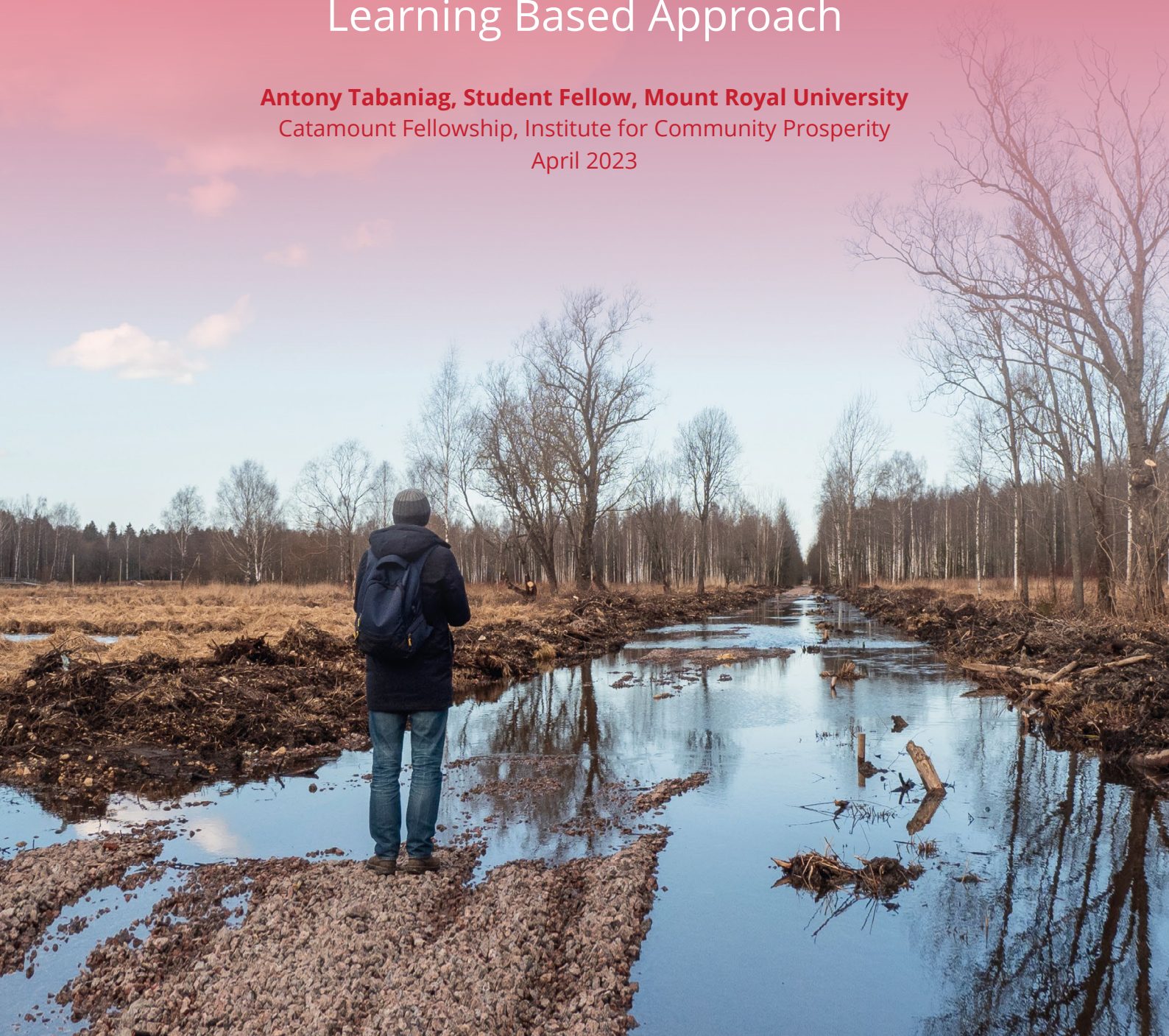


# Changing Paradigms in Water Resource Management: A Community Participation and Social Learning Based Approach

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**In Partnership with**

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# ACKNOWLEDGEMENT

Given the nature of this report and the subject matter I would like to begin by acknowledging that this was written at the confluence of the Bow and Elbow Rivers on traditional lands. In the spirit of respect, reciprocity and truth, I honour and acknowledge Moh'kinsstis, and the traditional treaty 7 territory and oral practices of the Blackfoot confederacy: Siksika, Kainai, Piikani, as well as the Îyâxe Nakoda and Tsuut'ina nations. I acknowledge that this territory is home to the Métis Nation of Alberta, Region 3 within the historical Northwest Métis homeland. The traditions and knowledge of these nations allowed for a harmonious existence with nature and inspired generations to maintain this harmony with nature. Finally, I acknowledge all Nations, indigenous and not, who live, work, and play on this land, and who honour and celebrate this territory.

