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Dam removal blind spots: debating the importance of community engagement in dam decommissioning projects

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This article calls for social justice within the transition from dam building to decommissioning. Dam decommissioning is escalating in the global north, and sooner than later, the tied will spread to the global south. Though dam removal is an essential strategy for riverine landscape restoration, it may yield negative social outcomes for communities living along dams. Ecological restoration must not be achieved at the expense of local communities. Decisions on dam removal are predominantly made by experts and government agencies, often to the exclusion of local communities. For this reason, the decisions to remove several dams in the global north have been opposed by local communities leading to suspension or, in worst-case scenarios, reversal of such decisions. By referring to cases from Europe, USA, and Canada where dam removals have been opposed, this article argues for better incorporation of local communities in decision-making. Community consultations and consent are key in achieving successful decommissioning with minimal harm on communities. Yet, they have not received sufficient attention in dam removal conversations. The socio-economic issues are also not sufficiently interrogated in the literature on dam removal. We underscore this gap and provides recommendations for best social performance in dam removals.

KEYWORDS

communities, indigenous people, FPIC, livelihoods, dam removal, culture, megadams

1 Introduction

Large dams are 15 m (or more) high from the lowest foundation to the crest, or impound more than 3 million cubic meter of water. Small dams are below 15 m in height and impounds less 100 surface acres of water (International Commission on Large Dams, 2011). Dams- both small and large- are hubs for such essential services as clean energy provision, irrigation, flood control, navigation, water supply, tourism opportunities and outdoor recreational activities (Chaffin and Gosnell, 2017; Schiermeier, 2018). However, dams are also associated with multiple negative impacts on aquatic ecosystems including transformation in the natural flow of rivers, and ecological characteristics of river channels and floodplains (Bednarek, 2001; Schiermeier, 2018). Most dams have a 50-year life span. After this period, decisions need to be reached to whether maintain or decommission them. Decisions to decommission dams are informed by several factors relating to functionality, public safety, relevance, economic viability, obsolescence, costs, as well socio-environmental impacts (Neave et al., 2009; Foley et al., 2017; Duda and Bellmore, 2021; Department of Environment Land Water and Planning, 2022; Duda et al., 2023; Matanzima and Mosuoe-Tsietsi, 2023). Research shows that the reasons for decommissioning dams may vary from

one context to another (Babbitt, 2002; Pohl, 2002). For example, in California in the United States of America (USA), dam removals are at their peak due to environmental concerns, whereas in Wisconsin meeting maintenance costs and safety issues are taking center stage (Pohl, 2002). In the developed world water supply and access is not a major problem. Therefore, removing obsolete dams is the best option (Grant and Lewis, 2015), unlike in under-developed countries (Perera and North, 2021; Perera et al., 2021). Furthermore, partly due to the high cost and competing demands, dam removals are less prevalent in resource constraint contexts.

In Europe and USA dams are removed at an accelerated pace. By 2022, in such countries as France, Finland, Spain and the United Kingdom, a total number of 5,000 culverts, old weirs as well as small (and large) dams had been decommissioned (American Rivers, 2022). In 2021 alone, 239 barriers were removed, with Spain alone having removed 108 barriers/small dams/weirs (Smart Water Magazine, 2021). By 2021, over 1,800 dams in USA had been decommissioned (American Rivers, 2022). Twenty first century is a decisive era in the field of dams, in which discussions about removal are becoming prominent. Arguably, it is becoming imperative to plan for decommissioning throughout the life cycle of a dam, as the processes can be complex, and the socio-environmental dynamics are constantly changing.

Robust community/stakeholder engagement guidelines are urgently needed for decommissioning planning and performance. Largely because such projects attract a conglomeration of many agents with diverging and converging interests including Non-Governmental Organizations (NGOs), government agencies, local communities, civil society and social activists—each with their own agenda regarding dams and the likely short- and long-term impacts of removing them (Sneddon et al., 2017). Understanding these divergent [and convergent] stakeholder values and agendas about dams is crucial in identifying and resolving conflicts about river restoration. This paper asks fundamental questions surrounding community engagement processes in cases where dam removal projects intersect with land connected peoples' water rights and interests. It shows gaps in the literature in this regard; and argues for an imperativeness of empirically rich case studies that would aid in understanding the social aspects of dam decommissioning.

