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# Enduring controversy : small reservoirs in sub-saharan Africa

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► **To cite this version:**

Jean-Philippe Venot, M. Hirvonen. Enduring controversy : small reservoirs in sub-saharan Africa. *Society and Natural Resources*, 2013, 26 (6), p. 883-897. 10.1080/08941920.2012.723306 . hal-03511822

**HAL Id: hal-03511822**

**<https://hal.science/hal-03511822>**

Submitted on 21 Dec 2023

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Author's version (accepted) of:

Enduring controversy:  
Small reservoirs in sub-Saharan Africa

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## **Abstract**

This paper draws from the fields of anthropology of development and sociology of science to bring new light on the discourses and dynamics of agricultural water management in sub-Saharan Africa. Specifically, it investigates the persistence of a long-standing and apparently contradictory narrative that posits small reservoirs as a solution to the region's agricultural water challenges, despite recurrent reports of their low performance. The prevalence of small reservoirs is due to their role as "anchoring devices"; they embed a narrative of 'having great potential' but in ways that intersect multiple interests and development discourses. The gap between intention and practice that characterizes small reservoirs marks a stable interpretation over their nature and outcomes in the face of conflicting evidence. Understanding the interactions between discourse, policy formulation and implementation that sustain development projects departs from a linear vision of development. It paves the way towards improved agricultural water management.

## **Key Words**

Anchoring device, Development policy, Governance, Knowledge production, Water resources

**Running Head:** Small Reservoirs: A Lasting Debate

## **Introduction**

Throughout the past decades, agriculture has been in and out of favour among development practitioners and international funding agencies. In 2007, the World Development Report heralded the comeback of agriculture after a 25-year hiatus from the development agenda. Today, agriculture is seen as ‘a vital development tool for achieving the Millennium Development Goals’ (World Bank 2007a, p.v), leading to increased investments in the sector.

As an upshot, projects and reforms dedicated to agricultural water management are receiving renewed interest. International organizations see these as ‘effective instruments in using agriculture for development’ (FAO 2008). New agricultural water management initiatives continue to emerge on the grounds that they improve food production and ultimately contribute to poverty alleviation and rural livelihoods, especially in sub-Saharan Africa (for instance, AfDB et al. 2008, FAO 2008, World Bank 2007a). Yet, most studies have argued that agricultural water sector projects and reforms fail to achieve these objectives. This is said to constitute a major challenge to the sustainable development of sub-Saharan Africa (World Bank 2007b).

There is, thus, an apparent contradiction between prescriptions (what projects are meant to achieve) and their realities. This paper tackles the ambiguity through case studies of small reservoirs (also called small dams) in Burkina Faso, Ethiopia and Ghana.<sup>1</sup> It draws on theoretical insights from the anthropology of development and science and technology studies to investigate the linkages between public policy (irrigation and agricultural development), technology (the small reservoir as a tangible ‘outcome of policy’) and the scientific and expert understandings that contribute towards shaping them. Rather than asking *how this apparent paradox can be solved*, the paper focuses on *why and how it has emerged and is sustained* in the case of small reservoirs in sub-Saharan Africa.

We explain the persistence of the contradiction between policy prescriptions and project realities by casting small reservoirs as ‘anchoring devices’ (van der Sluijs et al. 1998) – highly stable boundary objects (Star and Griesemer 1989) that allow a diverse group of actors to coalesce around a common interest, and to transiently stabilize a debate in order to allow for concerted action. More specifically, it is the multivalent character of the concepts of ‘small reservoir performance’ and ‘institutions for collective resource management’ that maintain such cohesiveness. Each has different meanings to different communities of practice, whether academics, policy-makers, extension agents or local communities. Yet, these various definitions share sufficient commonality to unite otherwise potentially disparate agendas. We focus on the evocation of meaning by extension agents and local communities to show the mutually constitutive relationship between on-the-ground interventions and global cause-and-effect narratives of development.

