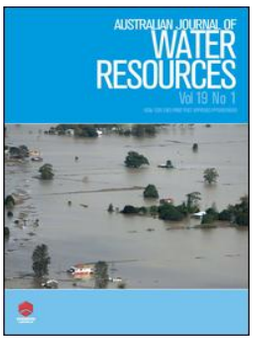

Australasian Journal of Water Resources

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/twar20

Cultural value of water and western water management: an Australian indigenous perspective

Bradley J. Moggridge & Ross M. Thompson

To cite this article: Bradley J. Moggridge & Ross M. Thompson (2021): Cultural value of water and western water management: an Australian indigenous perspective, Australasian Journal of Water Resources, DOI: 10.1080/13241583.2021.1897926

To link to this article: https://doi.org/10.1080/13241583.2021.1897926

AUSTRALASIAN JOURNAL OF WATER RESOURCES
https://doi.org/10.1080/13241583.2021.1897926

Taylor & Francis
Taylor & Francis Group

ARTICLE

Cultural value of water and western water management: an Australian indigenous perspective

Bradley J. Moggridge[a,b] and Ross M. Thompson[b]

[a]A Descendant of the Kamilaroi Nation, Institute for Applied Ecology, University of Canberra, AUSTRALIA; [b]Centre for Applied Water Science and Institute for Applied Ecology, University of Canberra, AUSTRALIA

ABSTRACT

Water is a critical issue for governments and community in an Australian context, and internationally. First Peoples of Australia, its Indigenous peoples, have over 65,000 years of connection and understanding of water, held by more than 250 distinct Indigenous Nations that occur from the wet tropics, through desert country and south to the temperate zone, river lands and alpine regions. The value of water is central to Indigenous peoples' being and culture, but since European colonisation in 1788, water has been subject to pumping, storage, diversion, extraction and pollution and without Indigenous people's council. Most recently, water has been attributed a market value to sell and trade on a market that moves up and down with availability (drought, flood or in-between). Indigenous peoples have very small water entitlements despite the high value they place on water and the strong connection water has to their sense of identity, spirituality and culture. There is both a need and a great opportunity for Indigenous people to uphold and protect their water values through Indigenous-grounded methodologies or Indigenous-led water research, and so as to integrate Indigenous water knowledge into science and policy.

ARTICLE HISTORY
Received 13 March 2020
Accepted 27 February 2021

KEYWORDS
Cultural value of water; indigenous Flows; knowledge; cultural Flows

1. Introduction

The First Peoples of Australia, which includes Indigenous people, Aboriginal and Torres Strait Islander people and Traditional Owners (hereafter 'Indigenous') have an intimate connection with surface water and groundwater and how it relates to the sky and land. Australia's Indigenous peoples are extraordinarily diverse, with more than 250 distinct language groups and 800 dialectal varieties spoken on the continent at the time of European settlement in 1788 (AIATSIS 2019). However, all groups share a sense of spiritual and cultural connections to, and custodial responsibilities for, water (CSIRO 2006; Langton 2002; Toussaint, Sullivan, and Yu 2005; Jackson 2005a). This has been the case for thousands of generations and is likely to have been of particular importance in parts of the Australian continent subject to a dry and rapidly aridifying climate (Krebs, Park, and Schneider 2011). Australia is the driest continent supporting a permanent population, and much of the country's interior receives less than 500 mm of rainfall – a low amount that is exacerbated by high rates of evaporation (Godden 2005 in Berry, Saito, and Forline 2018).

Indigenous peoples refer to the spiritual and physical landscape within which they exist as 'Country'. Relationship with Country does not separate the individual features of the landscape such as water, land and sky. The connection to Country is detailed through a complex oral tradition of Customary Lore, stories, songs and 'Dreaming'. Weir (2008), explains that when Country is sick, then so too are its people, and that Country will advise the people that the ancestors are not happy. In a contemporary context, Kingsley et al. (2009) showed a definitive link between Indigenous people caring for Country and a sense of self-esteem, self-identity, and cultural connection. Although the focus here is on Australia, Walkem (2005) in Sanderson (2008) identifies a need for understanding the relationship with water from an American First Nation's perspective.

For Australian Indigenous peoples, the nurture of water landscapes holds meaning and purpose. While each Indigenous nation or tribe or language group describes this in a different way and language, the underlying message is fundamentally the same; 'Garima gala nyabay. Gala nyabay garama ngali ngih' ('Look after the water. The water looks after us'). John 'Dudu' Nangkiriyn, Bidyadanga in Yu (1999) explains his value of water as follows: 'Water is the life for us all. It's the main part. If we are gonna lose that I don't know where we gonna stand. If that water go away, everything will die. That's the power of water. He connect with the land. Pukarrikarra (the dreaming) put 'em all together. One life'.

Marshall (2014, 2017) reflects on this notion that despite the significant political and social change

CONTACT Bradley J. Moggridge bradley.moggridge@canberra.edu.au A Descendant of the Kamilaroi Nation, Institute for Applied Ecology, University of Canberra, AUSTRALIA.

which has affected Indigenous communities in the last 200 years, the sacredness of water still remains formative in shaping identity and values.

Indigenous peoples' perspective on water is that it is sacred and living (as well as carrying other values) and necessary for survival. A precise classification system of water-reliant sites within their Country is a critical component of this. Their survival was dependant on this, and failure of this system could be fatal for the family group or tribe. It was necessary to be precise when talking about waterholes, as life may depend on going to the right place at the right time (Lowe and Pike, 1990). The protection of water was and is bound by traditional lore and customs, which provides a system of sustainable management ensuring healthy people and healthy water for future generations (Lingiari Foundation 2002). Figure 1 conceptualises these key inter-relationships.

This paper provides a synopsis of the current thinking and definitions concerning cultural values and flows in an Australian context, then expressing policy and legislative setting for describing the cultural values of water and proposes methodologies to quantify and qualify the amount of water required for cultural values.

2. Australian Indigenous cultural values and water

The primary author of this paper being of Kamilaroi heritage has a deep connection and strong value to water. His Nation has a very significant water site within its tribal area, this being Boobera Lagoon, on the Boomi Road west out of Goondiwindi. The lagoon holds a very significant Dreaming/Creation story of the Gurrya a crocodile-headed serpent bodied cultural hero, which is still believed to rest in a very deep hole in the lagoon and is believed to move between the lagoon and river channel of the Macintyre. The story involved a warrior Dhulala who was tired of the Gurrya taking his people, he speared the Gurrya and it chased him across the landscape creating and carving out Boobera Lagoon. Dhulala stopped at the Gurrya's mother-in-law the Bumble Tree and the Gurria did not dare come any closer. This is where the Gurria remains today and this creates a strong cultural connection and high value of this water body. Adapted from the primary authors own cultural knowledge and Reed, 1965 *Aboriginal Fables*.