In general, research has shown that environmentalists, engineers and other experts involved in different projects tend to bypass community engagement processes (Watson and Waterton, 2011; Madiya, 2021; Healy, 2022); and there is a similar risk within current and future dam decommissioning projects. Current literature mainly calculates ecological and economic costs, with little attention paid to social costs. We highlight this gap to propel decommissioning practices that are socially responsible and inclusive. Dam building studies reveal many socially irresponsible practices that can be corrected in decommissioning.

2 Current themes in literature

The bourgeoning dam removal praxis in the global north, has engendered a surge in studies that focus on their economic and environmental costs (Stanley and Doyle, 2003; Bellmore et al., 2017; Foley et al., 2017; Duda et al., 2023; Matanzima and Mosuoe-Tsietsi, 2023). However, most studies are about experiences from the USA. Even in the US, there are also many dam removal cases that have not been studied. Of the 1,796 dam removal cases in the Dam Removal Information Portal (DRIP) of the USA Geological Survey, only 203 have been studied so far (Wieferich et al., 2021). Although dam removal is common in many other developed nations in Europe and Australia, scientific information about what is happening on the ground is still scant (Tonitto and Riha, 2016). Global trends are required and are imperative in formulating guidelines for best practice, and in informing decisions about whether, and how best, to decommission dams (Bellmore et al., 2017).

Studies from the US estimated the economic and environmental costs (including sedimentation and flooding) of dam removal (Shuman, 1995; Doyle et al., 2011; Duda et al., 2023). In terms of economic costs, studies have shown that it is costly to decommission dams; and costs are contingent on different factors including "dam characteristics (dam height and material), hydrography (average annual discharge and drainage area), project complexity (inferred from construction and sediment management, mitigation, and post-removal cost drivers), and geographic region" (Duda et al., 2023, p. 1). For example, Duda et al. (2023) compiled reported costs from 455 unique sources for 668 dams removed in the USA from 1965 to 2020. From this survey, a model estimating dam removal costs was recently developed. It would be good if such a model is applied in different case studies to test its relevancy. Most models that have been used to determine dam removal are based on economic costs, and technical and ecological models (Zheng and Hobbs, 2013; Null et al., 2014; Duda et al., 2023), and not much on the social.

However, despite the notable negative costs of dam removal, there are also positive effects (Bednarek, 2001; Doyle et al., 2005; Grant and Lewis, 2015). For example, river or stream restoration results in increased biotic diversity through a boost in spawning grounds and habitat enhancement (Bednarek, 2001). Other scientists and ecologists have developed models for understanding ecological responses to dam removal (Bushaw-Newton et al., 2002; Bellmore et al., 2019). However, the rate at which ecological restoration occurs in different rivers vary (Hart et al., 2002; Doyle et al., 2005). Doyle et al.'s (2005) study of several dams decommissioned in the USA indicated variations in outcomes of removal, with each of the ecosystem attributes responding to dam removal in varied ways and rejuvenating at very different rates, ranging from months to decades. For example, riparian vegetation required extensive time for recovery than macroinvertebrates.

Given that most studies focus on environmental and economic aspects of dam removal, will social issues be well researched and will engineering companies consider engaging communities? Because the social costs of dam removals have not been sufficiently researched, the differential impacts on affected communities are not yet fully documented. Some studies have focused on how dam removals impact on people's interactions with dams from the socio-cultural perspective (Doyle et al., 2000; Lejon et al., 2009; Magilligan et al., 2017; Perera and North, 2021; Matanzima and Mosuoe-Tsietsi, 2023). Communities often oppose dam removal, and this has been the focus of some studies (Babbitt, 2002; Lejon et al., 2009; Jørgensen and Renöfält, 2012; Magilligan et al., 2017). Most of these conflicts are covered in the media, and not in academic writing. Using a Swedish example, Jørgensen and Renöfält (2012) examined media coverage of conflicts about dam removals. However, there is still a need to

carry out similar research in other regions. Data on such conflicts are crucial in establishing better pathways of engagement that mitigate conflicts.

