

## Vulnerability Assessments and Adaptation in the Hindu Kush Himalaya (HKH)



*"After the floods last year, now it has become the time of drought. There is no rain. But we are obliged to cultivate. If not, we have nothing to eat."*  
 – 60 year old farmer, Tinsukia in lower Himalayas, India, (2013)

*"People who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change."*  
 – IPCC Fifth Assessment Report (2014)

The two quotes above define vulnerability and the associated risks in a very simple manner. However, understanding and addressing vulnerability is not so simple. The Fifth Assessment Report (2014) of the Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as "the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt".

Assessing vulnerability is a complex process. This is particularly true in the context of the Hindu Kush Himalayan (HKH) region – one of the most dynamic and complex

ecosystems in the world. The Hindu Kush Himalayas are home to some of the world's wettest and driest environments, with elevation ranging from the plains to the highest mountains in the world. It is also at the centre of the largest concentration of human population, with a very high proportion living below the poverty line. Given this, vulnerability assessments in the HKH must take into consideration multiple drivers of change, including climate change, as well as the immense biophysical and socioeconomic diversity of the region.

As the source of ten of Asia's major river systems, the Hindu Kush Himalayas provide water, ecosystem services, and livelihoods to more than 210 million people. These benefit extend further downstream, with more than 1.3 billion people – a fifth of the world's population – who depend on water flowing from the region. The impacts of climate change and other changes are already being felt in ecosystems and communities across the region, thereby increasing the vulnerability of communities in the Hindu Kush Himalayas.

However, the vulnerabilities and adaptive strengths unique to the region not only impact people living in the Hindu Kush Himalayas, but also a much larger population that is indirectly dependent the region's vast wealth of natural resources. Traditional adaptation techniques, which have supported people in mountain areas for centuries, are no longer able to keep up with the rapid pace of change.

Assessing vulnerabilities in the context of climate change and other changes and supporting communities in adapting to change requires an in-depth knowledge of both local conditions and broader global climate change trends. Therefore, vulnerability and risk mapping should be done at various scales broadly covering three areas: assessment of climatic changes that are taking place or likely to take place in the future, how these changes will impact ecosystems and food security, and how different segments (for example, women and men, the poor and not-so-poor) within communities are or will be impacted and are coping or will cope with the changes.

Photo credits: Nand Kishor Agrawal



Understanding vulnerabilities in the context of climate change requires not only in-depth discussions and observations with communities, but also a scientific assessment of issues related to the climate-human interface and global climate trends,

## Himalayan Climate Change Adaptation Programme (HICAP)

The HICAP at ICIMOD is pioneering research that focuses on comprehensively assessing vulnerabilities and finding solutions beyond social, sectoral, and national boundaries in the Hindu Kush Himalayas. With a transboundary research approach, HICAP covers five river sub-basins – Upper Indus in Pakistan, Koshi in Nepal, Upper Brahmaputra in Tibet Autonomous Region, China, eastern Brahmaputra in Assam, India and Upper Salween-Mekong in China.

The HICAP approach integrates research on downscaling global climate scenarios for the sub-basins, hydrological modeling and projections, assessments and valuation of ecosystem services, transformations in farming systems, and people's vulnerability with a particular focus on women. It aims to provide evidence-based scientific knowledge for enhancing the understanding of vulnerabilities related to change, particularly climate change, and identifying opportunities and potentials for adaptation.

### Some Initial Results

A comprehensive analysis from various components of the ongoing research is yet to be done. However, findings from downscaled climate and hydrological scenarios for upstream parts of selected sub-basins using RCP (Representative Concentration Pathways) scenarios RCP 4.5 and RCP 8.5 indicate that glaciers in the five river basins are likely to reduce by 20 to 55% by the year 2050. At the same time, the melting of glaciers and increased projected precipitation are likely to cause overall river flows to increase or remain unchanged in 2041–2050 compared to 1998–2007 for all five river sub-basins (Lutz et al. 2014). The results also indicate high variability in water availability, with more water in the pre-monsoon periods. If these projections are on the mark, the resulting changes will have severe implications on levels

of vulnerability, particularly in relation to flood preparedness and in managing periods with reduced river flow.

Changes in forest ecosystems are already evident, albeit these are being driven by many factors, climate change being just one of them. Initial results from HICAP provide details on these changes as well as various options for improving the management of forests and watersheds, highlighting the potential for payments for ecosystem services (Rai et al. 2014). Similarly, mountain farming systems in the region are undergoing major changes due to outmigration, climatic stresses, and a general lack of interest in agriculture among younger generations. In addition to factors related to climate and migration, the incentives provided by governments and private companies are encouraging farmers to shift from traditional staple crops to cash crops. While this can lead to positive changes in many cases, it also leaves households vulnerable to market and price fluctuations and can reduce their self-sufficiency (Poverty and Vulnerability Assessment, 2013, HICAP).

HICAP has also conducted Poverty and Vulnerability Assessment (PVA) surveys in over 8,083 households in four river sub-basins in China, India, Nepal, and Pakistan. The initial results of these surveys indicate that people are already experiencing and coping with the effects of climatic and other changes, sometimes with life-long disadvantages. Mountain households, which predominantly practice rain-fed agriculture, have struggled with unexpected extended warm weather patterns, never before seen winter frost, the late arrival of the monsoon, droughts, and flooding. While some households have opportunities to shift to other crops and livelihood options, including migrating for economic opportunities, some are forced to cope with the stress in a disadvantaged situation. Women, in

particular, are left more vulnerable, in part due to the increasing outmigration of men, which leaves women responsible for managing the household's agricultural land. However, they rarely have the same level of access to information and resources afforded to men that would help them cope with changing situations. For some farmers climate change offers some temporary opportunities as well.

By sharing evidence-based knowledge from different sectors and helping to develop comprehensive vulnerability assessments, HICAP is helping to provide actionable proposals for both policy makers and the scientific community. ■

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