In 2002, the Boomanulla Statement was prepared to provide a framework for Aboriginal involvement in natural resource management. The Statement was the product of a two-day workshop on natural resource planning for representatives of Aboriginal communities in New South Wales and reflected expectations of the NSW Government's planning process for water catchments and native vegetation (NSWALC and DLWC 2002). At that time NSW had implemented the Water Management Act (NSW WMA) 2000 and the possibility of separating land and water creating a water market. The Boomanulla delegates produced a framework along with principles and a set of

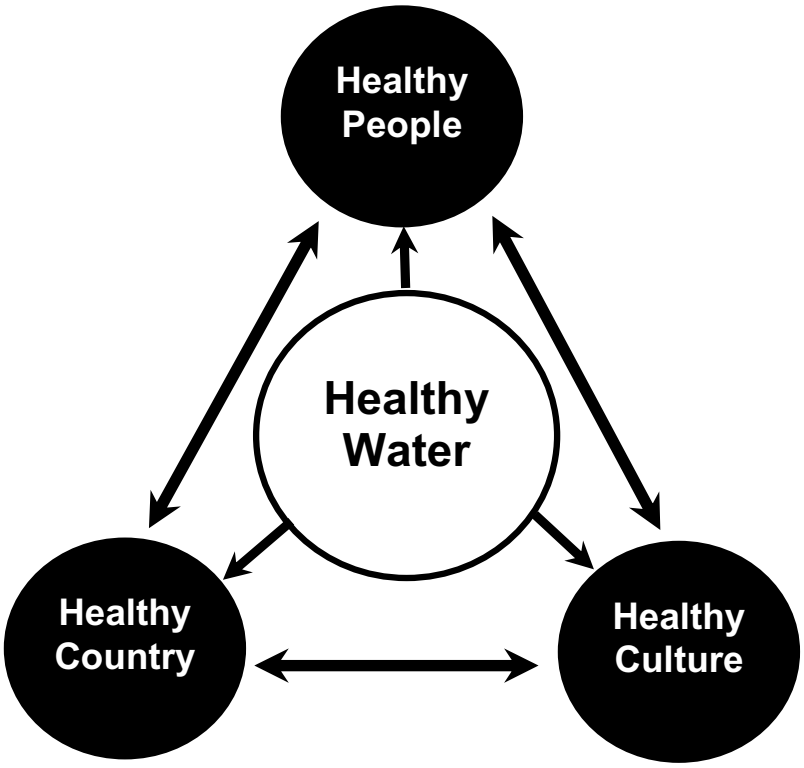

Figure 1. The relationship and importance of healthy water to a healthy country, healthy people and a healthy culture (Moggridge 2010 in Moggridge and Mihinui 2010).

recommendations. The key recommendation relating to water ownership stated: 4.1 (10) *Given the spiritual and traditional ownership rights of Aboriginal people the communities should have an equitable share of and real access to any proposed water markets*. The NSW WMA was intended to provide benefits for Aboriginal people and culture in NSW and includes principles around the protection of features of major cultural, heritage or spiritual significance, and rights to water under Native Title law (Jackson and Langton 2012). The NSW WMA was the first piece of Australian water legislation to include the protection of Aboriginal spiritual, social and customary values (Behrendt and Thompson 2003; Hartwig, Jackson, and Osborne 2018; Moggridge, Betterridge, and Thompson 2019).

The *Echuca Declaration* (MLDRIN, 2007) introduced the concept of 'cultural flows' in a document prepared by the Murray and Lower Darling Rivers Indigenous Nations (MLDRIN). (a confederation of 10 Aboriginal nations in the southern part of the Basin). Cultural flows were defined as: *Water entitlements that are legally and beneficially owned by the Aboriginal nations and are of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Aboriginal nations; this is our inherent right*. The Northern Basin Aboriginal Nations (NBAN; a confederation of 21 Aboriginal nations in the northern part of the Basin) adopted the *Declaration* in 2010. The term cultural flow is a broad one and includes all cultural uses of water, whether flowing or not. Behrendt and Thompson (2003) describe a cultural flow as 'an essential component of river management'. Further descriptions of the concept are given in Jackson, Moggridge, and Robinson (2010), Morgan, Strelein, and Weir (2003), Craig and Shearing (2004)) in Jackson and Morrison (2007), and MDBC (2006). However, some of these definitions have focused on the protection of customary values (Jackson and Morrison 2007) and may not accurately reflect the complexity of Indigenous relationships to water (Synexe Consulting, 2008). The concept of a 'cultural flows' or Indigenous Flows is relatively new to the language of natural resource and water managers and is not provided for in the *Water Act 2007* (Commonwealth).

Building on this definition of cultural flows, a collective of Indigenous peak bodies, the Murray Darling Basin Authority and consultant organisations developed the National Cultural Flows Research Program (NCFRP, 2018; Mooney and Cullen 2019). The NCFRP drew on a range of scientific research methodologies and generations of cultural knowledge with the intent of providing a greater understanding of Aboriginal values relating to natural resources, especially water, and equipping Indigenous people with information and tools to empower them in engaging with water management and reform. The NCFRP proposed eight components of research and methodology mainly targeted at the Murray-Darling basin, but also applicable more broadly.

Several studies have developed lists of water-dependent cultural values (Venn and Quiggin, 2007; Moggridge, Betterridge, and Thompson 2019), which may be maintained by surface water, seasonal flows, over-bank flows or groundwater. These include the protection of creation sites and sites recorded in creation stories or storylines. Cultural sites can be associated with particular totemic species which are significant to clan groups, or to education and initiation of young people. Sites associated with resource collection (e.g. for food, weaving or medicine) or manufacture (e.g. ochre, tools, musical instruments) can be important parts of cultural economies, with associated social activities. Historical sites, including burial sites, sites of massacres and known sites of occupation have an additional suite of cultural values. In south eastern Australia there are values associated with scarred trees (representing a history of manufacture of implements, weapons and watercraft). Moggridge, Betterridge, and Thompson (2019) discuss the importance of the linkages between places and language, with the potential for suites of terms to be lost if cultural sites are no longer accessible or active. A significant water site will have a local Indigenous specific name, meaning and significance. Where a site is polluted or affected by over-extraction, the loss of the site may lead to the loss of that local language name, meaning and significance, further compounding the sense of cultural loss.

