

Himalayan Climate Change Adaptation Programme in China



FOR MOUNTAINS AND PEOPLE

Introduction to HICAP

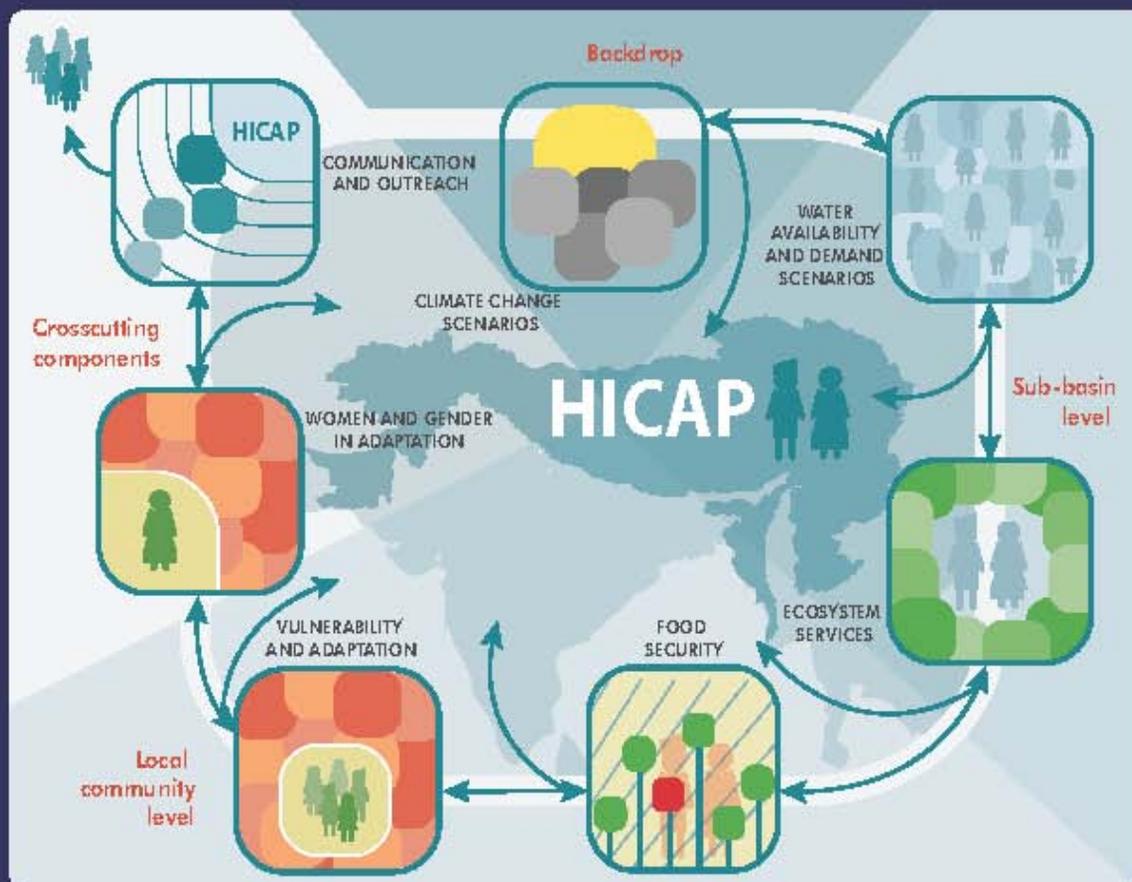
The Hindu Kush Himalayan (HKH) region is highly dynamic and is affected by many socioeconomic and environmental drivers of change, including climate change. The impacts of these changes challenge the resilience of human capacities and the environment and have high economic and social costs. The Hindu Kush Himalayan region and the downstream areas that depend on its water supply and ecosystem services, including the Indo-Gangetic Plain – ‘the grain basket of South Asia’ – are particularly vulnerable to these changes.

HICAP is a pioneering collaboration for research among three organizations – the Center for International

Climate and Environmental Research-Oslo (CICERO), the International Centre for Integrated Mountain Development (ICIMOD), and GRID-Arendal – aimed at contributing to enhanced resilience of mountain communities, particularly women, through improved understanding of vulnerabilities, opportunities, and potentials for adaptation. HICAP works in river basins of the upper Indus (Pakistan), eastern Brahmaputra (India), Koshi sub-basin (Nepal), upper Brahmaputra (Tibet Autonomous Region, China) and upper Salween and Mekong (China) rivers.