The subsequent section develops the analytical framework further. Section 2 provides the discursive backdrop of agricultural water management in sub-Saharan Africa, based on a review of development policy documents. This paves the way for a detailed investigation of the debate around small reservoirs (section 3). Despite its long history, we find that the terms of the debate – that small reservoirs routinely ‘underperform’, but remain necessary to advance development – remain largely unchanged among today’s academics, practitioners, local and national policy-makers, civil servants, development partners and farmers’ representatives. Section 4, in turn, pursues explanations for the persistence of this contradiction. Our data suggests that the interpretative flexibility inherent in the notions of ‘performance’ and ‘institutions’ serves to mediate between sets of actors, and contributes towards locked-in debate on dichotomous terms. Section 5 recaps the argument and posits small reservoirs in ‘Big Development’ debates. It demonstrates how small reservoirs fulfil the imperatives suggested by broader rhetoric on the environment and development in sub-

Saharan Africa, thereby further explaining their lasting popularity in the face of ambiguity. The conclusion takes the argument to a more fundamental level and calls for framing water development interventions, and other policy models, against the backdrop of the knowledge production dynamics and associated social networks that underpin them.

### **Development and Anchoring Devices: An Analytical Framework**

The field of anthropology has been particularly prolific in its studies of the relationship between development policy and development practice. The ensuing debate, however, has been bipolar (Crewe and Harrison 1999). On the one hand, an ‘instrumentalist school’ adheres to the position that development practice follows development policy in a linear manner. Development policy is thought to be the outcome of a logical problem-diagnosis exercise. Where policy fails to meet its intended outcomes, the reasons are to be found in the socio-political ‘externalities’ of the context of implementation. Critical anthropologists of development, on the other hand, argue that development policy is a rationalizing, technical discourse (Escobar 1995, Ferguson 1992). Such discourse is said to naturalize poverty, objectify the poor and depoliticize development. It hides what these scholars view as the true objectives of development: cognitive control, social regulation and bureaucratic dominance (Ferguson 1992).

Mosse (2004), however, rejects this dichotomous understanding of the relationship between development policy and practice. He argues that the instrumentalist school of thought is dismissive of the institutional politics of development, while the critical anthropologists replace ‘the instrumental rationality of policy with the anonymous automaticity of the machine’ (Mosse 2004, p.644). He proposes an alternative perspective – the ‘new ethnography of aid’ – that acknowledges the complex agency of all actors in development. In other words, villagers, field and office workers, project managers and individuals responsible for donor relations all ‘create everyday spheres of action that are autonomous from the

organizing (or legitimizing) project models [...], but that at the same time work actively to sustain those same models – because it is in their interest to do so’ (Mosse 2004, p665).

The paradigm of the new ethnography of aid is not whether development works, but *how*; not whether development is successful, but *how it is successful* (see Olivier de Sardan 2001 for a similar argument). As argued by critical discourse analysts, it is the interpretation of events and outcomes that is critical to understanding policy impacts. Policy models or development projects (such as small reservoirs) come into being and are sustained by discourse coalitions (Hajer 1995) and interpretative communities; a range of actors who devote their energies to maintaining coherent representations of the models. The more interests that are tied up with their particular interpretations, the more stable and dominant development’s policy models become (Mosse 2004).

These discursive and political analyses echo debates within the field of Science and Technology around the concepts of *boundary object* (Star and Griesemer 1989) and *anchoring device* (van der Sluijs et al. 1998). Boundary objects are relatively stable and reproducible things, people, projects, texts, maps, and ideas. They are multivalent in character and can be cast in different ways that speak to various social worlds and communities of practices. They come to embody multiple discourses, and in the process, act to mediate between different actors (such as, in the case of small reservoirs international funding agencies, national and local decision makers, local users, and researchers). Each party can keep its identity and its objectives, and carry on with its work, whilst interfacing with others on common interests (Star and Griesemer 1989). Building on this notion, van der Sluijs et al. (1998, p312) introduce the concept of anchoring device as a ‘highly stable boundary object in a context of scientific and social flux’. In their case study the anchoring device is the consensus-estimate of 1.5C to 4.5C for climate sensitivity.

The following sections look at small reservoirs as anchoring devices. We do not engage in a normative investigation of small reservoirs' outcomes; rather, we shed light on the multiple interpretations that different actors have of the same water intervention. We highlight that small reservoirs lend themselves to a dual narrative. On the one hand, they have tremendous potential, but on the other, they have not yet delivered on their promises. We argue that this duality allows for small reservoirs to act as meeting points for different communities of practice. This convergence contributes towards the stability of the narrative, and the lasting popularity of small reservoirs as development interventions. We further highlight how specific concepts of 'performance' and 'institutions' are central to sustaining the status quo.

