The Waterscape of Asia: No Escaping from the Reality of Water

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Understanding Asia's Himalayan hydrology

It is being fast established that the Himalayan hydrology will be one of the critical frontlines in the global battle against climate change and water issues. The Himalayan mountain system is of crucial importance to the river system of Asia not only in terms of influencing the monsoon but also of the glaciers that are the source of many of the great rivers. Geologists often regard all the rivers, including those originating from Tibet, collectively as the 'circum-Himalayan rivers'.[1] The Himalayan glaciers, regarded as the 'Third Pole', contain one of the largest reservoirs of snow and ice outside the Polar regions. Major Asian river systems – the Amu Darya, Indus, Ganges, Brahmaputra, Salween, Mekong, Yangtse, Yellow and Tarim have their sources in the Himalayan glaciers contributing to almost 70 per cent of water resources. Almost 2.0 billion people stretching from Afghanistan to the Ganga-Meghna-Brahmaputra basin in South Asia to the Mekong Delta in Southeast Asia are dependent on the flows of the rivers from the glaciers of the Himalaya that includes Tibet. The impact of global warming and climate change, as studies indicate, will gradually shrink glaciers resulting in the decrease of water runoff in the long-term. In the short-term earlier water runoff from glaciers when combined with seasonal rains can result in flood conditions.

Of all the evidence showing the impact of global warming, perhaps none is more visible than or as acutely dangerous as outburst flooding in the Himalayas. According to the assessment of the Centre for Integrated Mountain Development (ICIMOD) in Kathmandu there are about 200 glacial lakes in the Hindu Kush Himalaya region that are 'potentially dangerous': (25 in Bhutan, 77 in China, 30 in India, 20 in Nepal, and 52 in Pakistan). The ICIMOD keeps an inventory of 8,700 glacial lakes in the region. Glacial lakes are recognized as a threat to mountain areas worldwide. The lakes form as glacial

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melt-water collects behind ridges of loose rock debris called moraines that were deposited by the glaciers themselves.

Over the next 20 years, perceptions of a rapidly changing ecosystem in all likelihood will prompt nations to take unilateral actions to secure resources and territorial sovereignty. Any willingness to engage in greater river basin cooperation will depend on a number of factors, such as the behavior of other competing countries, the economic viability, and other interests that states are reluctant to either compromise or concede.

In the last two decades, the impact of climate change on water resources cannot be discounted. In fact as a precautionary approach, the awareness to the dangers of climate change on water resources should frame future water policies in the region. Some of the studies/findings indicate increased precipitation in some areas, increased drought in some others and increased variability of precipitation. Long-term trends for Himalayan glaciers under conditions of continued warming clearly point to melting though some reports have tended to exaggerate the situation. The melting in the short term will help liberate melt-water which can be used for agriculture and industry. However, de-glaciation will also lead to rapid destabilization of mountain slopes causing landslides, rock-falls and mudslides. This would directly impact the livelihood of the people who live on the floodplains of the major rivers spread across Nepal, India, Bhutan and Bangladesh.

The risks and uncertainties over the impact of climate change on water resources are potentially high in many South Asian countries. For example, Bangladesh given its location and geography is extremely vulnerable to any variations in water flow. Being the lowest of the riparian states it shares 54 rivers with India. Bangladesh, geographically speaking, is in a double trap. While on the one hand rivers flow in making it increasingly water dependent on the other it is witnessing sea-level rise. According to a modeling study, the mean global temperatures for Bangladesh may rise by 1.5 to 1.8 degree centigrade by 2050 and correspondingly sea levels may rise by about 30 cm accompanied by an increase in annual rainfall.[2] For India, the middle riparian, decreased snow cover will affect the flows in the Indus, the Sutlej, the Ganges and the Brahamaputra - all originating from Tibet. 70 per cent of the summer flow of the Ganges comes from the melt-water and thus can potentially impact the agriculture sector. India's National Communications (NATCOM) in 2004 has projected a decline in wheat production by 4-5 million tones with even 1 degree centigrade rise in temperature. Pakistan, like Bangladesh a lower riparian, is vulnerable to access of clean water. The western Himalayan glaciers act as reservoirs that release water into the rivers that feed the plains in Pakistan. The glacial retreat is increasing the flow and the recent devastating flood in Pakistan in July-August 2010 is a stark reminder of the perils of climate change. In the next decade erratic rainfall combined with glacial melt will exacerbate the already serious problems of flooding and draining. Following the glacial

retreat it is projected that there will be a 30-40 per cent reduction of flow in the Indus basin critically impacting food production.[3]