Indigenous people over the past 10 years have lobbied jurisdictions to research their cultural value of water and to quantify cultural flows to sustain those values (Maclean et al. 2012; Jackson et al. 2012). Behrendt and Thompson (2003) provide examples of 'surrogate cultural water targets' they state 'ensuring that 90% of high flows that would reach areas of significance under natural conditions reach those areas by management of flows and managing flows and extractions that ensure fish passage at 90% of the number of days that fish passage could occur under natural flow conditions'. Jackson and Morrison (2007) indicate that there is a need for greater clarity in conceptualising the nature of Indigenous water uses or needs, as well as the techniques for elucidating the relationship between flow and values.

The Murray-Darling Rivers Indigenous Nations (Jackson and Morrison 2007) describe a cultural flow as a water allocation available 'to each Indigenous Nation to enable them to exercise their custodial responsibilities to care for the river system'. A number of groups have defined cultural water requirements for particular regions including the Ngarrindjeri people of the Lower Lakes, Coorong

and Murray Mouth (MDBC 2006). Atkinson (2009) lists the expected outcomes from a cultural flow including improved ecosystem health with benefits for totemic species, resources, improved and strengthened spiritual, physical and mental health of the Indigenous people. Natural patterns of flows play an important role in generating life history events (e.g. fish spawning, flowering of plants) which are critical markers of Indigenous calendars and may provoke activities such as social gatherings, moving on to Country for education or initiation. The concept of a Natural Flow Regime (Poff et al. 1997) may have an analogous Indigenous Flow Regime that provides components and timing of flows that maintain critical cultural values.

In the Australian Human Rights Commission's – Native Title Report, the Indigenous Nations of the Murray-Darling River Nations argue that they require specific cultural water allocations, which they refer to as 'cultural flows', to meet their spiritual, cultural, social, economic and environmental management responsibilities and development aspirations. A less well-explored perspective on cultural flows is the question of economic participation. A cultural flow will allow Indigenous communities to participate in the water planning market through specific allocations backed by science (AHRC, 2008). However, it is not clear whether Indigenous or cultural flows would also be able to be traded in the water market. These funds could be used to support other restoration activities on water ways or to provide for local communities.

3. Challenges in implementing Indigenous flows

Incorporating Indigenous People into water reform and management is critical from an environmental, social, economic and cultural point of view (Craig 2006; Jackson et al. 2012; Taylor, Moggridge, and Poelina 2017; Alexandra 2019). However, we identify six immediate challenges in implementing Indigenous water flows in the Australian context.

3.1. Defining cultural needs

There are significant difficulties in defining the cultural need for water, particularly where traditional knowledge has been lost due to loss of language, disconnection from Country or the loss of oral histories. Knowledge of cultural needs for water may have been lost or may be held by a small number of elders. Jackson and Morrison (2007) state there is a need for well-resourced cultural mapping exercises overseen by Indigenous representative organisations to identify Indigenous water values and places of significance. Indigenous people will need the opportunity to identify and map their own specific water-dependent cultural values for their Country. These cultural values exist in a number of forms within a cultural landscape. In turn, these cultural heritage assets within the landscape increase the importance of respectful and culturally appropriate natural resource management.

The Cultural Flow methodology (National Cultural Flows Research Project (NCFRP) 2018) informed by Aboriginal Water Assessments (Mooney and Cullen 2019) provides a methodology to apply scientific rigour to collating and documenting cultural values. A further model for recording and understanding cultural needs for water can be found in Moggridge, Betterridge, and Thompson (2019), which describes the processes, governance and benefits of the Aboriginal Water Initiative (AWI operated between 2012–2017). The AWI was a team-based administrative concept created by the NSW Government in order to meet the obligations established under the NSW WMA. The AWI had three primary functions (1) to liaise with Aboriginal communities to obtain information on water-dependent cultural values for consideration in state water planning and licencing processes, (2) to build and provide cultural capability to departmental staff in dealing with Aboriginal people on water-related matters, and (3) to provide the opportunity to build the capacity and water understanding of employed Aboriginal staff through training and employment opportunities.

The AWI worked under six principles for culturally appropriate methods for engaging Aboriginal people in water including well-articulated governance structure (Moggridge, Betterridge, and Thompson 2019). Major outcomes included better understanding of Aboriginal water values, changes in licencing and collation of cultural knowledge.

3.2. Water literacy and indigenous people

The significance or value of water is well represented in the 250 distinct Indigenous languages within Australia which name water sites with their own distinct name, title and story. However, the language of water management is not always well understood by Indigenous people. Water sector language can be highly technical and results in the alienation of Indigenous knowledge and values. Conversely, cultural values of water are often poorly understood by water managers (Jackson 2015). For instance, water managers should understand that a water site is not only a watering hole for cattle but a distinct site in the local Indigenous peoples understanding and language relating to the environment and community. There is an urgent need for an agreed upon set of resources to improve the accessibility of the language around water management for both Indigenous and non-Indigenous Australians.

3.3. Differentiating Indigenous water from environmental flows

The concept of environmental flows is being increasingly implemented in various jurisdictions throughout the world (see Arthington 2012 for a review). This includes the Murray Darling Basin in Australia, where more than AUD$10Billion has been invested by the Commonwealth government in water buybacks and efficiencies to generate an environmental water reserve. That water reserve is planned and managed centrally supported by an extensive programme of monitoring and adaptive management. Other environmental watering programmes exist at the Australian state (e.g. Victorian Environmental Water Holder) and catchment (e.g. Daly River, Northern Territory) levels. In both cases allocation of water for environmental purposes is being given primary consideration in water allocation decisions (Craig 2006). There are numerous other examples of environmental flow allocations globally including in the USA see Richter and Thomas (2007), for Europe see Acreman and Ferguson, (2010) and China see Sun, Yang, and Cui (2008).

There has been a misconception that the needs for cultural water may be met through the existing means of allocating water to the environment. The environmental flow concept in many jurisdictions is deemed to satisfy all environmental (ecological) values, including Indigenous cultural values. Weir (2007) identified clear differences between environmental flows and cultural values, as environmental flows do not recognise different jurisdictions and language groups. Indigenous water flows are about the relationship between the traditional owners and their country. The environmental flow does not know those relationships (CSIRO, 2006). Regardless of land tenure, many Indigenous Nations want to be involved in protecting Country through environmental flow management (Garnett and Sithole 2007; Green and Minchin 2012; Robinson et al. 2016), as it is their custodial responsibility to do so.