### **Agricultural Water Management Discourses in sub-Saharan Africa**

By shaping beliefs and perceptions and by prescribing what is legitimate or illegitimate, general discourse – and more detailed cause-and-effect narratives – contribute to framing development knowledge and policy (Hajer 1995, Roe 1991). In this section, we engage with discourses of agricultural water management in sub-Saharan Africa that set the boundaries within which related development interventions can unfold.

In mainstream development discourse, agricultural growth is central to rural poverty reduction. The agricultural sector is said to account for 20% of sub-Saharan Africa's GDP and 67% of the total labour force, and to be the main source of international exports (FAO 2008, World Bank 2007a). But sub-Saharan Africa is also described as having the lowest agricultural productivity in the world, and as having witnessed an increase in the numbers of poor and malnourished people due to a mounting gap between agricultural output and population growth (AfDB et al. 2008, FAO 2008). The underperformance of the agricultural sector, further affected by adverse environmental and climatic conditions, is pointed out as a major drag on the region's development.



In the agricultural water sector, the picture is one of abundant yet very unequally distributed renewable water resources with limited water control, little irrigation, and a persistent tendency of expensive projects failing to achieve expected outcomes. Most studies point to the low performance, productivity and profitability of existing irrigation systems, and to various physical, institutional and economic constraints for their further development (AfDB et al. 2008, World Bank 2007b). The sector is said to have experienced general neglect as major donors perceive agricultural water projects as time consuming, expensive to design and implement, and ‘more contentious than [projects] in other sectors, especially when they involve [...] irrigation infrastructure’ (World Bank 2007b, p.34). Consequently, though most poverty reduction strategies in the region are predicated upon agricultural growth, it is said that ‘agricultural water management has generally not been seen as a vehicle for achieving this [and] has had a low profile Poverty Reduction Strategy Papers’ (AfDB et al. 2008, p. x).

Collectively, these discursive elements signal that the potential of the agricultural water sector in sub-Saharan Africa is high. But, although water is available locally to meet human needs, the region is said to be facing ‘*economic water scarcity*’ as a result of low investments, scant infrastructure, and weak human and institutional capital ultimately limiting access to water. The situation is said to necessitate additional investments in water development for poverty reduction (Molden 2007; AfDB et al. 2008, World Bank 2007b). In this vein, the New Partnership for Africa’s Development (NEPAD) has formulated priorities for action and investment in its Comprehensive Africa Agriculture Development Program (CAADP). Water management and irrigation development feature as one of the ‘areas for primary action’. The continent-wide rhetoric focuses on fulfilling targets for public investments in agriculture (a minimum of 10% of national budgets as endorsed in the “Maputo Declaration on Agriculture and Food Security in Africa” in 2003), agricultural productivity (to be increased by at least 6%), and irrigated area (to be increased from 8 to 15% of the arable land; NEPAD 2003).

Among the multiple options considered, the CAADP prioritizes ‘the identification and preparation of investments to support small-scale irrigation’ (NEPAD 2003, p.28). Small reservoirs are proposed as one of the solutions to agricultural development challenges in sub-Saharan Africa.

## **The Small Reservoir Debate: Controversy as Status Quo**

### ***Methods and Overview of Small Reservoirs in Three sub-Saharan Countries***

It is difficult to ignore small reservoirs. They are conspicuous throughout rural areas in sub-Saharan Africa. Thousands of small reservoirs dot the landscapes of the continent (Venot and Krishnan, 2011). This paper draws on evidence from three countries, namely Burkina Faso, Ethiopia and Ghana where small reservoirs are high in numbers, to make a broader argument on how policy models in the agricultural water sector emerge and are sustained.

In line with interdisciplinary research practice, we drew on multiple methods and generated both qualitative and quantitative data over a period that spanned April 2009 and October 2011. We complemented an initial literature review and analysis of policy documents with a rapid appraisal of more than 600 small reservoirs. The latter consisted in administering a questionnaire to extension agents, in their office –not in the field, so as to collect information on the design purpose, actual uses, level of performance, and institutional arrangements governing the management of small reservoirs. We sought more in-depth information on the multiple uses and perceptions of small reservoirs by carrying out field visits, focus group discussions and semi-structured interviews with users of 40 randomly sampled reservoirs and other key informant within the communities (local elected representatives, customary authorities, representatives of Water User Associations and other local groups). Finally, in order to situate local level dynamics in the broader perspective of development and planning

processes, we conducted key informants interviews with policy-makers in relevant ministries and regulatory authorities as well as with donors and technical development partners.

