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PAPER

Hydrogeology, European colonialism, local communities and First Peoples: moving beyond business as usual

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Abstract

European colonialism altered the connections between First Peoples, local communities, and groundwater systems across the world. In many countries, the practice of hydrogeology remains intertwined with the economic agendas of colonial settler communities, making colonialism a useful lens through which to consider our work. This paper briefly summarizes connections between First Peoples, local communities and groundwater, as well as the role of groundwater as a resource in the process of European colonization. The key contemporary legacies of colonization pertaining to groundwater resource utilization and management are outlined, and established human rights that relate to the practice of hydrogeology are highlighted. The paper concludes with a call for more meaningful relationships between hydrogeologists and local communities, a broader practice of hydrogeology that respects and integrates traditional knowledge and community perspectives so that we can walk together into a better future.

Keywords Colonialism · History of hydrogeology · Socio-economic aspects · Water resources management · Water rights

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Introduction

Access to water, including groundwater, has always been a key factor in the movement and success of human civilizations (Cuthbert and Ashley 2014; Bird et al. 2016; Goes et al. 2017). Yet, social and cultural implications of groundwater use and development have rarely been a primary consideration for hydrogeologists. Concerted efforts have recently been dedicated to deepening our comprehension of the connections between hydrogeology and society (Re 2015; Houben 2019; Vargas-Payera et al. 2023). However, there remains a paucity of literature examining the intersection of the practice of hydrogeology (or analogous activities that predate the establishment of this term) with European colonization and the communities that were colonized.

At the outset, we acknowledge that Indigenous people have a range of preferences in the terminology used to refer to their communities and themselves as individuals. Aiming to respect these differences, and for ease of communication, we have collectively chosen to hereafter use the term First Peoples, with the intention that this terminology includes those who identify as First Nations, Indigenous, or any other appropriate terms. Furthermore, there are, of course, many countries that were colonized by Europeans where the communities that were colonized would not identify as First Peoples (or other collective terms referred to previously), such as numerous African and South (-East) Asian countries, for example. Nonetheless, in many cases, these communities had connections to groundwater before colonization that were disrupted or taken advantage of by colonial settlers, and some examples of this are included within the following discussion.

This paper was prepared on the basis of our own experiences and understanding, combined with examples documented in the literature, to bring awareness to connections between First Peoples, local communities, and groundwater, elucidate how this connection has been impacted by colonization, reiterate relevant human rights, and suggest an intentional way forward. We envisage our audience as fellow hydrogeologists and groundwater professionals. We do not put this work forward as a literature review, although we have provided citations where possible and encourage the reader to engage with these publications to deepen their own understanding and inform their reflections. While we name and cite some specific examples, we do not suggest that this constitutes an exhaustive list. Examples are preferentially included from across our geographic reference points and those supported by references to provide evidence of the types of issues that exist more broadly.

We write as a collective of scientists who approach these topics from multiple perspectives: First Peoples and settlers; citizens of European colonial powers and countries that were colonized; practitioners within academia, industry, and government. We acknowledge and respect the diversity of experiences and cultures among First Peoples and those who experienced colonization. However, rather than documenting these differences, here we aim to synthesize common themes on the basis of our own experiences and interpretation of the issues. In doing so, we hope to initiate a process of reflection and a constructive, ongoing dialogue within the hydrogeological community about the legacy of colonization and paths forward in how we practice hydrogeology today. There is much more that can (and hopefully will) be written on this topic, and we encourage those with an understanding of the intersection of hydrogeology and European colonialism that may differ from (or compliment) ours to articulate this as they see fit.

The role and values of groundwater in communities and societies

Humans naturally settle and camp where water persists in the landscape; these sites are also commonly hydraulically connected to the underlying groundwater system (Brosnan et al. 2018; Bourke et al. 2023). Well before hydrogeology existed as a scientific discipline, humans actively protected, monitored, and managed groundwater resources. Over thousands of years, people on almost every continent developed relationships with both surface waters and groundwater for survival. The water assets, infrastructure, and cultural practices that allowed communities to maintain water supplies (and culture) prior to colonization often remain today, though there may be barriers to their maintenance and use (Marshall 2017; Lictevout et al. 2020). These diverse water assets include features hydrogeologists would call springs and soaks (e.g. *jilla*) as well as hand-made hydraulic infrastructures to tap groundwater (e.g. araths, birkas, foggaras, native wells, puquios, qanats, stepped wells, singing wells) and modifications to enhance the water-holding capacity of natural features (e.g. water trees, gnammas) (Allen 1997; Bayly 1999; Schreiber and Rojas 2003; D'Souza 2006; Mostafaeipour 2010; Behailu et al. 2016).

