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Editorial

Water Economics and Policy

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Abstract: Economics plays a double role in the field of water management, firstly as a powerful analytical tool supporting water allocation and policy decisions, and secondly in the form of policy instruments (water pricing, markets, etc.). This Special Issue presents a platform for sharing results connecting excellent interdisciplinary research applied to different regional and sectoral problems around the world. The 22 peer-reviewed papers collected in this Special Issue have been grouped into five broad categories: Water valuation and accounting; Economic instruments; Cost effectiveness and cost-benefit analysis; and Water productivity and Governance. They are briefly presented.

Keywords: water governance; water management; water resources; groundwater; water sustainability; water policy; economic instruments

1. Introduction

Fresh water is vital to the functioning of all terrestrial ecosystems—the flora and the fauna that make up those ecosystems, as well as the humans. Humanity relies on water not just for drinking, but also for food production, dealing with waste, providing energy and transport, etc. To meet their needs, people harness water through dams, irrigation networks, pumps, and pipes that supply drinking water and remove waste. Through the global hydrological cycle, renewable water resources amount to 42,000 km^3/year. Total water withdrawals still represent only a small share—about 9 percent of internal renewable water resources—but this average masks large geographical discrepancies [1]. This proportion is likely to increase as the global human population increases in the next thirty years and the demand for water in developing countries catches up with that of developed countries. The process whereby water resource development and use come to exceed available resources has been observed in many parts of the world and has been widely documented in the literature; a review of the published evidence can be found in [2,3], with several regions and countries entering a mature phase of the water economy [4]. According to the Intergovernmental Panel on Climate Change, changes in climate will intensify existing stress on water availability and will exacerbate different forms of water pollution, with impacts on ecosystems, human health and water system reliability in large parts of the world [5].

For a number of years, academics have tried to understand the links between the water system and human needs and the impacts that anthropogenic activities have on the water system itself [6]. In the early days, the scientific approach sat within individual domains (e.g., hydrology for the water cycle [7]; ecology for ecological impacts of water pollution [8]).

Since its formal recognition as an economic good by the United Nations in The Dublin Statement on Water and Sustainable Development (January 1992—International Conference on Water and the Environment), it has been widely accepted that managing water for its economic value is "an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources". This Declaration represented the formalization of what had been a reality for many

centuries, i.e. that water is a scarce resource (in quantity, quality or access) and as such decisions about its allocation are constantly made and rules about its management and governance need to be stablished. Water policy and management need to reflect the fundamentally interconnected nature of hydrological resources and there is a global consensus since Dublin in the use of economic instruments to improve sustainability.

Since the 1990s, economic analysis and its implications for policy and water management has received increasing attention from academics and substantial conceptual and epistemological advances have been made. Recently, from our point of view, there is a new emphasis on climate change adaptation and water use efficiency but the principles of Dublin declaration are still valid. Experts and policy makers agree that there is an urgent need for the reform of water policies and that economic science has a critical role to play in such reform. Economic science can support policy decision-making and we hope that this Special Issue is seen as a critical contribution to this endeavour.

Twenty-five years on from the Dublin Statement, it seems an appropriate time to take stock of the cumulated academic knowledge in this field, hence the value of the current Special Issue. Major policy changes have occurred during this time, such as the establishment and consolidation of the most ambitious piece of environmental legislation affecting a large set of countries, in the form of the European Water Framework Directive (WFD). The WFD and EU water policy have mostly been developed by policy-makers with a background in hydrology, civil engineering or public administration. So far, economics has played a secondary role [9] but the revised WFD should place social and economics sciences, and thus socio-economic knowledge, at the core of EU water policy and at the service of its social and environmental objectives (as we believe it was the original intention of the WFD). Viseu [10] exposes this secondary role of the social sciences (of which the economic ones are a subset) in the management of natural resources by stating that "Too many in the physical and life sciences dismiss social sciences as having a 'service' role, being allowed to observe what they do but not disturb it". Moreover, increasingly interdisciplinary and integrated approaches applied to the understanding of the socio-ecological complexities of water systems have emerged and solidly established themselves (ecosystem services-based approaches being one of them, in which water as an object of study features very prominently [11]).

