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Conflict of Interest

The authors declare that they have no conflict of interest.

Human Rights and Informed Consent

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the European Commission 7th Framework Program ethical standards (2013):

http://ec.europa.eu/research/participants/data/ref/fp7/89888/ethics-for-researchers_en.pdf.

Informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.

The effects of public participation on multi-level water governance, lessons from Uganda

Abstract

Water governance occurs at multiple levels, from the local to the supra-national, which are often highly fragmented. The interconnected nature of water requires interactions among these multiple governance levels. Public participation may foster such interactions. Thus, many water management reforms involved decentralization and public participation worldwide over the last decades. Yet, it is not demonstrated how these reforms may improve water resources sustainability. Their analysis in the literature does not show concretely how interactions among multiple levels materialize and are influenced by participation. As such, the question addressed is how interactions among multiple levels of water governance manifest over time in a participatory intervention. Using a case study in the Rwenzori region in Uganda, this article compares the multi-level interactions before and during a participatory process. The latter has been purposely implemented to bridge gaps between local and provincial levels through a participatory planning process centered on the provincial level. Four types of flows were analyzed: information and knowledge, hydrosocial, financial and human. Our analysis shows that using artefacts like the role-playing game and planning matrix fostered bi-directional information and knowledge flows. Hydrosocial flows did not change in depth but the legitimacy of the two organizations implementing the participatory process was reinforced. Project financial flows were injected through a provincial academic institution, who is not a regular budget recipient. They were therefore superimposed on existing budgeting process. We conclude by providing suggestions for the engineering of participatory processes in order to foster more collaborative and effective multi-level water governance.

Keywords

decentralization, engineering of participation, multi-level participation, planning, Rwenzori, scale,
Uganda

1. Introduction

Both scale and governance have become important areas of study for social scientists engaged with water issues in the past few decades (Norman, Bakker, & Cook, 2012). Water governance can be defined as the set of rules, practices, and processes (formal and informal) through which decisions for the management of water resources and services are taken and implemented, stakeholders articulate their interest and decision-makers are held accountable (OECD, 2015). Water governance occurs at multiple levels (from local to supra-national), which are often highly fragmented. In parallel, the very nature of water, a highly interconnected resource and interdependent with other sectors, requires interactions among multiple levels (Moss & Newig, 2010; Norman et al., 2012).

We distinguish here “scale” from “level” as per Daniell & Barreteau (2014) where *scale* is “the relative size or extent of something” (Oxford Dictionary) and *levels* are a graduated range on each scale. Daniell & Barreteau (2014) identify eight different scales (expanded and adapted from Cash et al., 2006): spatial, temporal, administrative, institutional, management, networks, knowledge/information and stakes/issues. According to this definition, the temporal scale, for example, may include the levels of hours, days, weeks, years, centuries, etc. Many studies and papers tend to use the terms “scale” and “level” interchangeably. As such, terms used by other authors are altered to match these definitions where their terms do not fit the operational definitions but their use and intent do.

Daniell & Barreteau (2014) therefore distinguish *multi-level* from *cross-scale* interactions (Fig.1). The former includes interactions that take place on a single scale while the latter includes interactions which take place from one scale to another.

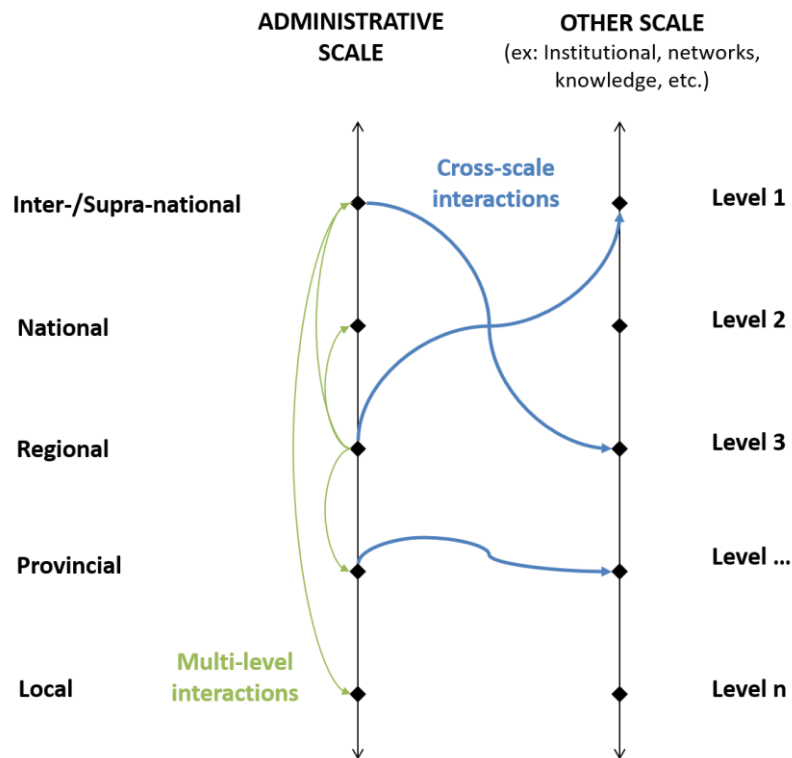


Fig.1 Distinction between multi-level and cross-scale interactions (based on Daniell & Barreteau, 2014)

We focus here on one specific part of governance: planning; and one specific scale: administrative, including different levels, from local to supra national. We argue that many decisions about water go through planning processes at different administrative levels, from supra-national to local. Hence, investigating planning and the administrative scale is relevant for analyzing water governance (Newig & Koontz, 2013).

It should be noted that Daniell & Barreteau's (2014) framework indicates that there is not just one administrative scale: there are as many administrative scales as there are issues addressed by public policies within a specific political organization. For example, one could look at the interactions between the administrative provincial level dealing with water issues and the administrative provincial level dealing with food or energy issues. This would bring us closer to nexus research which generates a

large amount of literature we do not deal with in this paper. Rather than these interactions across different administrative scales, we are interested here in the interactions among the different levels on the administrative scale that focuses on water issues in Uganda. We are therefore interested in the structuring of the organization of public policies and the interactions between their different levels on a particular issue: water. We argue that this aspect is important as well, in particular because the multi-level structuring of the organization of public policies is often similar from one issue to another and potentially generating inefficiencies and biases in public policies. This is at least the case in Uganda, which is discussed in this paper.

The interconnected nature of water, and the fact that water governance occurs at multiple levels implies that governance is expected to create interactions among these different levels in order to take into account decision-making across a range of water issues and dynamics, from climate trends at a global level to the sharing of water between two neighbors at a local level.

However, both the literature and practice show that there are still a number of operational difficulties in creating effective interactions among these different levels (Cash et al., 2006; Lovell, Mandondo, & Moriarty, 2002; OECD, 2011).