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# FOREWORD

The following report was created in partnership with the City of Calgary's Climate and Environment Department and as such the context of this work was informed by water management in Calgary. Additionally, it contains specific references to the Canadian system and some of the history behind water management in Canada. However, the intent of this work is to be as broadly applicable as is possible, to that end content and recommendations have been generalized to some degree.

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# INTRODUCTION

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The purpose of this paper is to critically examine the manner in which we govern watersheds and highlight opportunities to bring about positive change in the system. In order to do so, some assumptions must first be outlined. The first assumption is that the current system of top-down and government led management is not the ideal form of watershed management. The second assumption is that an Integrated Watershed Management approach is better suited to modern times. Taken together it implies that the future of watershed management is rooted in a much more local and participatory approach. The literature supports this as Integrated Watershed Management implies managing all human activities and natural resources in a coordinated and sustained model whilst creating solutions that respond to and involve local concerns and stakeholders (Behmel et al., 2018; Szetey et al., 2021).

Integrated Watershed Management represents a significant departure from the status quo and is something that must be considered carefully before implementing. To that end a brief literature review will be conducted to provide context behind the assumptions and serve as foundational material for recommendations. The areas of particular focus are governance structures and community participation, both of which are integral factors in a successful Integrated Watershed Management approach.

# LITERATURE REVIEW

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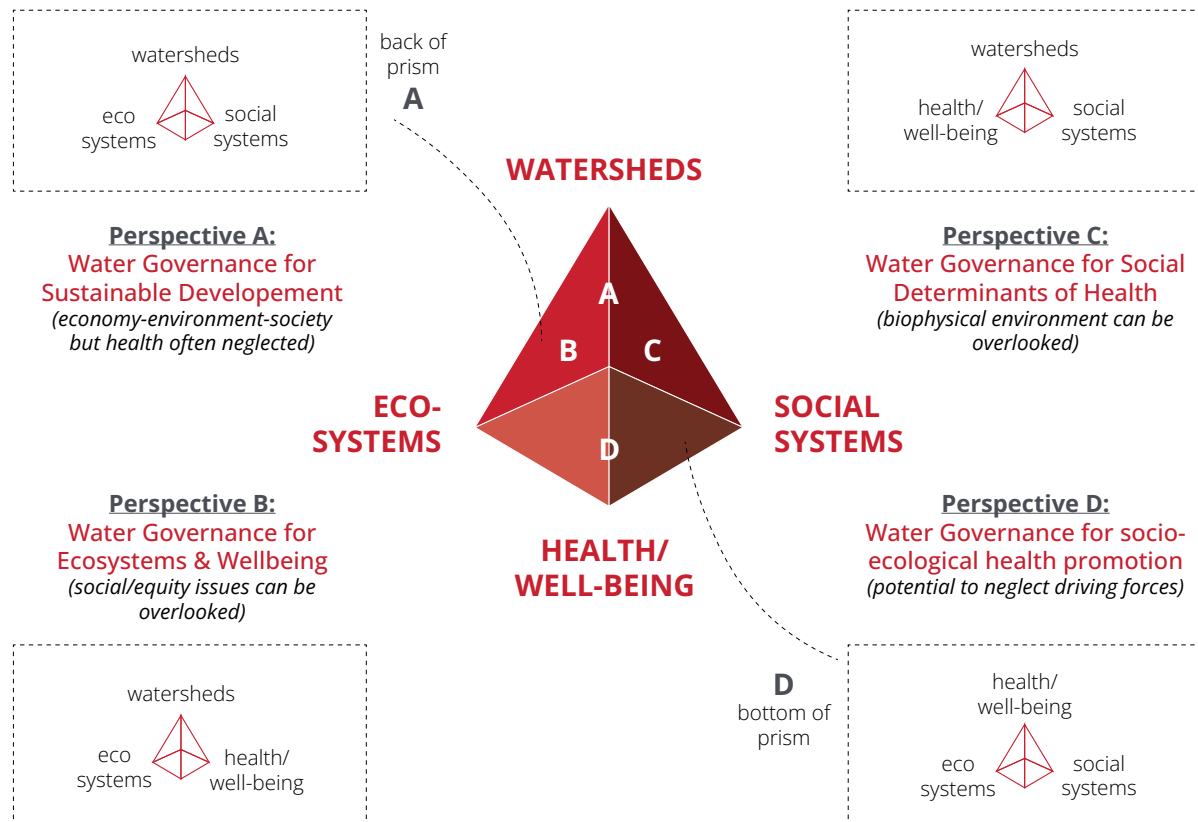
The Government of Canada itself recognized the need for better environmental management and subsequently passed the Canada Water Act in 1970, followed by the creation of the Department of the Environment in 1971 (Government of Canada, 2020). However the Constitution Act of 1867 created an unclear governance structure due to interjurisdictional separations of power (Government of Canada, 2020; Morrison et al., 2012). In practical terms this means that there are unclear lines between local, provincial, and federal institutions as to who has authority to manage and implement changes to watersheds (Morrison et al., 2012). **This structure has entrenched the top-down, government led approach to water management (Szetey et al., 2021). One could speculate that this entrenchment is the result of non-government bodies having little discretionary power over watersheds.** Whilst this approach is functional it restricts the ability for solutions to be area specific and involve community in the decision making process (Szetey et al., 2021).

