# Empowering marginalized communities in water resources management: Addressing inequitable practices in Participatory Model Building

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A B S T R A C T

Within the field of water resource management, Group Model Building (GMB) is a growing method used to engage stakeholders in the development of models that describe environmental and socioeconomic systems to create and test policy alternatives. While there is significant focus on improving stakeholder engagement, there is a lack of studies specifically looking at the experiences of marginalized communities and the barriers that prevent their fuller participation in the decision-making process. This paper explores the common issues and presents recommended improved practices, based on anti-oppression, related to the stages of problem framing, stakeholder identification and selection, workshop preparation, and workshop facilitation. For problem defining and stakeholder selection, the major recommendations are to engage diverse stakeholder communities from the earliest stages and give them control over framing the project scope. With regards to planning the model building workshops, it is recommended that the facilitation team work closely with marginalized stakeholders to highlight and address barriers that would prevent their inclusion. With the actual facilitation of the workshops, it is best to employ activities that allow stakeholders to provide knowledge and input in mediums that are most comfortable to them; additionally, the facilitation team needs to be able to challenge problematic interpersonal interactions as they manifest within conversations. This article focuses on building comfortability with political language so that the systemic oppression in which existing participatory processes occur can be understood, thus allowing GMB practitioners to engage in social justice efforts.

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## 1. Introduction

Significant threats to water resources around the world, and challenges in their sustainable management, are increasing due to numerous factors including population growth, agricultural pollution, urbanization, climate change, and unsustainable water resources management practices, among many other things (Campisi et al., 2012; Adamowski et al., 2009). Stakeholder engagement and participation is increasingly recognized as a critical aspect of sustainable water resources management (Inam et al., 2015; Halbe et al., 2014; Straith et al., 2014; Medema et al., 2014; Adamowski et al., 2012; Saadat et al., 2011). Involving the public in the decision-making process has many potential benefits that can improve the policy solutions put forward, though it does come at the expense of

requiring more time and effort put towards facilitating and supporting stakeholders through the entire process. However, the way stakeholders are identified, prioritized, and engaged with throughout the management process significantly impacts what results and policy decisions are produced. The composition chosen between government agencies, industry representatives, and community groups affects the discussions held throughout the process, resulting in different outcome goals and methods for achieving them (Moore and Koontz, 2010). As such, many different guiding principles, frameworks, and methods have been developed to determine which groups count as stakeholders and what their participation should be. The result is numerous methods that highlight and identify different kinds of stakeholder groups (Glicken, 2000; Prell et al., 2009; Hämäläinen et al., 2001; Mitchell et al., 1997).

While stakeholder participation can lead to more innovative and equitable solutions, equity is not necessarily promoted through processes of stakeholder participation. Taylor (2007), Williams

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(2004), and Hickey and Mohan (2005) have made important contributions to critical discourses around participatory processes and development. A number of different factors in the stakeholder selection and engagement stages can lead to the disenfranchisement of stakeholders in the decision-making, and this paper seeks to highlight and address those factors. Researchers and organizations using participatory decision-making processes must be cognizant of local and global histories of conflict and oppression, and consider how the processes are embedded within those histories.

Participatory Model Building (PMB) is an increasingly popular form of stakeholder engagement within water resource management. PMB refers to forms of resource management that are rooted in the incorporation of stakeholder input to guide the process and outcomes (Andersen et al., 2007). The level of stakeholder participation varies depending on the methods chosen. Group Model Building (GMB) is one subset of PMB, whereby stakeholders are involved in the development, testing, and implementation of the model. It is a participatory method that gives stakeholders a high level of control over the created model and the interventions and policy solutions that are proposed, tested, and ideally implemented. System dynamics modelling is a GMB method wherein stakeholders develop conceptual models of environmental and socioeconomic systems based on feedback loops, which are then quantified to test scenarios (Renger et al., 2008). Within this method, the group learning and experience sharing between stakeholders throughout the process is more heavily valued than other PMB processes (Voinov and Bousquet, 2010). We are focussing our attention in this article on GMB via system dynamics modelling because of the high degree of stakeholder participation in the process. We are also focussing on the field of water resource management because of the particularly complex and broad environmental and sociopolitical systems that are encompassed within the field. Not only does this allow the decision-making process to be made more accessible by addressing more barriers to participation, it also allows the critiques made to be more transferable to other forms of stakeholder engagement that share various aspects with GMB via system dynamics modelling.

The major stages of GMB are presented in Fig. 1 below. The process is led by the facilitation team, which is usually comprised of researchers and governmental body representatives, such as watershed organizations. The process begins with establishing the problem to be addressed and defining the boundaries of the system in question; this includes things such as the geographical region and scale. Then the facilitation team identifies the relevant stakeholders and selects those that they wish to include in the model building. Ideally these first three stages should be iterative, with the problem and boundary definition re-evaluated with input from the chosen stakeholders. This allows the stakeholders to aid in ensuring the model-building will be more representative of their context. Following this, the workshops wherein the model will be developed are planned, and preparatory activities may be done

with the stakeholders, followed by the workshop or series of workshops to actually create and test the model. It is possible for discussions in the workshops to result in the need to return to stage 1 and reassess the defined problem, but this is typically avoided through sufficient engagement of stakeholders from the beginning. Finally, once the model is completed and different solutions are tested, the selected solutions are then implemented; the developed model is then also incorporated into future governmental decision-making. This article looks at stages 1 through 5 and does not cover stage 6 (Fig. 1). The implementation and institutionalization of the solutions are much more dependent on the particular sociopolitical context the GMB is occurring within, and as such requires an article itself to properly explore the incorporation of anti-oppression.