Knowledge of the precise locations of springs and the underground water that sustains these surface expressions has been passed down from generation to generation, allowing knowledge of water assets to be developed, maintained, and transmitted through tens of thousands of years (Moggridge 2021; Mudd and Currell 2022; Dixon and Morgan 2023; Fensham et al. 2023). Although this knowledge has been crucial to the continuing survival of cultures, especially in arid regions, this view of groundwater as a vital resource conveys only part of the connection between groundwater and humanity.

The spiritual life of many First Peoples and cultures is closely aligned with the hydrologic cycle, and examples of cultural ties with groundwater are abundant. Groundwater

springs continue to be venerated by many cultures and religions and are commonly attributed to healing properties and therapeutic value (Ray 2020). First Peoples remain custodians of water on their Traditional Lands and have deep, continuing cultural and tangible links to (ground) water (Kreamer et al. 2015; Moggridge 2021). The ecosystems supported by groundwater are also commonly central to the cultural heritage and religious values of many communities and First Peoples, providing vital sources of food and medicine (Moggridge and Thompson 2021; Gibson et al. 2022). Indeed, connections to (ground) water and places of groundwater expression at the surface commonly play an integral role in the ability of First Peoples to maintain their spiritual, physical, and emotional well-being (Moggridge and Thompson 2021).

> "Water is the life for us all. It's the main part. If we are gonna loose that, I don't know where we are 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." John 'Dudu' Nagkiriyn, Bidyadanga, August, 1998 (after Yu 1999).

The role of groundwater in the colonization process

European colonialism since the 1500 s has impacted communities and groundwater systems globally (Becker 2019; Underhill et al. 2023). Within Europe, colonial expansion was preceded by the impoverishment of many local cultural connections to groundwater as 'modern', WEIRD (Western Educated Industrialized Rich Democratic) values took hold (Henrich et al. 2010, 2021). Subsequently, colonial expansion utilized the water-knowledge of local communities and First Peoples for the benefit of colonial settlers, often forcibly (Allen 1997; Bayly 1999; Birkenholtz 2008). This harnessing of potable water sources was essential for the economic and agricultural development of the colonists, but often took away vital sources of water, food, and culture from local communities and First Peoples (Birkenholtz 2008; Robins and Rose 2009; Moggridge 2020; Caron et al 2021). As sites where people lived, camped, and foraged, surface expressions of groundwater also became the sites of violent conflict and massacres during colonial expansion (Ryan et al. 2025). Knowledge of groundwater systems and expressions have also played a role in the resistance of colonization—within Ethiopia, for example, knowledge of the locations of cold groundwater springs was utilized by Empress Taytu to encircle and defeat the Italian incursion into Ethiopia during the battle of Adwa in 1896 (Milkias and Metaferia 2005).

Access to water was, of course, vital for colonial economic development. As such, groundwater, and the practice of hydrogeology often remains intertwined with the economic agendas of colonial settler communities. In some places, the process of colonization was fundamentally one of resource exploitation, with the burden borne by local communities while the benefits flowed to local colonial settlers or back to European centres (Te Rūnanga o Te Rarawa Iwi Research and Development 2013; Kooy and Bakker 2008). In other parts of the world, the implementation of "new" water technologies (e.g. canal networks, groundwater wells) by colonial governments enhanced the lives and livelihoods of local communities as well as colonial settlers (Shah 2010).

Agricultural development and food production were vital for the success of colonial settlements; both required water and in many parts of the colonized world this water was groundwater (Lictevout et al. 2020, 2023). In some places, plantation irrigation systems intensified groundwater extraction to sustain production of cash crops such as sugarcane (Stearns and Macdonald 1942; Wilcox 1997). For example, the development of tube wells (also called Abyssiniam wells or Norton tube wells), first used by the British Army in the 19th century, facilitated the replacement and/or abandonment of customary or traditional wells, with both positive and negative impacts for local communities (Mather and Rose 2012). Within India, the initial focus of British colonial settlers to improve irrigation water supply was the development of a vast network of perennial canals, but in areas with preexisting groundwater use, wells remained an important water source (Shah 2010). It was not until the 1960's that financial support from international donors and development agencies (e.g. World Bank) began to facilitate the widespread installation of privately owned tubewells for water supply (Birkenholtz 2008; Shah 2010). Similarly, international funds associated with "post-colonial" development programs continue to play a significant role in facilitating well installation and groundwater use across many African countries (Foster et al. 2006; Gaye and Tindimugaya 2019).

