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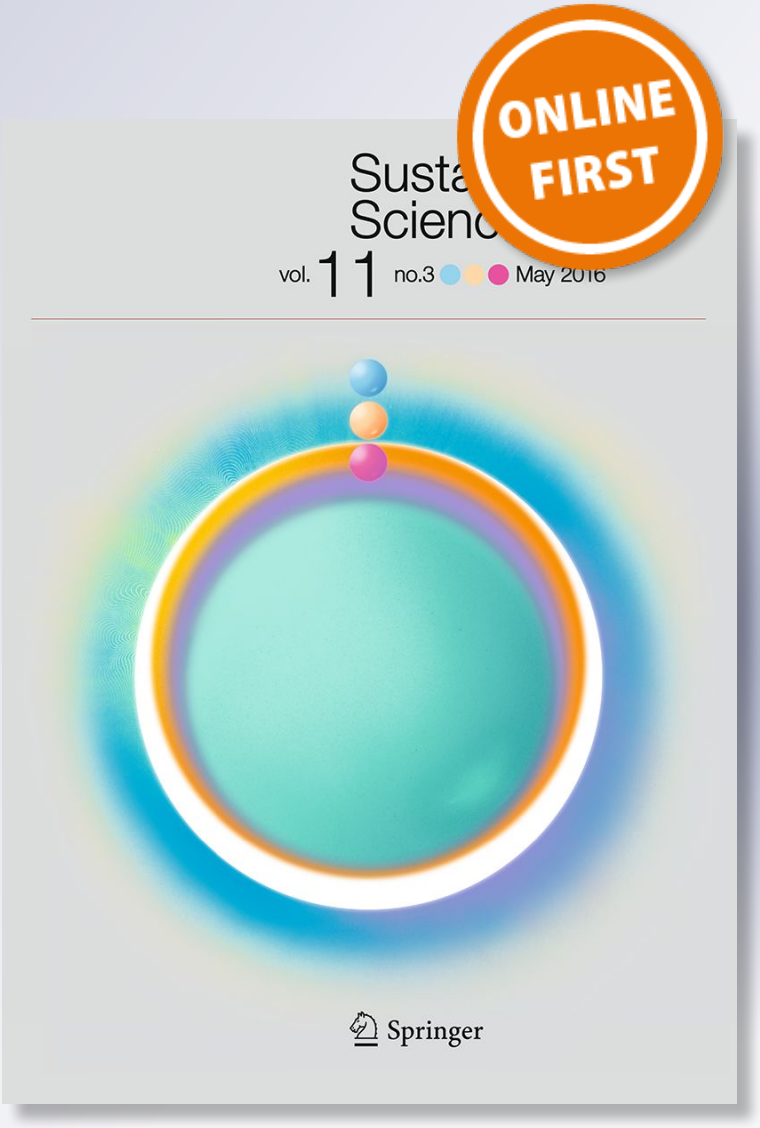

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ORIGINAL ARTICLE

"The river is us; the river is in our veins": re-defining river restoration in three Indigenous communities

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Abstract Indigenous communities are increasingly taking the lead in river restoration, using the process as an opportunity to re-engage deeply with their rivers, while revealing socio-cultural and political dimensions of restoration underreported in ecological and social science literatures. We engaged in collaborative research with representatives from three Indigenous nations in the United States, New Zealand, and Canada to explore the relationship between Indigenous ways of knowing and being (i.e., "Indigenous knowledges") and their restoration efforts. Our research project asks the following: how are Indigenous knowledges enacted through river restoration and how do they affect outcomes? How do the experiences of these Indigenous communities broaden our understanding of the social dimensions of river restoration? Our research reveals how socio-cultural protocols and spiritual practices are intertwined with restoration methodologies, showing why cultural approaches to restoration matter. We found that in many cases, a changing political or legal context helps create space for assertion of Indigenous spiritual and cultural values, while the restoration efforts themselves have the potential to both repair community relationships with water and empower communities vis-à-vis the wider society. We show that restoration has the potential to not only restore ecosystem processes and services, but to repair and transform human relationships with rivers and create space politically for decolonizing river governance.

Keywords River restoration · Indigenous knowledge · Māori · Anishinaabe

Introduction

In 2011, members of the Grand Traverse Band of Ottawa and Chippewa Indians held a ceremony at the site of the soon-to-be removed Brown Bridge dam. The Tribe's involvement in the dam's removal was motivated by the need to care for "the lifeblood of mother earth" and to plan for seven generations.[1] In 2013, across the border in Canada, Walpole Island First Nation citizens marched to protest the ongoing degradation of the St. Claire River, which carries pollutants from upstream industries to their lands and communities. Contemporarily, along the banks of the Waikato River in New Zealand, Māori communities come together to participate in traditional river activities as they

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[1] Derek Bailey, former GTB Chairman, https://www.youtube.com/watch?v=ioeGjVqJTBs.

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have for many generations, thereby expressing their physical and spiritual ties to the Waikato.

These examples, and the relationships to rivers that they embody, stand in contrast to prevailing society–river relations, which reflect the idea that rivers are resources to exploit for economic development (White 1995; Worster 1985; Tipa 2009). This view has justified damming, diverting, and polluting rivers, resulting in widespread impairment of their physical, biological, and chemical characteristics (Graf 2001; Palmer et al. 2007), with negative consequences for both biodiversity and human security (Bogardi et al. 2012; Vorosmarty et al. 2010).

River degradation has motivated the adoption of more sustainable and adaptive management practices (Newsom 2009), among which are restoration efforts. Restoration conventionally focuses on physical interventions to improve river form and function, such as bank stabilization, channel reconfiguration, floodplain reconnection, fish passage, in-stream habitat improvement, and dam removal/retrofitting (Arthington et al. 2010; Wohl et al. 2005, 2015). While many of these efforts have been successful, concerns remain about unclear priorities and uncertain approaches (Lave 2012a; Small and Doyle 2012; Harman et al. 2012) and the failure to fully include the "nonscientific community" in project planning and implementation (Wohl et al. 2015, p. 5981), which has led to inadequate consideration of the human dimensions of restoration (Naveh 2005; Shackelford et al. 2013; McDonald et al. 2004; Eden and Tunstall 2006). In the case of rivers, there is increasing awareness of the need to focus on the cultural, political, and economic processes that drive and complicate restoration activities, underpinned by the realization that rivers are always hybrids of nature and culture (Lave 2014; Wohl et al. 2015; Fox et al. 2016).