Anti-oppressive practice was developed within the field of social work as a practice that is grounded in social justice, seeking to support the challenging and resisting of oppression and marginalization (Baines, 2011). Oppression is "the systematic, unfair, unjust treatment of individuals as a result of societal practices and norms" (Cudd, 2005 quoted in Dong and Temple, 2011). Marginalization is the "process through which persons are peripheralized on the basis of their identities, associations, experiences, and environments" (LeBlanc, 1997). Marginalization is experienced through having minimal access to resources, association to cultural norms, and representation (this includes cultural representation in things such as media, or decision-making bodies like governments, organizations, and corporations). Marginalization is closely tied to oppression, and on a societal level can be seen as the product of structural barriers. Structural barriers are spaces, policies, practices, and attitudes that diminish the autonomy and choices available to individuals and communities as a result of their particular identities and experiences (van Wormer and Besthorn, 2010). We seek to bring this anti-oppressive practice into water resource management as a means of opening up discourse in the field around the structural barriers present in current water resource practices. As such, we assert that viewing water resource management as a political endeavour is to acknowledge that "nothing is neutral, and everything involves an overt or covert struggle over power, resources, and affirming identities" (Baines, 2011). We therefore recognize that all decisions made about the access or allocation of water resources either perpetuate or challenge current oppressions.

Within the water resource field, there tends to be a lack of deep understanding in how these structural barriers impact resulting proposed solutions, as well as who is able to participate and which voices dominate the discussions (McEwan, 2003). These considerations are critical and the facilitation team needs to be just as thoughtful about them as they are with the modelling itself. However, the specific facilitation methods employed by model facilitation teams in group modelling projects is usually secondary to model development and results in research (Berard, 2010). As a result, the process's structural barriers to access are often not given
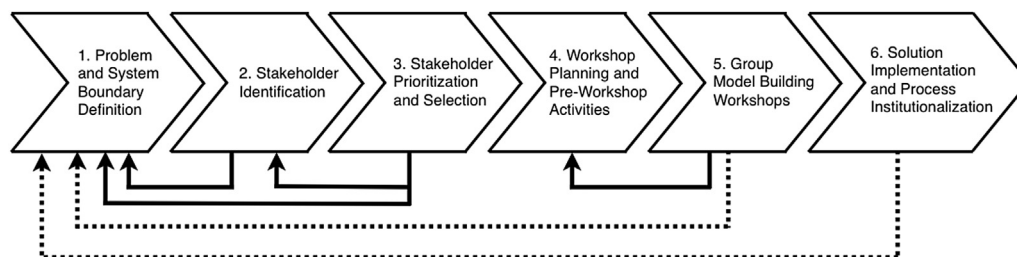


**Fig. 1.** The stages of the GMB process. Solid arrows represent cycles that happen on a more frequent basis. Dotted arrows represent cycles that rarely happen due to the greater difficulty.

sufficient consideration in the evaluation of the success or failure of the project with regards to engaging stakeholders. To achieve sustainable water resource management and governance, the process must be understood in the context of the societal structure of inequities (Halbe et al., 2013; Rizvi et al., 2013; Kolinjivadi et al., 2014, 2015). It must be stressed that equitable solutions, wherein resources are distributed in such a way that ensures a sufficient quality of life for all, cannot come out of an inequitable process; they can only be achieved if anti-oppressive practices are implemented.

It is important to acknowledge that this article is not attempting to 'solve' societal oppression. To truly empower marginalized communities in a liberatory sense requires challenging existing power structures at a fundamental level, rather than mere reform. Given this, the recommendations presented can be seen as a form of harm reduction; implementing them supports marginalized communities in the context of individual projects and reduces the negative impact of related decisions upon them. However, they do not address the systemic oppression within which the process exists, and thus cannot be seen as overcoming those oppressive forces. The model-building facilitation team developing the participatory processes must be cognizant of the limits to their capacity to affect change within existing societal structures and institutions. However, by incorporating anti-oppression into their practice, they can make the model building a more inclusive process.

The basis for this paper is a literature review (Section 2) of the common pitfalls encountered in the GMB process, with each sub-section focussing on one of the 5 different stages (Fig. 1). Particular methods and case studies are used as examples to underscore the critiques presented. Following this, in Section 3 a series of recommendations are proposed to address the issues that are raised. Best practices in terms of facilitating interpersonal dynamics and modelling activities within the workshop are explored in particularly thorough detail. While this article focuses its attention on GMB and system dynamics modelling, the accessibility barriers presented are endemic amongst most participatory processes. The recommendations should be seen as relevant to all work that involves natural resource management and stakeholder participation.

## 2. Literature review

### 2.1. Problem and system boundary definition

The first three stages of the GMB process, defining the problem, identifying stakeholders, and selecting the stakeholders to participate, are closely connected and done in an iterative manner. In theory, the facilitation team: "i) defines aspects of a social and natural phenomenon affected by a decision or action; ii) identifies individuals, groups and organizations who are affected by or can affect those parts of the phenomenon (this may include non-human and non-living entities and future generations); and iii) prioritizes these individuals and groups for involvement in the decision-making process" (Reed et al., 2009). In practice, those steps are repeated a number of times with the input of the different stakeholders who are engaged in the GMB process.

Typically the facilitation team, primarily relying upon scientific and local literature, begins by defining what problem will be studied and setting the temporal and spatial boundaries to be considered (Halbe and Adamowski, 2011). This makes it possible for relevant stakeholders to be identified. However, this also means that the problem to be studied is defined by those who are not part of the system, as can be the case with research projects (Reed et al., 2009). As outsiders of the system of interest, the facilitations can

lack intimate knowledge of the problems and regional context, and can thus miss critical issues that should be included in the study. As water management is a political issue, the power dynamics the process is embedded within need to be understood (Manzungu, 2002). Disregarding the existing societal power dynamics denies the realities of the full system being studied and prevents the facilitation teams from being able to view the system holistically. Additionally, histories of ineffective or harmful involvement with governmental and/or non-governmental organizations can result in communities being wary of engaging with another institutional process.