The mining of geologic resources has been another economic focus of colonial settlements. The extraction of gas, coal, and mineral resources in colonized places formed a vital source of income, and this ongoing activity is explicitly linked to groundwater through the need for potable and processing water supplies as well as dewatering, tailings, and mine water disposal (Gould 2022; Owen et al. 2022). Conflicts between local and Indigenous communities and mining companies continue to this day (Owen et al. 2022; Blair et al. 2024). A recent example is the commencement of uranium mining activity near Grand Canyon National Park, Arizona, USA in 2024 (Reimondo 2024), which is opposed by all 11 indigenous tribes in the region. Culturally significant groundwater springs in the Grand Canyon are potentially at risk, with dewatering of $\geq 30{,}000$ m^3 of arsenic and uranium-laden groundwater expected each year

(Solder et al. 2020; Crossey et al. 2024). Similar concerns have been identified in other countries, including, for example, uranium mining in Niger (Dobi et al. 2021) and lithium extraction in the Atacama Desert (Lorca et al. 2022).

The contemporary legacy of colonization on groundwater utilization and management

In many countries worldwide, contemporary global water politics and policy remain imprinted by European colonization (Taylor et al. 2016; Saunders 2018; Sultana 2022). The deep kinship between First Peoples and the natural world creates an obligation to care for the environment and maintain it for future generations. However, in most places that were colonized, the vast knowledge and experience of local communities and First Peoples have been sidelined in favor of Western perspectives. The colonial focus on economic development superseded, and in many places destroyed, a holistic, integrated Indigenous perspective on groundwater systems (Ah Chee 2002; D'Souza 2006; Scheuer and Isaki 2021). This historical and ongoing displacement by colonial settlements causes socio-economic disadvantage for many local and Indigenous communities and limits their capacity to achieve the UN Sustainable Development Goals (Marshall 2017; Underhill et al. 2023). As just one example among many, for Borana Pastoralist communities in Ethiopia, Kenya, and Somalia, water and pasture are two inseparable socio-ecological elements that must be managed collectively. In this case (and others), the implementation of water utilization and management approaches that followed the 'Eurocentric' view of natural resources as divisible physical entities has led to erosion of the Cultural Landscape and detrimentally altered ecosystems and natural resources (Helland 1980; Behailu et al. 2016; Mathur and Mulwafu 2018). However, water insecurity remains a global challenge that must be met. The sustainable withdrawal of groundwater reserves that is required to do so will be aided by the robust application of Western scientific perspectives *alongside* meaningful participation of local communities in development projects (Foster et al. 2006; Braune and Xu 2010; Maheshwari et al. 2014; Cuadrado-Quesada and Gupta 2019).

Water rights claimed during colonization have been prioritized by the legacy governments of colonization (e.g., Australia, New Zealand, Canada, United States of America) to support population centres and economic development (Marshall 2015, 2017; O'Donnell 2023; Currell et al. 2024). Groundwater withdrawals for potable use and agricultural development in colonized regions has resulted in groundwater depletion that has been considered by some as a vertical frontier of colonization, extending into the earth rather than across the surface of it (Underhill et al. 2022). For example, the groundwater depletion and associated land subsidence that is impacting contemporary Jakarta (Indonesia) began in 1870 with the establishment of a system of artesian wells in what was then Dutch Batavia (Kooy and Bakker 2008). The socio-cultural power dynamics that emerged from this colonial period remain embedded within contemporary water supply systems in Jakarta and continue to impact the distribution of water security across the city (Kooy and Bakker 2008). Chile provides another example: despite being an independent nation for two centuries, water privatization led to investment companies from developed countries, such as Spain or Canada, owning around 90% of the drinking water supply (based on data from the public cadaster of water rights, see Taucare et al. 2024). The overexploitation of this resource has caused a significant depletion of aquifers with groundwater level declining 50 m over 10 years, equivalent to the height of a 22-story building (Alvarez-Garreton et al. 2024; Taucare et al. 2024).