One of the solutions that was put forward to foster coordination among multiple levels of water governance is public participation (Dore & Lebel, 2010; Newig & Fritsch, 2009). Participation can in fact appear quite logically as a potential coordination mechanism among different levels as soon as actors from these different levels or their legitimate representatives are gathered in the same arena. Thus many water management reforms across the world over recent decades entailed devolution of the implementation of water policies to lower levels of management and increased public participation (Boelens, Getches, & Guevara-Gil, 2010; UNECA, 2014). This has led, for example, to the creation of

multi-stakeholder and multi-level platforms (e.g. Lebel & Garden, 2007), or to the implementation of role-playing games in multi-level arenas (e.g. Ducrot, 2009).

Despite the rapidly increasing academic interest in multi-level water governance and how different forms of participation and stakeholder engagement have been enacted in case studies across the world, there are relatively few that put a particular focus on the specific interactions created between multiple levels of governance. This is particularly the case if we look at studies with formal schemes of representation that go beyond interpersonal relations and power (e.g. actor-networks, coalition-building and/or levels of participant decision-making control, and concepts such as legitimacy); social learning (e.g. exchange of and development of collective knowledge); and mapping administrative levels of actors to participation structures (e.g. Maleki & Bots, 2013; Renn, Berghöfer, Wittmer, & Rauschmayer, 2010). Those focusing on a range of scales, levels and dynamics concurrently, based on a number of flow types in the water governance system, such as finances, power, water, information/knowledge and people are rarer (e.g. Edelenbos & Teisman, 2013). To make a small contribution to this under-researched area of the participation and multi-level water governance literature, we will focus on just the water administrative scale and a range of dynamics over the time. Hence, the research question of this paper is: how interactions among multiple levels of water governance manifest over time in a participatory intervention?

To answer this question, this article analyses one case study: a participatory process implemented in the Rwenzori region in Uganda. The participatory process was developed as part of a European Union funded research project called *AfroMaison*¹. The Rwenzori case is relevant to our research question because the participatory process was set up purposefully to catalyze multi-level participatory governance. The rationale of the intervention was based on the acknowledgement that the

¹ *AfroMaison project* (2011-2014): "Africa at a meso-scale: Adaptive and integrated tools and strategies for natural resources management " funded by the 7th Framework Program of the European Union, theme " ENV.2010.2.1.1-1" [Integrated management of water and other natural resources in Africa].

implementation of decentralized water policies in Uganda was hindered by multi-level governance gaps, notably a lack of resources and skills among district administrations, which are the ones responsible for water planning and management (Ojambo, 2012). Hence, the intervention aimed to bridge these gaps through the implementation of a multi-level participatory planning process. This paper analyses multi-level interactions that existed in the case study before the participatory process was implemented and those that were generated during the participatory process. The objective is to compare both in order to analyze the extent to which the participatory process has modified these multi-level interactions, even partially and temporarily.

Our analysis is based on a critical and reflexive posture. It is critical in that it does not magnify the results of the participatory process but simply seeks to account for its apparent effects, while taking into account the power plays and complexity of interactions among actors and levels. Our posture is also reflexive in that it accounts for the fact that actors in the field, by their very actions, contribute to the production of knowledge and, conversely, that researchers influenced actions in the field with the results of their analyses. This posture is at the heart of debates within the sociologists' community (Claeys-Mekdade, 2006). Without entering into these debates, our position is in line with sociological research focusing on action-research and its implications for field activities and the production of knowledge (Daré & Venot, 2016; Le Goff, 2012; Schwidt, 2017). The aim of the paper based on this analysis is to present insights that may be applicable for the engineering of participation processes in order to foster more collaborative and effective multi-level governance. The limits of this approach are discussed at the end of the paper.

2. Materials and methods

2.1 The Ugandan case study

The study area in Uganda is the Rwenzori mountain range located in western Uganda, at the border with the Democratic Republic of Congo (Fig.2). The Rwenzori region covers 14,000 km² (AfroMaison, 2014) over seven districts and has a population of about 2,4 million. The region, which is part of the White Nile basin, hosts several river systems, lakes, wetlands and crater lakes, as well as four national parks. These features constitute major tourist attractions to the region. The tropical climate, bimodal annual rainfall system (NEMA, 2004), as well as the past volcanic activity have made soils fertile. The Rwenzori region is predominantly inhabited by smallholder farmers who engage in subsistence farming. Major crops grown include coffee, cotton, banana, cassava, beans, maize, groundnuts, sweet potatoes and Irish potatoes. Some farmers keep livestock such as poultry, goats and cattle. Some large-scale farmers are engaged in commercial farming, especially tea plantations.



Fig.2 Map of the case study site (Google 2014, adapted by Clive Hilliker)

Poor land use practices such as bush burning, fuel wood harvesting and unsustainable timber harvesting have led to deforestation, soil erosion, landslides and floods (Plumptre, 2002). Land degradation, amid climate change and high population growth rates, has also led to food shortages

and disease outbreaks (Migongo-Bake & Catactutan, 2012). This makes the region economically vulnerable given that the majority of the people are below the poverty line (UBOS & ILRI, 2007).

Uganda has a considerable number of natural resources management legislation and policies. From 1992, natural resources management, including water, was devolved to the local governments (Onyach-Olaa, 2003), shaped by a five-tier structure (district/county/subcounty/parish/village, see Table 1). Environment committees and officers are responsible for community engagement and implementation of water laws. However, lack of governmental funds, heavy workloads and corruption impede adequate implementation of this legal framework. For a detailed description of the Rwenzori case context, see Hassenforder, Ferrand, Pittock, Daniell, & Barreteau (2015).

Levels within the administrative scale in Daniell & Barreteau's typology	Correspondence in Ugandan Five-tier structure specific to the Rwenzori region	Correspondence in Ugandan water management structures
Supranational		
National	Republic of Uganda	Ministry of Water and Environment
Regional	Region = Western region	
Provincial	District (LC5) = 9 districts: Kabarole, Kasese, Bundibugyo, Kyenjojo, Kamwenge, Kyegegwa, Ntoroko, Bunyangabu, and Kitagwenda	Environment committee Environment Officer Community Development Officer Catchment Management Committee

Local	County / municipality (LC4) = two	
		municipalities: Fort Portal and Kasese
	Sub-county / town (LC3)	Environment committee Environment Officer
	Ward or parish (LC2)	
	Village (LC1)	Village water user committee Secretary for environment on LC1 committee Environment committee

Table 1. Correspondence between levels within the administrative scale in Daniell & Barreteau’s (2014) typology and levels in Ugandan decentralized administrative and water management structures (LC = Local Council; In grey: level of focus of the participatory process developed in the frame of the AfroMaison project°. As an illustration, Kabarole district includes 12 subcounties and 4 town councils (LC3), 67 parishes/wards (LC2) and 503 villages (LC1) (Kabarole District Planning Division, 2020).