However, the social effects of the removal of dams can also be positive (Adams et al., 2023). For instance, in a study by Leisher et al. (2022), it was reported that the removal of two dams in the state of Maine, USA, resulted in changes in the recreational activities and opinions of the local population regarding the river. After 5 years of dam removal, there was an improvement in people's perception of water quality, swimming, paddling, fishing, and wildlife observation. Additionally, more individuals indicated that the river had become an integral part of their family's life.

A few important studies on dam decommissioning mention the importance of community engagement (see for example, Born et al., 1998; Tonitto and Riha, 2016; Arthington et al., 2023; Jumani et al., 2023) and its potential contribution to successful dam removals (Jadallah et al., 2019; Adams et al., 2023). However, in some studies, there is no full problematization of "community"; in terms of what it entails, its main tenets and limits, within the dam removal contexts. In some studies, community engagement issues are mentioned in passing on studies that are about other issues, without offering any guidelines for community incorporation. For example, Tonitto and Riha (2016) emphasize that guiding principles of a dam removal processes should, among many things, include:

> *"(1) stakeholder engagement to navigate the complexity of watershed land use, (2) an impacts assessment to inform the planning process, (3) pre- and post-dam removal observations of ecological, chemical and physical properties, (4) the expectation that there are short- and long-term ecological dynamics with population recovery depending on whether dam impacts were largely related to dispersion or to habitat destruction, (5) an expectation that changes in watershed chemistry are dependent on sediment type, sediment transport and watershed land use, and 6) rigorous assessment of physical changes resulting from dam removal, understanding that alteration in hydrologic flows, sediment transport, and channel evolution will shape ecological and chemical dynamics, and shape how stakeholders engage with the watershed"* (Tonitto and Riha, 2016, p. 491).

Apart from being outdated, Tonitto and Riha' (2016) study does not engage thoroughly with their suggestions for community engagement and what constitutes sound community engagement practice. Furthermore, a 3-tier decision-support framework for dam removal in California, also have stakeholder engagement in its third tier, and this is not discussed in sufficient details (Jumani et al., 2023).

3 Who are the key stakeholders in dam removal projects?

Stakeholder engagement is "a two-way process of communication and influencing decisions between a project and its stakeholders. It is an ongoing process throughout the life of a project" (Reddy et al., 2015, p. 58). Reddy et al. identify key reasons why stakeholder engagement is essential, and these includes:

> *"building strong and mutually beneficial relationships with project stakeholders; improved understanding and decision-making; the identification and management of project impacts on communities and related social risks; the identification and management of project risks in relation to time, budget and reputation and maximization of benefits for all stakeholders"* (Reddy et al., 2015, p. 72).

Effective stakeholder engagement in dam removal processes requires an identification of key stakeholders in each case. There is a need to ask crucial questions on who is affected in each dam removal case; how they are affected and involved in this case; and to what extent they should be involved as participants and as decision makers in dam removal. More importantly, there is a need to interrogate who should make decisions and who is involved in these processes.

In general, a myriad of key stakeholders are identified in each mega-infrastructure project (Reddy et al., 2015; Smyth and Vanclay, 2017). With regards to dams, in our own experience of studying dams, we realized that dams have owners, managers and different users. Among the owners and managers are the private entities, individuals, government departments and NGOs. Dam users are diverse, and this diversity is contingent on the location of the dam. These include NGOs, churches, farmers, traditional landowners and First Nations People/Aborigines (in rural/regional areas), local communities (in urban areas/cities), ranchers, wildlife conservationists, researchers and so on. All these groups interact with dams in different ways. Therefore, when we talk of key stakeholders, we need to understand the context of the dam, its owners, managers, and users. Evidence shows that owners and managers (informed/advised by ecologists, biologists, and other experts) are involved in decision-making processes to decommission dams; while communities (both rural and urban) who are reliant on these dams in their everyday life are largely excluded. We, therefore, emphasize community engagement in dam removal processes as they affect dam end users.

