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Effects of Environmental Change on the Global Water System: An Asian Perspective

ERIC CRASWELL
Global Water System Project

Scientific efforts to understand the impact of global environmental change on the Earth system are critically important to the sustainable management of natural resources. This is most obvious in the Asian region where population pressure on the resource base is most intense. In the case of water, a systems approach is required that accommodates both the multi-faceted dimensions of water resources and the accelerating pace of globalization and human development. The global water system includes the water cycle and three major interacting elements: the physical, biological and biogeochemical, and the human components. Major drivers of change that affect the system are climate change, population growth, land cover change, the development of water diversions and dams, economic development, and the vexed question of governance. Modifications to one component of the system cascade throughout the whole system. Research is needed to clarify the magnitude and mechanisms of change, and how society can best adapt to changes in the system state. We need global and regional assessments based on systematic condition indicators such as water availability per person, the water poverty index, pollution concentrations, and source water quality. Furthermore the research agenda needs to embrace important new concepts such as blue and green water, and virtual water in agricultural trade. Research is also needed on topics such as environmental flows and coastal zone ecology and management. Given the competing demands for water, and the importance of governance, there is a clear need for an inter-disciplinary approach based on a discourse that integrates natural sciences and social sciences.