There is a large body of knowledge concerning environmental flows and how they sustain ecological values. However, Indigenous people are minimally engaged unless there is a specific employed Indigenous unit such at the AWI in NSW (see Moggridge, Betterridge, and Thompson 2019) when water agencies and managers consider satisfying ecological outcomes in environmental flow assessments (FPWEC, 2012a). Jackson (2004, 2005b) indicates that Indigenous involvement in environmental water decisions is relatively rare, and that Indigenous traditional ecological knowledge has tended to be neglected.

While cultural flows may differ to environmental flows there is the opportunity to explore the similarities and differences between the human-based system of culture and the ecologically based system in environment. The question raises several possibilities: *Could the inclusion of Indigenous people in environmental flow decisions increase the benefit of an environmental flow? Can a cultural flow do the same or more than an environmental flow?* Further research is required to answer these questions. The Australian Productivity Commission's (PC 2017, p104) report on National Water Reform suggests environmental flows can accommodate cultural values in some cases. The First People Water Engagement Council in the Policy Framework emphasised the need to address the lack of Aboriginal input into environmental water management (FPWEC, 2012b, page 14).

There are also scenarios where applications of environmental flows could have negative cultural impacts. For example, environmental flows may reveal burial sites (human remains) or middens, due to seasonal flows and high flow velocities sitting on top. Cold water pollution released from low in the storage dams may affect totemic species breeding cycles. Water can be delivered to the environment at different times of the year than indicated by traditional knowledge and natural cycles/indicators (the arrival or leaving of an indicator species, changes in wind pattern flowering of a plant, the beginning of fire season). Use of water at certain times of the year, for example to support a bird breeding event, may mean that there is no water available for other purposes, such as cultural ceremonies on country.

3.4. Determining the water needs of cultural values

To date, there are only a limited number of 'Western scientific' approaches informed by cultural values that have quantified the amount of water required to sustain a cultural value or values. Moggridge, Betterridge, and Thompson (2019) provide a methodology and process to collate and inform water planning in NSW until the government disbanded the unit in 2017, further Maclean et al. (2012) provided insight into the water values, knowledge and management interests of one Murray-Darling Basin Aboriginal community, the Ngemba, and provides information on the suite of water values and knowledge, and the desire to co-manage environmental watering. Further studies from this report included Jackson et al. (2015) which describes the results of two multidisciplinary studies of Indigenous water values and benefits from re-allocating water to the environment in Brewarrina, NSW. Bark et al. (2015) explored cultural ecosystem services frameworks, notably the typology developed by Chan, Satterfield, and Goldstein (2012) and how it can be operationalised in water planning in

Brewarrina, NSW. The study assessed the cultural values important to Indigenous Ngemba people and identified the water requirements to meet the needs of the values.

Indigenous cultural values associated with waters are poorly understood by water resource managers/planners/policy makers, and some values are difficult to quantify (volumes) or articulate in allocation decisions and relate explicitly to a particular flow regime (Jackson 2008; Craig 2006). In some cases, environmental water/ecological relationships may be able to be used to understand Indigenous flows. For example, fishing for Yellowbelly or thagaay in Kamilaroi (*Macquaria ambigua*) or Murray Cod or goodoo in Kamilaroi (*Maccullochella peelii*) could be based on an ecological response model with the local Indigenous people deriving what the natural flow is, frequency duration and timing, based on traditional knowledge. In other cases, new models that associate physical attributes such as flow velocities and volumes with spiritual values may need to be developed.

3.5. Entering an already over-allocated water market

As indicated above, there are a number of issues with introducing Indigenous water into existing water markets. McAvoy (2006) notes that the value of water on the Australian market has increased dramatically, and the only water the Government can get back for purposes other than environmental, is water compulsorily acquired. This also applies to Indigenous communities. If they wish to enter the current water market, they must purchase surrendered or water licences for sale. There are additional major issues to be resolved around the permissible uses of specific purpose cultural water in NSW (for example, is not able to be traded Moggridge, Betterridge, and Thompson 2019) and whether reallocation of environmental water for cultural uses would be possible.

3.6. Operationalising Indigenous water

There remain major issues of governance and management around operationalising environmental flows. At all levels of government, it is unclear which Indigenous organisations or individuals would manage the logistics of Indigenous water events and the complex interactions with native title determinations and structures. In a management sense, there needs to be provision made for Indigenous groups to access the necessary modelling and procurement structures which are accessible to, for example, the Commonwealth Environmental Water Holder and state agencies or the commitment to establishing an Indigenous Water Holder.

At a local level, there is a need to establish principles around implementing environmental flows, such as adhering to the principle that there is free, prior informed consent of the Indigenous Nations in determining cultural values, water acquisition, constraints on delivering flows (e.g. downstream flooding of private land) and any economic benefit from flows. Similar principles around monitoring and research, and the imperative for co-design and execution with Indigenous people of those components. Nations need to have access to technical and scientific support as and when required to ensure water for cultural values released can be co-ordinated with other releases and events so as to achieve maximum efficiency and effectiveness.

4 The policy context for Indigenous water values and Australian water management

Australia has a federal system of government (colonial settler states), with the Commonwealth government (hereafter 'the Commonwealth') taking responsibility for a range of issues of national significance, including the signing of international environmental agreements. State governments have the Constitutional obligation to manage water and the environment, but co-operate through a range of agencies, including the Council of Australian Governments (COAG) and the Murray Darling Basin Authority to develop common positions in legislation and policy. These arrangements have established a framework of policy and legislation that defines the opportunity for Indigenous people to be engaged in water management.

4.1. The national water initiative

The Commonwealth's National Water Initiative (NWI) of 2004 explicitly recognises Indigenous rights and interests in national water policy, requiring jurisdictions to include Indigenous customary, social and spiritual intentions in water planning. The NWI also guarantees access for Indigenous peoples to water resources, including through the recognition of potential Native Title rights to catchments or aquifers area under the Commonwealth *Native Title Act* 1993. The application of the *Native Title Act* 1993 covers any waters over which Australia asserts sovereign rights under the *Seas and Submerged Lands Act* 1973 (Commonwealth). However, there are limitations to the application of Native Title over water, with modifiers such as 'wherever possible' and 'wherever they can be developed' referring to the potential to apply Native Title determinations to water. The NWI has provided the blueprint for water reform in Australia over nearly the last two decades, establishing the need for a water market, separating land title from water

title, allocations of water for the environment ('environmental flows') and water for '*other public benefits*: mitigating pollution, public health (e.g. limiting noxious algal blooms), Indigenous and cultural values, Native Title, recreation, fisheries, tourism, navigation and amenity values' (NWC, 2004). A review or refresh of the NWI is well overdue as many clauses are outdated and the climate rapidly changing, water policy is required to evolve and adapt with it.