4 Why do we need effective community engagement in dam decommissioning projects?

Communities, both indigenous and non-indigenous, have water rights, which dam decommissioning projects may intersect with, as well as with their interests, lives and livelihoods. This then raises fundamental questions regarding stakeholder engagement in dam decommissioning. Magilligan et al. (2017, p. 982) concur that "removing a dam requires scientific and technical expertise, coalition building across multiple stakeholders, and political/regulatory will". Indigenous people's rights over land need to be respected by any developments that affect their lives by altering environment. The decommissioning of dams affects waterways and require construction works in-country, which may have implications for land- and natural resource-based livelihoods, and cultural property. For communities living downstream in particular, the disruption of lives and livelihoods resulting from

dam decommissioning may include potential accidents from flooding (Pohl, 2002).

There are also negative environmental consequences of demolishing a dam, such as the alteration of riverscapes, which brings new ecological characteristics [dis]similar to what existed before (Bellmore et al., 2019). Inevitably, such environmental changes alter everyday relationships between water and people. As river flows are restored, water management and governance regimes may change, causing new forms of water rights and conflicts to emerge (O'Donnell and Talbot-Jones, 2018). The participation of diverse stakeholders (including Indigenous and non-Indigenous) increases their willingness to negotiate which mitigates these conflicts and failures (Lejon et al., 2009; Reddy et al., 2015).

Studies show that if communities feel neglected, they may reject or disrupt dam removal proposals (Gosnell and Kelly, 2010; Fox et al., 2016; Hommes, 2022). This may cause delays (Arthington et al., 2023), increase project costs, and result in reputational damage, as illustrated below. Effective collaboration promotes the formulation of sound and sustainable decisions by recognizing and communicating the needs and interests of all stakeholders including local communities. As well, collaboration instills a sense of trust between communities and dam removal practitioners. For example:

> *The decommissioning of three small dams along the Boardman/Ottaway River took over 15 years of collaborative engagements among a wide range of stakeholders including federal, state, tribal, and local governments, and many non-governmental organizations. The relationships, trust and commitments that strengthened cooperative engagements among the project partners are highlighted in the signing of the Project Partnership Agreement between Grand Traverse Ban of Ottawa and Chippewa Indian communities* (Fessell et al., 2023, p. 35).

Planning for dam removal in advance by engaging with local communities and land connected peoples is also essential as options for ensuring community safety and livelihoods restoration may be identified early on. Alternative livelihoods, for example, can be identified before the dam removal to prevent impoverishment among the affected people. Furthermore, informed decisions on which dams to decommission and when they should be removed can be arrived at when communities are included. For example, the Swanton Dam along Mississippi River was initially proposed during discussions among the Vermont state, a private utility (Central Vermont Public Service) and local communities in 2001, over the removal of the Peterson Dam, located on the nearby Lamoille River. Rather than removing the Peterson Dam, which local officials perceived it as creating economic benefits through the provision of clean energy, the utility opted to decommission the Swanton structure on the Missisquoi as an alternative.

Additionally, engaging with stakeholders including local communities is increasingly integrated in legislative requirements in various jurisdictions, and in some cases, it may also have implications for access to financing. International Finance Institutions, for example, require that projects reveal proper stakeholder engagement protocols and processes as a condition for receiving funds (IFC, 2012; World Bank, 2017). Research in the USA and Europe has shown that the decommissioning of dams is a costly process (Duda et al., 2023), and often requires external financing (Matanzima and Mosuoe-Tsietsi, 2023). Thus, entities initiating dam removals will likely require funding from financing institutions, and will need to demonstrate clear stakeholder and community engagement protocols. The IFC PS1 in particular, emphasizes that:

> *a) when affected communities are subject to identified risks and adverse impacts from a project, the project will undertake a process of consultation in a manner that provides the affected communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the project to consider and respond to them; b) the degree of engagement should be commensurate with project's risks and adverse impacts and with concerns raised by affected communities; c) for projects with potentially significant adverse impacts on affected communities, the project will conduct ICP (informed consultation and participation) process that will result in the informed participation of affected communities. (IFC, 2012, p. 13-14)*

5 Conflicts about dam removals

Conflicts over dam removals emerge in many contexts where dams are being removed; even well-planned projects often result in unexpected contestations (Babbitt, 2002; Lejon et al., 2009; Doyle et al., 2011; Magilligan et al., 2017). Studies show that failure to effectively engage with stakeholders culminates in disputes between communities, dam owners, and decommissioning firms (Lejon et al., 2009; Fox et al., 2016; Magilligan et al., 2017; Green, 2022). Ecological restoration proponents' interests can be in conflict with those of local communities (both indigenous and non-indigenous) who value their dammed landscapes (Poff et al., 2003; Magilligan et al., 2017). As Doyle et al. (2011) writes, several dam removals-related "battles" are ideological, demonstrating deep contrasts in values or identity regarding socio-cultural historical meanings accorded to the dam. There are several socio-cultural and political issues that generate discontent among communities, leading to opposition toward dam decommissioning. Also, environmental harm that disturbs people's cultures may cause resistance among local landowners and communities. Below we discuss the cultural, social, economic and political factors that induce contestations during dam removal projects.

5.1 Cultural factors

At the heart of most conflicts in dam removal contexts are socio-cultural issues. People who reside alongside dams for many years tend to develop strong cultural and religious ties with them (Lejon et al., 2009; Magilligan et al., 2017; Green, 2022). In Sweden, for example, where hydropower dams have been in place for many decades, they have become inextricably connected with cultures and are valued parts of the natural environment (Klein, 1999). Historic dams such

as the 22-meter-high Prosperina Dam near Mérida in Spain, are preserved as cultural heritage (Schiermeier, 2018). In situations like these, finding a balance between the significance of functioning ecosystems and cultural-historical values can be a complicated procedure.

Because reservoirs are entangled in people's senses of place, it can be difficult to convince indigenous groups to consent to decisions regarding dam removal. Specifically in the USA, some communities have objected to dam removal projects on the ground that they are remnants of industrial heritage that should be preserved. Dams are an inextricable part of heritage, history, and memory. Even in cases where the construction of dams may have destroyed indigenous people's (in)tangible cultural heritage, over time the dams themselves become entangled in new forms of heritage and history with which local communities begin to identify. New socio-cultural meanings and attachments are forged over space and time. For example, the removal of Homestead Woolen Mills (HWM) Dam in the USA was vehemently criticized by local communities because it threatened to destroy the cultural meanings that they attached to this decades old structure. Decisions to remove this dam were reached between a proactive state agency and the dam owner, who were of the opinion that the dam needed to be removed for safety concerns and the fulfillment of environmental restoration goals. The dam had been constructed in 1820. After an inspection in 1997, the state's Department of Environmental Services (DES) sent a "Letter of Deficiency" (LOD) to the dam owner demanding that the dilapidated dam be eliminated by 1998, and the owner agreed, ultimately filing a request in 2000 to breach the dam. During the filing process, the Town of Swanzey approached DES to buy the dam and prevent its decommissioning. The town's people contested the removal of the dam, citing loss of cultural heritage and wanting to uphold the dam that they considered to be a symbol of local identity (Mullens and Wanstreet, 2010; see also Magilligan et al., 2017).

5.2 Socio-economic factors

Dams have socio-economic benefits to societies, including sustenance of fishing, tourism, recreation, conservation, and cultures (Perera and North, 2021; Jumani et al., 2023). In one stream impounded by several dams in Sweden, people vehemently opposed the decommissioning of the dams Bruksfallet and Bultfallet, because they were socio-economically important to them. Such opposition led to the suspension of the dam removal project. People feared losing recreational opportunities because the communities located in the vicinity of the waterscape use it for recreational activities such as fishing, swimming and boating. Likewise, in the USA, initial opposition against the removal of the Elwha dam came from local populations who enjoyed boating and fishing in the lake (J. Helfield, cited in Lejon et al., 2009). Dam removal may also impact on local property values (Provencher et al., 2008). Where, for example, recreational infrastructure was built to suit dam landscapes, the same infrastructure may not be necessary on a flowing river, which then impacts its monetary value.