2.2 The participatory planning process in the Ugandan case

The participatory process was developed as part of a European Union funded research project called AfroMaison. AfroMaison’s objective was to "contribute to bringing the concept of Integrated Natural Resources Management into practice at the meso-scale" (AfroMaison, 2010, p.6), or what we call here provincial level. The main output of the project was a “toolbox” comprising a series of tools and approaches to support practical implementation of integrated natural resources management. One

of these approaches was a participatory planning process set up at several levels (Hassenforder, 2015): provincial, local and to a lesser extent national. At each of these levels, one or more groups of actors developed natural resource management plans through different workshops. The development of these management plans involved six phases (Fig.3):

1. The agreement on how the participatory process would take place,
2. the identification of the focal issue,
3. the proposal of actions likely to address the focal issue (using an action template, Fig.6),
4. the selection and organization of actions in time, space and levels (using the COOPLAN matrix as per Ferrand, Hassenforder, Abrami, & Aquae-Gaudi, 2015 and Fig.6),
5. the test of the plan using a role-playing game (based on Wat-A-Game toolkit; Abrami et al. 2012; Ferrand et al. 2009) and
6. an agreement on plan implementation.

At some key moments, the groups of the different levels would meet and share their respective results.

At the provincial level, this planning process was implemented through a series of four two-to-three day-long workshops with a group of 29 to 68 provincial participants. The process lasted 16 months, from April 2012 to July 2013 (workshops 1 to 4 in Figure 3). Concerning the local-level process, 35 communities were involved with an average of 17 participants per group, mainly farmers and pastoralists. They were invited using a pre-existing agricultural extension network. One to seven workshops were held in each community between January and June 2013. In total, the process involved 125 participants at the provincial level and 597 at the local level (Fig.4). Involvement of actors at the national level failed: two meetings were planned with the Minister of Water and Environment in 2013 but were cancelled by the Minister. The three members of the national parliament representing the Rwenzori region were invited to attend the provincial meetings, in January and July 2013, but only one attended.

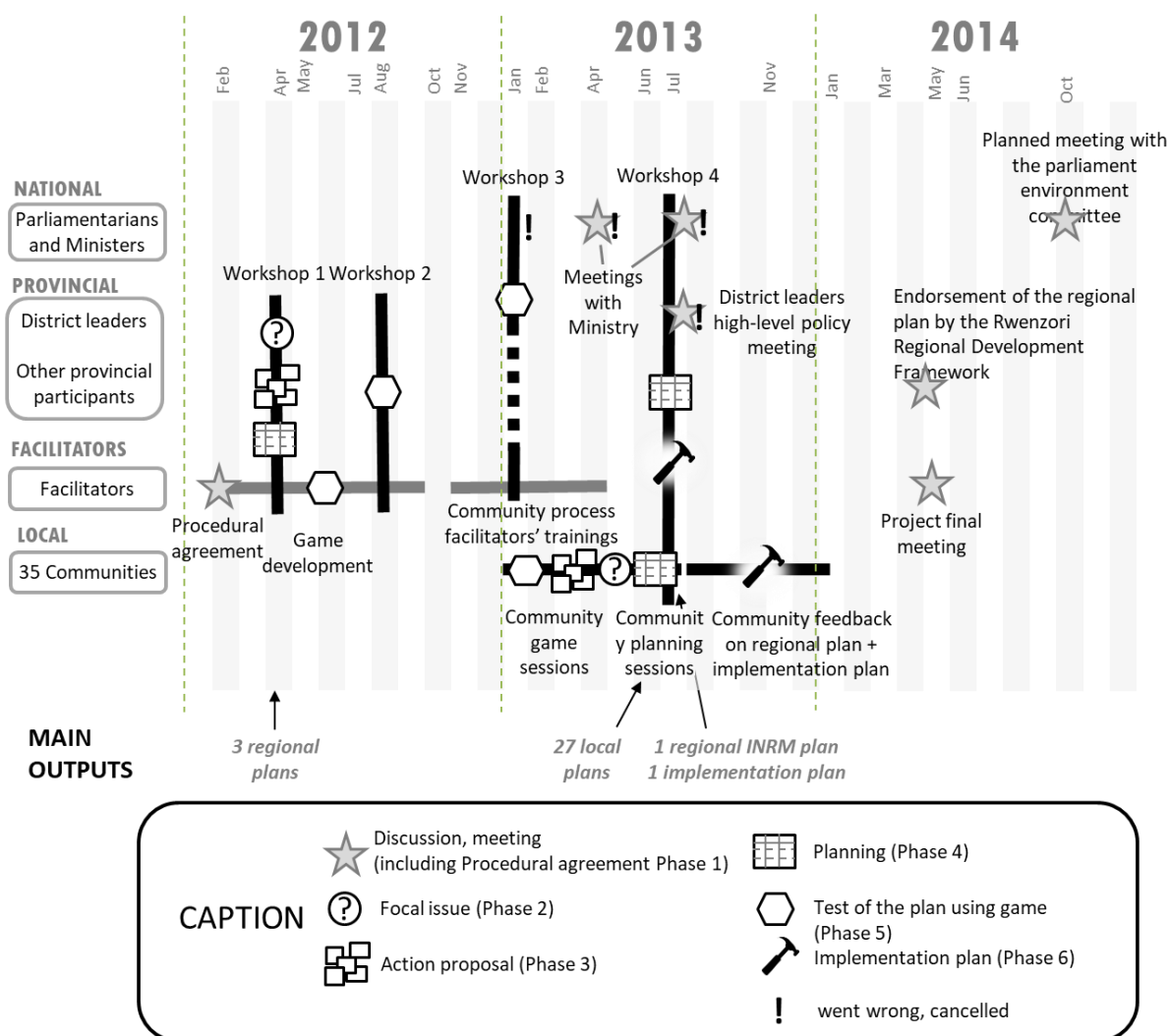


Fig.3 The multi-level participatory planning process in the Ugandan case

The resulting three provincial plans and 27 local plans were merged during a final workshop held in July 2013. After this, one last workshop was held in each community between July and December 2013 for them to make their own local implementation plan and provide their feedback on the provincial plan. At the end of the process, a coalition of local stakeholders called the Rwenzori Regional Development Framework (RRDF, 2011) endorsed the plan. The coalition took over the coordination and monitoring of plan implementation. Members of the RRDF agreed to implement parts of the plan depending on their scope of work, such as agriculture, water, community organizations or education.