HICAP generates knowledge of climate change impacts on natural resources, ecosystem services, and the communities that depend on them, contributing to policy and practice for enhanced adaptation.

HICAP framework



HICAP in China

Yunnan is a mountainous province in southwestern China. Situated at the far eastern edge of the Himalayan uplift, it is marked by high elevations (max. 6,740 m) in the northwest and low elevations (min. 76 m) in the southeast. The western half is characterized by mountain ranges and three major rivers running north and south: the Mekong, Salween (Nu), and Yangtze rivers.

Similar to other regions in the Hindu Kush Himalayas, Yunnan has experienced changes induced by climate variability and other drivers. From 2009 to 2012, Yunnan suffered a record-breaking drought. An estimated 23 million people suffered from water shortages. Such extreme weather events challenge the livelihoods of the people living in Yunnan, especially women, who are responsible for most household and agricultural activities.

In collaboration with Chinese partners, HICAP has been carrying out research activities on climate change scenarios, water availability, ecosystem services, food security, gender, and migration. Through this work, HICAP has been able to contribute to better understanding of the drivers of change and to link on-the-ground practices to policy development for enhanced adaptation in the upper Salween-Mekong River basin in Yunnan, and the upper Brahmaputra River basin in Tibet Autonomous Region.

Various HICAP cross-thematic research projects and activities are implemented through partnerships with national leading research institutions, including three institutes of the Chinese Academy of Sciences (CAS), two provincial research institutions, and two universities.

HICAP study sites in China



HICAP partners in China

Partner organization	Component/theme	Location of work
 Asia International Rivers Center (AIRC)/ Yunnan University < www.lancang-mekong.org >	Climate scenarios, water demand scenarios, food security, and adaptation	Deqin County, Lujiang Flatland, Yunnan Province
 Chengdu Institute of Biology (CIB) < www.cib.ac.cn >	Ecosystem services	Deqin County, Yunnan Province
 Ecological Environment Protection Research Center, Yunnan Institute of Environmental Science < www.cib.ac.cn >	Action research on ecosystems, vulnerability, and adaptation in Dali area	Erhai Lake and vicinity, Dali Prefecture, Yunnan Province
 Institute of Geographic Sciences and Natural Resources Research (IGSNRR) < www.igsnr.cas.cn >	Climate scenarios, water demand scenarios, food security	Dali Prefecture, Lujiang Flatland, Yunnan Province
 Kunming Institute of Botany (KIB) – including the Centre for Mountain Ecosystem Studies (CMES) < www.kib.ac.cn >	Programme management, support to research on ecosystem services, food security, adaptation, gender	Baoshan County, Yunnan Province
 Social Development Institute, Sichuan University < www.xbkfy.scu.edu.cn >	Vulnerability and adaptation in Lhasa	Lhasa, Tibet Autonomous Region
 Women and Development Research Centre (WAD), Yunnan Academy of Social Sciences (YASS) < www.sky.yn.gov.cn >	Labour migration, remittances, adaptation, and gender	Baoshan County, Yunnan Province



HICAP Research in China

Climate and water availability scenarios

Better quantitative information on future climate scenarios and water availability for planning adaptation and risk mitigation measures.

- Historical climatic and hydrological trends and temporal-spatial variations in the upper Salween-Mekong basin
- Impacts of climate change on extreme events
- Develop climate and water availability scenarios for future assessment of the upper Salween-Mekong river basin

Ecosystem services

Identification of risks and opportunities of climate and other regional drivers of change for natural and managed ecosystems, and assessment of the implications for sustained ecosystem services and their values.

- Identification and analysis of risk and opportunities for drivers of ecosystem change, and assessment of drivers of changes and trends in critical areas carried out, with particular focus on the high-altitude rangelands of northwestern Yunnan
- Valuation of ecosystem services in the Dali wetlands area
- Capacity development of local partners and payment for ecosystem services (PES) stakeholders and operation manuals and technical training curriculum on PES and valuation methodology

Food security

Assessing food security and vulnerability to food deficiency of vulnerable groups and the possible evolution under climate change impacts and societal change; identifying household food security problems and macro-level drivers; assessing relevant food security strategies and formulating policy recommendations.