If the problem and boundaries are too rigidly or narrowly defined, it may lead to the wrong questions being posed for investigation, or relevant stakeholders being excluded. Conversely, overly vague and loosely-defined problems and boundaries can also make it difficult to determine which stakeholders need to be involved. If the relevant stakeholder pool is too large, it can be overwhelming to sort through them all and prioritize the right groups. An ill-defined problem can also make it difficult to convince stakeholders to participate as it can be unclear to them how the process connects to them or is worth committing time or energy towards participation. Finding a proper balance between rigidity and flexibility, while also accurately describing the study area, is a major challenge to overcome.

### 2.2. Stakeholder identification

Once the study problem has been sufficiently defined, stakeholders must be identified. Both the definition of what a stakeholder is, and the method of identifying them, affects which individuals, communities, or organizations are considered for the participatory process. Broader conceptions define a stakeholder as "anyone who can affect, or be affected by, a project, objective, etc." (Garrod et al., 2013). Such broad definitions create space for marginalized communities to be potentially counted as stakeholders with relative ease. However, whether they are in fact recognized as stakeholders depends on how the facilitation team perceives the potential of the project to affect marginalized communities in different capacities and to different extents. Applying this definition, in and of itself, does not ensure they will be acknowledged as a distinct stakeholder group, as that depends on the method of identification used. Two main assumptions made by the modelling-building facilitation team determine whether marginalized communities will have a place in the process and, if they do have a place, how they will be represented.

The first problematic assumption is that facilitation teams generally view and discuss citizens as a relatively homogeneous collection of unorganized individuals (e.g. Luyet et al., 2012). This (mis)understanding contributes to the erasure of the different realities and experiences of marginalized groups. Believing the impacts upon the general public are evenly distributed obscures the ability to recognize how marginalized communities may be more severely impacted, and/or impacted in unique ways. For example, transgender people (people whose gender identity does not match the sex they were assigned at birth) who are undergoing hormone replacement therapy (HRT) may have specific concerns related to the endocrine-disrupter chemicals (EDCs) present in water systems; it can make it more difficult for them and their doctors to determine the proper hormone dosage (Colborn et al., 1993; Moore et al., 2003). This is not a concern that non-transgender, otherwise called cisgender, people will likely have or consider when discussing water treatment systems. As a result, transgender people can be unknowingly harmed in ways particular to them if they are not able to participate in the decision-making process.

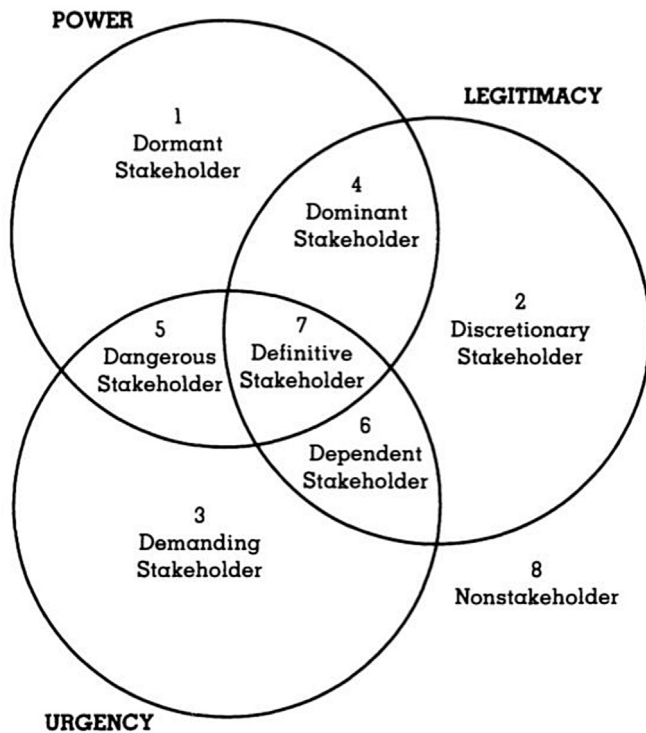Mitchell et al. (1997) developed the criteria of legitimacy, power,

**Fig. 2.** Representation of the stakeholder theory proposed by Mitchell et al., showing the classification of stakeholder types based on their attributes.
Source: Mitchell et al. (1997)

and urgency to identify and classify stakeholders; his stakeholder salience theory, which is represented in Fig. 2, has become widely used in stakeholder discourses. Legitimacy refers to a party having some form of socially acceptable or legal relationship with the entity. Power is a measure of whether a party can impose its will upon another entity. Lastly, urgency encompasses claims by a party that are both time-sensitive and critically important to them (Mitchell et al., 1997). Stakeholders with all three attributes are always included; those with only two may be included or have their interests considered while those with only one attribute are generally disregarded.

This conception of a stakeholder does not mesh well with the goal of ensuring representation of marginalized communities as they will almost always lack either power or legitimacy due to institutional disenfranchisement. For example, homeless people living in an abandoned building that is the focus of a development project will not be considered to have legitimacy or power regarding the project, despite being severely impacted by it, and thus having urgency. The lack of community empowerment is not surprising given that Mitchell's theory was developed to guide corporations in weeding out stakeholders that could be disregarded (Mitchell et al., 1997). As such, this framing of stakeholders is counterproductive to the goals of increasing inclusion of marginalized stakeholders.

The second problematic assumption that can prevent inclusive engagement is the over-emphasis of formal organizations as a source of community representation. Limited resources and oppressive power structures reduces the likelihood that marginalized communities will have formally organized representation (Williams, 2004). In the absence of formal organizations, facilitation teams may opt for consultative surveys as a means of obtaining opinions; this results in communities having minimal input in the model and no control over the process (Voinov and Gaddis, 2008).

Facilitation teams also need to be aware of how varying levels of privilege and marginalization within marginalized communities will influence which members dominate organizations that supposedly represent those communities. Those with greater privilege are more likely to fill representational positions due to their greater social capital. In many cases, these formal institutions and organizations do not actually, or accurately, represent water users or stakeholder groups (Manzungu, 2002; McEwan, 2003). In a focus group study conducted in the UK, where residents' associations were approached for citizen representation, the participants were primarily white retirees (Brookfield et al., 2013). The focus group was not reflective of the population's actual demographics because the facilitation team did not consider how residents' associations are generally not as active in poorer or racialized communities as they are in wealthier, white neighbourhoods. The resulting concerns raised were all related to the suburban environments in which the participants all lived, which is quite different from those living in urban centres (Brookfield et al., 2013). Not paying proper attention to the complexity in local social relationships and practices, leads to overlooking non-traditional community organizations and networks for representation (Resurreccion, 2006).

