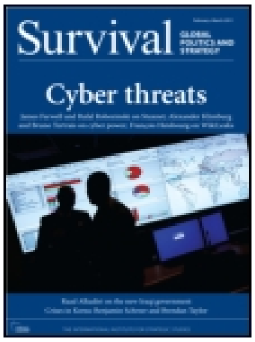

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Climate Change and Security at the Third Pole

Katherine Morton

In 1997 a group of Chinese and American glaciologists extracted ice-core data from the world's highest site in central Tibet. Under harsh physical conditions, 7,200 metres above sea level, the team recovered three ice cores from the Dasuopu glacier that revealed current temperatures were the highest in a thousand years.[1] Expeditions across the Tibetan Plateau have confirmed an accelerated warming trend that is leading to significant glacial retreat, especially on the northern slope of Mount Everest in the western Himalaya.[2] If this trend persists, the humanitarian, economic and geopolitical consequences will be dire.

Melting glaciers on the Tibetan Plateau

Known as 'the Third Pole', the Tibetan Plateau is the largest high-altitude land mass on Earth, with an average elevation of 4,500m above sea level. Covering an area of approximately 2.5 million km^2, it makes up one-quarter of China's territory and includes parts of India, Nepal and Bhutan. Its glaciers comprise the largest freshwater reserve outside the polar ice caps. The region as a whole is highly sensitive to global climate change. Over the past three decades, the average temperature has increased by almost 1°C, and Chinese climate scientists predict a further temperature rise of 2.0–2.6°C by 2050.[3]

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As a direct consequence, many of the glaciers that feed Asia's great rivers – the Yellow, Yangtze, Mekong, Salween, Indus, Ganges and Brahmaputra – are melting at an alarming rate. Data from the US National Snow and Ice Data Center reveal that the Himalayan glaciers are shrinking faster than anywhere else in the world.[4] But while the overall trend is one of glacial retreat (ranging from 10 to 60m per year), melting occurs at different rates depending upon variables such as elevation and snowfall.[5] Within the context of overall retreat, scientific investigations reveal a pattern of glacial advance in the Karakorum Himalaya as well as in some mountain ranges across the Tibetan Plateau.[6]

A statement in the 2007 Fourth Assessment Report of the UN Intergovernmental Panel on Climate Change (IPCC) that 'the likelihood of [the Himalayan glaciers] disappearing by the year 2035 and perhaps sooner is very high if the Earth keeps warming at the current rate' was challenged by an Indian government paper in November 2009, and led to widespread criticism of the panel. The assertion, which was retracted by the IPCC in January 2010, ultimately stemmed from a speculative 1999 news article cited in a 2005 World Wildlife Fund report. The IPCC, however, noted that its withdrawal of the claim did not affect its broader conclusions on loss of glaciers and other impacts on water resources. Although the claim was widely reported as 'one of the central predictions of the IPCC', it had not in fact been taken into account in either the Summary for Policymakers or the Synthesis Report. Nevertheless, the controversy and retraction underscore the inadequacies of existing data and monitoring, especially at high elevations.[7] Satellite studies offer only a rough estimate of deglaciation and ground estimates are still limited. In particular, there is a lack of systematic data on changes in mass balance (volume change) as opposed to simply monitoring fluctuations at the glacier terminus.

From a mitigation perspective, it is not only the increase in carbon emissions at the global level that is of concern. Regional carbon emissions from forest fires, wood and dung-fuelled stoves, transportation, and coal-fired power stations are creating atmospheric brown clouds that are most noticeable in South Asia and over the northern Indian Ocean. The brown clouds deposit dark particles and aerosols on the surfaces of the glaciers that cause them to melt faster because they reflect less and absorb more solar energy. According to William Law, head of Atmospheric Sciences at NASA's Goddard Space Flight Center, black carbon also creates 'a layer of warm air from the surface that rises to higher altitudes above the mountain ranges to become a major catalyst of glacier and snow melt'.[8] These two warming mechanisms are more than sufficient to outweigh any surface cooling due to the blocking of sunlight by the brown clouds. Recent research reveals that rapid glacial retreat correlates with the highest levels of black-carbon concentrations around the margin of the plateau.[9]

