policy brief

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Water, Climate Change, and Adaptation
Focus on the Ganges River Basin[1]

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Human-induced climate change has wide-ranging and complex impacts on water resources in South Asia and throughout the world. Strategies for adaptation to climate change, as well as changing demographics, socioeconomic conditions, and resource management practices may mitigate adverse impacts on water resources and the interconnected sectors of agriculture, ecosystem, energy, and health, while capitalizing on the opportunities presented by these changes. This brief aims to help guide policy engagement and future research in water and adaptation. It highlights some of the existing or potential strategies for adaptation in the Ganges river basin and describes five factors currently obstructing successful adaptation in the basin.

Seven Key Strategies for Adaptation in the Ganges River Basin

1. ***Enable flexible institutions and facilitate interscalar and intersectoral collaboration.*** At its core, the process of adaptation requires the ability to recognize and respond to changing circumstances. Strategies for enhancing this ability include the incorporation of flexibility mechanisms into water agreements and regulations and the facilitation of thinking, planning, implementation, and monitoring across scales and sectors.

2. ***Develop and conjunctively manage water resources.*** As climate change threatens to alter water supply in the basin, the development of additional water resources ranging from community-level rainwater harvesting and groundwater recharge to large-scale intra- and interbasin transfers will be used to meet rising water demands in riparian countries. Water resources—groundwater, surface water, soil water, and rainwater—must be managed and regulated conjunctively.

3. ***Increase water productivity.*** Augmenting returns per unit of water used will help facilitate adaptation while enhancing economic development. Key policy options for increasing water productivity include 1) improved crop breeding; 2) facilitation of intrasectoral allocation and market linkages; and 3) facilitation of intersectoral transfers.

4. ***Improve the strategic use of the storage continuum.*** Re-thinking water storage to examine the opportunities for natural storage options (e.g., ponds and wetlands) as well as constructed storage options (e.g., reservoirs and dams) at a significant scale in the Ganges basin will be imperative in ensuring adequate water resources for sanitation, agricultural, industrial, and environmental needs.

5. ***Improve water quality.*** Coping with changing circumstances will require efforts to mitigate the degradation of water supplies in the Ganges river basin by decreasing the introduction of pollutants and eliminating pollutants in the system. This may be accomplished through augmenting the capacity of treatment plants throughout the basin and efforts to protect natural environmental pollution filters.

6. ***Recognize and protect ecosystem services.*** The protection of diverse ecosystems is critical for decreasing vulnerability and enabling adaptation. Two specific policy options—valuing ecosystem services and the allocation of environmental flows—have the potential to augment social and ecological resilience in the Ganges basin.

1 This brief summarizes pertinent points from the authors' recent Working Paper of the same title, available at http://www.nicholas.duke.edu/institute.

7. ***Support risk management.*** Enabling adaptation within the Ganges basin will require efforts to support and enhance risk management from the local to the global level. Specific policy options that contribute to this aim include the enhancement and expansion of early warning systems, the provision of access to credit and insurance, and the investment in education and training to facilitate collaboration and enable the pursuit of alternative livelihoods.

Barriers to Strategy Development and Implementation in the Ganges River Basin

A comprehensive consideration of physical, informational, capacity, sociopolitical, and institutional obstacles will be fundamental to enabling strategic adaptation in the basin.

Physical

Recognizing that there is no one-size-fits-all strategy that can be applied throughout such a large basin, specific efforts to expand irrigation or increase storage capacity will have to take a close look at the physical characteristics of the locale within the wider strategic context of the basin as a whole.

Data and informational

While the foundation of knowledge regarding the nature and effects of global climate changes is rapidly increasing, there is still a certain level of uncertainty surrounding our understanding of how anticipated changes might impact water resources in the Ganges basin. Recognizing the inherent uncertainty in this complex field and seeking to increase our understanding of resources and interactions is important. Yet, it is also critical that this acknowledgement of uncertainty not paralyze action, but rather encourage policy engagement in a different, more adaptive way. Adopting an adaptive approach to resource management will require the ongoing collection and assessment of data and information as an integrated part of the policy process.

Capacity (technical, financial, and human)

One of the primary barriers to the development and implementation of adaptation strategies is the lack, or perceived lack, of technical, financial, and human capacity. Effective adaptation strategies will depend on the simultaneous development of capacity at all scales of governance, such that communities, nations, and regions can avoid or cope with extreme events or changing circumstances.

Sociopolitical

Sociopolitical barriers to the development and implementation of strategies for adaptation arise where strategies are viewed as undesirable or unnecessary by certain stakeholders. Understanding the multiplicity of interests and power asymmetries at play in the Ganges basin is critical for the development and implementation of strategies for adaptation. Overcoming the barriers posed by competing interests requires attention to developing mutually beneficial approaches to adaptation as well as strengthening institutions at every level to enable them to handle difficult decisions about tradeoffs.

Institutional

Like many international river basins, the Ganges is a complex system that crosses multiple jurisdictions and influences the functionality of multiple sectors. Yet, existing institutions are not well-equipped to handle such complexity. This is due in part to the fact that existing rules and regulations lack flexibility mechanisms and impede alterations to current management practices. Additionally, adaptation in the Ganges is hindered by the limited cooperation between countries in the basin. The flow of the Ganges through multiple subnational jurisdictions also complicates decision making and strategic planning. Recognizing that not all efforts to develop water resources in the basin will span multiple scales or sectors, management institutions at all levels still must be equipped to see individual interventions within the wider strategic context of the basin.

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