Agricultural operations and mining have also resulted in contamination of many groundwater systems (e.g. from nitrate, pesticides, heavy metals), which can render water sources unusable (Spalding and Exner 1993; Underhill et al. 2023). The impacts of mineral resource extraction on local and Indigenous communities can also include tailings dam failures and the drying of springs, wetlands, and groundwater-dependent ecosystems (García-Sanz et al. 2021; Gould 2022; Chávez et al. 2023; Owen et al. 2022; Blair et al. 2024). Even in developed countries of the Global North, drinking water quality concerns remain common in Indigenous communities that rely on groundwater for potable water supply (Marshall et al. 2019; Tapia et al. 2019; Hall et al 2022; Wyrwoll et al. 2022; Balasooriya et al. 2023).

However, despite their exposure to impacts, approaches for risk and impact assessment and mitigation of human activities on groundwater systems have failed to integrate the more holistic knowledge and perspectives of local communities and First Peoples (Wong et al. 2020; Currell et al. 2024). Thus, the dominant paradigm for human interactions with groundwater systems and their expressions shifted with European colonization from a more spiritual and holistic understanding extending across contemporary discipline boundaries to the more siloed approaches of Western societies and sciences.

> "Māori scholars have often reflected upon the severe impacts of the loss of Mana Atua upon our people's well-being, upon our perception of the world around us and our place in it. Indeed, the de-sanctification of nature has played a central role in the psychological assimilation of Indigenous peoples around the world. Most certainly our belief system of interconnectedness underpinned a

different set of obligations to nature, and in turning away from that system, we also turn away from those obligations. What was once a relationship based upon connectedness and reciprocity between us and our non-human ancestors thereby shifts towards one of dominion over and ownership of assets." (Ngata 2018)

Groundwater rights and reconciliation

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) established global principles advancing the inclusion of the perspectives, knowledge, and sciences of First Peoples (United Nations 2007); it contains three key articles that relate to groundwater and hydrogeology (see the following list). More broadly, UNDRIP sets out principles for redressing the structures of colonization and creating room for Indigenous perspectives, jurisdiction, and practice. UNDRIP was formally adopted in 2007 with 144 Countries voting in favour (11 abstentions). Four countries voted against UNDRIP in 2007—Australia, Canada, New Zealand, and the United States of America (USA)—all countries based on the legacy of European colonization. Although arguably late to the party, all four countries have since endorsed UNDRIP: Australia in 2009, New Zealand and USA in 2010 and Canada in 2016.

Article 25. 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, as well as coastal seas and other resources, and to uphold their responsibilities to future generations in this regard.
Article 31(1). Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge, and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect, and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.
Article 32(2). States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization, or exploitation of mineral, water, or other resources.

Globally, the degree of progress and approach towards implementation of UNDRIP in the context of groundwater varies. A more holistic, locally based perspective is beginning to be incorporated into water management frameworks (although primarily relating to surface waters). Updated legal frameworks and precedents are moving us towards increased recognition of Indigenous Water Rights (Womble et al. 2018), and free, prior, and informed consent (FPIC) is increasingly being adopted as the basis for state-involved activities on traditional territories (Curran 2019; Janke 2019, 2021; AIATSIS 2020; Wong et al. 2020). Water as a living entity (Yu 1999; Appleyard et al. 2001; Stensrud 2020) is also now being acknowledged within water management frameworks, with rivers recognized as bodies with rights and the explicit inclusion of water or lands as stakeholders and co-authors (Ngata 2018; RiverOfLife et al. 2020). Also, importantly, local communities and First Peoples are reclaiming ancestral viewpoints, prioritizing care rights over ownership, and practicing traditional observations and sciences, providing valuable insights into the health of water systems (Ngata 2018; Prieto 2022, 2023).

Despite this progress, practical implementation of the principles of decolonial water praxis remains challenging, and there remains much room for improvement (Wong et al. 2020; Jackson et al. 2023). Taking Canada as just one example, the Truth and Reconciliation Commission has provided 94 calls to action, which are being implemented (Truth and Reconciliation Commission of Canada 2015), but action beyond this is limited and incursions on UNDRIP and First Peoples' rights are ongoing. Colonial settler legal frameworks still commonly require consultation with local communities and First Peoples, but not consent (FPIC) for activities like mining to proceed. Within the Canadian context, this has resulted in continued mineral exploration in Asubpeeschoseewagong Anishinabek (Grassy Narrows) territory without free, prior, informed consent from the community (Ilyniak 2014). The community continues to suffer ongoing health and economic impacts from industrial mercury contamination of water and sediment along the Wabigoon River in the 1960's that was created and perpetuated by colonial governmental practices (Ilyniak 2014).

