HIMAP

CHAPTER 8 BRIEF

WATER SECURITY IN THE HINDU KUSH HIMALAYA

Water security has emerged as a subset of human security — one that has been raising serious concern throughout the early part of the 21st century. The Hindu Kush Himalaya (HKH), commonly described as the "water tower of Asia," plays an important role in ensuring water, food, energy, and environmental security for much of the continent.

This chapter takes stock of current scientific knowledge on the availability of water resources in the HKH; the varied components of its water supply; the impact of climate change on future water availability; the components of water demand; and policy, institutional, and governance challenges for water security in the region.

KEY FINDINGS

- The mountains of the Hindu Kush Himalaya (HKH) provide two billion people a vital regional lifeline via water for food, water for energy, and water for ecosystem services.
- Glacier and snow melt are important components of streamflow in the region. Groundwater, from springs in the mid-hills of the HKH, is also an important contributor to river baseflow.
- Water governance in the HKH is characterized by hybrid formal-informal regimes with a prevalence of informal institutions at the local level and formal state institutions at national and regional levels.

POLICY MESSAGES

- To counter the formidable and immediate threats to water security posed by human drivers and climate change, equitable, productive, and sustainable water use should be promoted through decentralized decision making, effective management of urban pollution, improved infrastructure planning, and enhanced regional cooperation.
- Ensuring regional and local water security requires proactive HKH-wide cooperation, specifically in open data sharing among scientists and ministry or agency personnel; conflict management via regional platforms; and investment of public- and private-sector funds for generating and exchanging knowledge, enhancing public awareness, and stimulating action.
- Tradeoffs between upstream and downstream water uses; between rural and urban areas; and among irrigation, energy, industrial, and other sectors must be carefully managed in order to enhance water security.

LINKS TO

SUSTAINABLE DEVELOPMENT GOALS

6 CLEAN WATER AND SANITATION

OBSERVATIONS AND TRENDS

Water availability, use, and governance in the HKH are in a constant state of flux. Ecosystem flows in Himalayan rivers and streams are subject to flow regimes that are heavily impacted by human water uses.

TWO BILLION PEOPLE ACROSS ASIA ARE DEPENDENT ON THE HKH FOR WATER AND A RANGE OF ECOSYSTEM SERVICES

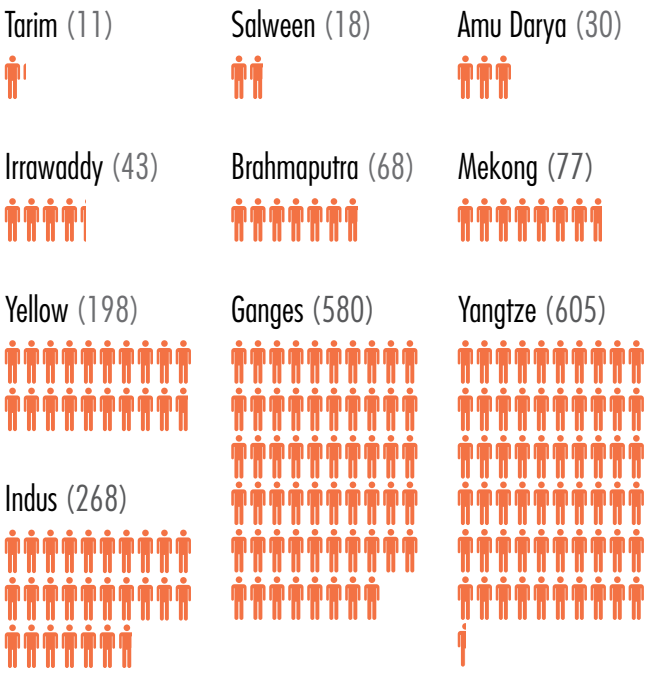
The HKH is the source of 10 major rivers that provide water — while also supporting food and energy production and a range of other ecosystem services — for two billion people across Asia. Precipitation, glacial melt, snow melt, runoff, river discharge, springs, and groundwater are the principal sources of water in the HKH.

The monsoon provides the main source of water for the eastern Himalaya, whereas the western Himalaya receives at least half of its precipitation from western disturbances in the winter. While glacier and snow melt are important components of overall streamflow in the region, rainfall runoff contributes the largest share of streamflow in the eastern rivers. Groundwater, from springs in the mid-hills of the HKH, is an important contributor to river baseflow. The contribution of springs to overall water budgets in the region is poorly understood. We urgently need better scientific knowledge of groundwater in the HKH — especially because millions of mountain people depend directly on springs. What is somewhat understood, however, is that groundwater is overexploited in the western plains, while it remains largely untapped in the eastern plains.

