

From An Informed Public To Social Learning For Water Management: Is Argentina Cast Adrift?

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Abstract: We as humans are inevitably and intimately connected to our aquatic ecosystems and have an important impact on both their quality and quantity. The accessibility and preservation of fresh water has significant implications for global human health and economic development. While in most developed countries the field of participatory water management is already being implemented, in South America the discourse is still purely academic. Limnology is a science capable of addressing a variety of issues in dynamic and innovative ways, but as we place ever increasing demands on our aquatic ecosystems, future water management will require limnologists trained to treat bodies of water as systems integrated with the surrounding social-ecological landscape. I believe that universities present an ideal platform for the dissemination and engagement of new more progressive perspectives, which focus on community involvement and social learning. South American countries, in particular Argentina, are in pressing need of these committed professionals to avoid a water crisis.

Keywords: Sustainability, Governance, Participatory, Complexity, Limnology.

I. INTRODUCTION

Water management is comprised of the activities of planning, developing, distributing and optimizing the use of water and its associated ecosystems. It is the field that addresses the need to administer the world's limited water supply in a way that is efficient, equitable and promotes sustainable development.

The approaches to water management have changed greatly since the days of technical end-of-pipe solutions such as pollution control. Conventional command-and-control resource management has come under increased criticism, as this approach involves too many uncertainties and complexities, and lacks stakeholder perspective. Innovative trends have emerged for understanding and managing social-ecological systems (Paavola and Hubacek 2013), and this new emphasis on sustainability requires increased social engagement, along with a participatory learning process (Pahl-Wostl et al. 2008).

The rate of water degradation is most pronounced in developing countries in the South where a combination of rapid population growth and poverty are interacting in negative and synergistic ways (Lundqvist 1998). However, some southern countries such as Australia and South Africa, which are particularly characterized by their water scarcity, are improving their systems of natural resource management by adopting participatory measures and creating dynamic institutions able to absorb and adapt to change. Australia, through its National Water Initiative, has set itself on the path to water sustainability (Jones 2004), while South Africa has developed a National Water Resource Strategy and has incorporated the principle of sustainability into their national constitution (Turton 2008). Argentina has also adopted a sustainability paradigm (Secretary of Environment and Sustainable Development) but has yet to lay down a practical road map to reach its goals. Traditionally in Argentina, water issues were handled by engineers and viewed strictly within the framework of resource usage. In this context, it has been argued that -anthropogenic impacts on the La Plata River Basin

and in Patagonia were principally from dams and reservoirs (Mugetti et al. 2004). In the last half century Argentina has been eager to emulate methodologies utilized in developed countries and has experimented with a variety of public policies since the 1960's, including managing water as if it were an unlimited resource (a brief economic history of modern Argentina through the 1990's can be found in Hall et al. (2001a)). The current focus on ecosystems management that is prevalent today in developed countries, is not yet widespread in Argentina. Within the decision making entities, there is an uneasy coexistence and blatant competition between the old ideas of water as merely an exploitable resource and the new view that it is a vital component in a greater system. The expansion of agricultural land has been identified as the most important driver of the loss of natural ecosystems and the benefits derived from them. Irrigation plays and will continue to play a fundamental role in the opportunities for agricultural expansion (Rockström et al. 2007). As a consequence, in a country such as Argentina, which relies on the production of cereal crops, it is imperative to manage water systems in a way that achieves sustainable food production. Participatory water management, as a methodology for resource administration, has an established and profound field of research and implementation (von Korff et al. 2012), which we drew on as a basis for our own investigations. We began a social project in the Lules River Tucumán, a basin which we have been studying since 1998, attempting to understand the local stakeholder's relationship between their ecosystem and the goods and services it provides (Fernandez & Molineri 2006, Quiroga et al. 2011, Fernández & Barber 2011). The preliminary results appear to be markedly affected by the stakeholders' negative social learning, as they had a tendency to withhold the real answers to the questions during the field surveys, for fear of being policed. The objective of this paper is to first demonstrate the challenges to integrating the idea of governance as empowerment into Argentine society. I will then illustrate how difficult it is in northwestern Argentina (NOA) to work in conjunction with three essential actors: government, society and science. Finally I will propose an educational alternative as a means to transform the current hazardous Argentine perspective to one of sustainable water management.