Climate change and water resources

Another factor that needs to be incorporated into water policy is the climate change connects. It is now being increasingly understood that the effects of global warming will be felt through changes in the hydrological cycle. An effective adaptation policy cannot be delinked from the way water resources are managed and utilized. The impact of global warming on water resources is particularly important for the Himalayan states that are highly dependent on glacial sources of rivers in the Hindu Kush. Initial findings of the ongoing research indicate increased precipitation in some areas and increased variability of precipitation in others. Changes in precipitation and evapo-transpiration will greatly influence groundwater recharge. The expected decline in glaciers and snowfields will affect the flow of rivers, and increase the likelihood of floods due to overall increase in intensity of rainy days. A policy that awaits clear evidence may not be prudent. A precautionary approach and alertness to possible changes is a wiser option.

The role of enforcement and monitoring agencies like the Environment Impact Assessment (EIA) needs to be effectively enforced in respective countries. The purposeful participation of the civil-society will be equally crucial for greater awareness and balance of development and water resources.

In the Himalayan region the Glacial Lakes Outburst Floods (GLOF) problem, as explained earlier, is compounded by the fact that there is a lack of long-term data. Research on climate change impact on glacial needs to be intensified at a regional level and cooperation should entail sharing of data. The present state of knowledge is inadequate in identifying and assessing the magnitude of potential outbreaks of glacial lakes. GLOF risks has to be soberly assessed and not heightened therefore leading to misperceptions. Countries in the region with trust deficit can easily misinterpret overstated risks, particularly the downstream countries. Regional cooperation will need to factor in enhanced and updated forms of an automated early warning system. Also upgraded remote sensing projects are important for flood warning systems because they can detect small changes in lake levels and send immediate signals to alarm systems near villages. Research and risk evaluation will also require ground-level surveys.

Another important feature which each individual state has to consider is to integrate and harmonize external water policies with internal water resource management. Such an approach would require treating river systems, particularly the Ganges-Brahamaputra-Meghna (GBM) and the Indus in a holistic way and reorienting hydro-diplomacy on a multilateral basis than just a bilateral format. This would entail a shift from 'sharing waters' to 'sharing benefits'. Ecological considerations should be the overarching perspective. This would easily allow a far greater understanding on the

nature and impact of climate change on water resources. In the past the dominant perspective was engineering and economics, but now the emphasis should be on ecology and climate change. Keeping the principle of just and wise-use of water, sensible riparian policies can be framed both internally and externally.

The combination of rising population, increased urbanization, and rapid economic growth compounds the challenges of securing water in the future. Asia, the most populous continent has also the lowest water per capita in the world. Figures indicate that one in five people in the region do not have access to clean water. With an additional 500 million people expected in the next 10 years in the Himalayan watershed states, the stress on food, energy and water resources will only increase. It is thus important to understand the Himalayan region in terms of 'exponential function'— increasing population leading to greater food demand that increases dependence on water for irrigation and energy. The interconnection of food-energy-water (FEW) is crucial, and if not framed sensibly into state polices the cascading effect on food production, livelihood, and migration, will impact political stability in the region. What becomes worrisome is the likelihood of competition over water resources. Though the possibility of water being a direct cause of conflict is unlikely, however, given that the Himalayan watershed is fraught with tensions, water can act as a dangerous trigger and destabilize the region.

Importance of China's hydrological position

From a hydrological perspective China cannot be ignored from the South Asian regional configuration. While China is not member of the SAARC (South Asian Association for Regional Cooperation) it gained observer status along with Japan, South Korea and the US in 2009. Increasingly, and as India's neighbouring countries like Bangladesh, Pakistan and Nepal would like, China is making its presence felt in South Asia and in the process competing directly with India which considers the region to be its sphere of influence. From a hydrological position, India is a lower riparian vis-à-vis China and an upper riparian vis-à-vis Pakistan and Bangladesh. An emphasis that has not been correctly articulated is the fact that India is middle riparian and has concerns over water uses with China and responsibility of sharing waters with its lower riparian neighbours. China's hydrological position, on the other hand, is one of complete riparian supremacy. India's middle riparian position increases its dependency on the head waters of the rivers sources such as Indus, Sutlej and Brahmaputra which originate in the Tibetan plateau. Of the nine major tributaries of the Ganges that flow in from Nepal, the three principal tributaries Karnali, Gandaki and Kosi rise from Tibet.