Both Morrison et al. and Brandes & Maas suggest that the governance structure surrounding water management needs to be redefined in order to better encapsulate sustainability into the planning process (2012, 2006). They differ in that Brandes and Maas suggest the adoption of ecological governance which embeds ecological sustainability into both social institutions and the decision making process (2006). By taking this approach there is an extension of decision makers to include non-governmental actors, thereby leveraging the interconnections present between stakeholders and accepting their inputs as legitimate and desirable (Brandes & Maas, 2006). Furthermore, by including these non-governmental actors it changes the structure of the governance system into becoming ecological as it now incorporates an expanded set of values and principles into the decision making process (Brandes & Maas, 2006).

Morrison et al. utilizes the Watershed Governance Prism (see Figure 1) to re-contextualize watersheds themselves as sources of public health, thus framing water management as a social issue (2012). The logic behind this approach is that there is an implicit connection between the health of our water systems and the health of the communities that depend on them (Morrison et al., 2012). By framing it in this manner a connection is formed in the minds of the public, one that can be utilized to combat the disengagement experienced when discussing watershed issues independently (Morrison et al., 2012). The need for this is due to the ease at which water issues can be overlooked given the Canadian public has been insulated through the 'myth of abundance' and therefore not recognizing ecological concerns (Morrison et al., 2012).



**Figure 1**  
Watershed Governance Prism  
(Morrison et al, 2012).



One of the common themes between the governance literatures is that of reshaping the top-down approach into one that not only accepts, but **values community input in decision making**. The first step in doing so is to actually create the conditions for this to be possible. The top-down approach has the benefit of viewing things from a macro perspective, however, this does not always translate well to the community level and thus there is a need to localize the issues into manageable pieces (Szety et al., 2021). The purpose of localization is to tailor the broader goals into areas of relevant local interest, thereby allowing communities to understand how the larger system impacts them locally (Szety et al., 2021). This then creates pathways which can be leveraged in order to gain both the community's participation in conservation efforts and the local perspective on issues (Szety et al., 2021). It is important to note that

the effectiveness of these localization efforts and thus of local participation are influenced by the specific interests, needs, and concerns of the stakeholders involved (Basco-Carrera et al., 2017). As such there needs to be consideration taken in regards to the willingness of stakeholders to participate and the power dynamics between stakeholders that may either encourage or discourage participation (Voinov et al., 2016, as cited in Basco-Carrera et al., 2017). To address this Basco-Carrera et al. uses a Ladder of participation (see figure 2) in order to categorize stakeholders based upon their roles in the planning and decision making process (2017). Given the complexity and the number of stakeholders involved in water management, the ladder can be utilized to organize both the stakeholders that are participating and to identify stakeholders who are either disengaged or have been overlooked (Basco-Carrera et al., 2017).