4.1. The Federal Water Act

The Commonwealth Water Act (Commonwealth of Australia 2012) was enacted to assist in implementing many of the elements of the National Water Initiative, including creation of a water market and trading scheme for the Murray-Darling Basin. The majority of provisions relate to the formation of the Murray Darling Basin Plan (2012) and respective committees (Sections 21 and 22) including the Basin Community Committee and further Act amendments to have an Indigenous Board Member (Section 178) of the Authority. However, there are limited references in the Act to Indigenous cultural values and water, the relevant section in the Act at page 589 Schedule 3, Clause 4 (4), which allows restrictions on use of traded water where necessary to manage features of major Indigenous, cultural heritage or spiritual significance.

4.2. The NSW Water Management Act

At state and territory level the NSW Water Management Act 2000 (WM Act), was the first piece of Australian water legislation to clearly incorporate Indigenous values (Objects s (3)), directly referring to the need to consult on *(iii) benefits to culture and heritage*, and *(iv) benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water*. The Act further provides for specific purpose Aboriginal licences and the consideration of values in water sharing plans. The provisions in the Act provided for the creation of the Aboriginal Water Initiative unit, which developed methodologies for consistently describing and recording Indigenous cultural values associated with water (see Moggridge, Betterridge, and Thompson 2019 for a detailed review).

4.3. Water for victoria

The state of Victoria released the *Water for Victoria*, (DELWP, 2016) policy in late 2016. Chapter 6 *Recognising and Managing for Aboriginal Values* included four key actions; recognising Aboriginal values and objectives of water, including Aboriginal values and traditional ecological knowledge in water planning, supporting Aboriginal access to water for economic development and building capacity to increase Aboriginal participation in water management. (Action 6.4) on recognising and managing for Aboriginal values. The policy was associated with a funding programme which totalled AUD$9.7million, which included funding to create a targeted Aboriginal water unit (Department of Environment, Land, Water and Planning (DELWP, Victoria) 2016 and Productivity Commission 2017).

Victoria at the time of preparing this paper has further advanced the cultural value of water with the introduction of legislation to recognise Birrarung (Yarra River) as a legal entity (O'Donnell and Talbot-Jones 2018). The legislation allows the Wurundjeri, the Traditional Owners of the Birrarung, to be included in decisions and the management of the River, including through representation on the Birrarung Council 'the voice for the Yarra' as prescribed by the Act (Victorian Government 2017), involvement in the development of the Yarra River Action Plan (Victorian Government 2017), and all matters relating to the River.

4.4. Northern territory – strategic Aboriginal water reserves

In Australia's Northern Territory Strategic Indigenous Reserves (SIRs) were established in the late 20th Century, largely in response to lobbying from Indigenous organisations (Barber and Jackson 2012; O'Donnell 2011) and after considerable political debate (Taylor, Moggridge, and Poelina 2017). The policy shift was well received by the Indigenous community and underpinned production of the Indigenous Water Policy Group's (IWPG's) *A Policy Statement on North Australian Indigenous Water Rights*, referred to here as the 'IWPG *Policy Statement*'. The election of a Country Liberal-led government in 2013 led to the dis-establishment of SIRs (Stewart 2013).

It 2016 the then Northern Territory Labour opposition went to the Territory election with a commitment to review the policy position of Strategic Indigenous Reserves (SIR). After their election victory, a discussion paper (DENR NT, 2017) was released which proposed that Strategic Indigenous Reserves (SIRs) be associated with a reserved volume of water exclusively accessible to Aboriginal landowners. Following the review, a policy framework was published (NT Government 2017), and the water entitlement was referred to as Strategic Aboriginal water reserves. In October 2019 the Northern Territory government passed the *Water Further Amendment Act* 2019. This legislation establishes Aboriginal economic development as a new beneficial use

category in the Northern Territory *Water Act* 1992, paving the way for water in new allocation plans to be assigned to Aboriginal water reserves.

4.5. Other agreements/initiatives

At an international level the Australian Federal Government is a signatory to the United Nations Declaration on the Rights of the Indigenous People (UNDRIP, 2007) Article 25 states; *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*. Australia was also the host for development of the Garma International Indigenous Water Declaration (NAILSMA, 2009a), which brought together Indigenous Peoples from across the world to share their experiences on issues and opportunities arising from emerging trends in mainstream water management systems. The Mary River Statement Delegates of the Mary River Water Forum (NAILSMA, 2009b) was an influential document (Taylor, Moggridge, and Poelina 2017) which described principles of Indigenous rights and interests in water with reference to the UNDRIP, 2007, including the need for allocations for social, cultural, ecological and economic needs.

Despite these efforts plus others (Taylor, Moggridge, and Poelina 2017), Australia has the least formal recognition of Indigenous water rights of any of the colonised countries, encompassing only non-exclusive rights to access water for personal and domestic purposes, and not for commercial purposes (Jackson 2009). Reviews of progress in water reform have repeatedly identified limited success in achieving equity in access to water for Indigenous peoples (NWC, 2009, NWC, 2011). The most recent reviews of progress in water reform in Australia (NWC, 2014 and Productivity Commission 2017) found that the inclusion of Indigenous values in water planning was 'rare' even though policy and legislative frameworks provided mechanisms for engagement, and that most jurisdictions have routinely failed to identify and provide for Indigenous cultural values in water planning. Jurisdictions have implemented programmes to consider cultural values but continue to allocate environmental water to cater for many values alongside economic values, with cultural values frequently relegated to secondary status or not considered (Moggridge, Betterridge, and Thompson 2019).

5. Conclusion

Indigenous people have a long and deep association with water and if water is to be sustainably managed in Australia, Indigenous people require a seat at the water planning table. The National Water Initiative (National Water Commission (NWC) 2004) provides a policy basis for this to occur as it recognises the concept of Indigenous knowledge and access to water. This has led to the emergence of Indigenous groups engaging with water management such as the First Peoples' Water Engagement Council, Murray Lower Darling Indigenous Nations, Northern Australia Indigenous Land and Sea Management Alliance and the Northern Basin Aboriginal Nations.

