# Cultural Values in Water Management and Governance

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Water is a fundamental resource for ecological and economic imperatives across the globe, contributing to the sustenance of livelihoods, food production and energy generation. Despite its importance, water resources are increasingly under threat due to overexploitation, pollution, scarcity, depletion and issues of accessibility/affordability. In addition to these threats, competitive water uses and strong interdependencies across different productive sectors. As such, "water crises" have been repeatedly identified among the top five global risks since 2012, with the international community acknowledging that water crises are regularly a crisis of management and/or governance. Cultural values associated with water management revolve around anthropocentrism, whereas values associated with water governance revolve around concepts of provenance/places. Implementation of ToC/cultural values is limited in practical applications, and an example is provided on how to improve on that. It's suggested that a succinct theory of culture such as Schwartz's cultural values be considered to be an alternative to capture a greater heterogeneity across the breadth of water governance/management-related and basin-specific contexts.

# 1. Introduction

Water management is known as "the application of structural and non-structural measures to control natural and man-made water resources systems for beneficial human and environmental purposes" [1]. This definition presumes deciding on long-term management objectives usually operationalized over short- to medium-term timeframes for multiple uses of water resources [2]. In contrast, water governance is defined as "the set of rules, practices and processes (formal and informal) through which decisions for the management of water resources and services are taken, implemented, stakeholders articulate their interest, and decision-makers are held accountable" [3]. This definition therefore makes water governance seemingly more amenable to collective and collaborative decision-making processes [4].

Given the multi-dimensionality of water resources (e.g., catchments vs aquifers, consumptive vs non-consumptive uses, water quality vs water quantity, economic development vs environmental sustainability), research on water management has slowly begun to focus on broader economic, social and environmental issues (c.f. triple bottom line (TBL) assessments) [5]. Although this trend has opened research to a broader array of interdisciplinary perspectives, a strong bias towards economic analysis still prevails in the literature [6][7][8]. Although useful, assuming monetary motivations are central to water management and a key driver of behavioral change in water users will often ignore the role social and cultural values might have in this regard. Recent research has explored ecological values in water management literature; however, these values are rarely acknowledged as part of the social/cultural aspects of water research [9][10][11].

In comparing the foci of water governance and water management, both paradigms seem to be plagued with complex decision-making processes, which can be closely described as "wicked problems, i.e., problems with multiple dimensions that present unexpected consequences when engaged" [12]. Decision-making in this space is further characterized by contrasting, and often competing, values and interests of multiple stakeholders and a lack of consensus regarding which evidence is required to make effective decisions for water management/governance [13][14]. This reinforces the need to account for more-than-monetary motivations and instead consider additional dimensions of local, social and cultural values into the analysis of both paradigms. More specifically, McIntyre-Mills [15] notes the importance of addressing the values underpinning social life to address water mismanagement and its associated interpretation as a "wicked problem".

Several approaches exploring collective or shared social/cultural values have been proposed to understand the drivers of decision-making in natural resources management [16]. Cultural values have often been subsumed within discussions of social values given their shared nature and relative stability among group members [16]. Yet it is worth acknowledging cultural values specifically as a subset of social values in water research as there may be multiple sets of cultural values

within a single society [16]. Therefore, focusing on *cultural values* rather than *social values* more broadly in water management/governance research may offer greater insights into individual/collective values in these domains.

In attempting to better understand the role social and cultural aspects have on decision-making in water research, two broad disciplines have recently emerged: hydro-sociology and socio-hydrology [17][18]. Although hydro-sociology has emerged from critical geography [19] and poststructuralist thinking [20], socio-hydrology is more closely linked to eco-hydrology and socio-technological systems [21]. As a result, hydro-sociology is more reflection of the concerns about power relations and qualitative nature of research more common in water governance [22][23]. In contrast, socio-hydrology is linked to integrated water management with a focus on more quantitative approaches (e.g., statistical analysis and causal feedback) geared towards engineering studies [21]. An important commonality between these two disciplines is the acknowledgment of the role of culture with calls for Cultural Theory to be included [24], greater cultural sensitivity in the approaches used [25], and consideration of cultural relations [26]. It can then be argued that a gap related to the inclusion of cultural aspects in the water management/governance-related research is observed in real-world problems.

Several cultural theories (and associated values) are available in the literature. For example, researchers have explored specific aspects using Cultural Theory/Plural Rationality by Douglas [27] (Cultural Theory and Plural Rationality are both names used to describe the grid-group theory developed by Mary Douglas), behavior phenotypes described by Poncela-Casasnovas et al. [28], and the cultural dimensions described by Hofstede [29] and Schwartz [30][31]. Important steps in closing the gap between theory and implementation in water management and governance research include thus understanding which cultural theories and values are presently explored and used in these domains, their salient features, and the potential for implementation/application across water-related research. This work addresses this gap. Doing so will inform the development of more nuanced and interdisciplinary insights into cultural theories and values with the potential for implementation and operationalization specifically in water research.