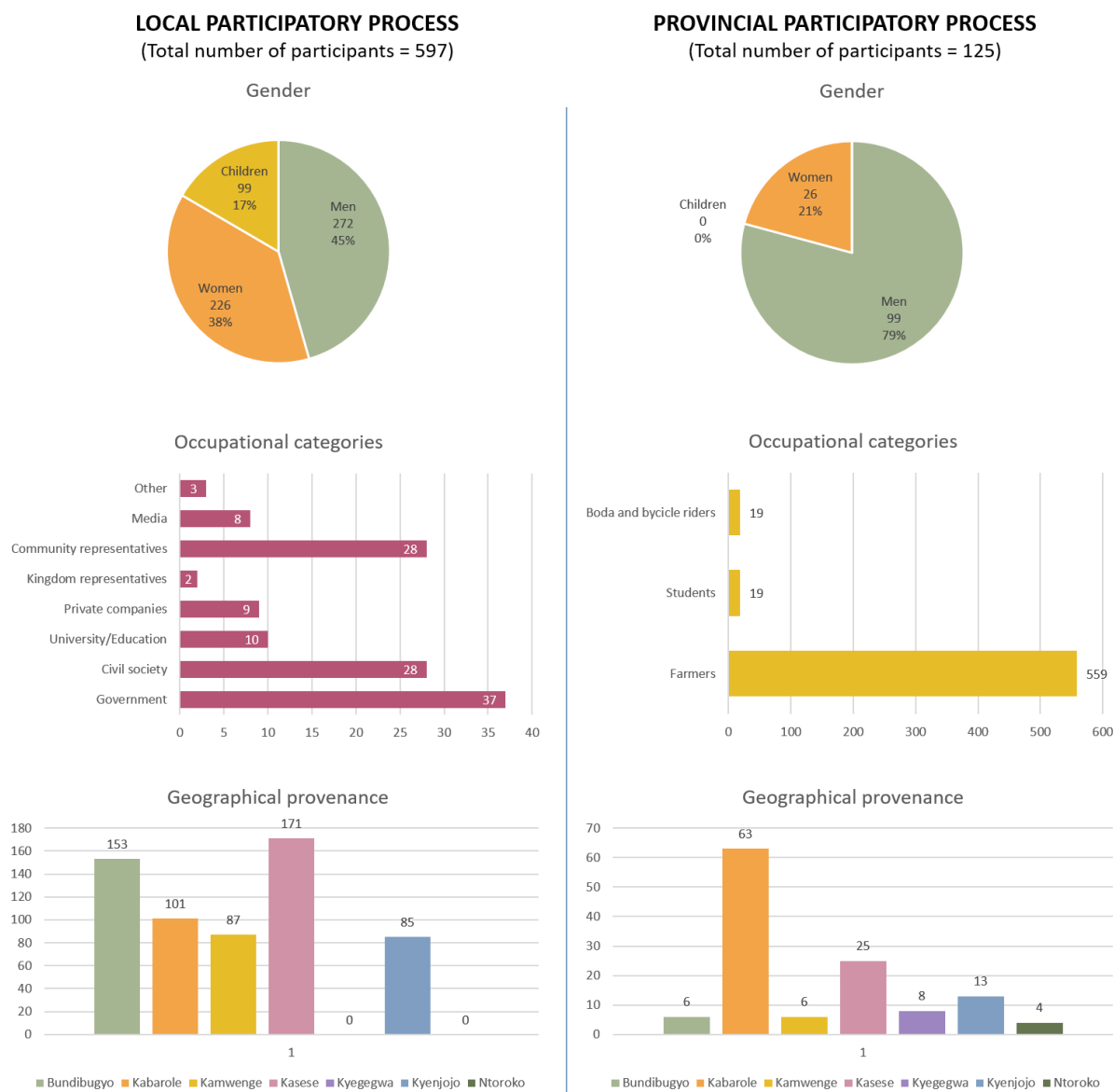


Fig.4 Participants in the local and provincial participatory processes: gender, occupational categories and geographical provenance

2.3 Data collection and analysis

We argue that most of the research reviewed and presented in the introduction does not explain concretely how interactions among multiple levels materialize in a dynamic manner, and therefore how participation may affect these interactions.

We have therefore decided to use the framework developed by Daniell & Barreteau (2014) in order to investigate our research question. They build on the assumption that interactions among multiple levels materialize through various flows. Their framework is composed of a typology including six types of flows. Analyzing these flows allows thorough investigation of interactions among multiple levels of participatory water governance and how participation may affect them. The six types of flows are:

- *Physical or material flows* (e.g. water, pollution, food, concrete, ecology). We will focus here on water flows;
- Information and knowledge flows that could create cognitive changes;
- *Political and social control flows*, also called *hydrosocial flows*, that influence who has decision-making power over water. Daniell & Barreteau (2014) mention that these “include primarily the issue of legitimacy of actors that are supposed to control the use and movement of water and how governance structures and actor coalitions shape water management decisions and outcomes”;
- *Financial flows* that can be generated by any entity with access to a bank account or other financial system for exchange;
- *Human flows*, such as people travelling between spatial or administrative levels; and the
- *Irreversibility effect*: flows, such as that of time passing, which lead to cumulative effects that are difficult or impossible to reverse, transforming the environment of action.

Our analysis focuses on four of the six flows identified by Daniell & Barreteau (2014). Both physical flows and irreversible effects are by definition not directly modifiable by the participatory process and therefore less relevant for our analysis. In addition, “irreversibility effects” are not mediated by any flow per se. They correspond to processes which are difficult to change and require an analysis over time. Hence we are not able to populate this category in this analysis.

As mentioned before, we focus in this article on the analysis of:

- One specific scale: the *administrative scale* regarding water issues (Fig.1). We therefore analyze the flows taking place among the five levels within this scale (supranational, national, regional, provincial and local); and
- One specific process: *planning*. We argue that decisions about water often go through planning processes at different administrative levels (from supra-national to local). Hence, investigating planning and the administrative scale is relevant for analyzing water governance.

In addition, we focus on a specific time frame: that is the flows taking place before the beginning of the AfroMaison participatory process (in 2012), and the flows that were generated by the participatory process (Apr. 2012 – Dec. 2013). We therefore seek to establish a picture of the flows taking place in the institutional decision-making processes before the beginning of the participatory process. Then, we picture the flows generated by the participatory process, to see to what extent these were different and have (even in a limited time and partially) modified pre-existing flows. We also focus on actors involved, directly or indirectly, in the participatory process. Since the AfroMaison project targeted the provincial level, we focus our analysis on flows coming in and going out of this specific level or impacting it. For example, we included information flows that took place among local actors and had repercussions on the provincial level because they impacted the way provincial policies were implemented. Conversely, we did not include flows taking place between the supra-national and the national levels without directly impacting the provincial level.

These boundaries in our analysis therefore incur limits in the potential conclusions that can be drawn. However, we felt it was necessary to narrow the scope of our analysis in order to understand in detail the changes in flows that had taken place before and during the participatory process. A reader looking for an in-depth analysis of the complexity of each of the flows, in the long term or

among all the actors in the region, will have to look for complementary analyses in the field of information and communication science (for information and knowledge flows), development economy (for financial flows), political ecology (for hydrosocial flows), and anthropology (for human flows), among others. On the other hand, the present analysis sheds light on the interactions between these different flows on the one hand and on the role of the participatory process in the change in flow dynamics on the other.