There has been some theoretical academic research and analysis of the concept of Indigenous and cultural flows, but the area has lagged behind development of the science around environmental flows. There is an urgent need for research and consultation on all aspects of the relationship between cultural values and water management. Indigenous water may partially overlap with the definitions of environmental water or environmental flows, but the overlap requires consultation, analysis and rigour.

The paper has identified considerable gaps in national, state and territory water legislation and policy seeking a need for further development of a practical methodology to identify, define and quantify cultural values and the water requirements along with building the water literacy of Indigenous people. This needs to incorporate two types of value sets, physical (tangible) values and non-physical (non-tangible) values (Moggridge et al. 2019). The main steps in this process must include working with Indigenous communities and water planning fraternity to identify ideal sites that can receive an Indigenous water flow.

The determination of water dependant cultural values must be led or at least co-designed with Indigenous communities to determine those values (physical and non-physical) and relate them to flow needs in order to determine the duration, timing, magnitude, quantity and quality and frequency of the water for cultural values. Co-design of appropriate ways to measure cultural benefits is also critical.

Acknowledgments

The author acknowledges the Indigenous ancestors that have gone before us and the Elders that sustain us now, also the University of Canberra, Centre for Applied Water Science (CAWS), Murray Darling Basin Authority and Peer Reviewers.

Notes on contributors

Associate Professor Bradley J. Moggridge is a proud Kamilaroi man (North-West NSW) now living in Canberra. His current role is in Indigenous Water Science and also PhD Candidate at the University of Canberra along with part-time Indigenous Liaison Officer for Threatened Species Recovery Hub. He has 25 years Indigenous

engagement in water and environmental sciences and includes qualifications in Hydrogeology (MSc) and Environmental Science (BSc). Bradley co-leads the Indigenous engagement in the Basin-wide program monitoring the effectiveness of environmental flows in the Murray Darling Basin in Australia as well as co-author (Indigenous) of the Inland Waters Theme of the Australian State of the Environment Report.

Professor Ross Thompson is foundation Director of the Centre for Applied Water Science and co-Director of the Institute for Applied Ecology at the University of Canberra. Ross is a freshwater ecologist with interests in the study of biodiversity and the restoration of landscapes. His fundamental research is in food web ecology; seeking the rules that determine how natural communities assemble and persist. His applied research addresses the ways in which food webs can be influenced by anthropogenic factors. Increasingly this has led him to research which reaches across social science, environmental law, economics and Indigenous reconciliation.

References

Acreman, M. C., and A. J. D. Ferguson. 2010. "Environmental Flows and the European Water Framework Directive." *Freshwater Biology* 55 (1): 32–48. doi:10.1111/j.1365-2427.2009.02181.x.

AIATSIS. 2019. "Indigenous Australian Languages Spoken Today". https://aiatsis.gov.au/explore/articles/indigenoussaustralianlanguagesaccessed 25 october 2019.

Alexandra, J. 2019. "Losing the Authority – What Institutional Architecture for Cooperative Governance in the Murray Darling Basin?" *Australasian Journal of Water Resources,* 23 (2): 99–115. doi:10.1080/13241583.2019.1586066.

Arthington, A. H. 2012. *Environmental Flows: Saving Rivers in the Third Millennium*. Vol. 4. University of California Press.

Atkinson, H. 2009. *Murray Darling Basin*. Canberra, AIATSIS: National Indigenous Studies Conference ANU.

Australian Human Rights Commission (AHRC). 2008. "Social Justice and Native Title Reports". Chapter 6 Indigenous Peoples and Water. Sydney

Barber, M., and S. Jackson. 2012. *Indigenous Water Management in the Upper Roper River, Northern Territory: History and Implications for Contemporary Water Planning*. CSIRO: Darwin.

Bark, R., M. Barber, S. Jackson, K. McLean, C. A. Pollino, and B. Moggridge. 2015. "Operationalising the Ecosystem Services Approach in Water Planning: A Case Study of Indigenous Cultural Values from the Murray–Darling Basin, Australia." *International Journal Biodiversity. Science and Ecosystem Services Management* 11 (3): 239–249. doi:10.1080/21513732.2014.983549.

Behrendt, J., and P. Thompson. 2003. "The Recognition and Protection of Aboriginal Interests." *NSW Rivers, OCP 1008*. November. Healthy Rivers Commission of NSW.

Berry, K. A. S., J. L. Saito, and L. Forline. 2018. "Reconceptualising Water Quality Governance to Incorporate Knowledge and Values: Case Studies from Australian and Brazilian Indigenous Communities." *Water Alternatives* 11 (1): 40–60.

Chan, K. M. A., T. Satterfield, and J. Goldstein. 2012. "Rethinking Ecosystem Services to Better Address and Navigate Cultural Values." . *Ecological Economics* 74: 8–18. doi:10.1016/j.ecolecon.2011.11.011.

Commonwealth of Australia. 2012. "Water Act" 2007. Basin Plan. Canberra

Commonwealth Scientific and Industrial Research Organisation (CSIRO). 2006. "Recognising and Protecting Indigenous Values in Water Resource Management". A report from a workshop held at CSIRO in Darwin, NT 5–6 April 2006.

Craig, D. 2006. *Indigenous Property Rights to Water: Environmental Flows, Cultural Values and Tradeable Property Rights*. Sydney: Macquarie University.

Craig, D., and S. Shearing. 2004. *Best Practice Models and Approaches for Indigenous Engagement in the Murray Darling Basin, Research Report Prepared for Murray Darling Basin Commission for the Development of the Indigenous Action Network*. Sydney: Macquarie Centre for Environmental Law.

Department of Environment and Natural Resources (DENR) 2017. "Strategic Indigenous Reserves Stakeholder Discussion Paper". Darwin Northern Territory.

Department of Environment, Land, Water and Planning (DELWP, Victoria). 2016. "Water for Victoria", http://delwp.vic.gov.au/__data/assets/pdf_file/0006/377772/Water-Plan-strategy2.pdf (accessed 29/10/2019)

First People's Water Engagement Council (FPWEC). 2012a. *Policy Framework for the National Water Commission*. Canberra, A.C.T: National Water Commission.

First People's Water Engagement Council (FPWEC). 2012b. *Advice to the National Water Commission*. Canberra, A. C.T: National Water Commission.

Foundation, L. 2002. "Indigenous Rights to Water Report": Lingiari report to ATSIC Background Briefing Papers. Lingiari Foundation WA.