## 2. Current Insights

### 2.1. Dominant Cultural Theories in Water Governance/Management

Cultural Theory (also known as Plural Rationality) developed by Douglas [27] overwhelmingly dominated studies in both water management and water governance. As a result, the four grid-group categories of Egalitarian, Hierarchist, Individualist and Fatalist dominated the extracted cultural values from the records. Moreover, the Perspectives Method mentioned by Offermans et al. [32] and Offermans and Valkering [33] is derived from Cultural Theory [27], thus contributing to two highly similar cultural theories stemming from anthropological studies. Although it's acknowledged that the simplicity of the four grid-group categories offers water researchers a succinct and manageable set of values to implement into applied research (e.g., [34][35]), there are several limitations of such an approach. For example, relying on too few values/categories may fail to capture the localized and evolving nature of cultural values and instead perpetuate an oversimplified model which overlooks more nuanced distinctions between values. Although it is claimed that Cultural Theory can account for individual differences and for individuals to move between the four grid-group categories [36], the theory remains steeped in the assumption that the overarching values themselves are static [27]. This may be explained by the ongoing push for generalizable results rather than localized, contextualized examples exploring nuance in water management [37].

The dominance of Cultural Theory and its anthropological disciplinary trajectory raise questions about the interdisciplinarity capacity of both water management and water governance. It could be argued that the emerging disciplines of hydro-sociology and socio-hydrology are attempting to address this issue by pushing for greater interdisciplinary collaboration and attention to cultural nuances [18][38]. The results show that Anthropology dominates the literature analyzed for both water governance and water management. Drawing on anthropological cultural theories without recognition of the disciplinary trajectory of the theories, risks undermining hydro-sociology and socio-hydrological imperatives. Without acknowledging the disciplinary trajectory, there is limited opportunity for water researchers to reflect on the paradigm the theory has emerged from (e.g., positivism) and to question the validity of such an approach.

At the same time, it is worth noting that several localized theories of Indigenous Knowledges associated with Cultural Studies were the second most common subset of cultural theories and disciplinary trajectory in the literature analyzed. Contrary to the homogenous approach of Cultural Theory and Perspectives Method emerging from Anthropology, the nine heterogenous Indigenous Knowledges theories appear to be more in line with the goals of socio-hydrology and hydro-sociology. Yet Jackson (2006, as cited in [39]) notes that there has been a tendency for the separate treatment of Indigenous and non-Indigenous values to compound the reification of "cultural values" often perceived largely within the confined of a cultural heritage paradigm. The heritage paradigm focuses on objects, entities and places at the expense of

recognition and valuation of relationships, processes and connections between social groups, people and place and people and non-human entities. Therefore, while the prevalence of cultural theories grounded in Indigenous Knowledges presents an opportunity for water governance/management research to broaden its disciplinary connections, it is worth exploring the specific values that have emerged within these theories to better understand if/how they have acknowledged cultural values beyond the heritage paradigm. Additionally, most cultural theories using Indigenous Knowledges have emerged from Australia ([40][41][42][43][44]), which might result in geographical bias but leaves ample scope for future research including not only Indigenous but other local values from a broader array of geographical locations on a global scale.

## 2.2. Dominant Cultural Values

The results show that the overall values represent a generic view of cultural values pertaining to life, health, knowledge and tradition even when the four grid-group categories from Cultural Theory were removed. However, when comparing the cultural values between water governance and water management, there are clear differences. Of the most 15 most common cultural values in water governance, ten have clear links to Indigenous Knowledges (lore, place/s, heritage, ancestors, river/s, country, totem, traditional, Aboriginal). Place/s is the most common values overall in the water governance list of cultural values. Therefore, the results of the cultural values in the water governance records did not show greater attention to relationships, processes and connections as suggested by [39]. This suggests that despite the prevalence of cultural values inspired by a broad array of cultural theories from Indigenous Knowledges, the specific values still maintain a focus on objects, entities and places. This could be explained by the overlap between environmental studies and Indigenous Knowledges which may see discussions of entities (e.g., rivers, country) arise more often.

Similarly, the researchers expected the influence of "environmental concerns" to dominate the cultural values in water management. However, in contrast to the clear links to Indigenous values, most of the most common values in water management align more closely with notions of anthropocentrism (life, health, human/s, exercise, identity) and economic utility (provide, use, given, parties, capital). Water management deals with the operationalization of governance arrangements for the beneficial use of water resources, and therefore values related to economic utility can be anticipated. At the same time, results indicate that intrinsic environmental values are secondary in the water management literature thus contradicting the view suggesting that research in this domain is slowly addressing the so-called TBL assessments ([5]).