Although the human dimensions of river restoration are receiving more attention, we argue that there is an opportunity for a more in-depth and critical examination of this trend. Specifically, we find that the human element has been narrowly construed, privileging socioeconomic concerns, such as financial arrangements, management systems, insurance, markets, permitting, human safety, and recreational activities (see Lund 2015; Kondolf et al. 2008). These considerations are important, but focusing on them tends to reduce social dimensions to values that can be "measured, modeled, and optimized" (Tadaki and Sinner 2014, p. 149), while neglecting cultural and spiritual understandings of rivers. Because such understandings frame Indigenous people's relationships to water and motivate their stewardship responsibilities towards rivers (Arquette et al. 2004; Mitchell 2013; McGregor 2014; Whyte 2016), we wondered if spiritual and cultural dimensions might be as important as physical interventions in Indigenous efforts to restore rivers. To address this question, our research focused on three Indigenous communities engaged in river restoration. We asked the following: how are Indigenous knowledges enacted through river restoration and how do they affect outcomes? How do the experiences of these Indigenous communities broaden our understanding of restoration, especially the social and cultural dimensions of river restoration?

Indigenous knowledge and river restoration

In recent years, many Indigenous people have increasingly taken leadership roles in river restoration.[2] Through their efforts, these communities are both fulfilling stewardship responsibilities articulated in ancient teachings such as creation stories and providing alternative models for weaving together Indigenous and sustainability sciences (Johnson et al. 2016). Place-specific meanings and familial conceptualizations of human–water relationships are prominent features of river restoration in Indigenous territories, where rivers are viewed not only as natural resources to support livelihoods, but are understood as ancestors and the source of life itself (Te Aho 2009). As such, they are sacred and central to the identities and cultures of Indigenous people.

A small but growing literature addresses the political, cultural, and scientific dimensions of Indigenous people's participation in river restoration, finding that communities benefit in multiple ways through the process (Cosens and Chaffin 2016; Gosnell and Kelly 2010; Long et al. 2003; Meurk et al. 2006; Muru-Lanning 2010; Morris and Ruru 2010; Holtgren 2013; Holtgren et al. 2014). Still, Indigenous communities are inadequately included in the planning and implementation of projects (von der Porten and de Loe 2013), treaty rights are disregarded (McGregor 2014), and there is often disregard for cultural values (Tipa 2009). Importantly, consideration of spiritual and cultural issues goes beyond simply including communities as stakeholders or collaborators in restoration (van der Porten and de Loe 2013). Rather, the goal is to "embed long-term relations of care" into notions of restoration (Salmond et al. 2014, p. 50; Whyte and Cuomo 2016), healing both ecosystems and communities in the process. Restoration along these lines moves away from reductionist approaches and towards the creation of space for personal narratives and "place-specific meanings" (Tadaki and Sinner 2014, p. 141) that reflect the "complex sets of relations [that] exist between humans and non-humans" (Jackson and Palmer 2015, p. 134). In other

[2] For example, the Penobscot Nation has overseen dam removal on the Penobscot River, the Lower Elwha Klallam Tribe was instrumental in the removal of the Elwha dams, and the Klamath Tribes have been key players in the Klamath Basin Restoration Agreement.

Fig. 1 The author team and other community members engaging in their Indigenous knowledge exchange through field excursions to the sites of river restoration

words, restoration has the potential to do more than just restore ecosystem processes and services. It has the potential to become a "transformative project" (Salmond et al. 2014 50), which both repairs human relationships with rivers and serves to resist the colonizing and capitalistic forces that ruptured human–river relations in the first place (Collard et al. 2015; Whyte 2016). Restoration for indigenous communities is, therefore, also a deeply political project.

Methods: collaborative research through dialog and exchange

Our research focused on Walpole Island First Nation (WIFN) Ontario, Canada; Grand Traverse Band (GTB) of Ottawa and Chippewa Indians, Michigan, USA; and Waikato-Tainui, New Zealand. We chose these communities because we had pre-existing relationships with each, they are all actively involved in river restoration activities, and we felt that a comparative study would strengthen our analysis. Our research process revolved around an Indigenous knowledge exchange (Gearheard et al. 2006; Gearheard 2013) between representatives from the three communities accompanied by academic researchers. The community collaborators acted as researchers in that they helped frame research questions, determined the activities we engaged in during our community/field visits, and aided in synthesizing the lessons learned. The community collaborators also acted as informants, sharing their experiences and understandings associated with river restoration. The academic partners facilitated semi-structured discussions during and after field visits, and added their own perspectives to the research discussions. Thus, following Gearheard et al. (2006) our exchanges were between Anishnaabe and Māori communities as well as between Indigenous community representatives, local researchers, and visiting academic researchers. Our methodology also reflects Indigenous-researcher "dialogic networks" (Davidson-Hunt and O'Flaherty 2007; Berkes 2009), which actively engage researchers and Indigenous community members as collaborators in processes of knowledge exchange, production, and integration.

Our fieldwork was organized around multi-day site visits to each of the three Indigenous communities, where we spent time in each community's sites of river restoration and other places of socio-cultural and ecological significance (Fig. 1). We co-determined research questions and themes to help generate conversations in the field (Davidson-Hunt and Berkes 2010). Our fieldwork included participation in each local host community's relevant cultural protocols and/or ceremonies. Participating in these cultural practices served multiple purposes. First, our participation

demonstrated respect for local customs. These practices also helped our group begin its work "in a good way", setting the tone and focus of the conversations in a way that was valued by the Indigenous collaborators. Additionally, given the history of researchers working in Indigenous communities and considering themselves the presumptive "experts", our participation in these practices helped to equilibrate researcher–Indigenous community power relations (Smith 2012; Whyte et al. 2015). Each of the three communities identified their own knowledge keepers, and the communities' ceremonies and speaking protocols created a space within the research process for these knowledge keepers to set the tone for our work together with regard to norms and prerequisites to engaging in research on Indigenous lands. Intermittently throughout the fieldwork, we held semi-structured workshops and created unstructured spaces for dialog, exchange, and problem solving, both in and out of the field. We followed these workshops with impromptu interviews with collaborators from the three communities to gather specific examples, insights, and stories regarding each of the communities.