Several methods were used to inform this analysis. For assessing the flows prior to the beginning of the participatory process, the main documentary source is a baseline study of the social-environmental context and water governance made in 2012 in the case study site (Migongo-Bake & Catactutan, 2012). This pre-analysis was based on a literature review, eight key informant interviews and one focus group with actors at the provincial level; and seven individual interviews, four transect walks and one focus-group discussion with farmers. Right after this initial data collection, we carried out ten supplementary interviews of stakeholders at the provincial and local levels to gather additional information about operational planning practices and relationships with stakeholders at various administrative levels². Monitoring of the process during the intervention was undertaken by a group of five local evaluators, appointed and working under the supervision of a chief evaluator, a co-author here. Various methods were used to record observation and analysis. They filled a “logbook” (Bousquet, Etienne, & D’Aquino, 2011) on a daily basis recording all interactions, events and other external factors taking place in the area. Each workshop was monitored using attendance lists, participants’ expectations, pictures, videos, participant observation and individual questionnaires filled by the participants, facilitators and evaluators at the end of the workshops. Interviews of facilitators, participants and non-participants were also undertaken by evaluators at

² The questionnaires used in the baseline study were common to the five cases of the AfroMaison project (the Oum Zessar watershed in Tunisia, the Inner Niger Delta in Mali, the Fogera woreda in Ethiopia, the Rwenzori region in Uganda and the Drakensberg in South Africa). The complementary interviews therefore allowed understanding of the Ugandan case specifically.

various stages of the process. The data collected with these monitoring and evaluation methods were transcribed by evaluators immediately after collection. The four code categories used were the four flows as per the strict definitions provided above (information and knowledge, hydrosocial, financial and human flows). An initial test of the reliability of the code was made on one document and two interviews: data were coded separately by the chief evaluator and by two local evaluators. Comparison of the results indicated that a change in code categories was not necessary. All the raw data were read, listened to and summarized to identify meaningful units of text corresponding to the four code categories. The direction of the flows was identified based on correspondences shown in Table 1. No computerized data management program was used. Both coding and data extraction was made manually, using Word and Excel documents. The following sections present the results of this analysis.

3. Results

Table 2 summarizes the main flows illustrated in Figure 5.

Table 2. Summary of the flows before and during the participatory process

(NGOs = non-governmental organizations)

	<i>Flows before the participatory process</i>	<i>Additional flows during the participatory process</i>
Information and knowledge flows	<p><u>Local > local</u></p> <p>Training and capacity-building by agricultural trainers and community based organizations</p> <p>Radios</p> <p>Discourses of religious and tribal leaders</p>	<p><u>Local > local</u></p> <p>Exchange of information among communities in game sessions</p> <p><u>Local > provincial</u></p> <p>Integration of local plans into the Rwenzori provincial management plan</p> <p>Public claims during meetings</p>

	<p>Discourses of village elders in local water management committees</p> <p><u>Provincial > local</u></p> <p>Intervention of environment officers and technicians</p> <p>Training of local youth in schools & universities</p> <p><u>Supra-national > local</u></p> <p>Awareness raising campaigns by NGOs</p>	<p><u>Provincial > local</u></p> <p>Feedback of the provincial plan to communities</p> <p><u>Provincial > national</u></p> <p>Solicitation of district stakeholders towards the Minister of Water and Environment</p> <p><u>Supra-national > provincial</u></p> <p>Intervention of international experts</p>
Hydrosocial flows	<p><u>Local > local</u></p> <p>Role of local water management committees in developing and implementing local bye-laws</p> <p>Influence of community based organizations, religious leaders, tribal leaders and kings in informal decision-making processes regarding local water management</p> <p><u>Local > provincial</u></p> <p>Lobby of NGOs and religious leaders to sectoral district sectoral committees to have their proposals funded by the plans</p> <p><u>Provincial > provincial</u></p> <p>Environment committees and officers who are meant to implement ordinances</p>	<p><u>Local > provincial</u></p> <p>Legitimacy of Mountains of the Moon University and the Rwenzori Regional Development Framework - SATNET</p> <p>Communities issuing their own water management plans</p>
Financial flows	<p><u>Local > provincial</u></p>	<p><u>Provincial > local</u></p> <p>Logistic expenses for local workshops</p>

	<p>Decentralized participatory budgeting system</p> <p><u>Provincial > local</u></p> <p>Allocation of the 5-year strategic budget to villages</p> <p>Allocation of budget to NGOs or religious leaders which lobbying was successful</p> <p><u>Supra-national > local</u></p> <p>Financial inputs from international donors</p> <p><u>Supra-national > provincial</u></p> <p>Financial inputs from international donors</p>	<p><u>Supra-national > provincial</u></p> <p>Funding from European project through provincial rural extension networks, ultimately acting locally</p>
Human flows	<p><u>Local > local</u></p> <p>Water users</p> <p><u>Local > provincial</u></p> <p>Youth travelling to the provincial capital where they study</p> <p><u>Provincial > provincial</u></p> <p>Environment officers rarely going to the field</p> <p><u>National > Provincial</u></p> <p>Three parliamentarians travelling to Fort Portal</p>	<p><u>Local > local</u></p> <p>Local facilitators and evaluators attending local workshops</p> <p><u>Local > provincial</u></p> <p>Communities attending provincial workshops</p> <p>Local facilitators and evaluators attending provincial workshops</p> <p><u>Provincial > provincial</u></p> <p>District representative attending provincial workshops</p> <p><u>National > provincial</u></p> <p>Parliamentarian attending provincial workshop</p> <p><u>Supra-national > provincial</u></p>

		International researchers attending provincial workshops <u>Supra-national > local</u> International researchers interviewing local farmers and attending local workshops
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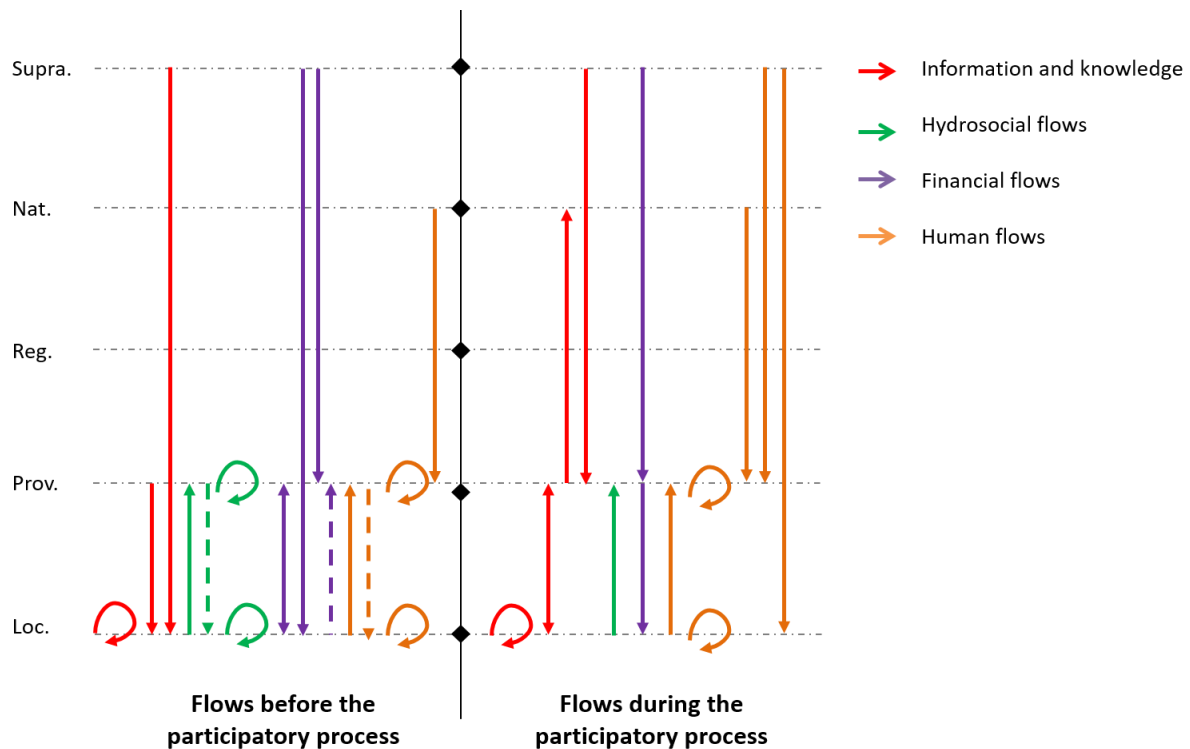


