

INDUS

The Indus runs for approx. 3,200 km and is a major source of water for drinking, household use, irrigation, and energy production for **268M people** who inhabit the basin (projected to rise to **319 million by 2025**). It is critical to the food bowl regions of **Punjab** in India and Pakistan as well as **Sindh** in Pakistan.

High population growth, rapid urbanisation and industrialisation, environmental degradation, unregulated and inefficient water use, and poverty, aggravated by climate change, make **the lower part of the basin one of the most water-stressed areas in the world**. Climate change is the biggest challenge to future water, food and energy security in the basin.

The basin is 1.1 million square kilometres (km²) total: 52% of which lies in Pakistan; 33% in India; 8% in China; 6% in Afghanistan.

Changes in precipitation, vulnerability to catastrophic events, and increased variability in water availability will affect all four basin countries Afghanistan, China, India, and Pakistan.

In India and Pakistan, where water supply is already stressed, and storage capacity is low, water demand is predicted to increase by 50 per cent by 2047, with climate change alone responsible for up to 15% of rising demand.

Pakistan, a country whose domestic and agricultural water supply relies on groundwater, is on the brink of a lasting and severe groundwater crisis. The country's Indus Basin groundwater aquifers hold more than 80 times the volume of freshwater held in the country's three largest dams.

Climate change and increasing demand for water are impacting the supply of surface water for irrigation, increasing dependence on groundwater across the region. Temperature rise, increasing evaporation and evapotranspiration, will prompt an upward spiral of demand.

Declining quantity and quality of groundwater supplies is already resulting in increasing tension between urban and rural stakeholders, disproportionately impacting women, the poor, and other marginalised populations.

Seawater has penetrated 30– 50 kilometres inland in some coastal areas of Sindh: reducing groundwater quality, agricultural productivity, and impacting the livelihoods of some of the poorest populations

‘The scale of climate change impacts in the Indus Basin is overwhelming... the impacts are disproportionately high on women, the poor, and other marginalised populations of the Indus Basin.’ (ICIMOD).

Treaties:

The Indus Waters Treaty 1960 (IWT) has successfully sustained communications and cooperative management between India and Pakistan for over 60 years, despite geopolitical tensions and three armed conflicts between the neighbouring states.

While it has supported the resolution of numerous conflicts and it is the only bilateral treaty that operates in the basin, the treaty has been criticised as being outdated, for not specifying the use of the river's resources within its possible limits, and for neglecting the effects of climate change.

In January 2023, Pakistan used IWT to take a complaint against India to the Permanent Court of Arbitration in The Hague.

The impacts of climate change show that **the business-as-usual approach runs a high risk of destabilisation in the region with a rippling effect that can trigger a series of intertwined crises**. The 2022 Pakistan floods gave rise to health, housing, and food security crises, increased poverty, and undermined social stability.

Solutions

Availability and sharing of high-quality and reliable data are essential for improved water management, and early warning systems, as well as to facilitate disaster management.

Developing this data using a 'whole basin' research approach would yield additional benefits: data-sharing would inform more reliable water accounting, underpin more strategic basin planning, increase transboundary understanding of the long-term impacts of climate change, secure more reliable water supply to all users even under increasingly uncertain conditions.

Greater 'hydro-solidarity' and climate diplomacy among researchers might also build trust among countries and move towards greater dialogue, especially among key governmental and civil society stakeholders —India's NITI Aayog Composite Water Management Index, Pakistan's Water and Power Development Authority, the Chinese Academy of Sciences or the National Natural Science Foundation of China, and Afghanistan's National Water Affairs Regulation Authority, and researchers, scientists and civil society from the Upper Indus Basin Network and beyond.

As climate change impacts become more severe in the Indus Basin, it is critical to engage local communities especially women, the poor, Indigenous people, those with disabilities, and other marginalised peoples to address the needs and aspirations of these groups.

River basins in South Asia are superimposed with cultural maps. Along with inter-disciplinary discourses on water, it is important to nurture a new epistemology of water that links cultural stories with water management and ancient reverence for rivers.

Pakistan:

Pakistan has a population of 231 million people. Nine out of Pakistan's 10 largest cities are situated within 50 km or less of the Indus. Its waters irrigate over 80% of Pakistan's arable land

through the world's largest contiguous irrigation system. Agriculture accounts for close to 90 per cent of water withdrawal in all HKH countries (except China, where it is 65%)

Major events

1,100 people died and 33 million people were directly affected by the 2022 floods – one of the most devastating and widespread in its history. Driven by variations in timing and intensity of monsoon will magnify impacts. In response, Pakistan launched the Living Indus Initiative, in partnership with the United Nations, an umbrella initiative and a call to action to lead and consolidate initiatives to restore the ecological health of the Indus within Pakistan's boundaries.

Economy

Pakistan's economy is dominated by agriculture with three-quarters of its labour force working in farming, making it hugely exposed to the economic consequences of too much too little water. In Pakistan alone over 40M people lack access to electricity – and millions are experiencing rolling blackouts – exacerbating socio-economic problems.

Ecology

The Indus is the largest carrier of waste to the Arabian Sea, threatening marine ecosystems. In Pakistan alone, the sharp altitudinal gradient splits the country into NINE different ecological zones, giving rise to amazing array of rare and unique wild species of plants, birds and animals – and within the country, less is known about its extraordinary biodiversity, and the extent of its losses.

Geology

Pakistan has over 13,000 glaciers, including some of the longest on earth, and an 1,100km coastline – making it doubly exposed to the impacts of rising temperatures on Earth's frozen zones. After winding through the rapidly eroding Himalaya, the Indus descends into the vast plains of the Punjab and Sindh regions. It flows slowly across the plains, depositing rich silt and finally emptying into the Arabian Sea through a 210 km-wide delta.

Energy

The Indus could potentially provide 35,700MGWatts of hydro. Currently just 12% is being harnessed.

The Tarbela dam in Haripur, Pakistan in the upper indus, is one of the largest dams in the world, built for water storage, hydropower, and flood mitigation. sediment inflow has reduced its storage volume by one-third and the advancing sediment is threatening power generation.

Other large, planned infrastructure investments include:

India: Upper Indus in the Jammu & Kashmir region of India

Pakistan: a cascade of five dams (known as the North Indus River Cascade) upstream in the Gilgit–Baltistan region, with the infrastructural investments under the China–Pakistan Economic Corridor (CPEC) project.

Afghanistan plans to develop hydropower on the tributaries of the Kabul River.

There is a growing case for alternative hydropower approaches and technologies such as a series of small dams along the length of the river or runoff-of-the-river hydropower stations, to

reduce the environmental impact and risk of failure. Pumped storage hydropower technology is also emerging as a potential method of electricity generation with little or no environmental risk.

About the IWT

Under the IWT, Pakistan is entitled to water from the three major western rivers of the basin (the Indus, Jhelum, and Chenab, which together contribute about 80 per cent of the total annual flow of the Indus) and India is entitled to the water in the three eastern rivers (Ravi, Sutlej, and Beas, with about 2 per cent of the annual flow). The Kabul River from Afghanistan provides the remaining 18 per cent of the Indus' annual flow.