This editorial briefly outlines the main content of the Special Issue on Water Economics and Policy by grouping the articles in five main themes that provide a partial overview of the current state-of-the-art based on valuable empirical studies across the globe, ranging from macro and micro-economics to political sciences. Invitations to the Special Issue did not include any prescription about the themes that the papers should cover, with the intention of capturing a non-guided taster of the current academic thinking in this area. The papers finally accepted for publication fall within the following themes: (1) water accounts and valuation; (2) economic instruments; (3) cost-benefit and cost-effectiveness analysis; (4) water productivity and efficiency; and (5) governance. This functional categorization pretends a clearer organization of this editorial and it is acknowledged that these categories are interlinked and could have followed a different configuration.

2. Contributed Papers

2.1. Water Accounts and Valuation

Shin et al. [12] apply a meta-regression analysis based on existing non-market valuation studies to estimate the magnitude of economic benefits for the use of a river in South Korea and its subsequent partial transfers for the sake of equity. Lee et al. [13], also in South Korea, use contingent valuation methods to estimate the willingness to pay for the improvement of drinking water quality through payments for upstream conversion to environmentally-friendly farming. Hampson et al. [14], using choice experiments, quantify the disaggregate value of ecosystem services for different users of a river in the UK. Novo [15] studies how to account for ecosystem degradation and the deterioration in associated ecosystem services using secondary data. Finally, Yang et al. [16] propose a method

to account for water resources, including both quantitative and qualitative assets and liabilities, while Gutiérrez-Martín et al. [17] describe the use of the UN SEEA Water accounting system to characterize the economic uses of water in a Mediterranean basin under the WFD scheme.

2.2. Economic Instruments

This group presents some relevant cases of the use of economic instruments. Pineau et al. [18] analyze hydropower water use in major producing countries and review the different economic instruments (royalties and others) used to appropriately distribute the costs and benefits of hydropower to society as a whole. A water pricing scheme for irrigation water in conditions of unmetered water use is the measure that Lika et al. [19] evaluate with a principal-agent model. Fang et al. [20] apply a computable general equilibrium model to quantify the performance and potential economic impacts of discharge tariffs, and Ahmad et al. [21] study the limits of water pricing in a developing country metropolis. Finally, Montilla-López et al. [22] review the worldwide use of water banks as a re-allocation mechanism of water rights.

2.3. Cost-Benefit and Cost Effectiveness Analysis

Two papers deal with economic support for water management decision-making, focusing on groundwater sustainability. López-Morales and Mesa-Jurado [23] rank cost-effectiveness measures for managing a large aquifer where urban use is the leading sector, and Rupérez-Moreno et al. [24] apply cost-benefit analysis to a similar context where irrigation is the main user.

2.4. Water Productivity and Efficiency

Measures to increase water-use efficiency and increase productivity are the topic of a group of papers. Expósito and Berbel [2] describe the co-evolution of water-use efficiency and water productivity and analyse the effect of these indicators in the 'closure' process of the Guadalquivir river basin observed in recent decades. Zingaro et al. [25] analyse the effects of agricultural and water policies on the crop pattern change using multi-regression models. Also in the irrigation sector, Yin et al. [26] analyse the impact of off-farm employment in water-use efficiency. The urban sector is addressed by Wong et al. [27], with a focus on the impact of water appliances on water efficiency in households, while the industrial sector is covered by Li et al. [28], who study the evolution of water use in the Chinese textile industry and propose alternatives to reduce water footprints and pollution.

2.5. Governance

Finally, a group of contributed papers address best practices for stakeholder engagement and political decision-making as a key element in good water governance. Delgado-Serrano et al. [29] address an innovative approach to implementing Ostrom principles in a community-based governance context. Graversgaard et al. [30] analyse public participation and stakeholder engagement and knowledge co-creation in water planning in the context of EU WFD regulation. Also in this context, Boeuf et al. [31] review the application of the concept of disproportionate cost in the WFD, which should be used when a water mass cannot achieve a good environmental status (GES). Finally, also in the WFD context, Klauer et al. [32] analyse the concept of GES in German waters.

3. Conclusions

The contributions to this Special Issue highlight the diversity of economic instruments and approaches to support water policy both at the analytical and the empirical level. Some conclusions of the presented papers are worth highlighting here: The valuation of ecosystem services and water accounts as a promising avenue to support water allocation; the need for effective public participation and stakeholder engagement, and the application of standardized procedures to support

decision-making, and realistic water-pricing schemes are promising avenues for water saving and appropriate water allocation.

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