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Transboundary Watersheds: Changing Environments and Streams of Thought

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ABSTRACT

Water is a “fugitive” resource in the sense that it flows naturally from one place to another, from one reserve to another (eg, groundwater to surface), and from one physical state (solid, liquid and gas) to another. Thus “trans-boundary” can mean many things including: transitions from wet to arid zones, from upstream to downstream, from one country or province to the next etc. The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992) defines “transboundary waters” to mean “any surface or ground waters which mark, cross or are located on the boundaries between two or more states.” Emerging issues in water resources emanate from three categories of problems: (1) transboundary water availability; (2) transboundary groundwater allocation, management, and conservation; and (3) transboundary water quality. Transboundary fluctuations and changes in river flow can be attributed to (1) climate variations and change on several timescales, and, (2) physical and biological transformations of basin hydrology including increased storage, diversions, and landscape changes.

Researchers and practitioners have identified numerous factors underlying international disputes involving river flows, including: the variability and uncertainty of supply, interdependencies among users, increasing over-allocation and rising costs, the increasing vulnerability of water quality and aquatic ecosystems to human activities, ways and means of supplying safe water facilities, and the mobilization of financial resources for water development and management. Many of these issues derive from general concerns in water resources management. How these concerns are met is strongly shaped by the choice of the spatial unit within which studies and management actions are conducted, by the way problems have been defined and changed over time, and by who benefits from defining problems in a particular way.

In the following discussion the scales of human activities and interactions with several river basins are put in the context of streamflow changes on a range of time and space scales. The conditioning factors on flow variability and change are discussed in general. Three regions, the Nile, the Parana-Paraguay River, and systems on the US-Mexico border, are then selected for detailed illustration. These are described within the many dimensions within which “water” is understood from its hydrological and economic through its environmental and cultural contexts.

While governing institutions that more closely correspond with the physical water system can help to assure appropriate consideration of efficiency and equity, domestic policy can pose major institutional barriers to international agreements and even lead to counterintuitive conclusions about management across national or state borders. Ultimately, the main tasks in the foreseeable future will be how to share common but variable water resources in a catchment area between upstream and downstream users, between various sectors, between rural and urban areas, between preservation of functioning ecosystems and more direct tangible needs. Engaging the many dimensions of transboundary river flow requires, more than ever, the need to understand these “regions” as integrators of social, cultural, climatic, economic, and ecological histories and networks, that help to shape shared community interests and values.