These overlooked stakeholders may very well come from inside communities that are otherwise under represented as some definitions of community refer to a geographic area and thus may not account for the ethnicity, gender, or class of the area (Chiu, 2008; Lake, 1996; Peterson & Lupton, 1996, as cited in Gibson-Wood & Wakefield, 2013). By overlooking the diversity inside of communities, community engagement models may actually end up excluding marginalized groups from participating in environmental planning (Gibson-Wood & Wakefield, 2013). Furthermore the engagement methods often involve attending meetings or otherwise active participation, both of which place hurdles for disadvantaged groups through direct and indirect costs such as membership fees or transportation (Gibson-Wood & Wakefield, 2013). Financial hurdles may also be linked directly to the manner in which participation

is considered 'valid' and to engagement as a whole (Gibson-Wood & Wakefield, 2013). Traditional forms of 'valid' environmental action such as simply reducing consumption levels or by emailing in to petition for action exclude those who do not have the means to do so from feeling like active participants (Gibson-Wood & Wakefield, 2013). Similarly, disengagement from environmental issues may not necessarily stem from lack of interest, but may instead be a result of environmental issues not being a priority when compared to going through the immigration process or finding employment (Gibson-Wood & Wakefield, 2013). All of which speaks for the need for a systemic approach to environmentalism and community engagement in order to properly encapsulate diverse perspectives into the planning and decision making process (Gibson-Wood & Wakefield, 2013).



# INTEGRATED WATERSHED MANAGEMENT

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Fundamentally there are a couple of recurring themes throughout the literature review. The first of which is that the current system was not designed to incorporate the level of sustainability planning and community engagement that is now sought after. Additionally, from a purely practical standpoint it also places the entire burden of planning and implementation upon those with the power to act. The stakeholders for water are, put simply, each and every one of us, but planning can only be significantly affected by a relatively small portion of the affected population. The second is how community participation itself is currently sporadic and presents limited opportunity for the community to have their values implemented into plans. In so doing it creates a situation where those with the capacity to act do not have the capability to do so and may in fact result in disengagement from the system as a whole.

Integrated watershed management therefore presents a system that addresses both of these major themes. It expands the scope of coordinated planning to include all human activities and natural resources within a watershed and includes all stakeholders as part of the planning and decision making process (Behmel et al., 2018). In essence an Integrated Watershed Management program is itself community engagement and participation. This does not however mean that decision making power is transferred to the various stakeholders, rather it is a method to accept input from them whilst allowing decision makers to understand and incorporate this input into planning (Behmel et al., 2018). Therefore, the intent is to simultaneously build shared knowledge, attain better project acceptability, and develop trust and communication between decision makers and stakeholders.

This dissemination of information between the various stakeholders, be that researchers, community organizations, NGO's, and governments is one of Integrated Watershed Management's greatest strengths. Each of these stakeholder groups possess different experiences, different skill sets, and different knowledge bases. All of which can be leveraged by Integrated Watershed Management's participatory nature to facilitate social learning and thus improve the capacity for adapting to change. To that end, social learning is potentially a requirement for Integrated Watershed Management's long term success as it provides the means to expand the shared knowledge upon which participatory action can be built.

In essence, social learning is a term used to describe the process of building and sharing knowledge across multiple stakeholder groups (Medema et al., 2014). Social-ecological systems are extremely complex and therefore changes to this system can be unpredictable, thus social learning is a means to adapt to the uncertainties brought about by change (Medema et al., 2014). This is of particular importance given that change cannot always be controlled nor be deliberate, as external factors can bring about spontaneous large scale changes to the system. One could say that this is what contingency and disaster planning is for as their entire purpose is to ensure preparedness in the event of the unexpected. However it is important to consider how those contingency and disaster plans are created and what they encapsulate. Given the complexity at play, it simply does not seem feasible that any singular entity is capable of covering all bases at once. Social learning addresses this by using a more bottom-up approach in which information is dispersed through networks and collaboration to deepen the level of understanding so that when policy is made it incorporates more of the underlying systems.



