critical assessment is required of how local communities are perceiving these changes and what their responses will be according to the chain of effects on their livelihoods. In order to understand the interactions between the cryosphere and communities in the Andean context, this session will explore a holistic approach for generating information and defining strategies to strengthen resilience. Three case studies bearing the same transdisciplinary methodology will be discussed in order to exemplify the work carried out in Bolivia by Agua Sustentable, a non-profit NGO based in La Paz, Bolivia, which aims to foster sustainable water and environmental management at the national and international levels.

Key questions

1. What are the factors to be considered for strengthening the resilience of glacier-dependent mountain communities and ecosystems?
2. How can knowledge and opportunities gained in both the Andes and HKH regions be shared for mutual benefit? What correspondences do you see between both mountain ranges?
3. How can the Andes and the HKH position themselves ahead of COP25, to be held in December 2019 in Chile, and how can communities gather to raise their voices in such events?

Special breakout session on scoping the *HIMAP Climate Change, Cryosphere, and Water Outlook*

Session design: Informal group breakout

Room setup: Panel and theatre

Session host: Philippus Wester, Regional Programme Manager – Mountain Knowledge and Action Networks, ICIMOD, and Anna Sinisalo, Programme Coordinator, Cryosphere Initiative, ICIMOD

The HIMAP Climate Change, Cryosphere, and Water Outlook is being prepared as a follow-up to the 2019 *Hindu Kush Himalaya Assessment*. This session calls potential contributors to come together to discuss and outline the content, draft a tentative timeline, and create a list of potential co-authors.

The session is open to anyone interested in developing the content and contributing to the report.

Session F1: Building resilience and capacities: Community voices

Room: (TBC)

Session design: Moderated panel discussion

Room setup: Theatre arrangement with two panels

Session hosts: Amina Maharjan, Migration Specialist, ICIMOD, and Arabinda Mishra, Theme Leader – Livelihoods, ICIMOD

Rapporteurs: Binaya Pasakhala and Tenzing Sherpa (ICIMOD)

Theme

Cryospheric changes are driven by factors at different levels and the consequent impacts, in turn, can have different scales. This complicates the study of cryosphere–society linkages. Scientist have studied these linkages at various scales, but the abundance of local knowledge among communities are not adequately considered for these studies. The local communities, as care takers and inhabitants of the mountains who depend on cryospheric services, often have precious, longitudinal knowledge (based on lived experience, observations, and generational knowledge transfer) about the cryosphere and its changes that might be highly useful for scientific investigations.

Another important aspect relates to the differences in type of services that are required for building community resilience within the changing sphere of influence of cryospheric change. It is therefore important to understand cryospheric services demanded at different scales.

This session aims to strengthen understanding of cryospheric changes and risks as perceived by mountain communities and studied by scientists; foster integration of local and scientific approaches in future studies; and highlight the cryospheric services required for building the resilience of mountain communities.

Key questions

1. How do mountain communities perceive cryospheric changes and related risks? How can science contribute to informing communities about future risks?
2. What are the local perceptions about scientists studying cryospheric changes? How do scientists view the community's role/indigenous knowledge in building the scientific approach to cryospheric change?
3. What kinds of cryosphere-related services are important to build the resilience of the communities? How can science provide the demanded cryosphere-related services to the communities?

Session F2: Cryosphere contributions: Gender and social justice perspective

Date: 30 August 2019

Time: 11:15–12:30

Room: (TBC)

Session design: Panel presentation using different formats

Room setup: Theatre style

Session hosts: Suman Bisht, Senior Gender Specialist, ICIMOD

Session chair: Pasang Yangjee Sherpa, University of Washington

Rapporteurs: Sijal Pokharel and Chimi Seldon (ICIMOD)

Theme

The high mountains of the HKH region have significant and untapped economic potential for long-term sustainable development and poverty alleviation in and around the region. They provide key environmental services such as fresh water, clean energy (hydro power), aesthetic and recreation services, non-material benefits such as religious and cultural services, suitable living environments, and the unique biological habitats and diversity related to the cryosphere in the region. To date, cryosphere science research has largely focused on the study of its natural properties (cryosphere process, mechanisms) or the negative impacts (e.g. sea level rise and cryosphere disasters). In recent times, studies on cryosphere

services function's positive contributions to human wellbeing and their livelihood have been gaining attention. However, these studies do not take into account the distribution pattern of the different cryosphere components to understand how these benefits are shared and distributed between different sections of the community – who gains and who is left out. We know that there are relations of inequality, hierarchy, marginalization, and exclusion among different groups of women and men in the region, which affects their access to and control of various resources. Women across socioeconomic categories in the HKH are disproportionately affected by inequalities in the distribution of rights, assets, resources, and power. It is therefore important that research and development in cryosphere science strongly integrate natural science with socioeconomic studies, with a strong gender perspective to know who manages and controls these resources and natural systems.

The existing disparities in accessing cryosphere services will be further exacerbated as the changes in the cryosphere and the associated environmental change introduce new challenges for water, energy, and food security. There is a vast emerging literature on gender and climate change but very little on gender, inequality, and social justice in the context of cryosphere.

The objective of this session therefore is to understand the complex benefit-sharing mechanisms and the factors that influence it in order to develop sustainable cryosphere services function utilization strategies for the equitable distribution of benefit across diverse populations with an eye on environmental protection.

Key questions

- What are the impacts of glacial floods on different sections of the community?
- How are women positioned in the mountaineering world? What are the challenges and opportunities?
- Who control and who benefits from access to irrigation in high-mountain agriculture?
- What opportunities are available for sustainable livelihoods in mountain ecosystems?

Session F3: Cryosphere, society, and risk management

Room: (TBC)

Session design: Panel Presentation followed by a Q&A session with audience and group discussion

Room setup: Four chairs with a table on the dais; small round tables with meta cards, board, paper, pen, etc.

Session hosts: Neera Shrestha Pradhan, Programme Coordinator – SWaRMA, ICIMOD; Sanjeev Bhuchar, Theme Leader – Water and Air (Ad-Interim), ICIMOD; and Nanki Kaur, Regional Programme Manager – Adaptation and Resilience Building, ICIMOD

Rapporteurs: Anushilan Acharya and Serena Amatya (ICIMOD)

Theme

The cryosphere provides multiple services to society. However, climate change-induced cryospheric changes have also led to erratic water availability and an increase in the frequency and intensity of hazards and risks that adversely affect socioecological systems in the mountains and the downstream. Climate change could further alter and complicate the roles of the cryosphere, not only through hazards but also the changes in services that could potentially add more risks. It is crucial to adapt to these changes, minimize risks, and effectively utilize cryospheric resources by adopting more sustainable development approaches. This should be done without compromising the ability of future generations to continue sharing the cryosphere's benefits. Considering the physical, socioecological, and economic hazards and risks discussed in the previous sessions, this session focuses on reducing cryospheric-induced risks to formulate transformative strategies relevant to mountain society and downstream. The session is designed as an interactive session with a mixture of keynote presentation, panel presentation, group work, and discussions.

Key questions

1. What are the major cryosphere-induced risks to the HKH society?
2. What measures can maximize benefits while minimizing risks in relation to the cryosphere and society?