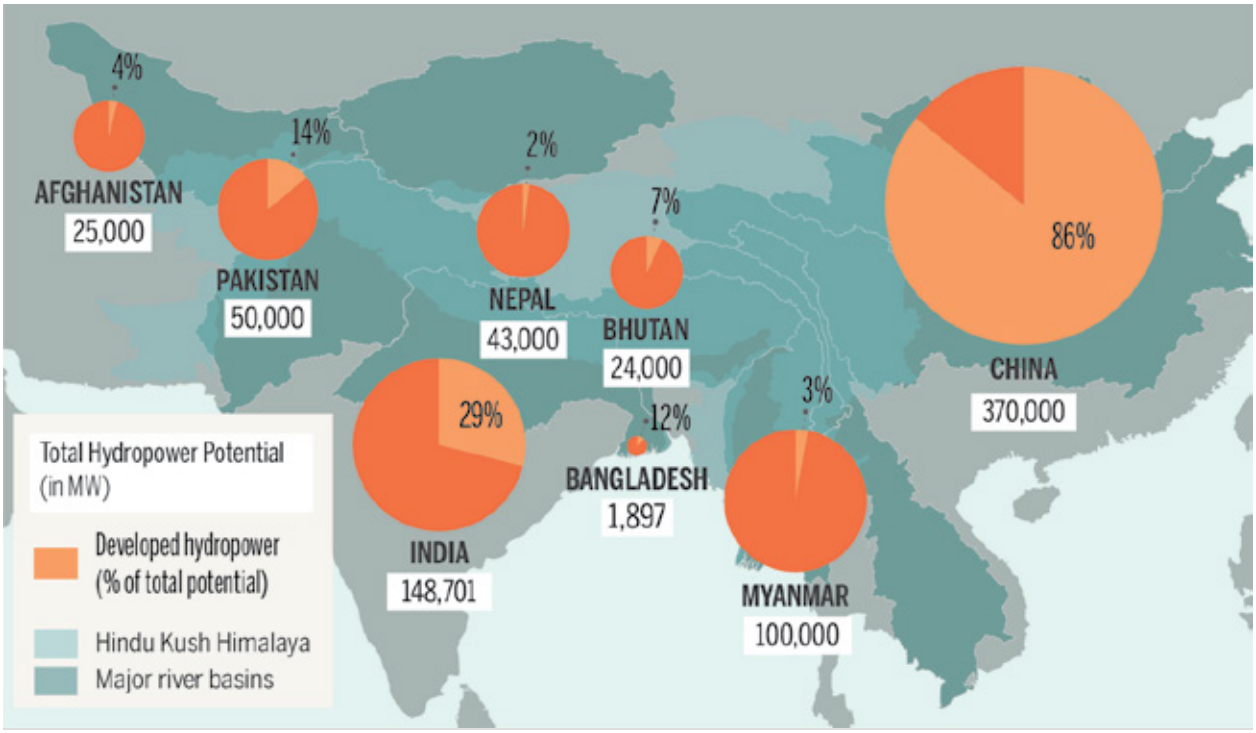
INCREASE IN STREAMFLOW EXPECTED DUE TO CLIMATE CHANGE TILL 2050 AND DECREASE IN PRE-MONSOON FLOW THEREAFTER

As a result of climate change, a consistent increase in streamflow is expected at large scales for the upstream reaches of the Indus, Ganges, and Brahmaputra rivers until at least 2050. In the Indus, this increase will result from increased glacial melt for a limited period, while in the Ganges and the Brahmaputra, it is expected to result mainly from increased precipitation. Pre-monsoon flows are expected to decline, with implications for irrigation, hydropower, and ecosystem services.

RIVERS FROM THE HINDU KUSH HIMALAYA PROVIDE WATER FOR TWO BILLION PEOPLE ACROSS ASIA



FOR THE DEVELOPMENT OF THE REGION'S 500 GW HYDROPOWER POTENTIAL TO BE SUSTAINABLE, IT MUST CONSIDER NATURAL FLOW REGIMES AND BENEFITS FOR MOUNTAIN COMMUNITIES



HYDROPOWER CAN DISRUPT NATURAL FLOW REGIMES, IN TURN HARMING LOCAL IRRIGATION, FISHERIES, AND ECOSYSTEMS

Hydropower can change the timing and location of river flow thereby disrupting natural flow regimes, which can impact other water users and needs, such as local irrigation, capture fisheries and ecosystems. Such conflicts arise especially in the mid-hills and the mountains — the location of most current and foreseeable hydropower sites. The HKH has a total of 500 gigawatts (GW) of hydropower potential, of which only a small fraction is actually developed.

