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Technical knowledge and democratic decision-making: building adaptive capacity of fresh water systems in Brazil

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Around the world, the effects of global climate variability and change have steadily risen in both the public and governmental policy agendas. Freshwater basins are among the systems most negatively affected by climate variability and are expected to be under even more stress under climate change. In this context it is important to understand the factors, including governance mechanisms that build water systems adaptive capacity to respond and adapt to climatic change. In principle, the design of governance mechanisms that introduce many of the theorized determinants of adaptive capacity such as democracy (including participation, representation, and accountability), use of knowledge, networks and social capital, and flexibility should increase the adaptability of fresh water systems to climate variability and change. Yet, in the process of water management these determinants are neither discrete nor independent; rather they influence and are influenced by each other and by several other factors at play at the different scales of water governance. And while these determinants have mostly been theorized as varying in the same direction and positively influencing each other, much less attention has been paid to the potential negative feedbacks and synergies between them. This study empirically explores a few of these relationships in the context of water management and reform in Brazil. In particular, it seeks to understand the interaction between knowledge use (especially climate information) and democratization of decisions in building the adaptive capacity of Brazilian water systems to climate variability and change.

Figure 1: Relationship between technical knowledge use and democratic decision making with adaptive capacity to climate variability and change

		Democracy	
		High	**Low**
Knowledge	**High**	Higher levels of adaptive capacity	Technocratic Insulation
	Low	Potential for ill informed decisions	Maladaptation

For the past fifteen years, water management in Brazil has undergone an encompassing reform that has created a set of participatory councils (committees and consortia) at the river basin level. Among the goals

of the integrated water management (IWM) model adopted in Brazil is the democratization of the decision making process between state and private actors. Another goal is the adoption of a number of mechanisms to optimize water use and conservation such as river basin plans and bulk water permits and charges. River basin councils generally have a tri-partite composition: state agencies (including state owned companies that use water, such as the sanitation and water utilities); municipal governments (including municipal, state and federal) and civil society organizations (ranging from those representing private users, such as the federation of industries, to universities, professional organizations, NGOs and community organizations). Councils' attributions include establishing a water charging system, allocating revenues, designing (many times with the support of external consultants) and approving river basin water resource management plans, negotiating conflict, and promoting water-related activities in the basin such as environmental education, training, etc. The study draws from the burgeoning literature focusing on vulnerability, adaptation, and adaptive capacity to climate stressors to inform its empirical research. Specifically, it asks: What role can technoscientific knowledge play in building the adaptive capacity of water systems to climate variability and change in Brazil? How does it interact with other determinants of adaptive capacity in responding to climate-related stress? A combination of qualitative and quantitative methods is used, including survey data collected across eighteen river basins (626 members of river basin committees and consortia) and in-depth qualitative interviews with key informants in each river basin to query more specifically about climate use data and past response to climate stress. Data from the survey and key informant questionnaires are used to understand patterns of techno-scientific knowledge use across the eighteen river basins. The types of knowledge queried include weather and climate information, water quality, river flow and reservoir models, environmental impact reports and basin management plans. This study finds that: a) effective participation will only be achieved through the transparent and accessible use of technoscientific knowledge by these councils; b) past experience, higher levels of education and participation in networks by council members influence the use of technoscientific knowledge within councils; c) while members of river basin councils find that the use of technoscientific knowledge improves decisionmaking at the basin level, they also find that it introduces significant levels of inequality, even higher than political and economic power.