

Flows, ecology and people: is there room for cultural demands in the assessment of environmental flows?

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ABSTRACT

The science and practice of environmental flows – aimed at the protection of ecosystem values and functions in regulated rivers – has progressively recognized the relevance of incorporating socio-cultural demands of local communities in the calculation of water requirements of rivers' habitats and services. This review paper synthesizes the concept of cultural flows, and presents the main approaches explored or conducted up to this date to provide such flows in rivers of different regions and typology. This work highlights the necessity of integrating cultural demands in future attempts to protect and restore altered flow patterns, due to the multiple interactions between flow, ecology and people which typically characterize rivers and other aquatic systems.

Key words | ecohydrology, environmental demands, instream flows, socio-hydrology, water requirements

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INTRODUCTION

Environmental flows are recognized today as an essential tool for the harmonization of water uses and the conservation of water-dependent ecosystems, in the worldwide sphere. One common definition for environment flows ([Brisbane Declaration 2007](#)) is 'the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems'.

Nonetheless, environmental flows have rarely considered, in practical terms and with the exception of a limited number of cases, water requirements of local communities and indigenous populations, whose uses and priorities may be very different from those considered by water managers and by other stakeholders in the basin ([Magdaleno 2009](#)). Indigenous and local communities have unique and holistic relationships with land, rivers, seas, natural resources and wildlife, whose ecological, spiritual, cultural, economic and social dimensions avoid fragmentation or compartmentalization ([Posey 1999](#)). Those relationships have been part of their existence for thousands of years, generating traditions, customs and laws associated with water and access to water, which are not recognized today by the legislation of almost any country in the world. Even current scientific knowledge finds problems to incorporate the requirements of indigenous communities

in their analytic procedures. In general terms, this lack of recognition can be based on a lack of knowledge and a general misunderstanding about indigenous cultural and spiritual values ([Craig 2007](#)).

River systems constitute complex cultural networks, composed of a large number of sites with which indigenous individuals and groups have spiritual connections and cultural responsibilities ([Jackson 2006](#); [Groenfeldt & Schmidt 2013](#)). For example, it is common to find indigenous populations that have mythological understanding about the consequences of poor water management, which shows their level of awareness of the need to properly care for and manage water resources. In addition, although there are common approaches, many laws and indigenous customs related to water are usually differentiated for each clan or group, since they derive from the characteristics of the places where they live, and their own interpretation of these places.

RECENT INSIGHTS INTO THE DEFINITION AND PRACTICE OF CULTURAL FLOWS

In recent years, some of those concepts have been grouped under the alternative denomination of 'cultural flows',

differentiated but under the scope of environmental flows, by converging on the protection of certain natural values of the system. According to Behrendt & Thompson (2003), who have dealt with this subject from the perspective of Australian aboriginal communities, cultural flows could be defined as ‘those flows that in quantity and variability ensure the maintenance of aboriginal cultural practices, and connections with the rivers’. Another definition provided by Duff (2011) is that cultural flows are those that incorporate water demands associated with the indigenous culture, compromising the fulfillment of cultural obligations related to the health of water bodies. Johnston (2013) refers to cultural flows as dynamic procedures in which water may provide foundations for sustaining cultural values, beliefs and ways of life, offering mechanisms for expanding Integrated Water Resources Management (IWRM) practices to manage water in a more social and environmentally equitable way. The ongoing National Cultural Flows Research Project (a collaborative project coordinated by the Aboriginal nations of the Murray–Darling basin in Australia) makes use of the definition provided by the Echuca Declaration (2007): ‘water entitlements that are legally and beneficially owned by Indigenous Nations of a sufficient and adequate quantity and quality, to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations’.