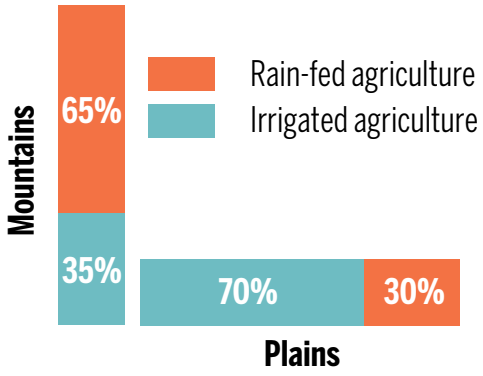
The hydropower sector in the HKH suffers from the twin challenges of societal pressure and climate change. The sector faces major challenges due to glacial melt induced by climate change. Glaciers across the region are retreating, leading to changes in future hydrological regimes. At the same time, risks of glacial lake outburst floods and landslides are increasing, putting both existing and planned hydropower plants at risk.

Very often, mountain people do not derive commensurate benefits from these projects. These projects are mostly developed in mountain areas, and mountain people fear that even as they bear the environmental and social costs of hydropower, the benefits in the form of electricity will flow to people in the plains. As a consequence, most hydropower projects have seen widespread protests from local mountain communities. Appropriate benefit-sharing norms are needed to ensure that mountain people also benefit from the region's vast hydropower potential.

GOOD WATER GOVERNANCE IS NEEDED TO ENSURE WATER SECURITY IN THE HKH AND IT MUST BE POLITICALLY AND CULTURALLY TAILORED TO THE LOCAL, NATIONAL, AND REGIONAL CONTEXTS

Among the leading causes of poor water governance in the HKH are unequal power dynamics, centralized decision making, and inadequate opportunities for local communities to influence their water-security decisions despite the presence of local institutions – all taking place under constantly changing conditions in the ecologically fragile landscape with dispersed settlements. Transboundary institutions for water resources are inadequate or non-existent, heightening the risk of conflict while also offering opportunities for HKH-wide cooperation. Throughout the HKH, more attention needs to be paid to HKH-specific conditions as well as more general challenges including participatory and cooperative decision making, evidence-based policies, transparent programme implementation, accountability at all levels, and transboundary and regional cooperation.

DIFFERENCES IN THE MOUNTAINS AND THE PLAINS DEMAND DIFFERENT STRATEGIES FOR ENSURING WATER SECURITY



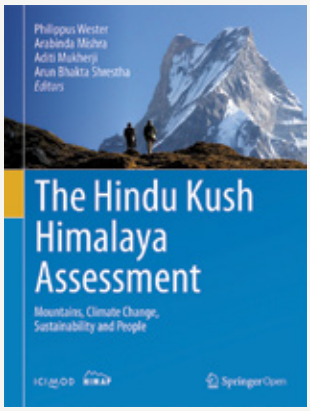
INDIA, BANGLADESH, PAKISTAN, AND CHINA TOGETHER ACCOUNT FOR MORE THAN 50% OF THE WORLD'S GROUNDWATER WITHDRAWALS

For all eight HKH countries – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan, agriculture accounts for the largest share of water use, accounting for over 90% of use in Afghanistan and 65% in more industrialized China. India, Bangladesh, Pakistan, and China together account for more than 50% of the world's groundwater withdrawals. These withdrawals mostly take place in the plains of river basins that originate in the HKH. Groundwater is used mostly for irrigation and in other sectors like urban water provisioning.

NATURE AND DYNAMICS OF THE REGION'S AGRICULTURE SHIFTING IN RESPONSE TO CLIMATE AND DEMOGRAPHIC CHANGES

In recent years, late melting of glaciers due to high climatic snow line has made seasonal water scarcer in the Upper Hunza region of Pakistan (and in the trans-Himalayan part of Ladakh in India). In response, communities have come together to create artificial glaciers on southern slopes, both as a strategy to cope with seasonal water scarcity and long-term adaptation to climate change.

Another system of irrigation in the hills of the western HKH is spate irrigation, which uses flood water generated from an upstream hill slope that is then stored as soil moisture. The inherent uncertainty of occurrences and magnitudes of floods means that minimum yield too is not assured every year, leading to cyclic outmigration of labour.



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