The identification of stakeholders is done first through a brainstorm by the facilitation team (Halbe and Adamowski, 2011; Inam et al., 2015). This initial brainstorming is usually followed up by other means of soliciting information on stakeholders that were not identified. One such method is the snowball method, where the list of stakeholders is sent to some of the stakeholders for suggestions on others to include (Luyet et al., 2012). This method can lead to an over-representation of similar stakeholders if the stakeholders asked for suggestions provide stakeholders that are similar to them. As marginalized communities are often disregarded in public discourse, this method can maintain their exclusion unless enough marginalized groups were identified in the first brainstorming and approached. Another method is to use various means of communication (newspapers, newsletters, websites, etc.) to send out public announcements calling for interested individuals or groups (Glicken, 2000). While this method, if effective in its reach, can bring in stakeholders that would not have been identified otherwise, it does place the responsibility on marginalized communities that have not been identified as stakeholders to learn about the process and step forward. With either method used, the facilitation team needs to be thoughtful about their aims in order to identify a diverse and equitable list of stakeholders.

### 2.3. Stakeholder prioritization and selection

In addition to the above-mentioned categories created by Mitchell et al. (1997), a number of other methods have been developed to categorize and prioritize stakeholders for participation. The facilitation team can use several different analytical categorizations (Reed et al., 2009). Stakeholders can be grouped based on their levels of interest in, and influence on, the process; additional characteristics, such as their level of support for the project, can also be added to glean further insights into the similarities between different stakeholders (Reed et al., 2009). One challenge for the facilitation team with this method is understanding a group's sentiments towards the project, especially when looking at communities rather than organizations. Additionally, a focus on stakeholder's receptivity to the project can lead to fewer dissenting stakeholders being included; marginalized communities are often more negatively impacted by resource projects and thus are more likely to be seen as 'difficult' stakeholders to be excluded because of their opposition. Therefore, when grouping stakeholders as a method of selecting important ones, the characteristics highlighted can affect which stakeholders are ultimately invited to participate

or not.

Stakeholders themselves can be engaged in the prioritization stage through constructivist methods, which are those that recognize multiply-constructed realities and create spaces for stakeholders to articulate their views of the system and problem being addressed (Ravnborg and Westermann, 2002). Stakeholders define the relevant parameters to be used in the categorization and actively shape the process. Card-sorting, Strategic Perspectives Analysis, and Q methodology are common examples of constructivist methods (Reed et al., 2009). Card-sorting is a method whereby participants are given a collection of cards with subjects written on them and asked to sort the cards into groups based on any criteria they wish; they explain their criteria and choices and repeat the process as many times as they can (Hare and Pahl-Wostl, 2002). While the methods allow for greater stakeholder control, resource constraints often make it difficult for all identified stakeholders to take part, meaning the facilitation team has to chose a subset that should provide diverse perspectives.

Following the categorization of stakeholders, the facilitation team prioritizes those that will be involved in the GMB process based on attribute sets that are applied to the identified stakeholders and categories. Urgency, legitimacy, and power is one set. Another is based on power and interest, as shown in the power versus interest diagram in Fig. 3. Four quadrants are created that make up the combinations of high/low power and high/low interest, with each field being a distinct group from which a representative subset of stakeholders can be selected (Bryson, 2007). This method, while useful, does not assess the reasons for whether a stakeholder has power and/or interest or not. It does not capture when low power comes out of institutional oppression, or when low interest is really just a perceived low interest due to the erasure of marginalized voices or a community's lack of access to information. Delving into the reasons for groups having or lacking particular attributes can reveal unique causes, histories, or contexts, which the facilitation team should take into consideration.

When prioritizing stakeholders, the underlying goals of the facilitation team, in terms of stakeholder representation, are not often questioned. Edmunds and Wollenberg (2001) argue that demographic representation does not lead to an equitable representation of marginalized communities, and that, instead, strategic

representation should be the goal. Marginalized communities need greater representation to compensate for their lower societal power. In the case of South Africa's implementation of the National Water Act, efforts to achieve demographic representation ultimately resulted in the majority of positions being held by the minority wealthy white farmers who had the financial means to win the spots (Manzungu, 2002). Striving for demographic representation when different demographics have vastly different societal power and status does not lead to equitable representation. Rather it perpetuates the power dynamics by ignoring the inequitable places those groups occupy. The result is that the voices of marginalized communities are continually reduced in the face of the much greater social capital held by privileged stakeholders.

### 2.4. Workshop planning and pre-workshop activities

Logistical decisions made by the facilitation team for the model-building workshops heavily impact the extent to which marginalized stakeholders can participate. While all participating stakeholders volunteer some resources towards the project, the cost for marginalized communities is often relatively greater due to their reduced access to resources to begin with (King et al., 1998). With the creation of Community Fisheries in Cambodia, a push for greater representation of women in the fisheries management simply added to "women's already long list of care taking roles" and actually led to their exclusion "due to traditional practices and established norms of gendered exclusion" (Resurreccion, 2006). Without considering the unequal capacity for participation due to gendered differences in workloads, the process failed to empower women in the decision-making. Financially compensating stakeholders, and especially covering any costs they must incur by participating, is often important for addressing economic barriers. However, these barriers are not often acknowledged by facilitation teams, which results in lower rates of participation and the exclusion of marginalized people (King et al., 1998).