Recent legal recognition of the uses and indigenous traditions associated to water has been a reality in different national and international initiatives. This is the case of the United Nations Declaration on the Rights of Indigenous Peoples (2007), which states (Article 25) that ‘Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard’. The Indigenous Peoples Kyoto Water Declaration (2003) and the Garma International Indigenous Water Declaration (2008) highlight the relationship with their lands, territories and waters as the fundamental physical, cultural and spiritual basis for their existence, and claims for self-determination of Indigenous Peoples in the practice of their cultural and spiritual relationships with water. Agenda 21, adopted at the United Nations Conference on Environment and Development (Earth Summit 1992), and the Indigenous and Tribal Peoples Convention (1989) support alike the rights of indigenous peoples to water required to maintain indigenous culture.

Also water-related legislation of some countries has progressively added references to cultural flows (Davies *et al.*

2017). This is the case of Australia, whose Federal Water Act (2007) and Water Amendment Bill (2008) already recognize cultural flows as traditional owner rights (Jackson & Langton 2011). The Murray–Darling River Basin has echoed those commitments, by including indigenous values and demands for cultural flow allocation (as stated in the aforementioned Echuca Declaration, in 2007) as part of its central approach to water planning and management (Weir 2010; Morgan 2011). In New Zealand, cultural flows have been incorporated in the calculation of water requirements in the Kakaunui River (Tipa & Nelson 2012), and in other rivers (Durette 2010; Harmsworth *et al.* 2016). In India, many works refer today to social and cultural expectations as part of river planning and water agreements; water planning in the Ganga Basin illustrates those efforts, by considering water needs for many religious activities (ghats in holy river reaches, bathing, etc.) (Lokgariwar *et al.* 2014). In Central America, ongoing planning processes also tend to consider sacred links of indigenous communities with specific features of rivers (e.g. sacred pools, flow continuity or specific flow thresholds as indicators of present and future land and people fertility in rivers of El Salvador) (MARN 2017). But, also in North America and Europe, cultural flows are considered, directly or in a more indirect way, as relevant milestones during water planning processes – at least in specific basins where socio-cultural links with water are more explicit, or have been interiorized as part of recreational or religious activities (Getches 2005; Sanford 2007; Phare 2009; Getzner 2014).

APPROACHES TO THE IMPLEMENTATION OF CULTURAL FLOWS

But how can cultural flows be effectively incorporated into the calculation of environmental flows? Finn & Jackson (2011) suggest three fundamental challenges for merging cultural allocations with environmental flows: (i) recognition that, in the context of indigenous populations, target species may be different from those selected by other actors throughout the modelling of flow suitability for different biotic groups or guilds; (ii) establishment of managerial objectives for water and rivers should respond to the needs of indigenous communities (e.g. hunting and fishing, collection of riverine plants, bathing, celebration of rituals and sacred ceremonies, etc.); (iii) integration of indigenous cosmological vision and nature–human relations in the management of water resources and fluvial ecosystems (Figure 1).