5.3 Environmental factors

Conflicts concerning dam removal are fundamentally connected to how societies interpret landscapes. Communities may not be ready to accept temporary environmental effects that arise from decommissioning. As Lejon et al. (2009) argue, communities often hold wrong information regarding the consequences of dam removal. The major misconception is that dam removal may lead to nothing but a muddy pool. Additionally, local communities are worried about their safety due to potential environmental risks, such as accidents causing flooding, which may arise from the removal of the dam. In 2011, a small number of first nations people collaborated with the Greenfield Historical Association (GHA) and the Museum of Our Industrial Heritage (MOIH), to oppose the removal of the Wiley and Russell Dam on Massachusetts' Green River, arguing that its decommissioning would wipe away an important symbol of the region's industrial history and culture. On top of that, local people contended that removing the dam would culminate in devaluation of property and some believed that it would have negative environmental impacts (Magilligan et al., 2017).

5.4 Political factors

Dam removal praxis transpire in socio-politically charged contexts. Dam removal goals, as Magilligan et al. (2017) writes:

> *are contingent on broader institutional networks of power and influence. Research shows that complex bureaucracies delay dam removal processes, and in some cases decisions to decommission dams can be reversed by institutions that perceive dam removals as flawed and not advancing their political interests and those of the public* (p. 982–994).

Thus, local communities tend to align with institutions that support their cause for social protection. Politicians often tend to capitalize on local communities' anger against decommissioning to reverse dam removal decisions. Such an assemblage of different actors against dam removal is important to investigate further in all dam removal cases where they are prevalent, to understand their complexities and ultimate impacts and suggest resolution pathways. Dam removal emerges from intricate socio-political processes shaped by dynamics at different local, national and regional levels. Fox et al. (2016) and Magilligan et al. (2017) in the New England's dam removal initiatives, contemplating removals of reservoirs constructed before 1850 that fueled early industrialization and economic development in USA. Socio-political dynamics at local level dictated the outcome of dam decommissioning these cases (Magilligan et al., 2017).

6 Dam removal policy landscape in the global north

The development of dam decommissioning policies is a recent phenomenon in several jurisdictions. Policies are important as they stipulate considerations for dam removal for their owners. Such

considerations differ from country to country. However, the general rule across policies is that dam owners should calculate impacts and costs before removing a dam. After this, particular steps for removal must be followed including site reconnaissance, feasibility study, community consultation, designing and permitting.

For many years, dams were decommissioned in the absence of policies, safeguards and guidelines of best practice (Doyle et al., 2011). Despite advances in dam removal policy design in the global north, there is still a need for more scientific research to inform their review and further development (Doyle et al., 2011). Additionally, there is a lack of policy analysis in the literature on dam removal. Without sufficient scholarly analysis, it becomes challenging to comprehend the effectiveness of policies, safeguards, and guidelines in the process of removing dams.

It is crucial to have appropriate policies that are informed by an understanding of the impacts on geography, ecology, economy, and society when it comes to dam removal. Doyle et al. strongly recommended the need to develop and implement two sets of policies: "(1) the development and adoption of a prioritization scheme for what constitutes an important dam removal, and (2) the establishment of minimum levels of analysis prior to decision-making about a dam removal—which would help mitigate the social and environmental shortcomings experienced in dam removal" (Doyle et al., 2011, p. 453). Since their recommendation to develop such policies, several governments in the global north have developed dam removal policies; but what is lacking is analyses on the effectiveness of these policies.