Time is a particularly important constraint for the facilitation team to consider, as GMB processes are usually part of long-term water resource management processes and programs. Marginalized communities are often expected to contribute the most time into development and resource projects, which can maintain their oppression (Williams, 2004). Admittedly, many of the recommendations raised in this paper also require greater involvement of marginalized communities, but the aim is for the facilitation team to work with them in strategic and flexible ways such that they are properly supported and compensated. The significant time commitment can rapidly skew participation and representation in the process towards more privileged people and groups (Brookfield et al., 2013). In many cases, community participants do not have time to participate continually and consistently during the whole multi-workshop process (Burgin et al., 2013). It is typically more difficult for marginalized individuals to plan things such as jobs, household work, childcare, and community care/obligations around their participation, particularly women (McEwan, 2003). If the workshops are not planned around the availability of community members, then participation will become predominately representative of governmental and non-governmental organizations, and industry.

The long-term aspect of GMB can also become a source of tension, with stakeholders losing trust in the model-building facilitation team and process as a whole (Pahl-Wostl and Hare, 2004). This is a result of a lack of transparency and ongoing communication with the stakeholders; it can be frustrating for stakeholders to not see the time they dedicate to the project leading to actual results, which can breed disillusionment and cynicism (King et al., 1998; McEwan, 2003). For an adaptive management project in the
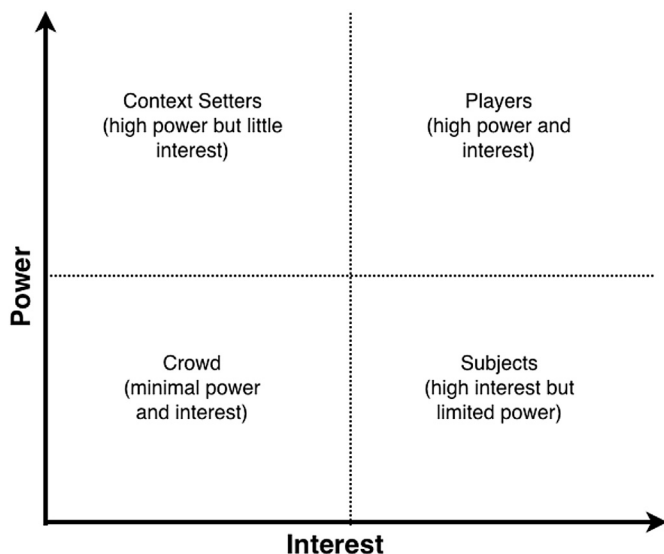


**Fig. 3.** A power versus interest chart that can be used in the classification of stakeholders during the prioritization and selection stage.

Upper Great Lakes of the U.S. and Canada, the facilitation team promoted learning and transparency through making the process information more accessible (Werick, 2011). An interactive information management map was developed and made available online that allowed people to track the progress of the model development and see how documents, data, and reports were used during each stage; unfortunately in this case the information was only made available after the project was completed (Werick, 2011). Establishing such a platform from the beginning of the process can allow the facilitation team to be more open and accountable to stakeholders and other interested people throughout each stage.

The choice of venue for the workshops is often done without consideration of the inherent politics of the choice. Hotels and village halls are chosen as supposedly "neutral" venues (Garrod et al., 2013). However, no space is truly neutral or devoid of politics and ignoring that erases their implications. Marginalized individuals are often either unable to access a space, or are made keenly aware of their 'otherness' when in the space (Kitchin, 2010). For example, an expensive, luxurious hotel will be a space that poorer communities feel out of place in, making them less likely to attend workshops there. Spaces without proper accommodations may be inaccessible to people with limited mobility. Numerous other issues can impede people from easily attending workshops, such as the availability and/or cost of parking or the necessary travel to get to the venue. The cost of transportation and accommodations, if necessary, can be prohibitive for marginalized communities to participate (Manzungu, 2002). Logistic details like the participants' comfort and arrangement of the seating also affects the level of engagement of the participants. The location and access to washrooms in the venue, as well as the provision of refreshments, particularly if the workshops are long, will all affect whether participants find the workshops to be pleasurable experiences and continue to attend them.

Pre-workshop activities and tasks are done with stakeholders in preparation for the group workshops. These activities are primarily divergent tasks, which focus on the individuals and their articulation of the problem, system, and connections (Berard, 2010).

Interviews are usually done with stakeholders prior to the workshop, to get the initial perspectives of stakeholders on the articulated problem (Berard, 2010). The interview framing might shift conversation away from concerns of particular stakeholders if the questions are too narrowly focused. For GMB, the preparatory interviews can involve a member of the facilitation team helping the stakeholders build causal loop diagrams, an example of which is presented in Fig. 4 (Halbe and Adamowski, 2011). Causal loop diagrams are simple modelling exercises whereby participants connect causes or consequences related to a problem variable, with a major focus on revealing feedback loops within environmental and socio-economic systems (Prodanovic and Simonovic, 2010; Inam et al., 2015). The individual stakeholders' causal loop diagrams are then consolidated into a larger group model and stakeholder feedback on it is obtained to identify potential major points of contention. A lack of formal education can make creating such models difficult, so the facilitation team needs to be prepared to provide sufficient support.

## 2.5. Group modeling building workshops

At the beginning of the GMB workshops, procedural rules are first discussed, covering things like conflict resolution, model implementation, etc. (Vennix, 1999). The facilitation team typically prepares and presents the rules to the participants, which can mean that the participants do not feel a sense of ownership and responsibility to follow them. If the rules do not cover power dynamics and explicitly address issues of oppression, such as racism, sexism, classism, homophobia, etc. as they may occur in interpersonal exchanges between participants, the space will remain unsafe for marginalized participants and more privileged individuals will dominate discussions and outcomes (Cornwall, 2003). Also, if the inherent power held by the facilitation team is not acknowledged, marginalized individuals may feel uncomfortable challenging any problematic behaviour of theirs.