Garnett, S. T., and B. Sithole. 2007. *Sustainable Northern Landscapes and the Nexus with Indigenous Health; Healthy Country Healthy People*. Canberra: Land and Water Australia.

"Getup's Webpage Titled: Indigenous Aspects of the Murray-Darling Basin Issue": http://www.getup.org.au/blogs/view.php?id=1523 accessed October 2009

Godden, L. 2005. "Water Law Reform in Australia and South Africa: Sustainability, Efficiency and Social Justice." *Journal of Environmental Law* 17 (2): 181–205. doi:10.1093/envlaw/eqi016.

Government, N. S. W. 2000. Water Management Act 2000, NSW Government Sydney.

Government, V. 2017. "Yarra River Protection (Wilip-gin Birrarung Murron) Act 2017", Victoria

Green, D., and L. Minchin. 2012. "The Co-benefits of Carbon Management on Country." *Nature Climate Change* 2 (9): 641–643. doi:10.1038/nclimate1643.

Hartwig, L. D., S. Jackson, and L. Osborne. 2018. ""Recognition of Barkandji Water Rights in Australian Settler-Colonial Water Regimes."." *Water Resources* 7 (1): 16–26.http://www.mdba.gov.au/sites/default/files/Basin-Plan/Basin-Plan-Nov2012.pdf accessed 1st August 2018.

Jackson, S. 2004. "Addressing Indigenous Cultural Requirements", *Water Allocation Planning, Presentation at LWA Funded R&D with an Indigenous Focus Coordination Meeting*, 9 December 2004. Published by Charles Darwin University: Darwin

Jackson, S. 2005a. "Indigenous Values and Water Resource Management: A Case Study from the Northern Territory." *Australasian Journal of Environmental Management* 12 (3): 136–146. doi:10.1080/14486563.2005.10648644.

Jackson, S. 2005b. "Addressing Indigenous Cultural Requirements in Water Allocation Planning." In 2005

RIPRAP - River and Riparian Lands Management Newsletter Edition 28, 32–33.
Jackson, S., and J. Morrison. 2007. "Indigenous Perspectives in Water Management, Reforms and Implementation." In *Water and Australian Society*, edited by K. Hussey and S. Dovers. CSIRO Publishing, 23-41.
Jackson, S. 2008. "Recognition of Indigenous Interests in Australian Water Resource Management, with Particular Reference to Environmental Flow Assessment, Journal of Geography Compass (Environment & Society)." 2 (3): 874–898.
Jackson, S. 2009. "National Indigenous Water Planning Forum: Background Paper on Indigenous Participation." In *Water Planning and Access to Water. Unpublished Report Prepared for the National Water*. CSIRO: Commission. Darwin.
Jackson, S. 2015. "The Cultural Politics of Environmental Water Management in Australia." In *Water and Society III, WIT Transactions on Ecology and the Environment*, 29–42. Vol. 200.
Jackson, S., B. J. Moggridge, and C. J. Robinson. 2010. "Effects of Changes in Water Availability on Indigenous People of the Murray – Darling Basin: A Scoping Study", Report to the Murray Darling Basin Authority.
Jackson, S., C. Pollino, B. Maclean, B. Moggridge, and R. Bark. 2015. ""Meeting Indigenous Peoples' Objectives in Environmental Flow Assessments: Case Studies from an Australian Multi-Jurisdictional Water Sharing Initiative."." *Journal of Hydrology* 522: 141–151. doi:10.1016/j.jhydrol.2014.12.047.
Jackson, S., and M. Langton. 2012. "Trends in the Recognition of Indigenous Water Needs in Australian Water Reform: The Limitations of 'Cultural' Entitlements in Achieving Water Equity." *Journal of Water Law* 22 (2–3): 109–123.
Jackson, S., P. L. Tan, C. Mooney, S. Hoverman, and I. White. 2012. "Principles and Guidelines for Good Practice in Indigenous Engagement in Water Planning." *Journal of Hydrology* 474: 57–65. doi:10.1016/j.jhydrol.2011.12.015.
Kingsley,, J. Yotti, M. Townsend, R. Phillips, and D. Aldous. 2009. "If the Land Is Healthy It Makes the People Healthy." *The Relationship between Caring for Country and Health for the Yorta Yorta Nation, Boonwurrung and Bangerang Tribes. Health & Place 15*, 291–299. Publisher Elsevier Ltd. 2009
Krebs, U., W. Park, and B. Schneider. 2011. "Pliocene Aridification of Australia Caused by Tectonically Induced Weakening of the Indonesian Throughflow." In *Palaeogeography, Palaeoclimatology,* Published by Elsevier*Palaeoecology*, 111–117. Vol. 309.
Langton, M. 2002. "Freshwater", *On-shore Water Rights Discussion Booklet, Volume One, Lingiari Foundation*, February, 2002. Broome: Lingiari Foundation: 43–64.
Lowe, P., and J. Pike. 1990. Jilji.*Life in the Great Sandy Desert. Magabala Books*.Broome, W.A. : Magabala Books.
Maclean, K., R. H. Bark, B. Moggridge, S. Jackson, and C. Pollino. 2012. *Ngemba Water Values and Interests Ngemba Old Mission Billabong and Brewarrina Aboriginal Fish Traps (Baiame's Nguunhu)*. Australia: CSIRO.
Marshall, V. A. 2014. *A Web of Aboriginal Water Rights: Examining the Competing Aboriginal Claim for Water Property Rights and Interests in Australia*. PhD Submitted to Macquarie University, Canberra, Australia.
Marshall, V. A. 2017. *Overturning Aqua Nullius: Securing Aboriginal Water Rights*. Canberra: Aboriginal Studies Press.
McAvoy, T. 2006. "Water – Fluid Perceptions". *Transforming Cultures eJournal* . 1. 2 June 2006
Moggridge, B. 2010."Aboriginal Water Knowledge and Connections": Presentation of *Water and Its Interdependencies in the Australian Economy*, 22 to 23 June 2010. Australian Academy of Technological Sciences and Engineering, Sydney
Moggridge, B., and R. Mihinui. 2010. "Guiding Principles for Indigenous Cultural and Spiritual Values on Water, for the Review of Australian and New Zealand Guidelines for Fresh and Marine Water Quality National Water Quality Management Strategy". http://www.waterquality govauanzguidelinesguidelinevaluesderiveculturalvaluesaccessed5419
Moggridge, B. J., L. Betterridge, and R. M. Thompson. 2019. "Integrating Aboriginal Cultural Values into Water Planning: A Case Study from New South Wales, Australia." *Australasian Journal of Environmental Management* 26 (3): 273–286. doi:10.1080/14486563.2019.1650837.
Mooney, W., and A. Cullen. 2019. "Implementing the Aboriginal Waterways Assessment Tool: Collaborations to Engage and Empower First Nations in Waterway Management." *Australasian Journal of Environmental Management* 26 (3): 197–215. doi:10.1080/14486563.2019.1645752.
Morgan, M., L. Strelein, and J. Weir. 2003. "Discussion Paper Indigenous Rights to Water in the Murray Darling Basin." In, *In Support of the Indigenous Final Report to the Living Murray Initiative*. Published Canberra: AIATSIS.
Murray and Lower Darling Rivers Indigenous Nations (MLDRIN), 2007 "The Echuca Declaration". Adopted 14 November 2007
Murray Darling Basin Commission (MDBC). 2006. *The Lower Lakes, Coorong and Murray Mouth Icon Site Environmental Management Plan*. MDBC, Canberra ACT. 2006-2007.
Murray Darling Basin Plan. 2012 http://www.mdba.gov.au/sites/default/files/pubs/What-is-the-Murray-Darling-Basin-Plan.pdf Accessed 1st August 2012.
National Cultural Flows Research Project (NCFRP). 2018 http://culturalflows.com.au/accessed 25 october 2019.
National Water Commission (NWC). 2004. *Intergovernmental Agreement on a National Water Initiative. Between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory*. Canberra, Australia.
National Water Commission (NWC). 2009. "Australian Water Reform 2009 – Second Biennial Assessment of Progress." In *Implementation of the National Water Initiative*. Canberra: NWC.
National Water Commission (NWC). 2011. "Commonwealth of Australia, Canberra". National Water Commission, 2011:44.
National Water Commission (NWC). 2014. "A Review of Indigenous Involvement". 2014. In *Water Planning*. Canberra: Australia.
"Northern Australian Indigenous Land and Sea Management Alliance (NAILSMA)". 2009a. *Garma International Indigenous Water Declaration*. http://www.