# CHALLENGES

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There will be challenges in implementing this new system as it would require an alteration of the current dynamics which is inherently disruptive to the current system. It is therefore prudent to not only be cognizant of the expected barriers but to also plan for them. First and foremost is the question of who is participating and to what degree. Public responses will always be varied, as more organized groups or those in proximity to new projects tend to be over-represented whilst unorganized or marginalized groups may not be represented at all (Mostert, 2003). Furthermore, as was mentioned during the literature review, marginalized groups may simply have too little time or too many other concerns to become involved (Mostert, 2003; Gibson-Wood & Wakefield,

2013). Improperly reconciling this matter is of significant concern as it risks alienating groups who may otherwise be supportive of change, leading to disappointment and thus disinterest for further participation or reduce public acceptance of projects due to feeling unheard and undervalued (Mostert, 2003). As was established during the literature review, it is not due to lack of interest but rather a lack of means that prevents them from supporting environmental action plans. Thus it is imperative that these groups feel that they are able to meaningfully contribute in order to gain support and prevent needless opposition to environmental initiatives.

The second set of issues relates to the question of the response quality and consistency of decision making (Mostert, 2003). Given that water management inherently requires long term planning, there is reason for concern that the public would not recognize the need for such long term strategies or may otherwise be too ill-informed of future plans to plan accordingly (Mostert, 2003). This is exacerbated by the latter concern, as there is inherently no unified voice and thus may very well lead to contradictory decisions (Mostert, 2003). This then may very well lead to situations where public opinion becomes muddled to the extent that no clear direction can be determined.

All of which raises the question regarding how best to manage these concerns. For Mostert himself, the majority can be addressed via proper implementation of a public participation program and social learning (2003). This then begs the question of how to actually implement such a system into the real world. To this end, the following sections will delve into potentially useful frameworks that would allow social learning and by extension, Integrated Watershed Management as a whole.

# FRAMEWORKS FOR PARTICIPATORY ACTION PLANNING

The most critical aspect is to define how exactly members of the public participate in the decision making process. To begin, the boundaries of participation must be established. Mostert defines the lowest level of participation as information supply and the highest level as complete decision-making by the public itself (2003). Starting with the latter, this level of participation is unfeasible given the concerns outlined previously. The former, lowest level has in large part already been achieved through the various education and engagement efforts being conducted by government and charitable institutions. Thus, there is a need to explore options that address the middle ground between these two levels of participation.

An important distinction to make at this stage is that participation does not necessarily need to be entirely equal across the board. If it were viewed that way then public participation would become an all or nothing approach. To that end, the ladder of participation will become a crucial consideration for any realistic implementation. Originally devised by Arnstein in 1969 this laddering framework stratifies the levels of participation based on their power to implement changes in a system. Whilst there are numerous iterations upon the participation ladder, the model created by Basco-Carrera et al. will be utilized as it combines much of the earlier models together (2017).