Workshop activities often shift from individually-based activities, to small groups, to the full group (Andersen and Richardson, 1997). Those activities involving small groups or the entire group
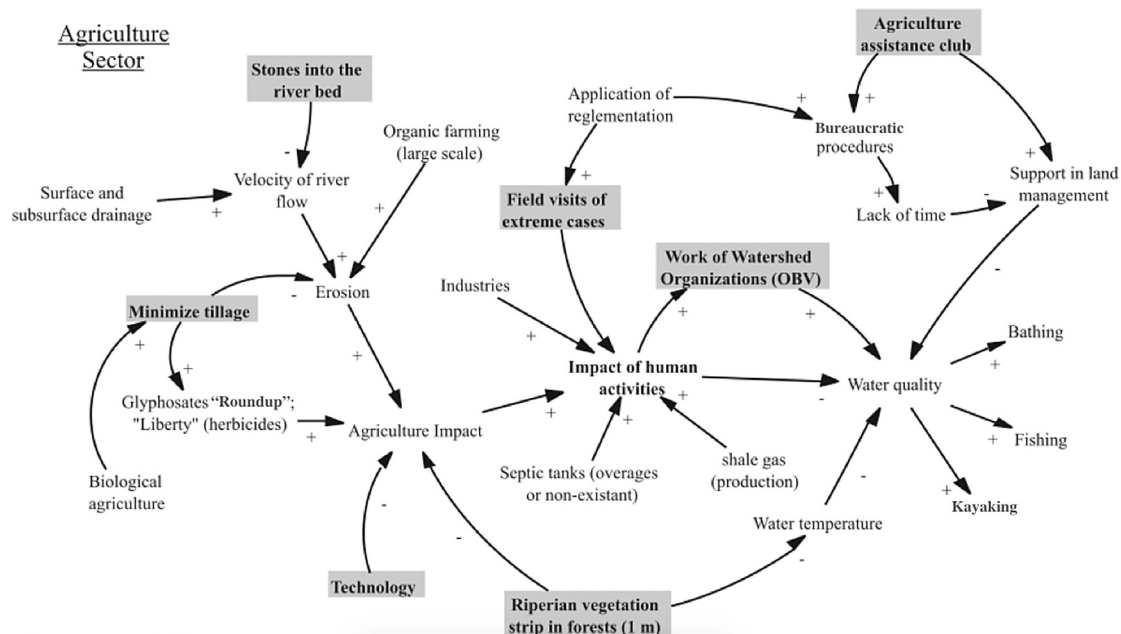
**Fig. 4.** Example of a causal loop diagram created with stakeholders from the agriculture sector in a case study for the Du Chêne, Quebec watershed.
Source: Halbe and Adamowski (2011)

together are convergent tasks (Berard, 2010). They revolve around stakeholder discussions and feedback on causes, consequences, and possible solution strategies (Halbe and Adamowski, 2011). Group activities focus on creating dialogue between the different stakeholders to promote social learning and consensus (Pahl-Wostl et al., 2011). However, "approaches that try to underplay or neutralize differences among stakeholders through the pursuit of consensus and emphasis on communication, for example, serve no strategic interests to disadvantaged groups/people" (Edmunds and Wollenberg, 2001). Participants with greater societal privilege will have greater power in the discussions, pulling consensus towards their view and away from those of marginalized participants. Also, socially or politically oriented conflicts can be seen as irrelevant in the workshops when the process is seen as a scientific endeavour. This can cause important points of contention to be disregarded in the pursuit of a false consensus.

Stakeholders are often not able to directly participate in the modelling effort because they lack the necessary skills and knowledge (Renger et al., 2008). This means that part of the process is inaccessible, so facilitators need to choose appropriate activities to ensure that the modelling stage does not become a 'black box' to the stakeholders. Different activities allow input through different mediums, and also different kinds of information. The choices about the activities used will make participation easier or harder for participants. Additionally, valuing 'objective' or 'factual' statements over more subjective or anecdotal ones can delegitimize and devalue the lived experiences of marginalized stakeholders; marginalization and oppression is often more easily demonstrated through anecdotes that reflect the broader social forces (Myers et al., 1991). So while a shared anecdote may seem like an isolated incident, it is, in fact, indicative of larger societal structures that are difficult to fully describe. Anecdotes are a form of evidence that reflects realities that data cannot necessarily capture easily.

Methods for stakeholders to provide feedback on principles or solutions can also potentially erase the voices of marginalized communities. Each group decision and policy proposal reveals the collective social values in terms of who, and what, matter or not (Priestley, 1998). For example, participants often vote on options to express collective valuing (Andersen and Richardson, 1997). As there are typical issues relevant only to marginalized groups, privileged participants are unlikely to use their votes towards those particular issues; the result is that the issues which are very important to a small group of stakeholders may be masked when the rankings are done collectively.

## 3. Recommendations

On a broad level, the recommendations centre on understanding the GMB process as embedded within local and global realities, and contexts of power imbalances that shape those that are and are not able to access the process. As such, the recommendations focus on addressing those power imbalances and inaccessibility through promoting flexibility in each stage of the process and in the structure of the process itself. The facilitation team should acknowledge "the reality of the social injustices that are bound to permeate the group experience, just as they permeate society" (Burnes and Ross, 2010). The major issues that will be addressed are poor communication with stakeholders, the underrepresentation of marginalized stakeholders, insufficient care taken in planning the workshops, and workshop inputs being overly constrained.

Involving stakeholders in the formation of the research process can build trust and help ensure that the process will produce more equitable results (Pahl-Wostl and Hare, 2004). Throughout the process, the facilitation team should maintain ongoing communication with all engaged stakeholders (Walsh et al., 2013). With

regards to marginalized stakeholders in particular, the facilitation team should engage in more strategic dialogue that is guided by the marginalized stakeholders. This means that the basis of communication between the facilitation team and marginalized communities is defined by the communities themselves and structured around their availability and needs. The facilitation team should be aiming to maximizing the influence of marginalized voices whilst minimizing the actual time and resource drain of the communities themselves. This can be achieved by allowing the communities to decide when consultations/information sharing will occur, what type of information the team presents to them, and the form(s) it is presented in. All stages in the process should thus be flexible and shaped around the marginalized communities, with other forms of support provided as needed, to ensure that their high level of participation does not become an additional hardship for them.