- Overall evaluation of China's national policies for food security over the past decades, especially since the implementation of China's economic reform and opening-up policy in late 1970s
- Analysis of the effects of policy implementation on food security of the country and its spatial and temporal variations
- Identification of food security-sensitive areas in the upper Salween-Mekong River basin based on meteorological analysis and household surveys

Vulnerability and adaptation

Assessing the adaptive capacity of mountain communities and the policy frameworks conditioning adaptation at the community level; assessing the current and future vulnerability of existing and proposed livelihood systems; generating knowledge on key drivers that determine differential vulnerability and adaptive capacity and changes.

- Poverty and Vulnerability Assessment (PVA) in the upper Salween-Mekong River basin
- 1,950 household questionnaire surveys and 65 community surveys in 13 counties of five prefectures in Yunnan
- PVA China report under development

Women in adaptation

Understanding the differential impacts of climate change on women's roles, divisions of labour, decision making power, and control over and access to resources; integrating gender issues and enhancing women's role in coping strategies and adaptation policies.

- Annotated bibliography of migration literature of the mountain areas of China, including women and migration, with a special focus on Yunnan
- Analysis of China's migration policy from a gender perspective

The Dali wetlands

Dali Bai Autonomous Prefecture is an autonomous prefecture in northwestern Yunnan Province. It is located on a fertile plateau between the Cangshan Mountain Range to the west and Erhai Lake to the east. Erhai Lake is situated at an elevation of 1,972 m, with an area of 250 km², making it the second largest highland lake in China. The Dali wetlands consist of North Erhai Lake, South Cibi Lake, Dong Hu Wetland Restoration Area, and Xi Hu Wetland Park. The wetlands are rich in biodiversity, and serves as a major habitat for migratory birds in northwestern Yunnan.



Key issues in the Dali wetlands ecosystem



- Decline in water sources
- Decline in fish populations



- Monoculture plantation
- Forest clearance for walnut plantation
- Invasive species



- Change in cropping patterns
- Increasing use of pesticides and chemical fertilizer
- Increasing crop intensity

Understanding drivers of change in the Dali wetlands

Around the world, wetlands provide highly valuable ecosystem services. In 1997, the Millennium Ecosystem Assessment valued the world's wetlands at USD 15 trillion. They have abundant biodiversity, a high capacity for carbon sequestration and for filtering water, and can even mitigate flooding. However, wetland ecosystems are also extremely vulnerable in the face of climate and anthropogenic changes. The Dong Hu wetlands is an important source of food for local people. It is the water source of Erhai Lake, part of the Mekong River basin. It provides important protection to the ecological security of Dali and the surrounding areas.

In light of the PVA research findings, a team of scientists from ICIMOD and the Centre for Mountain Ecosystem Studies (CMES-KIB) are analysing the Dali wetlands in order to better understand the site's landscape, ecosystems, and community livelihoods and to further explore the issues and gaps in the interface between ecosystem services and community livelihoods.

Key drivers of ecosystem change in the Dali wetlands are:

- Market forces (vegetable farming, walnut plantation, garlic cultivation)
- Labour migration
- Invasive species
- Monoculture crop cultivation

Key community adaptation strategies adopted in the Dali wetlands area:

- Rainwater harvesting
- Water conservation ponds
- Mulching
- Plastic covered tunnels for vegetable farming
- Changing crop varieties (potato and maize are replaced by high-value medicinal and aromatic plants)



Linking practice to policy

The Dali wetlands complex is the main source of water for irrigation and groundwater recharge in the Dali area. The central government of China and the provincial government of Yunnan have initiated a wetlands restoration project with compensative mechanisms for the farmers affected by the project. The objective of the government initiative is to improve the quality of water in Erhai Lake through the restoration of the wetlands' water filtration function, which cleans the water before it enters Erhai Lake.