Moving beyond business as usual

Given the role of groundwater in the process and legacy of European colonization, we suggest it is time for the practice of hydrogeology to move beyond business as usual. There is much to be gained from a two-way approach, linking Indigenous and local knowledges with "Western" science (Iseke and Desmoulins 2015; Lilleyman et al. 2022; Moggridge et al. 2022), deepening connections between hydrogeological

practitioners and local communities. The vast timeframe of Indigenous or Traditional Knowledges spans glacial cycles of sea-level rise which often had profound implications for the hydrology of landscapes. Contemporary hydrogeologists can learn from this vast depth of experience as we practice our discipline in a time of changing climates and hydrocycles. To give just one specific example out of many, climate change and permafrost thaw can reactivate groundwater systems, which has resulted in a growing need for hydrogeological researchers and practitioners with the skills and knowledge to engage with northern Indigenous communities respectfully and ethically in what is now commonly called northern Canada (Bozhkov et al. 2020).

Across hydrogeology, individuals and organizations may reflect on their legacies (Gebhard et al. 2022) and take time to learn the histories of the First People(s) and local communities of the territories they work in. When opportunities arise, intentional listening to community perspectives can create a deeper understanding of their relationships to groundwater and how hydrogeology shaped their experiences of colonization (Kagawa-Viviani 2019). We can be open to working in transdisciplinary ways and incorporating other ways of knowing alongside our training in the Western scientific tradition (Linton and Budds 2013; Rudolph 2022; Stensrud 2019; Wong et al. 2020). This requires the building of respectful relationships with Indigenous or First Nations individuals and local communities (Gordon and Around Him 2024), which takes time and will not necessarily progress according to a particular schedule.

It is also important to remember that Traditional Knowledge is the intellectual property of First Peoples who may opt to withhold it in light of cultural sensitivity and protocol. Nevertheless, significant gains can be achieved through effective engagement and mutually respectful and beneficial partnerships with First Peoples and local communities (Castleden et al. 2012; Ray 2023), both in terms of community understanding of any proposal, and improved collective outcomes for water resource management (Vargas-Payera 2018; Poelina et al. 2019; Vargas-Payera et al. 2020).

First Peoples have extensive responsibilities to Water, Land, and Sky as well as the social and emotional well-being and health of their communities, but are not systematically recognized or compensated for this work. As hydrogeologists work to do better in our inclusion of and engagement with First Peoples, this places more burdens on Traditional Knowledge holders; thus, we must be mindful of their time and competing responsibilities. In many cases, the basic needs of Indigenous Communities (housing, health services, justice, education, economic opportunities, rituals) are not being met (Durbin 2009; Marshall et al. 2019; Closing the Gap 2020; Hall et al 2022; Wyrwoll et al. 2022). Knowing this, we can pause to consider the local context and possible legacy of our work within the community:

Have the perspectives and needs of the local community been considered; has participation and/or leadership by local community members been facilitated?
Will the outputs of the work be in a form that is easily accessible and understandable to local communities and/or First Peoples?
Will the project include outreach, training opportunities, and enrichment for the communities where the work will be sited?
Will the project provide meaningful and desired benefits to the local community?

Although we as hydrogeologists may be obliged to conduct some form of consultation with local communities and First Peoples, consent will not necessarily follow. If this is the case, we can consider what is appropriate as a next step. Local laws and regulations may allow for the activity to proceed anyway, but this does not mean it necessarily should; thus, consider what power you might have to influence the outcome, and how you might choose to employ this power. Indeed, we can move beyond consultation and work towards free, prior, and informed consent. This can then provide opportunities for local community participation and Indigenous-led groundwater-focused programs and hydrogeology. There is a clear paucity of hydrogeological work that has been undertaken with meaningful participation of First Peoples and local communities; hydrogeology led by First Peoples is even rarer (Dahlhaus et al. 2008; Leonard et al. 2023).