**Figure 2**

*Ladder of Participation*



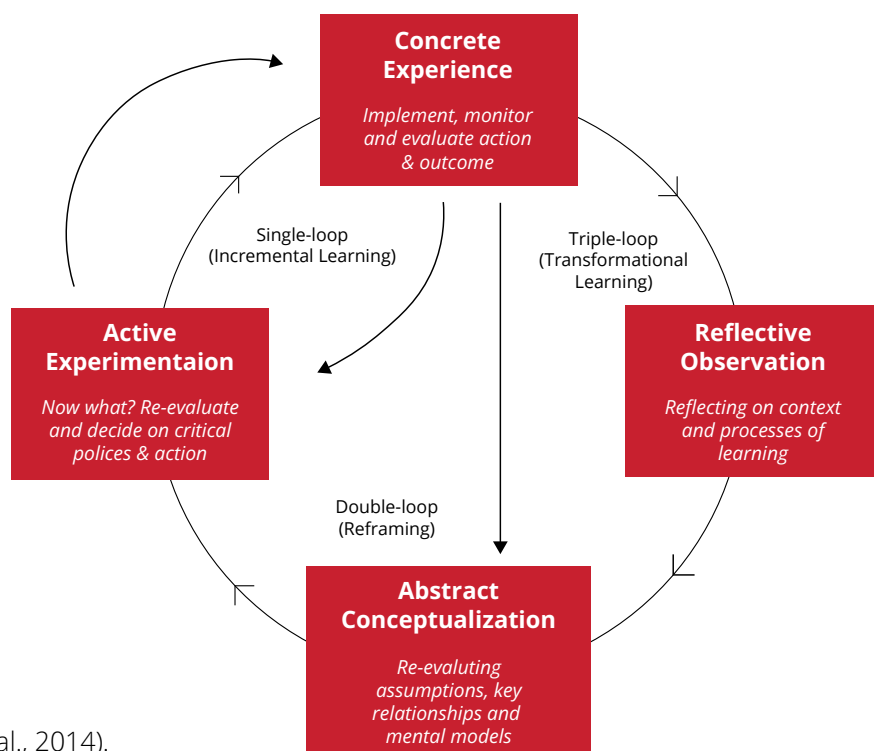
**Fig. 3** Ladder of participation for water resources planning and management (adapted from: Arnstein, 1969; Bruns, 2003; Mostert, 2003)

(Basco-Carrera et al., 2017)

Through the use of this ladder the roles and responsibilities of each various stakeholder can be assessed and therefore managed accordingly. For example, discussion with a community organization might be appropriate if a project directly impacts their community center. That same community organization might later be consulted about the project or simply made aware of a different project that affects a different area. Being able to create a process around how decision makers interact with the community is valuable in and of itself. This process can then be used to first consult or discuss projects with the community and through this engagement may lead into co-design initiatives.

Anecdotally, during the research process a community conversation was hosted and brought together academics, government representatives, charitable organizations, and some of the general public. During this discussion it was discovered that one of the charities had a pilot program that could potentially benefit from an existing program one of the other attendees was aware of. This serendipitous interaction only occurred because a conscious decision was made to facilitate discussion between groups that may otherwise never interact. Furthermore, the response from the academics was positive as they had a chance to both share their expertise whilst simultaneously learning about the real world barriers that some organizations experience.

Whilst the participation ladder provides context for who is participating and to what degree, it in isolation is insufficient at managing the complexity associated with Integrated Watershed Management. The other half of Integrated Watershed Management is structured around building and sharing knowledge. Thus, it has become prudent to discuss social learning in more depth. As previously defined, social learning is a means of managing the process of social change by facilitating learning from one another to the benefit of the wider system (Medema et al., 2014). More specifically, what is required is multi-loop social learning which incorporates an understanding of the limitations of existing institutions with learning oriented and participatory governance (Medema et al., 2014). The multi-loop process allows for different levels of participatory learning via an expanding set of goals from incremental learning, to reframing, and finally transformational learning (Medema et al., 2014).



(Medema et al., 2014).

As defined by Medema et al., (2014) single loop learning is following the rules whilst learning new skills and capabilities incrementally but does not challenge any of the underlying beliefs and assumptions about the system. Double loop builds off of this and begins to question whether the rules of the system need to be altered to prevent the recurrence of problems and issues. Furthermore, it allows for the creativity and reflection required to not only question the underlying system but understand why some solutions are more effective than others in solving a problem. Finally the third loop examines how individuals learn, what are the norms and values that guide the decision making process. It therefore seeks to change the context or perspective surrounding the issue and questions how those decision making systems could be changed. It takes what was questioned in the double loop system and asks whether it should be this way and if not, how it can be changed in order to allow it to function better.

The purpose for this is that the management systems around water are extremely complex with essentially unlimited stakeholders. As Medema et al. notes, policy makers tend to give more attention to policy development than implementation, yet eventually all policies are dependent upon how individuals interpret and act on these policies (2014). Thus, highlighting the need for multi-loop social learning to be incorporated into a system that is equipped to handle the varied goals and interests of stakeholders in addition to the power and trust dynamics that exist between them (Medema, 2014). To rephrase, the goal is not to remove independent authority to act but rather to incorporate social learning and participatory action into the existing system in an attempt to prevent disjointed learning and the siloing of information into small groups of individuals (Medema, 2014). To this end, this paper shall propose a combination of the ladder of participation and of multi-loop social learning as a potential avenue towards Integrated Watershed Management.