## 2.3. Advancing Cultural Theories and Values for Water Governance/Management

The spread of cultural values and theories in the records offers an opportunity to advance water management research in several ways. Given that the most common cultural theories in both water governance and water management are similar, there is potential for each discipline to learn from the other by looking more closely at the specific values emerging. As the water governance values highlighted local and Indigenous values more distinctly, there is a chance for water management approaches to adopt these values to develop more nuanced sets of cultural values. This is particularly relevant for studies conducted at a global scale (e.g., [45]) attempting to represent multiple values from various geographical, social and cultural contexts (e.g., [35]).

Understandably, this presents a challenge for researchers as they would need to incorporate many values into water management research, which is primarily concerned with operationalizing decision-making processes. This has only been addressed in a few studies, for example from groundwater management using examples such as agent-based modeling [35] or comparisons to hand pump usage [46]. Thus, the researchers see a gap between theory and practice that further intradisciplinary research work between water governance and water management could address. This further solidifies the need for disciplines such as hydro-sociology and socio-hydrology to work together for more culturally sensitive yet operational approaches to emerge in water management.

## 2.4. Implementing Theories of Culture and Associated Values in Water Governance/Management Research

A key learning from this research is the need for a shift in thinking from cultural theories to theories of culture. It is clear from the studies analyzed that there is no single "best" theory for capturing relevant cultural values in culturally heterogenous and constantly changing environments, particularly at the global/international level, and specifically for water management/governance research. Nor is there a single theory that has emerged as "best" for incorporating a broad range of cultural values that can also be operationalized for decision-making. Therefore, the researchers argue that a shift in thinking towards theories of culture could offer water governance/management research the chance to adapt and

cater the subset of inter/intradisciplinary cultural values used in any project to the specific context that is being examined. In general, it seems that theories of culture developed through bottom-up approaches working with the local communities that research pertain to might best conceptualize the relevant values. Concomitantly, for future research working at the global or international level and hoping to model decision-making processes, a significantly broad yet manageable set of cultural values covering aspects of multiple theories of culture will be required.

An example of an implementation strategy of cultural values at global scale was attempted by Castilla-Rho et al. [34][35] to assess groundwater sustainability in irrigated agriculture. In that work, data from the World Value Survey Wave 6 was used as proxy to parameterize farmers' decision-making process with culturally varying values based on the four grid-group categories (Egalitarian–Hierarchist–Individualist–Fatalist) proposed by Cultural Theory [27]. The specific cultural values of farmers translated into grid-group scores were then used in the following "social sub-model (S)" following a Cobb-Douglas functional form:

$$S = \text{grid}^m \, (1 - \text{group})^n,$$

where S = social utility function, m = number of times a farmer reports a neighbor taking groundwater illegally, and n = number of times a farmer is seen taken groundwater illegally. Using Cultural Theory's four grid-group categories, Castilla-Rho et al. [34][35] quantified the loss of social reputation and the social costs to farmers (i.e., S in equation 1) when reporting non-compliant neighbors engaged in illegal extraction of groundwater in California Valley (USA), Murray-Darling Basin (Australia), and Punjab (India/Pakistan). The researchers argue that this simple "social sub-model" might be improved in future research by considering other theories of culture embedding alternative cultural values to account for a wider and diverse range of cultural landscapes around the globe.

One potential area in which some of these theories of culture (e.g., [47][48]) are making progress pertains to "relational values" [49]. Such relational values encompass not only anthropocentric values but also those of nature in ways similar to many of the Indigenous Knowledges observed in this research. Schultz [50] however notes that these relational values have received limited recognition in the field of water research. As such, relational values drawn from these theories have been validated less often which makes them more difficult to assess when applied to new research contexts.

Another potential area for improvement (future research) is disentangling the multiple cultural values with the potential for practical implementation in modeling applications. An attractive approach corresponds to the motivational value-based approach organized around four relational models (self-transcendence, conservation, self-enhancement, openness to change) proposed by Schwartz [30][31]. Schwartz's model includes a manageable yet comprehensive set of ten cultural values (self-direction, universalism, benevolence, tradition, conformity, security, power, achievement, hedonism, stimulation) that have been validated in numerous studies in environmental and social sciences [51][52][53]. Although Schwartz's model has emerged from psychology and business studies, these cultural values are based on extensive research in multiple countries with everyday people unlike other popular theories such as Hofstede [29], which have tended to focus only on managers in international business. Moreover, in a preliminary comparison of Schwartz's values to the values emerging in this research, it has been found that it is possible to map all the cultural values in the literature about water resources management/governance into Schwartz's cultural values. This suggests that Schwartz's model not only has potential for modeling approaches but also the ability to attend to a broad array of diverse values emerging from water management and water governance studies. However, the researchers recommend that any future research verify the applicability of Schwartz's cultural values by carefully considering the nature, breadth and context of their projects as well as the validity of this potential mapping exercise.

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