Funding for groundwater-related programs is usually sourced from the colonial settler community within a given country, or from outside of the country (as is common across the Global South). This creates a fundamental cross-cultural tension in the deployment of groundwater projects working within and for First Peoples and local communities. If more effort can be put into working with local communities to understand their priorities and needs, this will likely lead to better long-term outcomes from these (often substantial) investments. Improved cross-cultural understanding also has the potential to empower communities to more effectively maintain and advocate for their groundwater-related needs and values. This can be facilitated by intentionally providing up-skilling opportunities for local communities to build their understanding of the Western scientific perspectives and approaches embedded within the delivery and maintenance of groundwater programs and assets. There is much to be gained also from improved cultural competency and up-skilling of settler-community scientists and groundwater practitioners regarding traditional ways of knowing and being, which can be achieved through publicly available materials, and direct engagement with First Peoples and local communities as appropriate.

Within academia, particularly, there is a long history of studying First Peoples, rather than working equitably with, or in ways that directly benefit them (Roldan-Hernandez et al. 2020; Wong et al. 2020). As educators, we can observe that groundwater texts and curricula continue to omit discussion of the vast knowledge and connections of First Peoples to groundwater systems and the links between hydrogeology and European colonial expansion, and work to include these perspectives in our own teaching. As researchers, we can be open to opportunities to incorporate Indigenous scientific methods and knowledge into our research and practice. Research led by First Peoples can be more place-based than most academic work (which aims to place new knowledge in a global context); here, we can be open to an expanded definition of valid research methodologies to become inclusive of nonlinear story- and place-based approaches (Brown and Strega 2015). There is also a case to be made for researchers to clarify our values and intentions (as opposed to our actions, or study objectives) and consider how these may differ or align with those of local communities and First Peoples. Spending substantial time listening deeply to community perspectives prior to attempting to identify research objectives and actions is likely to help here.

> "For far too long, researchers have enjoyed great privilege as they have passed through our communities and homeland, using public or academic funding to answer their own questions about our environment, wildlife, and people. Many of these same researchers then ignore the Inuit in creating the outcomes of their work for the advancement of their careers, their research institutions, or their governments. This type of exploitative relationship must end." (National Inuit Strategy on Research, Inuit Tapiriit Kanatami 2018; after Wong et al. 2020).

We encourage national chapters of the International Association of Hydrogeologists (IAH) to consider what appropriate steps may look like in their respective contexts. In 2022, IAH Australia prepared and signed an Indigenous Groundwater Declaration that seeks to acknowledge Indigenous Australians as knowledge holders and stewards of groundwater (as IAH also aims to be). This declaration consists of a preamble and seven articles that the hydrogeological community is invited to consider (see the electronic supplementary material, ESM). While this uses Australia-specific language, it rests upon a foundation of the globally accepted UNDRIP (Article 1). The Declaration then acknowledges the cultural and spiritual connections of Indigenous peoples with groundwater (Articles 2 and 3), the groundwater knowledge and stewardship of Indigenous people (Article 4), and the importance of including Indigenous science and knowledge in hydrogeology (Article 5). The Declaration concludes by stating our hope and intention to walk together with Indigenous Australians to achieve our common goal of protecting and securing groundwater for the future (Articles 6 and 7). Within the Australian groundwater community, this declaration has served as a tool for awareness raising and promoting reflection by individuals and organizations, and it may serve as a guide for similar declarations elsewhere.

Conclusion

Hydrogeology and groundwater often shaped, and continue to shape, relationships between First Peoples, local communities, and settler communities. We suggest that a broader understanding and meaningful consideration of the social context in which we practice is essential for all hydrogeologists, regardless of their background or status. We propose moving beyond business as usual to reframe colonial-legacy relationships so that we can walk together into a better future. The task of deconstructing colonial legacies must be facilitated by people working within the relevant governance systems; most commonly, this means people trained within the Western scientific framework. Although we cannot right past wrongs, we can shape a more positive relationship with First Peoples and local communities moving forward. Other disciplines, such as ecology, have already begun recognizing that caring for ecosystems means working hand in hand with local communities and holders of Traditional Knowledge (e.g. Jessen et al. 2022; Johnson et al. 2023). Let us now embrace this opportunity to become open-eyed allies, building meaningful partnerships that propel us towards an expanded, more inclusive, and equitable practice of hydrogeology.

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