Fig.5 Flows of interactions among multiple levels before and during the participatory process in the Ugandan case study (dotted arrows represent flows that are supposed to exist from an administrative, legal or juridical point of view but are in fact malfunctioning or nonexistent from an operational point of view)

3.1 Flows of interactions among multiple levels before the beginning of the participatory process

Most **information and knowledge flows** about water circulate within the local level. Specifically, networks of agricultural trainers (e.g. SATNET - Sustainable Agriculture Trainers Network) and community based organizations share information and build capacities of farmers about sustainable

water-preserving agricultural techniques and behaviors. Many messages about water preservation are also conveyed through the radio, as well as by religious leaders, tribal leaders of the Bakonzo, the Bamba and the Babwisi and Bunyoro and Toro kings (local > local). Beliefs linked to water are also conveyed by village elders who often head local water management committees (Migongo-Bake & Catactutan, 2012). For example, Bakonjo believe that if bamboo trees are grown on farmland, an elder will die. This knowledge often supersedes government information, particularly in areas where government officials are not able to intervene on a regular basis. Some information flows also go from the provincial to the local level, through the intervention of governmental environment officers and technicians. Finally, some flows, such as awareness-raising campaigns from international NGOs, come from the supra national level (supra-national > local). In general, information flows are mainly mediated by in-person interrelationships, except through provincial radio broadcast, a major media, and rarely phone (oral or text) word-of-mouth. Internet means are rarely used for water information and knowledge purposes outside academic or foreigner arenas.

Regarding **hydrosocial flows**, water management decision-making is highly fragmented between the provincial and the local level. Ordinances are issued at the provincial level (provincial > provincial) that have to be in line with the national laws and acts. However, these are poorly implemented, mainly due to a lack of governmental funds, low salaries and corruption. Environment committees and officers in the region are generally active at the district level, sometimes at the sub-county level and almost always inactive or nonexistent at the local level (hence the dotted green arrow in figure 5). One interviewee (interviewed in July 2012), who is an independent environment officer in Fort Portal, mentioned: “most [local environment officers] don’t know their roles, they lack knowledge, money, transport. [...] The local environment officer is often a poor person, he will not go and discuss environmental issues and penalties with a rich man who provides him with milk and other things”. This led to a certain remoteness of communities from the governmental regulations and suspicion towards the capacity of the state to manage natural resources. As a result, many local communities

adopt local bye-laws for water management that generally are a combination of Local Council bye-laws, social norms and culture (local > local) (Hartter & Ryan, 2010; Hassenforder, Ferrand, Pittock, Daniell, & Barreteau, 2015). In addition, as previously mentioned, community-based organizations, religious leaders, tribal leaders and kings play a large role in informal decision-making processes regarding local water management, i.e. customary governance. In villages where local water management committees exist, the committee is generally in charge of making sure that water resources (particularly wells) are properly utilized. They control the utilization and access rights of resources. Financial or physical sanctions are applied to offenders who pollute water. Local organizations or non-governmental organizations (NGOs) have played a role in implementing such sanctioning systems, including “community policing” or “shame lists” against persons who did not use sanitation facilities or who polluted or wasted water. In some places, open defecation was even reported to lead to public ban (pillory).

Financial flows follow a similar pattern to hydrosocial flows since, to a certain extent, administrative water budgets are linked to the decentralized water planning process. There is a budgeting cycle every year which should be fueled by a participatory process. In each village (LC1), a LC1 chairman is elected by villagers. The chairman selects a committee of 10 people approved by villagers. Each committee gathers about every three months and writes down villagers’ needs and expectations. These are taken up to LC2, 3, 4 and then 5 levels (dotted purple arrow from local > provincial), each level prioritizing the actions which are to be funded (see Table 1). At the subcounty and district levels, 5-year strategic plans, revised at mid-term, aim at funding prioritized actions. These plans attract financial inputs from international donors (supra-national > provincial) who also fund some local projects directly (supra-national > local). Budget conferences at the subcounty and district levels select actions to be funded through the 5-year strategic plans. Plans are then further scrutinized and approved by district councils and district sectoral committees. Budget is then allocated to villages (provincial > local). However, implementation of this decentralized participatory budgeting system

rarely goes as planned. Interviews revealed that many villagers have the feeling that their needs and expectations are rarely funded: “even when it [proposals] goes up, it doesn’t go down” (Interview : program Officer, Rwenzori Information Centres Network 02/08/12). Several actors, including NGOs and religious leaders, lobby district sectoral committees to have their proposals funded by the plans (provincial > local). This formal structure is complemented by groups of “saving-and-credit”, mainly with women, who can indirectly contribute to natural resource management actions.

Human flows related to water management are also rather uni-level. Interviews with environment officers revealed that they rarely go to the field to monitor water usage due to a lack of funds and vehicles (hence the orange dotted arrow from provincial > local). The geographical remoteness of local communities from decision making hubs along with the rugged terrain limit human flows from local to provincial levels, even less to Kampala. The three members of the national parliament representing the Rwenzori region often travel to Fort Portal, the main city in the Rwenzori region, since they originate from the region (national > provincial). However youth engaged in education, especially in local university, are de facto carrying voices and perspectives of their own community toward the provincial capital where they study (local > provincial).

3.2 Flows of interactions among multiple levels during the participatory process

This section addresses flows that were identified during the participatory process, that is flows observed throughout the period during which connected participatory events were organized (Apr. 2012-Dec.2013).

Since the participatory process targeted multi-level planning, the main focus was put to multidirectional flows of **information and knowledge**. These included specific integration of local plans into the Rwenzori provincial management plan (local > provincial) and feedback of the

provincial plan to communities (provincial > local), as well as exchange of information among communities (local > local). District stakeholders solicited the Minister of Water and Environment with the aim of creating a ministerial commission on integrated water management (provincial > national). In addition, international experts, including an economist, a hydrologist, an ecologist and agro-foresters were solicited to provide inputs at several occasions during the participatory planning process (supra-national > provincial).