Our team included members with a broad range of academic and practice-based expertise. The team comprised tribal/first nation elected officials JC, MW, and TS from GTB and CR from WIFN; elders and cultural leaders PN from Waikato-Tainui, BW from WIFN and HB from GTB; tribal program managers and administrators JW, AT, HP and TR from Waikato-Tainui, AJ and JJ from WIFN and FD and BF from GTB. Each of these participants has multiple roles in their respective communities and various areas of knowledge. For example, CR is an active Anishnaabe language revitalization advocate and fluent speaker, and AT and JC have law degrees and specialize in tribal policy analysis and formation. Academic partners included NR who had pre-existing professional relationships with representatives from each of the three Indigenous nations, and whose research focuses on understanding Indigenous knowledge and stewardship practices, DT who studies Indigenous political traditions and worldviews and CF, a geographer who focuses on river-basin conflicts and river restoration.

Indigenous communities and their rivers

Each Indigenous community involved in our research has different opportunities to enact Indigenous knowledge in the river restoration process. Waikato-Tainui has significant power to guide the restoration of the Waikato River, primarily due to the 2010 Waikato River Settlement Claim, which provides for their cultural and spiritual relationship with the river, giving them the legal right and the economic resources to protect and restore the river guided by Indigenous knowledge. The process is linked to the wider political empowerment and cultural renewal of Māori in New Zealand. The Grand Traverse Band (GTB) is a primary partner in a comprehensive restoration process through the removal of multiple dams on the Ottaway River.[3] In this case, changes in the legal and economic status of the Tribe created the restoration opportunity, while the process itself is reconnecting the community with the river. For Walpole Island First Nation (WIFN), the degraded St. Clair River continues to adversely affect the health of the community, both physically and spiritually. The community is working to heal itself and the river ecosystem through spiritual, political, and environmental activities, despite being more economically and politically constrained than the other two communities. While there are differences in the experiences of each of the three communities, in all cases they view spiritual and cultural healing as a prerequisite to restoring and reconnecting to their rivers.

Waikato-Tainui and the Waikato River: reclaiming rights to care for their ancestor

The Waikato River is New Zealand's longest river. It runs for 425 kilometers through the North Island, flowing from the eastern slopes of Mount Ruapehu to the Tasman Sea through Port Waikato, just south of Auckland (Fig. 2). The landscape through which the river flows has been altered by urbanization and agriculture, and the river itself is regulated and fragmented by seven large dams. Many significant cultural and historical sites have been lost or degraded as a result of raupatu.[4]

The importance of the Waikato River to Waikato-Tainui is difficult to overstate. For Waikato-Tainui, The Waikato River is a tupuna (ancestor), which has mana (prestige) and in turn represents the mana and mauri (life force) of the tribe (Waikato-Tainui Raupatu Claims Waikato River Settlement Act 2010). As an ancestral river, the Waikato is an indivisible being and is the basis of tribal identity and culture for the Waikato-Tainui people (Te Aho 2009). The community's relationship with the river was disrupted beginning in the 1860s, when the Crown's military forces invaded their territory and made extensive use of the Waikato and Waipaa rivers. As a result of raupatu, the Crown established control over the river, new settlers occupied the confiscated lands, and farms and towns developed along the river corridor. Although development of the Waikato River

[3] This river is more commonly called the Boardman River. Ottaway is an Anishnaabe name.

[4] Raupatu is a Māori term that refers to the invasion and confiscation of Waikato lands.

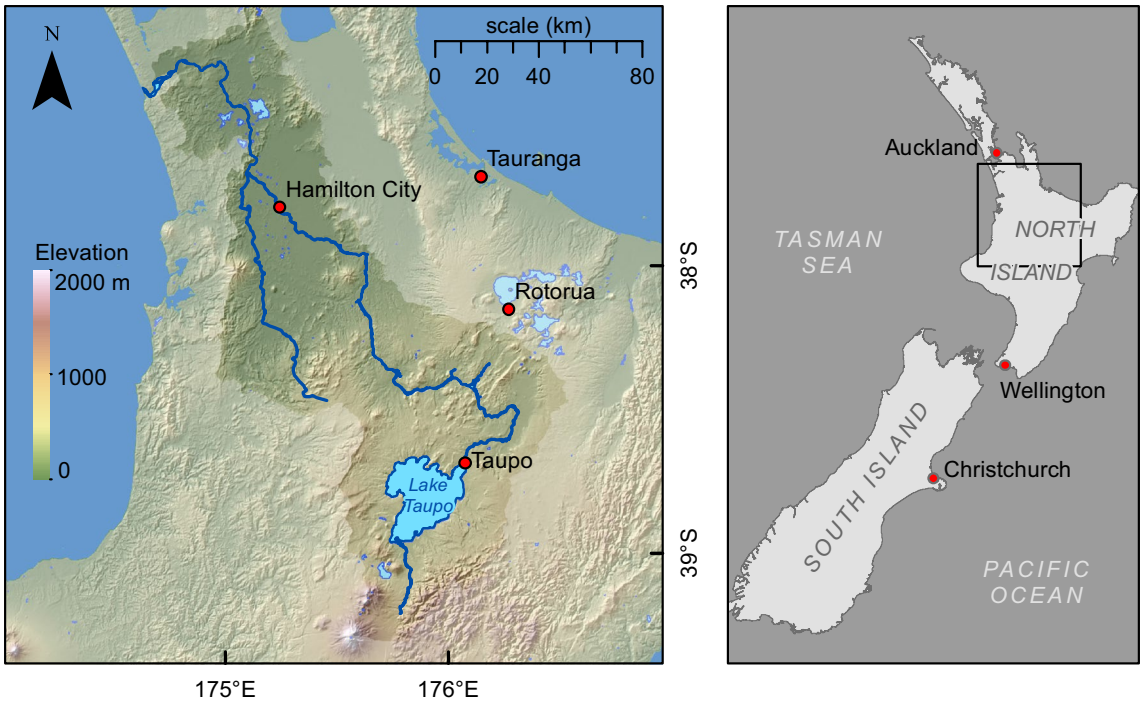

Fig. 2 Map of Waikato River, showing drainage basin (*shaded*) and major metropolitan areas

contributed to economic growth in New Zealand, Waikato-Tainui saw the decline of their rich fisheries, particularly eels and whitebait, which for generations had been central to their way of life.