## Participatory learning matrix

	Initial Engagement		Collaborative Dialogue		Collaborative Creation	
<b>Transformational Learning</b>  How do we decide what is right?					Individuals question what led to the need for this solution and whether they have addressed the root cause with their solution	Individuals reflect on their decision. Consider how the current system influenced their decisions and if the system itself could be altered for the better
<b>Reframing</b>  Are we doing the right things?			Individuals consider who are the subject matter experts and whether the correct experts have been consulted	Individuals question why the issue occurred and how best to address it	Individuals question assumptions that they may have had during the design process and reflect on why a particular solution was used over alternatives	Individuals closely collaborate with one another to reframe the issue and determine whether they made the correct decision
<b>Incremental Learning</b>  Are we doing things right?	Individuals first learn of an issue	Individuals build a base of knowledge about the issue	Individuals seek subject matter experts	Individuals share knowledge and perspective with one another	Individuals learn from and leverage one another's skills and capabilities, while allowing each other to act in their areas of expertise	Individuals work to collectively deepen their level of understanding and use this to reach a mutual decision
	<b>Awareness</b>	<b>Information</b>	<b>Consultation</b>	<b>Discussion</b>	<b>Co-Design</b>	<b>Co-Decision making</b>

Participatory learning matrix. (Adapted from "Collaborative modelling or participatory modelling? A Framework for water resources management" by L. Basco-Carrera, 2017, *Environmental Modelling & Software*, 110-95 ,91 and "Multi-Loop Social Learning for Sustainable Land and Water Governance: Towards a Research Agenda on the Potential of Virtual Learning" by W. Medema, 2014, *NJAS – Wageningen Journal of Life Sciences*, 28-23 ,(6)69.)

What the participatory learning matrix seeks to accomplish is to map the journey from the moment individuals are first made aware of an issue all the way through to the decision making process. First and foremost, the Participatory Learning Matrix assumes that everyone, regardless of their role, will start from the left most column and progress through each column on the right. In doing so individuals will both expand and deepen their levels of understanding and experience as they learn from both one another and reflect on their own experiences.

This does not mean however that all applications for this matrix need to follow this progression. Rather, it may be entirely appropriate for the general public as a collective whole to remain within the initial engagement section or to limit the numbers involved in the collaborative creation sections. Whilst this is certainly exclusionary, it is out of necessity as a certain level of systemic understanding is required to avoid unintended and unwanted consequences of ineffective policies and decisions (Midgely, 2016). Therefore, it is a requirement of the Participatory Learning Matrix to fairly and knowingly assess where an individual's skills and capabilities could be utilized and to repeat this assessment process on a case by case basis. Recognizing that this presents a significant hurdle, current decision makers will shoulder much of the early burden in securing public acceptance of the program.

As this is intended to be a participatory form of learning, it will of course require collaboration in order to succeed. To that end, anecdotal evidence from research indicates not only a willingness for participatory action but actively desiring more collaboration between the actors in this sector. Should this hold true for the broader community then one could assume that the primary hurdle will be in altering the system to allow for participatory action and learning to flourish. The Participatory Learning Matrix alone is insufficient at accomplishing this task and must thereby rely upon the public and private sectors to build relationships based upon mutual trust. The methodology for which is beyond the scope of this paper. However, one potential route is to start with a small pilot program of interested parties who are willing to experiment with what works and what doesn't. Allow them to proceed through and iterate upon Participatory Learning Matrix, building trust between one another and organically expanding their networks of consultants as the needs arise.

## CONCLUSION

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The current system surrounding water resource management is under pressure to change. Be that from internal forces calling for more participatory action or from external forces of adjusting to the changing climate. Regardless of which forces are exerting this pressure, change is inevitable and thus the system is going to have to adapt in some regard. This will assuredly cause a great deal of uncertainty, however, it presents an opportunity to pursue meaningful change through an integrated water management system that empowers the community whilst building resiliency for any future changes. There will be numerous barriers that need to be addressed, one of which is on how to build and manage trust and relationships within this new system. One thing is certain, no matter how the system changes over time, there is no need for any one entity to go it alone. After all, in matters of water, everyone is in this together.

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