As mentioned earlier, **hydrosocial flows** concern how actor coalitions shape water management decisions and outcomes. During the participatory process, the two actor coalitions that were considered by participants as having the most legitimacy to implement the water management plan were Mountains of the Moon University, the Rwenzori Regional Development Framework and SATNET (local > provincial). Yet the project aimed at empowering communities to make decisions over their water resources. And indeed, the fact that 27 communities issued their own water management plans, and afterwards were able to defend their plan in front of provincial stakeholders shows that participants gained capacities in managing their water resources (local > provincial). Indeed, exchange of knowledge among communities was encouraged by the project and as a result some community members who had knowledge about a specific technique organized trainings in neighboring communities. As a result several local actions were implemented, such as building of energy saving stoves or waste separation areas.

The main **financial flow** here is from the European project and it was provided to actors at the district level (supra-national > provincial). Secondary flows appeared dynamically in relation to logistic issues in communities, for local workshop expenditures (provincial > local). Evaluators were employed, not the facilitators.

Human flows took place mainly through provincial workshops, which explains the orange arrows pointing mainly towards the provincial level. Provincial workshops gathered participants from the communities (local > provincial), districts (provincial > provincial), one member of parliament (national > provincial) and international researchers (supra-national > provincial). Some foreign researchers interviewed local farmers and attended local workshops (supranational > local). Only major human flows are represented here.

3.3 Comparison of the flows of interactions before and during the participatory process

The main question that this paper sought to address is: how are the interactions among multiple levels of water governance manifested over time in a participatory intervention? A comparison of the flows before and during the participatory process in the Ugandan case provides some insights to answer this question.

Information and knowledge flows from provincial to local and from local to local levels did not change much during the participatory process since the process used existing flows to communicate, including the mobilization of agricultural trainers, radio, etc. However, the nature of information exchange between community members was to some extent different. Using artefacts like the role-playing game and the CooPlan matrix (Fig.6) gave community members the opportunity to discuss certain topics that were not frequently discussed before. In particular, observations of the game sessions highlighted the fact that the game led participants to discuss the effects of individual actions on the environment and other stakeholders, whereas sessions with agricultural trainers usually include discussions on specific agricultural practices and have less of a systemic approach. Getting participants to explain their actions and management choices also led them to discuss some beliefs, such as the kind of bamboo trees that can be planted when someone dies. Information exchange

also occurred among communities themselves, through posters summarizing results of neighboring communities and through observers who could tell what was happening elsewhere.

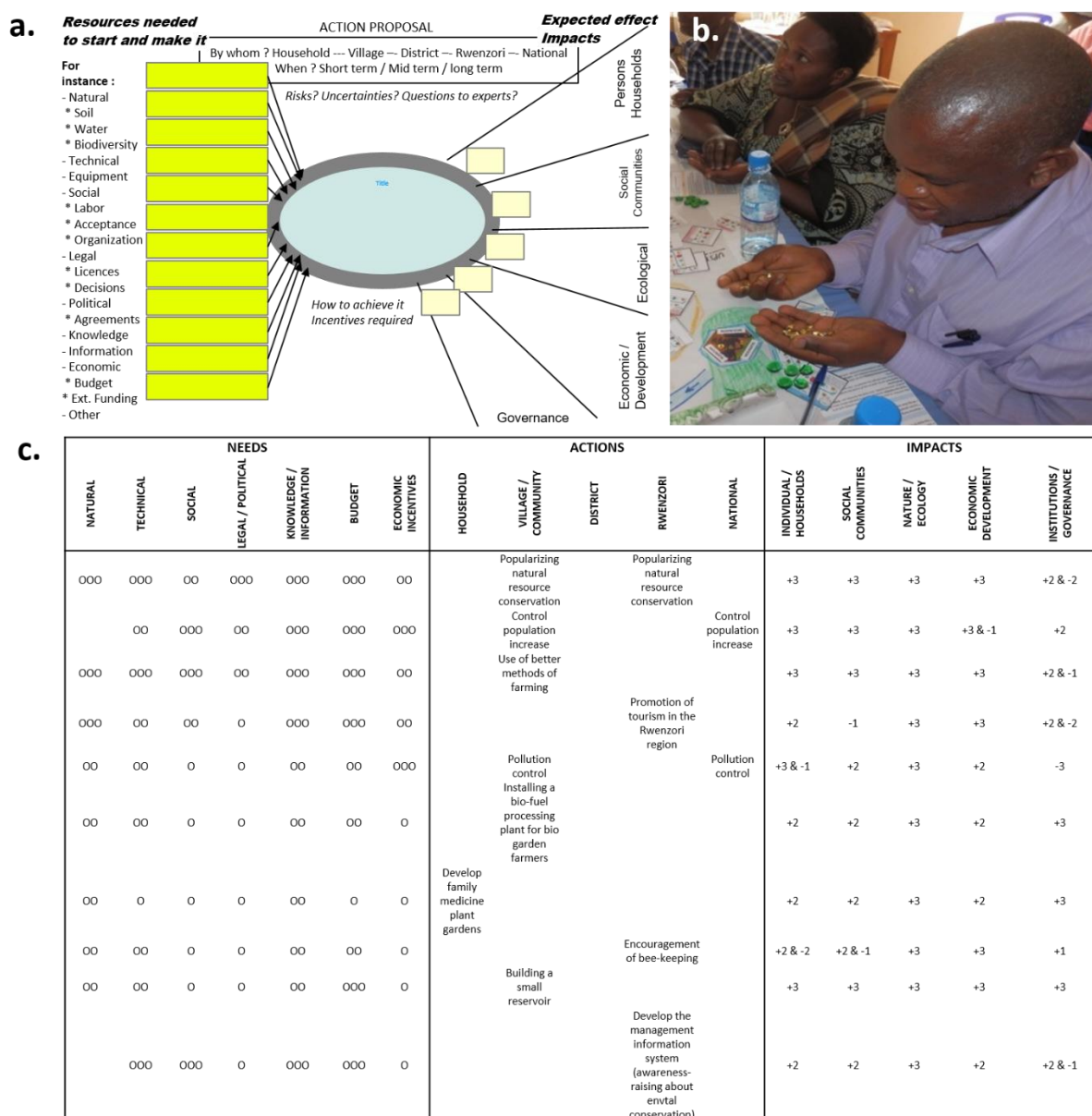


Fig.6 Some of the artefacts used during the participatory process: top left (a): action template to be filled by participants when proposing actions; top right (b): yellow pebbles materializing the financial flows in the game; bottom (c): CooPlan matrix for organizing actions in time, space and levels.