Māori political and socio-cultural group identities in the Waikato River region are quite complex. The Waikato River is important to several iwi (tribes) and exclusively so at certain stretches of the river (Ngati Tuwharetoa, Raukawa, and Te Arawa River Iwi Waikato River Act 2010). Each iwi comprises several hapū (sub-tribes) and whānau (extended families) within each hapū. There are two other important levels of political and social organization as well. First, clusters of whānau are organized into marae (communities), and this is the level at which many important political decisions are deliberated before voting occurs at higher iwi levels. Second, the Kīngitanga, an Aotearoa New Zealand-wide political association established in the mid-1800s to resist Māori land appropriations, is centered politically within the Waikato-Tainui iwi. Each of these groups within the Waikato River region has its own history, knowledge, and responsibility for the Waikato River. To allow room for Māori-Anishnaabe cross-case analysis, our paper focuses on the work conducted at the Waikato-Tainui iwi level.[5]

In 1995, Waikato-Tainui became the first tribe to negotiate a contemporary settlement with the Crown to address historical grievances. The Statement of Claim returned some lands to Waikato-Tainui, while preserving the right to revisit the claim to the Waikato River at a later date. In 2008, the Deed of Settlement for the Waikato River was ratified, leading to a commitment by the Crown and Waikato-Tainui to enter a new era of co-management over the Waikato River (Te Aho 2009). The Waikato River Settlement is underpinned by the principles mana o te awa (health and well-being of the river) and mana whakahaere (health and well-being of the people), and the overarching purpose of the settlement is to "protect the health and well-being of the river for future generations".

GTB and the Ottaway River: taking down dams to let the river run free

The Ottaway River runs for 80 kilometers in Northwest Michigan, passing through a landscape of forests, fields, and towns before flowing into Lake Michigan (Fig. 3). The Ottaway River project involves the removal of three dams and the modification of one dam, making it the most comprehensive dam removal and watershed restoration effort in Michigan's history. Water in all its forms is considered a living member of GTB's extended family and is revered as one of the most sacred beings to the Anishnaabe people.

[5] For an in depth analysis of the politics of various Waikato River Māori groups' care for their river, see Muru-Lanning 2016.

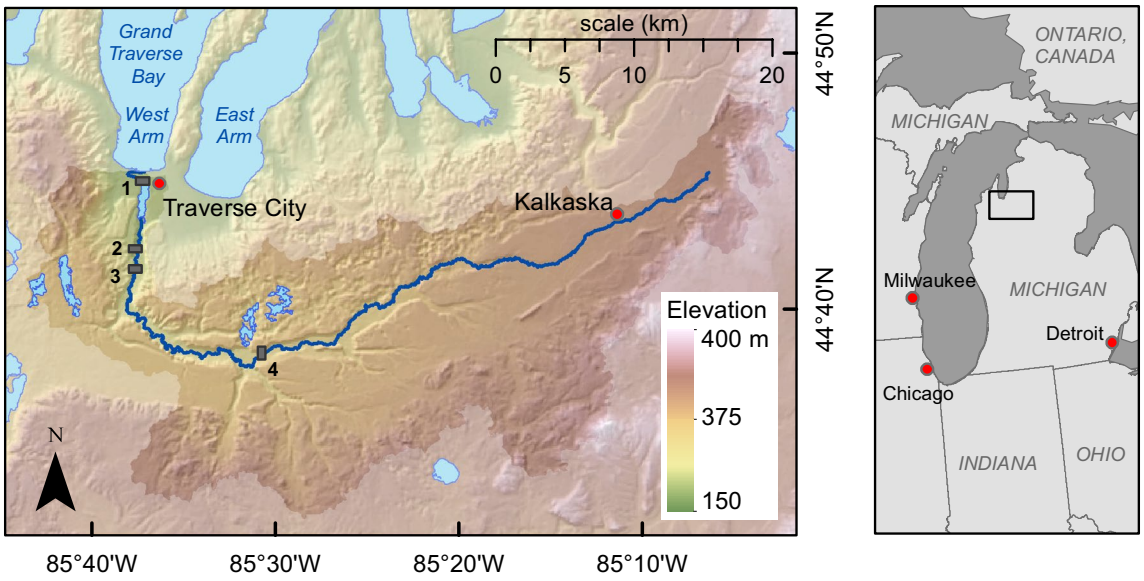

Fig. 3 Map of Ottaway (AKA Boardman) River showing drainage basin (*shaded*) and major metropolitan areas. Also shown are the locations of former dams and dams slated for future removal or modification (*gray boxes*)

Commercial and subsistence fishing are woven throughout GTB's history through to the current era. The Tribe views the dam removal project as a healing process for the river, for Mother Earth, and for the GTB community.

This river restoration project is possible because of relatively recent political and legal rights restored to GTB. Despite thousands of years of continual occupancy in the region, between 1872 and 1980 the Ottawa and Chippewa Indians of the Grand Traverse area were not formally recognized as a tribal government by the United States. While leaders of the various bands of Anishnaabe from the Grand Traverse Bay region had signed several treaties with the US government in the 1800s, including the 1855 Treaty of Detroit, one particular clause in this 1855 treaty was erroneously interpreted by the Bureau of Indian Affairs as terminating the trust relationship between the federal government and the Tribe (Fletcher 2006). In 1980, after 108 years of not being acknowledged by the US government, the Tribe was federally re-recognized as the Grand Traverse Band of Ottawa and Chippewa Indians. With federal recognition, GTB was able to access federal funding, create basic human service programs, and establish a natural resource and environmental management team highly respected by peer groups across the country.