Working jointly with the Yunnan Institute of Environmental Sciences and the Center for Mountain Ecosystem Studies-Kunming Institute of Botany, CAS, HICAP intends to explore ways to link its previous studies in the area to the government initiative. HICAP aims to contribute to the Dali wetlands restoration project by: 1) improving understanding of the wetland ecosystem-livelihood interface and 2) assessing the effectiveness of the payment mechanism while suggesting possible improvements. HICAP hopes to further contribute to China's national policy and initiatives on wetlands ecosystem restoration and to promote greater collaboration with local communities.



Baoshan gender and migration studies

Baoshan Prefecture is a geographically, ecologically, and socially diverse area located in western Yunnan Province, along the border with Myanmar. The Mekong River and Salween River flow through the entire length of the prefecture. Women in the Hindu Kush Himalayan region are often at the frontline of managing natural resources on a daily basis, playing a unique role in sustaining mountain livelihoods. Women in Yunnan are no exception.

HICAP, in partnership with the Yunnan Academy of Social Sciences (YASS) and the Centre for Mountain Ecosystem Studies (CMES-KIB), is carrying out research in Baoshan as part of the gender and migration component of the project. This component focuses on the differentiated relationship between and among women and men, and their ability to adapt to climate change in highly dynamic environments and different socio-cultural contexts across the region. It aims to examine how planned adaptation measures and policies can take into account women's prominent role and gendered knowledge and contribute to more equitable access to and provision of development resources.

Key findings of the gender and migration case study in Baoshan are:

- Cash from agricultural production was not enough to meet housing and education needs, driving villagers to migrate in search of job opportunities.
- Women did not have equal opportunity to migrate, particularly unmarried women with children, but migrant women perceived that working outside gave them a more important position in the household.
- Because of rising male outmigration, labour burdens increasingly fall on women and the elderly.
- The drought from 2009 to 2012 severely affected agricultural production in the area and created an added burden on elders' and women's workloads. Women who experienced the drought remembered this clearly as a bad experience, but were not sure of the cause.
- Remittances from migrant workers were primarily used to mitigate rather than adapt to the effects of the drought.
- Women expressed hope that the government and community could support the construction of better irrigation facilities and provide accurate daily weather information.

As the gender and migration research continues in Yunnan, local women's indigenous knowledge and experiences of adaptation prove to be highly valuable. Addressing women's needs and integrating their knowledge and experiences into adaptation work is crucial. In order to reduce women's vulnerability in the face of climate change and improve their adaptive capacity, HICAP is looking into ways to enhance their participation in natural resource management and disaster risk reduction.

The Future of HICAP in China

Now in its fourth year of working in China, HICAP, together with Chinese partner institutes, has generated a large volume of research and knowledge on climate change and adaptation, particularly in the upper Salween-Mekong River basin.

Under HICAP's ecosystem services component, research frameworks and methodologies for the valuation of ecosystem services were developed in partnership with the Chengdu Institute of Biology (CIB-CAS). The impacts of climate change, extreme droughts, and major technical interventions on high-altitude rangelands in Deqin County in northwestern Yunnan were analysed to identify risks and opportunities for drivers of ecosystem change.

Other HICAP activities in China include research on the application of the Temperature-Vegetation Dryness Index (TVDI) in drought monitoring, water availability scenario studies across the upper Salween-Mekong River basin, food security, and community adaptation measures in the Mekong River valley. The HICAP Poverty and Vulnerability Assessment (PVA) alone surveyed 66 communities and a total of 1,980 households in Yunnan. These studies help in identifying drivers of change, and contribute to better planning of adaptation strategies specific to Yunnan and China.

Overall, HICAP currently has 50 publications, of which nine are specific to China.

Stakeholders dealing with climate and other changes – from policy and decision makers to local communities – do not experience change and its impacts as isolated phenomena separated by discipline. Although the programme is organized into seven components, the nature of the work in HICAP is interdisciplinary.

Much of HICAP's research in China is entering its final stages. In the coming years, HICAP and its Chinese partners will focus on the synthesis of results generated from studies in Yunnan and the Tibet Autonomous Region. The synthesis will consolidate research results generated from each sub-basin, as well as each component of the programme, culminating in a regional synthesis for the Hindu Kush Himalayas, which can be used as a basis for policy engagement and awareness raising and a foundation for knowledge-practice-policy uptake in China and the greater Hindu Kush Himalayan region.



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