### 3.1. Problem and system boundary definition

The facilitation team should make developing an understanding of systemic oppression a priority in preparing themselves for addressing structural barriers to participation and supporting marginalized communities. For example, training for the facilitation team on intersectional gender analysis is one means of giving the team the necessary knowledge and skills to adequately address these issues (Resurreccion, 2006). The facilitation team should ideally feel comfortable speaking about power dynamics related to all forms of oppression, including gender, race, language, (dis) ability, socio-economic class, sexual orientation, colonialism, etc.

Much of the work done within water resource management is already interdisciplinary. However, the disciplines drawn upon as part of that work should be expanded to include areas such as critical race, gender theory, etc. Drawing from these fields can provide a stronger foundation for an anti-oppressive GMB. Furthermore, the field of social work especially has many lessons to teach those in water resource management when it comes to working directly with, and empowering, marginalized communities in complex institutional structures.

With regards to the problem framing and boundary setting, the facilitation team should initially establish relatively flexible parameters. As stakeholders should be involved in the fuller constructing of the system's scope and focus, the problem needs to be easily adapted and reshaped to incorporate new perspectives.

### 3.2. Stakeholder identification, prioritization, and selection

When promoting stakeholder engagement in each stage, stakeholder identification (stage 2) and stakeholder prioritization and selection (stage 3) should be an iterative process that cycles between the 2 stages, as well as stage 1, many times (Reed et al., 2009). Community members, especially local activists and community organizers, should be consulted from the beginning of the process to help set the project goals (Voinov and Gaddis, 2008). With very large-scale projects, it can become infeasible to have such a bottom-up process; the facilitation team may find it more manageable to divide the project into subsystems with which to move forward in the process. The facilitation team needs to place particularly strong focus on identifying marginalized stakeholder groups in the initial brainstorming; successfully identifying a number of them at the beginning will make it easier to identify and connect with other marginalized groups throughout the process. Problem and system boundaries can then be reshaped with stakeholder input to better reflect the local context.

By treating stages 1 through 3 as an iterative, rather than linear, process, the GMB can engage a more representative array of community stakeholders. However, despite the best efforts, it is likely

that new stakeholders will be discovered or seek participation in the process after the workshops and model building has begun (Langsdale et al., 2013). The facilitation team should anticipate needing to integrate and support new stakeholders along the process.

The facilitation team should also remember to look to informal community organizations, gatherings, and networks for representation of marginalized communities (Singh, 2007). While the appropriate means of reaching out will depend on the context, respect and humility are key when presenting the initial goals of the project and asking for their participation (Langsdale et al., 2013). It must be clear (and followed through with) that the community will have actual power over the process, and not be tokenized.

### 3.3. Workshop planning and pre-workshop activities

The logistical planning of the workshops should involve input from the marginalized stakeholders. The accessibility barriers that prevent representatives of marginalized communities from participating need to be identified and addressed early in the planning process. These barriers will depend on the regional context and characteristics of the marginalized groups. The choice of days and times should also be done around the availability of those who have inflexible work or obligation schedules. The chosen venue should be one where the participating stakeholders will be able to physically access, feel comfortable in, and be able to travel to easily, with assistance provided for those who need it. There should also be discussions about the interpersonal dynamics that will be at play and what support may be needed (Meynen and Doornbos, 2004). However, it is important to recognize that despite best efforts, the social and political conditions of marginalized communities will always be present during the engagement process, so the facilitation team must work with the communities to create realistic options for their participation (Resurreccion, 2006). For example, providing childcare options is critical for supporting the participation of women in many contexts.

During the pre-workshop interviews, the facilitation team should provide support to ensure that all stakeholders understand and are comfortable with the modelling activities. Building confidence with the activities before the workshop can allow participants to engage more fully when carrying out the activities in groups. Also, the facilitation team should assess the participants' ability to have conversations about oppression during the interviews (Burnes and Ross, 2010). Incorporating anti-oppression into GMB involves discussion on oppression in the workshops, so it is best for the facilitation team to have an understanding of the background knowledge participants are coming to the workshops with. This will help them prepare how to lead those conversations in ways that most promote learning.

### 3.4. Group modeling building workshops

The procedural rules presented at the beginning of the workshop set the tone for the workshop. The goals of the rules are to create a space that facilitates social learning among the stakeholders and validates their subjective experiences (Pahl-Wostl, 2006). While the facilitation team should prepare some preliminary rules, they should be discussed and developed as a group with the participants. The rules should be aimed at creating a safer space; this means rules such as not interrupting each other, believing each other's accounts rather than denying or delegitimizing their experiences, and encouraging active listening. Facilitators need to practice active listening themselves to ensure that participants feel heard and that their input is validated, valued, and

included in the created model (Vennix, 1999).

Facilitators must be aware of how power shapes the space taken up within conversations and actively work to balance out the speaking distribution. However, the issue should be raised with participants so that all work together to address it. Marginalized participants, who are socialized to not value their own views and knowledge, should be encouraged, but not pressured, to contribute more than they normally would, so that their views are properly represented and included. Conversely, privileged participants who are used to taking up space in conversations should be encouraged to be aware of how often they are talking and not monopolize the discussions.

The facilitation team should also lead a conversation on how oppressive or problematic comments or actions will be dealt with. It is important for facilitators to address issues of oppression in the moment, as well as supporting other participants in addressing oppression, rather than leaving them for later (Burnes and Ross, 2010). Facilitators need to be comfortable calling out language that is racist, sexist, ableist, etc. and challenging participants who use such problematic language (Preston-Shoot, 1995). Equally important, it should be made clear to participants how to best handle being called out and unlearn oppressive behaviours; anti-oppressive education pedagogy can provide strong direction for facilitators in addressing these interpersonal power imbalances (Kumashiro, 2000). Participants should understand that having their comments challenged as problematic is not a personal attack; they should listen and work to correct that oppressive behaviour. The facilitation team must stress their own openness to being challenged and earnest desire to create an anti-oppressive space.