Jurisdictional issues, particularly the political dynamics of jurisdiction, complicate the Ottaway River restoration initiative, making the process more challenging for project partners. For instance, GTB has sovereign authority over natural resource management decision on their tribally owned lands. Additionally, they have off-reservation treaty rights within the 1836 ceded territories comprising a large portion of the State of Michigan, where they co-manage fisheries in the Great Lakes and inland fish and wildlife alongside state and federal partners on public lands.[6] Yet, the Tribe has very little direct authority over land use decisions on private lands within these ceded territories. The Ottaway River crosses through all of these land designations, and thus requires a diverse mix of partners and decision-making strategies, from planning stages through implementation.

Walpole Island First Nation and the St. Clair River: resisting degradation of the river and reclaiming community health

The St. Clair River is a 65-km-long river that flows south, draining Lake Huron into Lake St. Clair and forming part of the international boundary between Ontario and Michigan. The river flows through a heavily urbanized and industrialized landscape, with the most development around Port Huron in Michigan and Sarnia in Ontario at the northern end of the river, where there is a large petrochemical complex. There are 27 industrial facilities in Canada and six in the US along the river (Fig. 4).

The river branches into several channels near its mouth at Lake St. Clair, creating the Walpole Island Delta, which

[6] The State of Michigan refuses to call this work "co-management" despite the fact that the provisions of the Great Lakes and inland consent decrees connected to the Treaty of 1836 follow very closely the definitions of co-management in the literature, e.g., Pinkerton 1994.

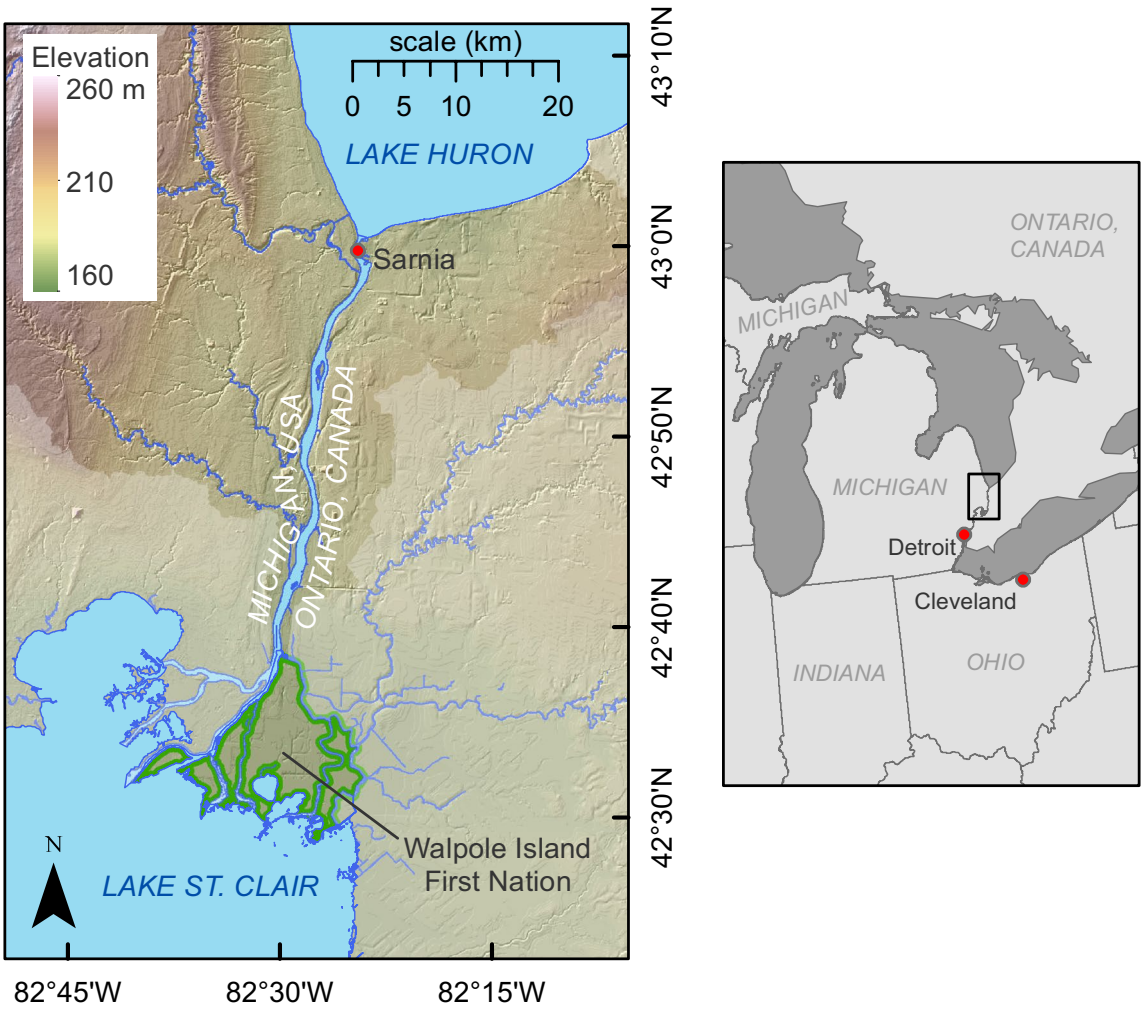

Fig. 4 Map of St. Claire River, showing Bkejwanong (Walpole Island First Nation unceded territories) outlined in *green*, drainage basin (*shaded*) and major metropolitan areas

is home to Walpole Island First Nation. In the Anishnaabe language, the area is called Bkejwanong (where the waters divide). The six islands that make up the delta have tall grass prairies, a Carolinian forest, and the most diverse wetlands in all of the Great Lakes Basin. Walpole Island First Nation (WIFN) is part of the Ojibwe, Potawatomi, and Odawa people, who together comprise a political and social compact known as the Council of Three Fires. It is an independent First Nation with the distinction of being "unceded territory", which means that it has never been established or set apart as a "reservation". WIFN has sovereign control over land use and resource management decisions within its unceded territories, and remains politically engaged in its much larger traditional territories, for instance by being a central actor in ecological restoration efforts within the Thames River watershed.