The participatory process also sought as much as possible to make information and knowledge flows bi-directional and not just top-down. For instance, communities could present their plans at the

provincial level. This information and knowledge flow from local to provincial must be analyzed in conjunction with the **human flow** going in the same direction. Indeed, it is rare for community representatives to sit in provincial decision-making arenas. The presence of these representatives made it possible to set up speaking arrangements that encouraged provincial-level actors to listen to the constraints and expectations of local-level actors. It is precisely this interaction that is often missing in natural resource management in the Rwenzori region. This acknowledgement was the rationale of the Afromaison project and indeed these interactions were reinforced in the timeframe of the participatory process.

Finally, the participatory process sought to bring information from the provincial to the national level, although attempts to establish a link with the parliamentary level have progressed very slowly. Only one parliamentarian agreed to attend provincial workshops and the ministerial commission that was supposed to be put in place has not, up to now, been constituted.

The participatory process was too restricted in time and space to have modified the **hydrosocial flows** in depth. Nevertheless, final interviews with participants showed that the process contributed to strengthen the legitimacy of Mountains of the Moon University and SATNET to carry bottom-up approaches to natural resource management. In the final questionnaires, a majority of participants indicated that they considered both organizations to be the most legitimate organizations to implement the plans. The participatory process also contributed to highlighting and discussing the role of environment officers whose absence, either physically or in terms of participation, was pointed out during the first provincial level workshops.

In **financial terms**, **flows** occurring in the course of the participatory process came from the supranational level (i.e. the European project) and were superimposed on the existing budgeting process. Project financial flows were in the Ugandan case injected directly at the provincial level

through an academic institution, who is not a regular recipient of natural resource management budget and is not accustomed to managing such funds. Moreover, the financial flows during the participatory process do not go from local to provincial because even though AfroMaison project fostered a participatory planning approach, the project did not finance the implementation of the plans. The rationale of the project was to build capacities at different scales so that the plans could be financed locally. As a result, AfroMaison project did not contribute to the establishment of a participatory budgeting process.

4. Discussion and conclusion

This comparative analysis has several methodological limits that have to be highlighted. Firstly, this comparison was made based on “pictures”, or static schemes of the flows at specific times, before and during the participatory process. A more dynamic representation of the evolution of these flows over time would enrich the analysis. Secondly, our analysis focuses on one specific part of governance, planning, one specific scale, administrative, and one specific natural resource, water. A broader analysis of other parts of governance, multi-scale (and not only multi-level) interactions, and of linkages with other natural resources would enrich the comprehension of the system at hand. Thirdly, we fully cannot track the secondary impact of participation on the various flows, as the enquiry would have been much too demanding for participants already hyper-engaged, and causal imputation would have been very difficult, outside using a control group.

Indeed, there are several other elements that impact the participatory process and the four flows. These include contextual elements (e.g. institutional dynamics, political economies in which local processes unfold, tacit political values and power structures) and elements that are inherent to the participatory process, including who is the convener, what is the role of the participatory process in decision-making, who participated and who did not and who facilitated. In the Ugandan case study

for instance, one of the stated objectives of the AfroMaison project was to bridge the multi-level gap. It is difficult to establish whether the flow changes would have been identical without this intentionality. At the same time, the participatory planning process remained parallel to the institutional natural resources planning process, which may partly explain why the changes caused are unlikely to last over time. In addition, other contextual aspects required crisis management in 2012-2013 (Congolese refugee flows, Ebola epidemics and floods in Kasese region) that took precedence over longer-term planning and caused a shift in the level of focus.

Despite these limits, this analysis has the merit of highlighting the nature of the flows that make up part of the multi-level governance in the case study. It also points out the importance of the engineering of the participatory process on the way it affects multi-level governance. Indeed, all flows, be they informational, political, social, financial or human, can be affected by the type of process chosen, the limits set for it, as well as the actors invited to it and the role they are given in it. All these elements can limit the effectiveness of water governance, reduce the scope of decision-making or make it accessible only to certain people. Acknowledging this, the role of the participatory process engineer then becomes to frame, for each modifiable flow, its origin, direction and magnitude in order to limit such deviances of participation.

From the current analysis and our experience, we propose some ways to engineer participatory processes in order to foster multi-level governance.

In the Ugandan process, the multi-directionality of information & knowledge flows was partly generated by the use of various forms of participatory modelling and simulation, including a combination of role-playing games and participatory planning. Indeed, the use of boundary objects such as role-playing games, action templates or the CooPlan matrix (Fig.6) has made it possible to elicit the four flows and to allow a dialogue on concrete elements. In the game for example, the

financial flows are materialized by yellow pebbles that are transferred from one player to another. In the action template, the participants are asked to reflect and then to dialogue on the information and knowledge resources needed to carry out a specific action. The four flows are thus concretely represented in the boundary objects and discussed. If the causality between the use of these boundary objects and the effects on multi-level governance in the Rwenzori region is difficult to establish, our analysis shows that they have at least contributed to it. We therefore recommend the use of such boundary objects in participatory processes in order to foster multi-level governance. Additionally, one of the lessons we have learned from this experience is that the involvement of specialized mediators for each type of flow might have fostered dialogue about the four flows and their interconnections. Such mediators would have been in charge of ensuring the specific address of each flow and the connection with other flows.

Concerning political and social control, some facilitation methods can reduce power imbalances and elite capture and adjust for cultural orientations. These include for example organizing the process separately with the different categories of stakeholders and then merging the results, putting the most powerful actors in the position of observers at certain times; switching roles in the role-playing game (e.g. asking a farmer to play the role of a decision-maker and vice-versa) or using participatory methods dedicated to conflict resolution (e.g. preference elicitation, consensus building, deliberation). These are common facilitation methods which allow all participants, including the most timid and marginalized, to express themselves. We also recommend the establishment of a participation charter and rules. These can be co-constructed with participants. They provide a framework for speaking out, sharing knowledge and respecting others and the process. They are more easily respected when they have been approved by participants in the early stages of the participatory process.

For financial flows, investment committees or participatory budgeting may help to diversify the stakeholder group in charge of administrating project finances. Regarding human flows, the variation of places and the multiplication of physical exchanges seems to favor multi-level governance, for example by encouraging decision-makers to come to the field or by offering lay stakeholders the opportunity to observe or even participate in institutional decision-making arenas. In Uganda, tight and multiplex social networks strongly enabled interactions among multiple levels of water governance. The fact, for example, that the facilitator of the participatory process is also involved in several regional civil society initiatives such as the Tooro Botanical Garden; or the fact that a member of parliament has family living in the region are non-negligible factors of multi-level integration which may need to be reconstructed elsewhere.

Having stressed the importance of the engineering of the participatory process, we advance the hypothesis that including participants in this engineering phase would make the four flows visible and allow their co-design with different actors, thus improving the effectiveness of multi-level participatory water governance. Several research studies go in this direction, in the field of decision aiding (Daniell, 2012; Pluchinotta, Kazakçi, Giordano, & Tsoukiàs, 2019), political science (Floc'Hlay & Plottu, 1998), and sociology (Barbier, 2005). Two of the authors of the paper have experimented such participatory engineering of participation in Drôme river basin in France (Hassenforder, Girard, Ferrand, Petitjean, & Fermond, n.d.) but further real-life experiments are still lacking.

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