China is equally water insecure but its insecurity relates to the disproportionate availability or uneven distribution of waters within its territory, the majority of which is in the south (Tibet Autonomous Region) with the north and west excessively water stressed. China suffers from an annual shortage of 40 billion cubic meters of water and

is expected to face 25 per cent supply gap for projected water demand by 2030.[4] More than anything else, the water shortage becomes an impediment to China's goal of meeting food production and challenges the leadership claims to self-sufficiency in food grains. Electricity is equally crucial in China's economic development. With a GDP growing at the rate of 8-10 per cent a year, China's energy requirement is projected to increase by 150 per cent by 2020. While resource rich in coal and a net importer of oil, both climate unfriendly, China is compelled to develop its hydroelectricity as a clean and renewable source of energy. China has already half of the world's large dams including the Three Gorges. China's dams and water diversions are an important component of its rise. Its 'hydroegoism' or 'hydroaggression' is intended to secure its massive water requirements in its northern and western regions. But importantly the control over such a valuable natural resource gives Beijing enormous strategic latitude with its neighbours.[5]

The Question of Tibet

Tibet's water resources raise contesting questions. Should China alone be the stakeholder to the fate of the waters in Tibet? China has rampantly exploited all the rivers from the Tibetan Plateau. With historical disagreement over the territory, Tibet's unresolved political status will be of direct consequence to ways to sustainably manage the water resources. Lower riparian pressure and international attention to defining vital resource as 'commons' would be significant to preserving and sharing the waters of Tibet. While such redefinition is politically sensitive, as it clashes with national jurisdiction, it nonetheless, merits attention keeping in mind future water requirement of the 2 billion people in South and Southeast Asia. International laws on allocating water within river-basin are difficult to implement and often contradictory. The UN Convention on the Non-Navigational Uses of International Watercourses approved in 1997 by a vote of 104-3 (but not yet ratified) requires watercourse nations (Article 5) to participate in the use, development, and protection of an international watercourse in an equitable and reasonable manner.

The rapidly changing Himalayan hydrology will require genuine willingness of states to engage in greater river basin cooperation. It is of existential importance to draw China into a water dialogue and evolve new mechanisms and approaches to solve water problems. The stability of the region will greatly depend upon the stable flow of waters.

Comprehensive understanding of water

Water requirement has undoubtedly emerged as an issue of great concern and urgency. With multiplying demand on water, the availability of which remains constant, a water crisis is impending. This holds particularly for developing countries, where the

requirement of water will rise by 50 per cent by 2030. A comprehensive water policy for these states would need to take into account the rapidly changing water conditions, in terms of quality, quantity, and the uneven distribution of water.

Much of the policy understanding on water has been narrowly framed on the principle of 'water management' that entails manipulation of water for specific uses through water-based projects. Clearly, a more comprehensive policy for protection, development, and utilization of water resources—including both surface and underground water—needs to be developed. This would mean a shift to a more rational and integrated 'water resource management' that treats water bodies as one hydrological unit and, in the process, embraces the 'conjunctive use' of both surface and underground water resources and their sustainable development. While the developmental focus will remain essentially on the socio-economic uses, it must be noted that water is equally necessary for sustaining the ecosystem. The challenge lies in maintaining the balance.

Regional cooperation will need to factor in an enhanced and updated automated early warning system. The cooperative framework would also require upgrading remote-sensing projects, which are critical for improving flood warning systems. Such enhancement will help in detecting small changes in lake levels, and thereby send immediate signals to alarm systems near villages. While building such capacity is important, what is of greater relevance is repeated risk-evaluation at the ground level, leading to thorough risk assessment. Local knowledge and indigenous understanding are immensely important to the overall assessment. Thus a lot of fresh thinking based on evolving hydrological knowledge and understanding is required—thinking that is sincere, evidential, and scientific; and not alarmist, rhetorical, and misrepresented.

Climate variation and its impact on water resources bind the Himalayan region together. Some of the impacts of climate change are already being observed with glacial melt, seismic activity, and unpredictable weather patterns. States would need to reorient their riparian polices on a multilateral basis. While, on the one hand, a shift from merely 'sharing waters' to 'sharing benefits' is necessary, on the other, it is imperative not to lose sight of the ecological consideration.

NOTES

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