II. WATER SUSTAINABILITY AND GOVERNANCE

It has been observed that merely having an informed public may be insufficient to create the necessary social involvement for participatory decisions in ecosystems management. It has been shown that the methodologies of participative management and social learning are valid approaches towards the achievement of water sustainability (Collins & Ray 2009). Sustainability means that all the societal expectations, ideals and needs are balanced with the goods and services provided by aquatic ecosystems, under "appropriate" management, in a dynamic and constantly adjusting process. In Argentina however, a country characterized by marked disparities in economic (GDP), cultural and political development, the reality of a paradigm in which citizens are concerned about environmental decisions is still a distant objective. Since 1983 Argentina has been a consolidated representative democracy; however the building of better institutions is still necessary for it to be considered an efficient participatory democracy. At the turn of this century, Argentina was confronted by a tremendous economic and social crisis (including an IMF default), which was subsequently followed by rapid restored economic growth (>5% average per year). This steady growth was boosted by the high international price of soy beans, a change in economic strategy (closed market economy) and strong social measures put in place to assist the most vulnerable sectors of society. Simultaneously, public works projects increased cash flow into the market. Today however, Argentina continues to have a chaotic social framework, a climate of political distrust, government vulture fund debt and widespread hopelessness. All of this in a context of rapid urbanization (93% in 2013 according to World Bank information) and extreme marginalization, the social consequences of which include the prevalence of drugs, unemployment, social unrest and social pathologies. Given this scenario, environmental problems are seen as a minor issue. This in spite of the fact that an analyses of anthropogenic impacts on water resources concluded that the current conditions of aquatic habitats has been assessed as severe in 16 of the 37 studied sub-regions (Mugetti et al. 2004). Regional analysis also shows a wide range of environmental situations and vast regional differences in water availability, which profoundly affect the perceptions by the areas's inhabitants. For example, the NOA is 6,738,800 Km² and has a remarkably heterogenetic landscape, which coupled with an inconsistency in water availability produces the reduction in the well-being of its inhabitants. The social gap is worst in the suburbs of the province's capital, where those marginalized, despite the economic rebound, live in crowded communities and violent slums. In this scenario, it is difficult to focus on a holistic approach to water issues, and the situation is worsened by conflicts between governmental offices and other urgent social demands. Initiatives are sporadic, delayed and incomplete, and the circumstances have been aggravated by various periods of below average precipitation (observations made previous to the presentation of the current manuscript). Governmental agencies resolve these demands by putting more pressure on existing water bodies,

including subterranean aquifers, and levying sanctions on water mismanagement or contaminators. These acute problems do not allow for long term structural solutions, in spite of the fact that there already exist formal written plans and strategies on the desks of the universities and research centers. In this complex situation a solution using a multi-sectorial approach, including representatives of all the stakeholders, has no precedent and appears to be inapplicable in the short term. Therefore the possibility of incorporating methodologies such as Integrated Environment Management (Toth and Aumen 1994), Ecosystem Management (Stanford and Poole 1996) or Integrated Water Resource Management (Lundqvist 1998) to move toward guaranteeing access to safe water in the NOA, is still far away. The NOA agencies are still several steps behind the standard criteria used in developed countries, despite periodic recommendations in this regard, given that interactivity among stakeholders is in its preliminary stages (Hunzinger 1997, Fernandez & Molineri 2006, Lomascolo & Manso 2010). A good example of this is the *Strategic Action Programme for the Binational Bermejo River Basin* (Navajas and Schreider 2011). The dam construction projects in the Upper Basin, needed to regulate the flow of the river and generate energy, were expanded to incorporate a more comprehensive and systemic approach, promoting impute from the entire Bermejo Basin (Navajas and Schreider 2011). However, these attempts did not translate into a collective program due to a lack of community awareness, commitment, and participation, as well as the absence of mechanisms to support community involvement in the processes of natural resources management. Evaluation of these findings suggests that no significant progress was made, in part because the project was unable to build a participatory and consultative framework across the Bermejo Basin (Navajas and Schreider 2011).