The people of Bkejwanong actively care for their waters in a number of ways, including environmental monitoring and research, government-to-government political activities at local, provincial and national levels, and caring for waters spiritually. This spiritual path sits at the center of all the community's water-related work and is led by a group of women of Bkejwanong known as Akii Kwe (Earth women) (McGregor 2008). According to Anishnaabe traditions, women have the responsibility to care for water spiritually and to speak on behalf of water. In Bkejwanong, Akii Kwe is fulfilling these responsibilities by consulting with elders and conducting water ceremonies (McGregor 2008). The community recognizes that it is on a path of healing human community members following the traumatic impacts of colonialism, as well as healing the water, which is also viewed as a living member of the community or extended family.

While the tribe has been sustainably managing this ecosystem for thousands of years, land use change on Walpole Island and upstream pollutants are currently creating

challenges to sustainable management. WIFN has worked to protect the river, which, as Anishnaabe people, they believe is an obligation. They are active in remediation and restoration of the St. Clair River in their territory, sitting on bi-national advisory committees and partnering with environmental groups and other communities. But, WIFN has limited political and economic power, and tribal members see themselves as being in the early stages of healing the river and their community.

Enacting Māori and Anishnaabe ways of knowing through river restoration in Waikato-Tainui, GTB, and WIFN

In this section we highlight the ways that communities are enacting Indigenous knowledge in their river restoration processes. First, we explain how the enactment of Indigenous knowledge is tied to Indigenous ways of knowing the world, which frame reciprocal relations of care between rivers and people. We show that ceremony is a prerequisite to and a core part of Indigenous river restoration, and that it is a constitutive element of each community's spiritual relationship with its river. Both ceremony and Indigenous ways of knowing the world are inseparable from communities' original languages, Anishnaabemowin and te reo Māori. Second, we discuss how Indigenous knowledge was enacted in our project through sharing stories and experiences and by traveling to each other's rivers. An important finding is that participation in this project became an enactment of Indigenous knowledge, as well as part of the restoration process.

Enacting Indigenous knowledge

For Anishnaabe and Māori people, rivers are living ancestors that require some help from people to heal damages and illnesses caused by people. By providing care for these ancestors, in part through ceremony, people themselves (or communities) are undergoing their own healing processes by restoring their relationships with rivers. This creates a depth of commitment to restoration that goes well beyond the ecological rationales that generally motivate other river projects. AT notes, "I feel like if, for Waikato-Tainui, if we were not involved, we would be lost. I can not even imagine us not being involved."

All three communities expressed a similar obligation, even in the face of difficulties. As a WIFN woman observes, even though it has been difficult at times, there is an unwavering commitment to "upholding our responsibility as Anishnaabe people, the responsibility that has been handed down to us by the Creator, to take care of the environment and take care of the land and take care of the river" (AJ). Outsiders might not always understand the depth of these Indigenous commitments. MW from GTB recalls: "We *still* have folks that say, 'What's in it for you? Why are you doing this?' And it's mind-boggling, that mindset, Why are you there? What's in it for you?". He explains that the Anishnaabe have a "deep-rooted attention to stewardship", which has nothing to do with the specific benefits implied by outsiders' questions. The enactment of Indigenous knowledge can also shift the time frame of restoration, reflecting a deep commitment to future generations. TR, who has been heavily involved in riparian restoration projects for Waikato-Tainui, emphasizes, "a hundred year time line is fine. We don't just focus on the immediate" when restoring the river's health.

The enactment of Indigenous knowledge is borne out of the understanding that rivers are ancestors whose well-being and existence are inseparable from each community. During one of our meetings, CR from WIFN recounted his discussion with a Penobscot Nation citizen about his community's relationships with rivers:

> He spoke of the river and how he related to the river as, 'it's who we are, we are the river.' "Giikidaa", he says, "The river is us. The river is in our veins." And if we explore this, we can come to a realization that it is so true, that if we do not take care of these things that are given to us to sustain in life, our teachings suggest that it can be taken away. And we as a people in our community understand, we know that if our Mother becomes sick, then we will become sick. If the rivers are the lifeblood of our Mother and they become contaminated, then the same happens to us.

Similarly, the Anishnaabe understand that "water provides life to all things on Mother Earth and we know that we are in water before we are born into this physical world" (JC). Waikato-Tainui also "see our river as an ancestor, as a single body, with its own body with its own life force" (HP), which means that "[we] are the guardians and protectors of the River. We have a duty to try to make people understand that the assault on the River, our ancestor, must stop" (Deed of Settlement 2008, p12). For Waikato-Tainui, it is not possible to separate the well-being of the river from the community, since:

> The river "is a being, a mother, a complete and whole body comprising the water, the bed and the banks from its source to the sea. The life of the river and thus of the tribe is in its intactness—no limb struck from its body or the head separate from the heart ... [it] looks after us throughout our lives. The river feeds us, nurtures us, and takes care of us, healing our hurts and protecting us from harm" (Ibid. 10–11).

If the river is sick, the community suffers, and it is important to "ensure the water is healthy for her well-being as well as the benefit of the whole community" (JC). For Waikato-Tainui, when people are sick, they go to the river, to "anoint themselves and be healed ... To us, the most important thing about the River is the water's healing power" (Deed of Settlement 2008, p. 11). Further, the healing relationship is reciprocal (Te Aho 2009). As AT describes: "The river is our ancestor, she provides us with life as we do her; hence reconnecting our people to their awa tupuna (ancestral river) is a priority if we are to restore her well-being." Social problems in indigenous communities are inseparable from the health of the river. They continue to exist because, "to us, our river is an indivisible being from which we draw life. As a Tribe we draw our identity from her. Our Tribe, our iwi [tribe], we are Waikato-Tainui. She is classed as a degrading waterbody, and because she is sick, then we are too, and this is reflected by the social issues we face as a tribe" (AT).

Ceremony and prayer are central parts of this relationship, and all three communities use water ceremonies and other offering ceremonies to show their appreciation for the rivers and to help care for the spirit of the rivers. For example, Māori do their "threes" and "sevens" at the river's edge.[7] Anishnaabe offer tobacco and other gifts to the river. As life givers, Anishnaabe women have a special relationship with the water. Women express that connection through prayer, conducting water ceremonies when appropriate, and protecting the water.