Hundreds of millions depend on the glaciers

The retreat of the glaciers is likely to have dramatic adverse effects on biodiversity, people and livelihoods in East, South and Southeast Asia, with long-term implications for water, food and energy security. Collectively, the glacier-fed rivers on the Tibetan Plateau provide water for up to one-quarter of the world's population. These rivers flow through some of the poorest, most densely populated, intensively irrigated and rapidly developing areas in the world.[10] Hundreds of millions of people depend upon the natural storage facilities of the glaciers for drinking water, power generation, industry and agriculture. The contribution of snow and glacial melt in the major rivers ranges from 5 to 45% of average flows, increasing to 70% of summer river flows to the Ganges and Indus rivers. The Indus river irrigation systems in Pakistan depend on glacial melt from the eastern Hindu Kush, Karakorum and western Himalaya for about 50% of total run-off.[11] And almost one-quarter of those living in China's western provinces depend upon glacial melt as a source of water during the dry season.[12]

Climate change is already damaging the seasonal regulating capacity of glacial water flows. Over the longer term, higher temperatures will increase flooding in the rainy season and reduce water in the dry season. Eventually water shortages are likely to occur on a massive scale. The consequences for a region already highly prone to both floods and drought will be dire. To be sure, many uncertainties remain over future changes in regional precipitation due to the complex nature of the Asian monsoon, the determining factor for Asia's climate.[13] However, there is increasing evidence to suggest that a weaker monsoon is now occurring during the dry season. In general, over the past decade, annual mean rainfall has declined in north and northeast China, the arid plains of Pakistan, and northeast India. There has been an increase in extreme rainfall in parts of India, Nepal and Bangladesh, as well as in western and southern parts of China.[14]

Glacial melt also triggers a higher incidence of natural disasters – landslides, flooding and glacial-lake outbursts[15] – that can, in turn, lead to internal displacement and the destruction of critical infrastructure. Glacial-lake outburst floods have long been a source of insecurity in the Hindu Kush and Tibetan Himalaya.[16] Nepal has more than 2,300 glacial lakes, with at least 23 at risk of bursting. The retreat of the Imja glacier in the Khumbu range, for example, has created an enormous lake estimated to hold up to 36m cubic metres of water.[17] A 2005 report by the International Centre for Integrated Mountain Development identified 52 potential lake-outburst hazards in Pakistan, 22 in Himachal Pradesh and 77 in the Tibetan Autonomous Region.[18]

Dams risk catastrophic failure

Ironically, the melting of the glaciers is allowing easier access to the plateau's rich natural resources, similar to the way the decline of Arctic sea ice is leading to greater competition for scarce resources and renewed geopolitical tensions.[19] At the same time, ambitious plans are under way to develop the region's hydropower potential, which may lead to a vicious cycle of sediment accumulation that would cripple the ability of dams to control floods and reduce the capacity for power generation. Climate change is already bringing about changes in flow regimes that will, in turn, affect the performance of hydroelectricity schemes.

In the interests of mitigating climate change, hydropower is an obvious option because it provides cleaner energy. It is widely promoted in China as a pathway to a harmonious world. New hydropower projects are integral to the development plans of many countries in the region. However, this mountainous part of the world is very active geologically, with a high incidence of earthquakes. Hence, all dams risk catastrophic failure if built directly over a fault.

The effects of dam building on downstream countries may also create the conditions for cross-border conflicts and exacerbate the looming water crisis in China and the Asia region as a whole.[20] China's plans to build a dam on the bend of the Yarlung Tsangpo/Brahmaputra, which flows into the disputed territory of Arunachal Pradesh in India and then into Bangladesh and the Bay of Bengal, are already exacerbating tensions between China and India. Diverting water away from the Brahmaputra basin at a time glacial retreat is threatening the future supply of fresh water for millions of people seems imprudent, if not myopic. Deprived of freshwater supply during the dry season, the productivity of forests, wetlands and coastal swamps in the lower basin will decline rapidly with serious consequences for local communities.