Policies in the global north do recognize the need for better incorporation of indigenous communities within dam decommissioning decision-making processes. The following are examples of policies that recognize community participation in dam removal praxis across Australia, USA and Canada. In the state of Victoria, Australia, the government through the Department of Environment, Land, Water and Planning (DELWP) has introduced a policy that guides the decommissioning of large dams.[1] This policy does mention the need to consider community relationships with the dam and the potential concerns decommissioning may bring. It argues that the "*views of stakeholders will be an important part of making a decision on the future of a dam*" (Department of Environment Land Water and Planning, 2022, p. 2). It further recognizes the need to "*partner with traditional Owners [of the land in which dams are to be decommissioned and those to be impacted by floods] in the decision-making process when selecting a decommissioning option to understand the impacts*" (Department of Environment Land Water and Planning, 2022, p. 2).

Furthermore, the Guidelines for Dam Decommissioning Projects designed by the United States Society on Dams (2015) consider the need to identify key stakeholders and consult with them in dam removal projects. It states that: "*any proposed dam decommissioning project will require the involvement of applicable federal, state, and local government agencies, and any affected Native American Tribes*" (p. 21). It further notes that:

> *"A host of other project stakeholders could include public utilities; a wide range of nongovernmental organizations (NGOs) including The Nature Conservancy, American Rivers, Trout Unlimited, and Friends of the Earth; local businesses; and private citizens. Landowners directly impacted by a proposed dam decommissioning project, and members of the local community, are important stakeholders in the project. Water users in the vicinity of the reservoir or served by the downstream river channel may be impacted by changes in both the quantity and quality of groundwater supplies resulting from drawdown of the reservoir and by the release of impounded sediments to the river. Public utilities may be impacted by the project if water pipelines or electrical transmission lines cross the dam or reservoir, or by the loss of a source of hydroelectric power. It is very important to identify all potential stakeholders early and to involve them in the decision-making process"* (p. 23).

In Canada, the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Ministry of Forests Lands Natural Resource Operations and Rural Development (2019) published a Dam Decommission Guidelines document under the auspices of its dam safety program. It also acknowledges that consultation is an important component of the dam removal processes, and it hinges on the principle that those affected by proposed projects should have an opportunity to provide input (Ministry of Forests Lands Natural Resource Operations and Rural Development, 2019). It also acknowledges that many dams and reservoirs provide benefits to communities; thus, their removal may have adverse impacts on local communities and their environments. Therefore, before proceeding with a dam removal project, the owner must take into account potentially significant adverse environmental, social, economic, health and heritage effects. Once identified, prevention or reduction strategies should be developed. Section 5.2.1 of the guidelines clearly states ways in which First Nations can be consulted. Although the duty to consult rests with the Crown, in certain cases the dam owner may be expected to:

> • *Involve First Nations in relevant studies* • *Incorporate community and traditional knowledge into baseline studies* • *Identify First Nation interests that may be affected by a proposed project* • *Identify and develop measures to prevent, avoid or mitigate any potential significant adverse effects on First Nations' interests. (p. 18)*

As shown across the three policy examples provided above, we notice some similarities within the policies, guidelines, and safeguards about dam removal mainly in connection with recognizing local communities. Such a recognition is spread across three different nations. There are many other state, country and regional specific policies being developed. Emphasis is on ensuring that they emphasize stakeholder/community engagements.

The application of policies, safeguards, and guidelines require constant adjustment in relation to the changing dynamics on the ground. It is only through empirical analysis of policies that this can be achieved. Although empirical studies that assess issues regarding community engagement at the decommissioning stage may begin

1 A large dam is one with a height of 15 m (49 ft) or greater from lowest foundation to crest or a dam between 5 m (16 ft) metres and 15 metres impounding more than 3 million cubic metres (2,400 acre·ft).

in the global north, the same practice can also benefit the global south in the future.

7 Conclusions, recommendations, and directions for future research

This paper does not provide guidelines for community engagement best practice, it only highlights that it is an imperative, and shows key social issues that need to be incorporated within policies and guidelines for dam removal. The development and implementation of sound policies and guidelines are key in ensuring social best practices in dam decommissioning. Jurisdictions where dam removal is being considered as an option for ecological restoration should draw lessons from Canada, Australia and USA.