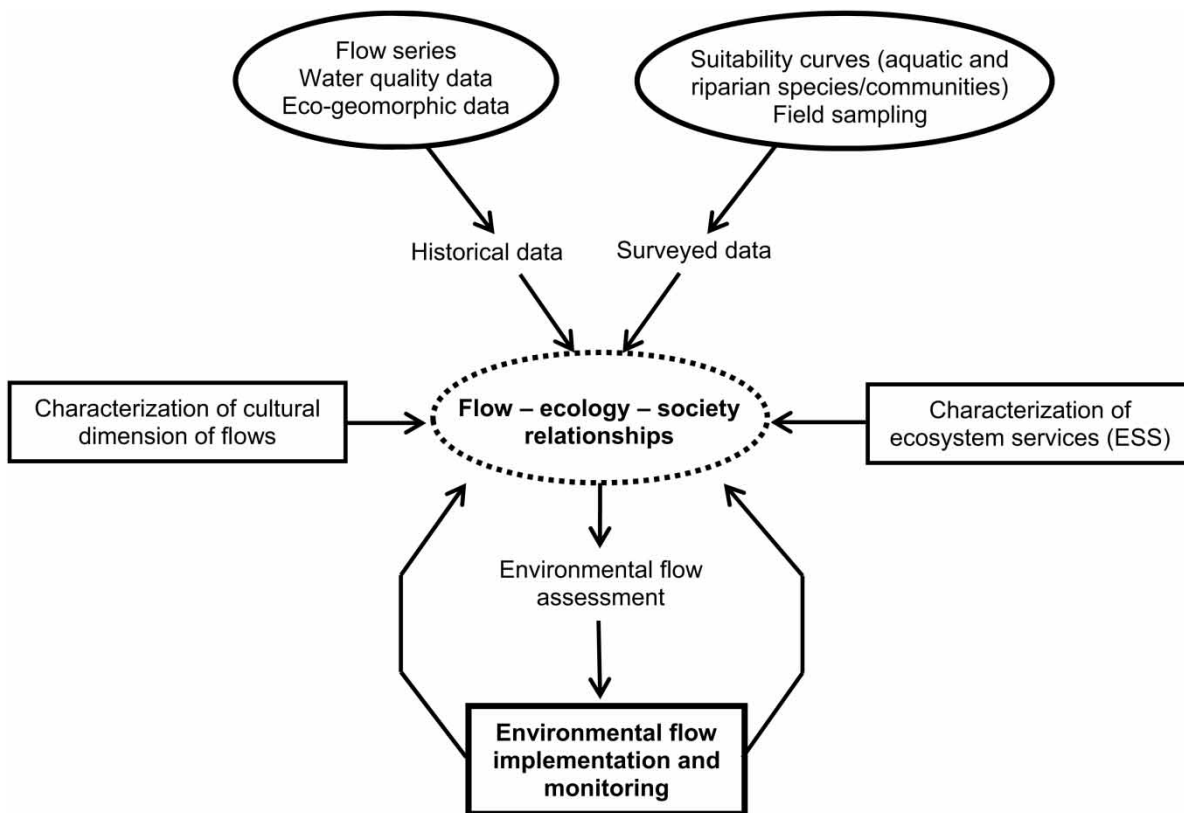


Figure 1 | Integration of cultural flows and societal demands of riverine communities during environmental flow assessments. The dynamic relationships between flow patterns, ecological processes and cultural requirements suggest the necessity of adopting adaptive managerial approaches capable of integrating the best available knowledge on their interactions.

Johnston (2013) refers to the potential application of different strategies to calculate and implement cultural flows. One of them would imply fulfilling qualitative descriptions of knowledge and relationships of people and river systems, and later generating social and cultural indicators which may be used to define and adopt certain managerial procedures. An alternative strategy would be based on defining the links between cultural values and ecosystem services, and promoting management scenarios which may optimize their interactions.

Determination of cultural flows and their incorporation into managerial mechanisms inevitably requires a higher level of participation and empowerment of indigenous populations, the adoption of political, educational and research strategies of a transcultural nature, as well as institutional changes in planning and water management (Duff *et al.* 2010; Bischoff-Mattson *et al.* 2018).

Science should progressively provide new updated insights into the theory and practice of cultural flows, contributing to improve and weave the many underlying aspects which sustain their design and implementation. Scientific

meetings targeted to discussing ameliorated approaches to cultural flows could be essential for that aim. This is the case of the International Riversymposium (21st edition to be held in October 2018 in Sydney, Australia) which exemplifies the interest generated in the topic among river scientists by providing specific discussions focused on social and cultural flows, as already done in its 2017 edition.

Legislation and policy should create the context by providing consistent initiatives which can mitigate inertial approaches not sensitive to cultural requirements of local communities (Taylor *et al.* 2016). On many occasions, the inextricable relationships of indigenous populations with land and water are subordinated to other approaches, which defend the achievement of maximum efficiency in their use as the first objective of management. In this sense, there are different questions to be raised, such as what should be the way to measure the efficiency in water uses, what values and uses of water should be commercialized, and how property rights and interests of the communities can coexist with those of other sectors of the population (Craig 2007; Hillman 2009).

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