III. DIFFICULTIES OF APPLICATION GOVERNANCE IN ARGENTINA

Governments of developing countries are being forced into the rapid extraction and depletion of primary natural resources to generate an immediate cash flow, the consequences of which will unquestionably destroy the long term productivity of the region. Meanwhile, the passivity of Argentine society is jeopardizing these resources and ecosystems (Grau et al. 2005) by misguidedly trying to achieve human well-being exclusively through economic growth. Hence the first step to aligning the economic model with reality is positioning the regional economy *inside* the global biophysical system. Real economies cannot exist outside the global biophysical system, which provides them with energy, raw materials, and a milieu within which to operate and assimilate waste (Hall et al. 2001b, Growdy et al. 2010).

For a long time it was accepted that an informed public was the only prerequisite condition to reach legitimized decisions about environmental issues. Today governments and specialists have signaled a change in the thinking regarding this policy. Multi-scale, polycentric governance approaches recognize the necessity of *impute* from a large number of stakeholders functioning in different institutional settings (von Korff et al. 2012). The process toward social participation is progressive, with the input-output of interdisciplinary actors who learn, advance, regress and collaborate to achieve an objective. In Argentina there still does not exist the corpus of knowledge necessary to organize the first steps towards social participation capable of then triggering the whole process. Only a handful of cases, such as the Bermejo Project, have even attempted to shift their strategic vision from a merely utilitarian approach, centered on the multiple uses of water resources, to a more ecosystem-based approach, promoting sustainable development and greater environmental sensitivity (Navajas and Schreider 2011). It is currently accepted that full stakeholder awareness and participation are necessary to legitimize rules for the appropriate administration of natural resources (Costanza 2008). The process of stakeholder identification is a difficult task in the NOA due to a labile social structure accompanied by distrust of recognized authorities. The panorama gets more complicated when we consider not only the local stakeholders but also include business, social organizations, scientists, policy makers and politicians (de Vos and Wester 2005). Attempts to involve indigenous groups in participatory approaches have also presented many challenges (Korstanje & Ascarate, 2007).

It is imperative to prepare new generations of South American scientists to be able to integrate a variety of disciplines into the management of aquatic systems (Assis Estevez, 2011). In Argentina, institutions such as the university are recognized and respected as a valid authority, making them an ideal platform for the dissemination of participatory research and application. Therefore, following the example of the U.S. (National Research Council 1996), steps should be taken to strengthen the Limnology programs within educational institutions, especially considering the experiences acquired by Argentine limnologists. This interesting possibility is an important stride towards improving the links between scientific understandings, practical management and stakeholder interests.

IV. CONCLUSION

Developed countries are experimenting with new paradigms of governance, including attempts at open governance to facilitate the complexity of managing social-ecological systems. Meanwhile in developing countries, governmental agencies are disarticulated and do not learn from such experiences because of the pressure of daily problems. This becomes critical as all citizens need to be guaranteed access to safe water for the future. In South American countries, new innovative approaches are urgently needed to be able to determine and assimilate social-ecological systems for sustainable water management. Today it is accepted that Limnology is an effective model for interdisciplinary water science, capable of benefiting society as a whole. Consequently, strengthening limnology programs within South American educational institutions is imperative to prepare new generations of limnologists for an era of social participation in the management of aquatic systems.

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