Furthermore, communities, civil society groups, and implementing agencies, need to ensure that policies are effectively implemented. This can be achieved by clearly communicating key aspects of the guidelines to affected stakeholders, to enable transparency during implementation. Local people's concerns can go unaccounted for if policy implementation is not sufficiently monitored.

Existing policies have room for improvement as many caveats persist. One of the major concerns is that stakeholder engagement is only emphasized before dam removal processes, and not during and after dam removal. We strongly emphasize the need to incorporate communities throughout the entire decommissioning process. Responsible authorities need to enter into agreements with communities about socio-economic development in the region post-dam removal. This ensures that communities are sustainably empowered even after the dam removal. There is also need to identify what benefits a free-flowing river can bring to the communities and how they can benefit.

Another weakness in the policy landscape is the vagueness about what it is at the local community level that needs to be preserved. Beyond consultations, there must be clearly defined tangible and intangible heritage of the affected people within the guidelines and safeguards that should be safeguarded. However, it is understandable that provisions for what should be preserved will vary from one context to another.

Currently, most dams that are being removed are small. The social and environmental harm emanating from demolishing small dams is of a lower magnitude compared to decommissioning a large dam. In particular, the current removal of small dams should be perceived by different stakeholders as opportunities to learn and gain experience and insights to inform large-scale decommissioning that may have even greater impacts. Hence, it is important to plan now, and to raise awareness for just dam removal processes.

Most dams in the developed countries are managed by different government departments and agencies, water authorities and private entities. All dam owners should commit to inclusively engage in adequate community engagement and consultation processes with landowners, communities, and indigenous peoples. Identification of all concerned key stakeholders in each case is key. Local communities (both indigenous and non-indigenous) should be given opportunities to offer (or not to offer) free, prior, and informed consent after all the benefits and setbacks of dam removal have been explained to them in accessible language. After providing consent, communities must participate in dam removal processes, and be meaningfully involved in decision-making.

Environmental and social impact assessments (ESIA) should be carried out to understand the social and environmental issues at stake in dam removal. In terms of the social, there is a need to consider the following questions: *Who are the local stakeholders? How will they be impacted by the dam removal? What can be done to minimize social impacts?* In terms of the environments, there is a need to understand: *What is the distribution of environmental features in the area? What environmental impacts are likely to result from the dam removal? What are the social implications of those environmental impacts? What can be done to minimize the environmental effects?* Local stakeholders must be involved in all the ESIA processes.

7.1 Directions for future research

Despite growing interest in dam removals, research into their adverse consequences remains scant (Schiermeier, 2018). Currently, the field is dominated by ecological and biological data gathered through scientific research methods. Qualitative interpretations of the implications of dam removal on the ground are limited, hence are urgently needed. Social science research is key in identifying the social problems associated with dam removals across the spectrum of processes.

Research also needs to trace trends of dam removal since its peak in the 1990s, with the aim of identifying and learning from past weaknesses in relation to stakeholder engagement and associated implications. We need to understand why conflicts emanated from (un)successful dam removal projects, and how such conflicts were navigated.

There is also a need for post-dam removal studies to understand longitudinal (in)tangible impacts on local communities. These can be carried at 5-to-10-year intervals. Comparative studies of the global north and south cases studies are useful in establishing sound international and regional safeguards. This will make it viable to establish sound dam removal safeguards, policies, guidelines, and standards at both national and international levels, that can lead to successful restoration of rivers, while not impinging on people's needs and rights.

Comparative analyses of removals between Indigenous and non-Indigenous communities are essential largely because the two are bound to be impacted by dam removal processes in different ways. Research about the Indigenous communities should be participatory and collaborative. Indigenous communities must not be at the margins of research part they should be actively involved as equal partners with researchers, government agencies and NGOs. This is essential in achieving theoretical and practical output with justice at its core.

Furthermore, scientific research is required in deciding on which dams to remove (and not to). It has been noted that "some dams are better candidates for removal than others, such as those where the benefits of removal outweigh the uses and benefits of the

dam" (Babbitt, 2002, p. 657). Scientific studies can help identify the best candidates with potential social and economic impacts on communities.

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