nailsma.org.au/nailsma/forum/downloads/International-Indigenous-Water-Declaration_LMMar09.pdf

Northern Australian Indigenous Land and Sea Management Alliance (NAILSMA). 2009b. "North Australian Indigenous Experts Water Futures Forum –." *The Mary River Statement*.

Northern Territory Government (NT Government). 2017. "Strategic Aboriginal Water Reserve, Policy Framework", Darwin NT.

NSW Aboriginal Land Council (NSWALC) and NSW Department of Land and Water Conservation (DLWC). 2002. The Boomanulla Conference for Country, Canberra. NSW Government. 2000. Water Management Act 2000, NSW Government, Sydney.

O'Donnell, E. L., and J. Talbot-Jones. 2018. "Creating Legal Rights for Rivers: Lessons from Australia, New Zealand, and India." *Ecology and Society* 23 (1): 7. doi:10.5751/ES-09854-230107.

O'Donnell, M. 2011. "Indigenous Rights." In *Water in Northern Australia. Report for NAILSMA- TRaCK 6.2*. John Toohy Chambers: Darwin, Australia.

Poff, L. N., D. J. Allan, M. B. Bain, J. R. Karr, K. L. Prestergaard, B. R. Sparks, and J. C. Stromberg. 1997. "Natural Flow Regime: A Paradigm for River Conservation and Restoration. Article." In *BioScience:* Oxford University Press.

Productivity Commission. 2017. "National Water Reform, Final Report", Canberra

Reed, A. W. 1965, *Aboriginal Fables* (Sydney: A H & A W Reed,), accessed via http://pandora.nla.gov.au/pan/37310/20081022-1214/www.nla.gov.au/exhibitions/bunyips/html-site/abor-stories/garriya.html

Richter, B., and G. Thomas. 2007. "Restoring Environmental Flows by Modifying Dam Operations." *Ecology and Society* 12 (1): 1. doi:10.5751/ES-02014-120112.

Robinson, C. J., A. R. Renwick, T. May, E. Gerrard, R. Foley, M. Battaglia, H. Possingham, D. Griggs, and D. Walker. 2016. "Indigenous Benefits and Carbon Offsets Schemes: An Australian Case Study." *Environmental Science & Policy* 56: 129–134. doi:10.1016/j.envsci.2015.11.007.

Sanderson, C. D. 2008. "Nipiy Wasekimew/Clear Water: The Meaning of Water, from the Words of the Elders." In *Submitted Doctor of Philosophy Simon Fraser University*.

Stewart, P. 2013. "Indigenous Water Reserve Policy Tap Turned Off". ABC News. Accessed 25 October 2019. http://www.abc.net.au/news/2013-10-09/nt-indigenouswater-reserve-policy-dropped/5012152

Sun, T., Z. F. Yang, and B. S. Cui. 2008. "Critical Environmental Flows to Support Integrated Ecological Objectives for the Yellow River Estuary, China." *Water Resources Management* 22 (8): 973–989. doi:10.1007/s11269-007-9205-9.

Synexe Consulting Limited. 2008. "Knowledge Notes 2008/03. Accounting for Indigenous Cultural Flows in Water Planning". Online resource at: http://www.synexe.com/images/200803%20Cultural%20flows.pdf

Taylor, K. S., B. J. Moggridge, and A. Poelina. 2017. "Australian Indigenous Water Policy and the Impacts of the Ever-changing Political Cycle." *Australasian Journal Water Resources* vol.20 (2): 132–147. doi:10.1080/13241583.2017.1348887.

Toussaint, S., P. Sullivan, and S. Yu. 2005. "Water Ways in Aboriginal Australia: An Interconnected Analysis." *Anthropological Forum* 15 (1): 61–74. doi:10.1080/0066467042000336715.

United Nations General Assembly. 2007. "United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)". New York

Venn, T. and J. Quiggan. 2007. "Accommodating indigenous cultural heritage values in resource assessment: Cape York Peninsula and the Murray-Darling Basin, Australia." Ecological Economics 61:334–344

Weir, J. 2007. *Murray River Country: An Ecological Dialogue with Traditional Owners, PhD Thesis, submitted to Australian National University*, October 2007

Weir, J. 2008. *Connectivity. Australian Humanities Review, Ecological Humanities Issue 45*. Canberra: Australian National University E Press.

Yu, S. 1999. *Ngapa Kunangkul: Living Water Report on the Aboriginal Cultural Values of Groundwater in the La Grange Sub-Basin*. Published by University of Western Australia..