Higher temperatures are also associated with the thawing of the permafrost, the frozen soils overlying the plateau that provide much needed moisture. The melting of the permafrost is exacerbating worsening trends in desertification and grasslands degradation. Of additional concern is the potential release of between 60 and 190 billion tonnes of carbon locked up in the permafrost, which could help accelerate global warming.[21]

In the immediate term, the impacts of climate change will be greatest on poor communities that are least able to adapt. Tibetan pastoralists depend on the grasslands for their survival and climate change is already leading to historically unprecedented pressures. For example, at the source of the Yellow River, over one-third of the grasslands have already been transformed into semi-desert, lakes are drying up and aquifers have become severely depleted.[22] Climate reconstructions based on tree ring samples reveal a winter temperature increase of 2.5°C between 1941 and 1990, in stark contrast to minimal temperature variability over the previous 400 years.[23]

A major problem is that we still do not know enough about climate impacts on the grasslands. Field investigations are few and far between. What we do know is that a simple causal relationship between overgrazing and environmental degradation – a 'tragedy of the commons' scenario – is misleading precisely because it fails to take into account climate change. Blaming degradation on overgrazing feeds off a false assumption that traditional lifestyles are backward, irrational and unsustainable. In reality, as rangeland ecologist Daniel Miller put it, 'the very existence of nomads on the Tibetan Plateau – undoubtedly the world's harshest pastoral area – is itself proof of the rationality and efficacy of many aspects of traditional practice'.[24]

From an ecological-security perspective, the lesson is that the path towards a more sustainable and secure future on the plateau will, in part, depend upon retaining links with the past. If we lose the ice from the glaciers and we lose the knowledge of the original custodians of the land, how are we going to understand how things behaved in the past in order to establish viable plans for the future? Just as ice cores from the glaciers can provide a wealth of information about monsoon failure, precipitation and levels of radiation from nuclear testing, pastoralists are a vital source of information about land use change and the extent of climate impacts at the micro level.

Learning to cooperate

Building resilience to climate disruption requires an inventory of adaptation strategies. Appropriate adjustments range from technological options to the establishment of early-warning systems for disaster relief, institutional reforms and attitudinal changes. A critical factor in future cross-border cooperation will be the willingness to learn from past experiences rather than start with a new road map for regional adaptation. Traditional techniques can be adapted. In Pakistan, for example, *phumbarrash*, or fire signalling, is a traditional means of flood warning; in the Mekong Delta traditional houses are built on stilts; and ancient clay pots in Bangladesh are still an effective means of conserving water. This is not to suggest that traditional methods provide an adequate response to large-scale environmental change, but rather that indigenous knowledge can make a useful contribution. The fusion between old and new is most likely to lead to sustainable outcomes. For example, in Gansu Province in western China, rainwater harvesting has existed for at least two millennia and is now being modified to suit modern agriculture and changing biophysical conditions.[25] The new agricultural approach aims to alleviate water constraints by integrating rainwater harvesting, water-saving irrigation and effective crop rotation.[26]

In a similar vein, much can be done to build on the region's diverse experiences in disaster-relief operations. Bangladesh has developed an impressive range of coping strategies for dealing with massive flooding that can be further enhanced with financial and technological support. It is important to recognise that learning is an essential pre-requisite for building adaptive capacity over time. Seen from this perspective, the potential does exist to turn a climate hotspot into a bellwether of climate adaptation.

A more immediate problem is that the region lacks meaningful institutions to deal with the crisis. A consultative process for considering adaptation options and identifying collective responses does not, as yet, exist. At the bilateral level, the Indus Water Treaty negotiated between India and Pakistan in 1960 with the help of the World Bank is a well-known example of a successful resolution of a major dispute over international waters.[27] As a consequence of partition in 1947, the basin was divided between the two countries, creating the potential for major conflict. A proposal to divide the Indus waters equally between the two countries and, at the same time, enhance water availability was accepted by both sides. The three eastern rivers – the Ravi, Sutlej and Beas – were placed under Indian control while Pakistan was given the Indus, Jhelum and Chenab.