Finally, when discussing the rules for the workshops, participants should be asked of any accessibility needs they may have. This could include requiring that people speak loudly due to hearing impairments, needing large written texts due to visual impairments, or even desiring semi-frequent short breaks to move around and stretch. They should be encouraged to share what kinds of considerations the facilitator can take to make the workshop as comfortable and enjoyable for them as possible. Another important accessibility need, which would have to be considered and addressed during the planning of the workshops themselves, may be translation services. If the participants do have different linguistic backgrounds, then the group should discuss how conversations will happen with the translations, to ensure the language barrier does not impede dialogue.

Tension and conflict between the stakeholders usually arises during the process and it should be acknowledged when it does (Voinov and Gaddis, 2008). It should be recognized that conflict in the GMB process often comes out of different needs and valuations which need to be explored collectively. The process should be situated as an empowering political space, whereby group identity and interests of marginalized communities is recognized and protected (Edmunds and Wollenberg, 2001).

Marginalized communities can be given more control by allowing them to opt-out of exercises, as a way to challenge and delegitimize processes they feel are defective (Manzungu, 2002). It can often be difficult to immediately articulate why an experience or discussion is oppressive, or what the source of unease is, so this method allows marginalized participants to pause the process and require the facilitation team to work with them to explore and address their concerns before moving on. Marginalized stakeholders can also be empowered through any activities that involve stakeholders collectively ranking issues or solutions. As has been discussed above, marginalized communities will frequently have more issues that affect them than other stakeholders, and they will especially have issues that only concern them, so the voting can be modified to give them a larger voice. This can be done through

giving them more votes than other stakeholders. It can also be done by having two rounds of voting, the full collective one to fill a certain number of priorities, and a second one of just marginalized stakeholders for several more priorities that will be included in the full list. The latter ensures marginalized communities have a certain amount of say in the end product, and reduces the pressure on them to 'prove' that all of their concerns are valid to more privileged participants.

Questions around who will be using the model, how they'll be engaging with it, and the project aims guide the choice in modelling software packages (Bots and van Daalen, 2008). While there are a number of different modelling software packages used for system dynamics, they are all based on a similar premise; the models are conceptualized in the format of stocks and flows, with parameter operations describing the links between them (Voinov and Bousquet, 2010). They are useful in their ability to capture nearly any process and context, though most software packages cannot be used for spatially explicit formulations (Voinov and Bousquet, 2010). Simpler models can provide greater flexibility and can be useful in the workshops; being easy to modify and quick to run, they can be used to rapidly test scenarios suggested by the participants and enhance the discussions (Langsdale et al., 2013). For example, visualization techniques can be effective in presenting scientific information in a way that is easier for the stakeholders who are not highly science-literate to understand and engage with (Walsh et al., 2013). However, simpler modelling software can be ineffective at portraying more complex systems. Icon-based software can be used to make the model more transparent and accessible to participants (Metcalf et al., 2010). One potentially useful approach is the 'story-and-simulation,' which allows stakeholders to create a qualitative storyline that the research team can quantify and simulate in the model (Bots and van Daalen, 2008).

Anti-oppressive social work can provide many insights into participatory processes. Strier (2007) presents the value of using both data and anecdotes, arguing that while "quantitative methods may be used to provide measurable, empirical data regarding the structural expressions of oppression, more qualitative, 'bottom-up', interpretive methods may be suitable for reflecting the experience of oppression." There is a need for both kinds of inputs in GMB in order for the system to be more accurately represented. Prompting stakeholders to describe the various ways water resources impact their lives in an open-ended fashion can be a way of giving marginalized community representatives space to provide different perspectives and connect their views to other issues that are most relevant to their communities and lives. Methods that have fewer constraints create more space for marginalized communities to use for political action, though the facilitation team will have to work to ensure their input is properly incorporated into the model and decision-making process.

The stakeholders' knowledge and priorities should directly shape the selection of the model platform and parameters (Voinov and Gaddis, 2008). Causal loop diagrams are useful in giving space for participants to provide input on relationships and impacts of various actions or trends, especially socio-economic factors, without needing to deal with equations and complex coding (Prodanovic and Simonovic, 2010). Using a variety of techniques and activities in the workshops makes it possible for diverse forms of input to be presented by the stakeholders. Role playing games (Pahl-Wostl and Hare, 2004) can allow stakeholders to explore their interactions with each other and share experiences. Micro-simulations provide the opportunity to test proposed solutions through subportions of the model and present the predicted changes in the system so that participants can better interact with the model and provide feedback (Garrod et al., 2013).

Finally, after each workshop, it can be useful for the facilitation team to meet with only the marginalized stakeholders to debrief following the workshops. This can be important when marginalized communities participating in the process have experienced, or continue to experience, oppression directly from other stakeholders also participating. Creating a space for venting about what comes up during the workshop is a critical part of supporting marginalized communities through the whole process.

## 4. Conclusion

We have sought to demonstrate how anti-oppressive practice can be incorporated into GMB via system dynamics modelling as a way to empower marginalized communities in water resource management. When identifying and prioritizing stakeholders, it should be a strategic, iterative process that taps into informal community structures to approach and engage marginalized communities. They should then be properly consulted in the planning of workshops so that barriers to their involvement can be addressed. In the model building workshops, the facilitators should be trained to deal with the interpersonal effects of systemic oppression and use a variety of methods that value and support the input of all forms of knowledge expression.

This work is meant to integrate and further a more explicitly political language within water resource management. As was mentioned in the introduction, this article is ultimately striving to reduce the harm of oppression in the context of the participatory approach and promoting a more self-reflective practice for model-building facilitators. This is meant to be a starting place for exploring the anti-oppressive potential within water resource management, and further studies must go deeper into dismantling structural barriers in each stage. In particular, work needs to be done on pursuing the broader implementation of the proposed solutions and institutionalization of the process through an anti-oppressive lens. By reconceptualizing water resource management as a political endeavour entrenched within systems of oppression, model building can be seen as a space for social justice efforts and solidarity with marginalized communities.

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