Indigenous ways of knowing and communicating with rivers depend on original languages, and prayers spoken in Anishnaabemowin and Te Reo Māori are important because they are direct conversations with spiritual entities that have occurred over many generations, specifically in those languages. Indigenous languages are also integral parts of community identity, and using the languages signifies indigenous leadership or contributions to the restoration process. As CR from WIFN explains:

> In our language when we say bi—just that sound alone—it acknowledges life. There's something about that sound that connected with our people, our ancestors, and they understood it. It was so clear. Bi, nibi. In our language when we say nibi, we're referring to water. But it's so much more than that. Nibi is life. Ziibi (river). They would stand out along the rivers edge and thank our Mother Earth for ziibi. You hear that sound in there, bi. Ziibi makes reference to that water that flows. If I share in English it would be 'a river', but it's so much more than that.

For Māori, waiata (song) provides an important oral record of their ancestors and their association with places, events, activities, thoughts, and emotions. Furthermore, they help people identify with the land and water. As AT notes: "We have a song that we are taught as children called 'Waikato te Awa.' It is a song that traces a waka (canoe) journey from the source of our river to the mouth, denoting significant sites along the banks of the river. It tells the story of who we are as a people and our connection to the land and water." In all three communities, language revitalization is fundamental to cultural revitalization, which is interwoven with river stewardship.

Indigenous knowledge as process: coming together and sharing stories

Through our research, we found that indigenous knowledge is best understood as a process, rather than just the incorporation of traditional ecological knowledge into a restoration plan. Specifically, collaboration and sharing, with both Native and non-Native community members, are enactments of indigenous knowledge. AJ from WIFN notes: "And so that's what we're shooting for, instead of just having a little bit of traditional knowledge here and a word from our chief in the beginning. We want to lead this, because it is our responsibility as Anishnaabe people to look after the land because it looks after us." This approach has practical consequences, as tribes take the lead in restoration, access funds, and assume responsibility, while partnering with outside agencies and the wider community. In case of the Ottaway River restoration, "there would be no project without the GTB ... government agencies did not want to take the legal risk [associated with being in charge]. Funds from the BIA and EPA came at a critical point" (FD).

The river restoration process supported by indigenous knowledge is about "everybody working together ... to try to walk in a good way" (HB). 'Walking in good way' begins with communities being more directly involved in the restoration process. In all three cases, community members have "gone from being researched to doing research" (AT). This involves activities ranging from day-to-day monitoring on Walpole Island to equal representation on governing bodies overseeing restoration of the Waikato River. 'Walking in a good way' is also about sharing stories and perspectives with the wider, non-tribal community. Each of the river restoration projects necessitates cooperation with many other agencies and partners, and in the case of dam removal on the Ottaway, "What's really been the eye opener and what's really been the benefit of the Tribe's

[7] For Waikato-Tainui, three or seven *whakaritenga* (ritual) are part of a prayer that seeks blessing, safepassage, and anointment by acknowledging the Mauri (life force) of the river and their ancestors.

involvement in this is really waking up the state government, the local units of government, the local community, non-tribal community, to the importance of the river to the tribe" (BF). In some cases, this might be the first time that a wider community has the chance to listen to native perspectives on environmental degradation and restoration. As GTB tribal counselor MW explains with regard to public meetings around dam removal:

> Then to have one of our counselors at this meeting, with the public, explain that his ancestors have been there for thousands of years ... to have tribal council sit there and explain to people ... you could hear a pin drop. You could feel the response in the community as they start to understand the ties between the indigenous people of that land and the waters that were there.

This exchange has affected the work people are doing to restore their rivers in very tangible ways. AT explained: "This project has been a direct contributor to invoking and maintaining excitement, particularly in our youth, for river restoration and freshwater management." Other participants similarly noted how the project changed and deepened their relationships within their own communities, re-establishing trust and strengthening bonds. A natural resource manager for GTB explained that having tribal leaders on the team meant that "they felt it [the empowerment of the knowledge exchange] along with us, and that's what really, really made the difference" (BF).

Importantly, participating in one another's ceremonies and sharing knowledge and experiences did not just remain within the tribes. Rather, this was often re-translated to the non-native community, which then influenced the restoration process. As GTB councilor MW explains:

> What we learned in New Zealand about ... the way their Tribe looks at the river; we're so used to looking *at* the river, we never bother to think about looking *out* from the river and that's certainly something that we've learned. It's that the grandmother river is looking out at us, the way we're behaving and maybe doesn't look the same way that we might relate to the pieces that we want to restore; the river looks out. And I think that has certainly allowed us to talk to the design engineers and the consultants that work on these projects and have them, maybe not understand it at a spiritual level, but let us explain at an ecological level, supported by data, with that spirituality behind it.

We also found that visiting each other's communities and rivers, sharing stories, and comparing experiences through this project were important enactments of indigenous knowledge. During the exchanges, elders shared stories of how they remembered their rivers. A Waikato-Tainui elder explained, "I was born by the river. We could drink from the Waikato, and eat fish ... we cannot do that now. We are looking towards the grandchildren" (PN). A WIFN elder similarly recalled, "We used to swim back in the creek near here. We would bend over and drink it. From the big river too. We trusted it. Now I am scared to stick my feet in it" (EI). These stories, coupled with "actually being in the community on the land and seeing the communities' connections to the things that they're doing, and their pride with what's happening, and their sadness in some of the things that are happening" (AJ) created powerful exchanges between participants and influenced their work back home.

Discussion

In our collaborative research process, the community researchers discussed their perspectives about and experiences with river care, illuminating the specific ways that their Anishnaabe and Māori nations view and approach restoration. They also clarified aspects of the broader cultural contexts of their restoration work to help find insights into our original research questions. These cultural contexts were demonstrated through ceremonies and protocols that the entire research team participated in, within each respective community. Participation in cultural practices then opened the door for dialog about cultural teachings, community perspectives about water and rivers, and how river restoration fits into these community-specific cultural contexts.

Before we could begin to understand the relational aspects of Māori and Anishnaabe river care, we needed to appreciate each community's perspectives of rivers as living beings. For the Māori and Anishnaabe partners, rivers are simultaneously living relatives and very old ancestors. As living beings, rivers have rights and require care from the human community. Communities describe their restoration work in caregiver terms, similar to caring for an aging relative. As with medical practitioners and their patients, healing is a two-way process where doctors need to listen carefully to their patients before diagnosis or treatment can begin (Long et al. 2003). Our community partners' restoration work begins much the same way, by listening carefully to their rivers throughout the restoration treatments. JW noted: "to understand what the river needs, we have to look at what the river sees. Getting community members out on the river helps us view the world from her eyes. We'll know our Nanny [the Waikato River] is on a healthy path when she can take care of herself."