The fact that the treaty has endured for five decades despite a stand-off (and, more recently, a nuclear stand-off) between the two countries is testament to the high value attached to water resources for domestic agricultural production.[28] Notably, in this case the agreement works on the basis of a division of waters rather than a shared arrangement. On a more cautionary note, it is evident that the agreement has not led to improvements in water access and quality at the national level. It took 30 years before the four Pakistani provinces of Baluchistan, North-West Frontier Province, Sind and Punjab finally agreed on an internal allocation mechanism.[29] Moreover, Pakistan has recently accused India of violating the treaty through its upstream storage and discharge activities, and there have been calls for arbitration over long-term declines in flows due to deforestation and climate change, although this could actually reduce the volumes available to Pakistan.[30] An additional complication arises from the fact that non-treaty members such as Afghanistan and China are now asserting their rights to share water from tributaries originating in their territories.[31]

A bilateral agreement between India and Bangladesh is in place for the purpose of sharing dry-season flow in the Ganges, but this has not proven very effective. At best, it has forced the two countries to establish a dialogue on flood management and hydropower generation. The Mahakli Treaty between India and Nepal has served a similar purpose by paving the way for the construction of the Pancheshwar multipurpose hydropower project. Most critically, multilateral agreements that encourage water-sharing on the basis of a common regional framework have yet to emerge. In recent years, governments have brought water issues to the forefront of their national agendas and official recognition of the impending climate crisis does now exist. However, sovereignty concerns continue to trump regional interests, energy security outweighs environmental stewardship, and mutual distrust hinders effective political action.

Despite growing evidence of impending environmental crisis, the Abu Dhabi dialogue is the only existing multilateral response mechanism. The dialogue brings together government representatives and experts from seven countries in South Asia (Afghanistan, Bangladesh, Bhutan, China, India, Nepal and Pakistan) for the purpose of fostering water cooperation in the Greater Himalaya. Based upon an informal and consultative process, the dialogue aims to build trust via information exchange and the co-management of development projects.[32]

Overcoming distrust remains the single biggest impediment to enhancing regional cooperation. Information-sharing between China and India, in particular, is still severely limited; delays in issuing flood warnings across borders are common; and the retreat of the glaciers is still a matter of dispute between states which share the rivers they feed. Even scientific research is constrained due to national-security concerns. According to some reports, the Indian National Commission for Integrated Water Research Development has denied access to data on Himalayan rivers.[33]

The litmus test for a positive water future at the regional level lies in strengthening water cooperation across the Sino-Indian border. On the positive side, Indian and Chinese scientists are currently involved in a joint exploration of climate-change impacts at the sources of the Sutlej and Brahmaputra. More recently, the governments of China and India signed a Memorandum of Understanding on the provision of hydrological data on the Brahmaputra during the flood season.[34] And at the 16th Meeting of the South Asia Association for Regional Cooperation, heads of government adopted the Thimphu Statement on Climate Change calling for the establishment of an inter-governmental expert group on climate change to guide regional cooperation.[35] However, relative to the magnitude of the crisis unfolding, such measures are inadequate.

* * *

The unfolding climate crisis requires, as a critical first step, an inclusive dialogue mechanism that can bring together many stakeholders including vulnerable communities, corporations involved in infrastructure development, and national and local governments. To ensure against poorly designed interventions, the adaptation agenda needs to promote location-specific solutions. In light of the region's rapid industrialisation drive and advancing population, attention also needs to focus on reducing the risk of 'maladaptation', such as building infrastructure that is not designed to cope with extreme weather events, or planting crops that are not able to survive prolonged drought.

In the nineteenth century, the Tibetan Plateau was seen as a strategic buffer caught between the ambitions of two great powers, Tsarist Russia and the British Empire. Arthur Connolly's metaphor of 'the great game' was used to describe a single-minded pursuit of cultural superiority within the region. The strategic importance of the Tibetan Plateau as an ecological buffer against catastrophe that could threaten one-fifth of humanity did not enter into the geopolitical discourse. This has since changed. The melting of the glaciers has exposed a physical connection with the rest of the globe that has hitherto been poorly understood. A clear picture of how the region as a whole is likely to be affected over the next two decades is beyond our grasp. But the Tibetan Plateau is now on the global climate and security agenda and is likely to stay there for decades.

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