For GTB, WIFN, and Waikato-Tainui, the well-being of rivers and people is inextricably linked. If the river is sick,

communities are sick. Restoration processes are thus for rivers and people, and getting Native community members to simply spend more time on and with rivers is part of the healing process and methodology in all three communities. For Waikato-Tainui this takes the form of getting people down to the river to help with monitoring, to pick up trash, do riparian planting, and participate in customary river activities such as waka ama.[8] For WIFN, this means doing community-based research into species such as leopard frogs, which are disappearing (likely as a result of chemical pollutants). In the case of GTB, it has been about bringing the community together around dam removal, while ensuring that "cultural values will provide a framework" for the process (HB). For example, the GTB Natural Resource Department has facilitated river floats for tribal citizens as an action-based methodology for soliciting tribal citizen preferences and priorities for the project.

Ceremonies and protocols were central to our collaborative research project, serving to legitimate the exchange of Indigenous knowledge. Participation in these activities happened early in each of our community site visits. For example, in Walpole Island, the Aakii Kwe traditional women's group conducted a water ceremony with all of the knowledge exchange participants. And, when we visited a marae (gathering house) in a local community of Waikato-Tainui, the local hosts welcomed us using specific cultural protocols including songs and speeches by elders conducted in te reo Māori. It was critical for us to be welcomed into the Māori community by listening to them speak on their own terms in their own language. One WIFN Councilor, who was deeply affected by this experience, took the story back to his Band Council, which is now looking to re-instate its own Anishnaabe welcoming ceremonies. We found participation in these ceremonies to be an important example of how Indigenous people "do" research.

Although it was not one of our explicit research goals going into this project, we learned a lot about research collaborations between academic and Indigenous partners. We developed strong interpersonal relationships among all the collaborators, emphasizing collaborative fieldwork and spending time together "on the land", taking care to include ample time for both formal and informal collaborator interactions (Parrado-Roselli 2007; Huntington et al. 2011). Our experiences also reinforced and corroborated existing lessons from the community-based participatory research literature concerning the importance of sovereignty, ethics and informed consent, and intellectual property rights when working with Indigenous nations (Harding et al. 2011; CTKW 2014). We strove to ensure the active involvement of communities in the entire research process, from conceptualizing focus of the project to collecting, analyzing, and interpreting the information or data to disseminating the results (Fisher and Ball 2003).

Conclusion

Returning to our original question about the nature of Indigenous knowledge in river restoration, enacting Indigenous knowledge in river restoration means that Indigenous communities need to be present *physically* in the restoration process. In other words, Euro-American actors cannot just consult with Indigenous communities or "use" their Indigenous knowledge in their science and engineering processes. Bringing young people to their rivers seemed particularly important in all three cases. Indigenous communities need to be *intellectually* present as well, with Indigenous minds involved in project conceptualization, implementation, and evaluation. They need to be present politically, with Indigenous voices, leadership, and language publically and visibly involved in the restoration, advancing the standing of Indigenous communities and their governments within their regions and globally. It also means creating space within the institutions and procedures for Native people to do things their own way. In part, this means Indigenous people are *spiritually* present in the work. For the three Indigenous communities involved in this research, river restoration is embedded in human–water relationships, relationships that emerge from and are maintained in part through cultural and spiritual practices including ceremony.

Enacting Indigenous knowledge through river restoration also has consequences for how we think about restoration in the wider society, broadening the definition to include deeply cultural dimensions and making space in restoration for multiple ways of knowing and being. Because Anishnaabe and Māori people recognize rivers as living, spiritual beings, caring for rivers requires spiritual work, making water ceremonies and other related ceremonial processes key in these communities. For example, Anishnaabe communities will often open and close important meetings and projects with pipe, smudge, or sunrise ceremonies and/or songs from a ceremonial drum group. On Walpole Island, the women's group Akii Kwe helps take care of the water, understanding their rivers as one of many "veins that lead to the heart ... [and therefore] we cannot let it die" (BW). The women pray over the water and thank the Creator for the water. The ceremonies are intricate and ancient, involving traditional foods and medicines, songs, and offerings to water spirits. Ceremonies such as these feed the spirit of the water and strengthen human–water bonds, reminding people of their relationships with water including interdependencies and

[8] Waka ama means outrigger canoeing. For example, see http://www.wakaama.co.nz/stories .

human responsibilities for caring for rivers and other water beings (McGregor 2014).

However, in most instances, river restoration requires partnership, and not all partners hold the same (or any) beliefs about spiritual dimensions of water. Nevertheless, when non-Indigenous partners participate in an Indigenous partner's cultural protocols, it can be helpful to the restoration process by creating awareness of the interdependencies between humans and rivers, facilitating cross-cultural dialog that can enhance relationships among partners, and by acknowledging that the norms of Indigenous communities are just as valid as those of Euro-Americans or Paakehaa (Anglo New Zealanders). Following the norms of Indigenous partners (e.g., how meetings are started or concluded, decision making rules, etc.), at least when working or meeting in their territories, goes a long way towards recalibrating unequal power relations that exist between Indigenous, state, and NGO actors.

Collectively, the restoration work being done by WIFN, Waikato-Tainui, and GTB represents "a shift in thinking around traditional approaches to both human and biophysical relationships ... towards respecting more relational ontologies of connection" (Wilcock et al. 2013, 590). In our research, we saw evidence of Indigenous-led projects inspiring change in the environmental institutions charged with managing and restoring rivers (Salmond et al. 2014, p. 55), creating spaces for the inclusion of new meanings, processes, and outcomes in restoration. In all three cases, we found evidence that river restoration was repairing human–river relationships within both indigenous and non-indigenous communities, and that emerging approaches to river restoration (e.g., dam removal) could be guided by Indigenous knowledge. Put differently, in the words of an Odawa elder, through this project we witnessed the ways in which "the visions and teachings of the past flow through the waters of today and into the waters of tomorrow" (HB).

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