In Burkina Faso, most small reservoirs were constructed between 1975 and 1985. Since then, there has been a continuous commitment to build more infrastructures for small-scale irrigation and about 1,200 small reservoirs can be found in the country. In Ghana, considerable investments were made following independence in the 1960s, after which small reservoirs virtually disappeared from the national development agenda. Since the mid-1990s, however, there has been renewed interest in small reservoir projects, mainly due to large donor-driven investments in the north of the country. There would be nearly 1,000 reservoirs in Ghana, two thirds of which being located in the three northern regions (Venot et al. 2011). In north-eastern Ethiopia, investment in small reservoirs gained prominence from 1995 as a way to enhance food security and provide labour opportunities to the people in a region devastated by decades of famine and political instability (Aberra 2004). In the early 2000s, more than 100 dams dotted the hilly terrain of the Tigray region.

### ***Framing Understandings of Small Reservoirs: An Enduring Debate at Global Level***

Interest in small scale irrigation (and in small reservoirs in particular) reflects broad changes in rural development thinking. As early as the 1960s, small farms had been framed as motors of rural development. This paved the way to a participatory and bottom-up rhetoric (Chambers et al. 1989) that emerged in the 1980s and underpinned a sustained interest in farmer managed irrigation schemes notably in South Asia (Yoder 1994). More recently, the early 1990s witnessed another boom in academic and development interest in small-scale irrigation, this time in sub-Saharan Africa (Turner 1994). Two phenomena in particular may explain this interest; firstly, the droughts of the 1970s that affected sub-Saharan agriculture and livelihoods dramatically and secondly, the controversy around large-scale dams, their costs, and their social and environmental consequences (WCD 2000). These two phenomena

coincided with calls for decentralization of decision-making and participation of local users in the management of natural resources, both of which soon became mainstream discourses.

At the core of our understanding of small reservoirs appears a two-fold narrative in which small reservoirs have tremendous potential but have not yet delivered on their promises. The arguments advanced to support this are summarized in table 1. On the one hand, small reservoirs are high in demand among local communities, are a priority for national governments, and continue to attract funding from international development agencies (Venot and Cecchi 2011). They are said to have significant impacts on food security and local incomes by supporting multiple uses of water, such as irrigation, livestock watering, fisheries, and domestic uses. Further, they are seen as a viable option to buffer against extreme weather events and changing climatic patterns (McCartney and Smakhtin 2010). On the other hand, many studies point out their underperformance (Faulkner et al. 2008). Others highlight the governance challenges faced by small reservoir projects, both at the local (participation and empowerment) and national levels (Birner et al. 2010). In addition, there is emerging evidence that uses of small reservoirs contribute towards environmental deterioration – erosion of the shoreline, decreasing water quality – and have adverse health impacts though adequate management could lead to improved human health (Boelee et al. 2009).

Table 1. Contrasting opinions on small reservoirs and small scale irrigation

<b>Opportunities/stated advantages</b>	<b>Limitations/stated drawbacks</b>
<i>Governance and Planning</i>	
Viable/practical alternatives to large projects	Multiple approaches/lack of benchmarking
Compatibility with local farming systems	Low visibility and limited funding
Easily adaptable to local conditions and allowing involvement of population in the sitting/design	Planning processes similar to those of large-scale projects
Quicker/higher returns than large-scale projects	Lack of attention to complexity of intervention
	Lack of involvement of population in planning phases
<i>Management</i>	
Easy to maintain and manage	Low management capacity (community/extension agents)
Compatible with local culture and knowledge	Need/lack of attention to training
Amenable to participatory management	No sustained interest for participatory management
	Lack of empowerment/ownership
	Complexity of institutional (land and water) arrangements
	Lack of maintenance/Low performance
	Local power structures impeding equitable access
<i>Infrastructure/Development</i>	
Low costs (absolute value)	High costs relative to benefits
Simple technology	Inconsistent commitment by governments/donors
Large scope for development	Difficulty to replicate (context specificity)
Substantial aggregate areas	Need/lack of attention to proper feasibility studies
Spread benefits spatially/reach remote areas	Lack of capacity (engineering)/low quality of construction
<i>Impacts</i>	
Multiple uses (irrigation, livestock, fisheries)	Weak forward/backward linkages (market/inputs)
Substantial impacts on economy (diversification)	Conflicts
Generate employment opportunities	Capture by local elites
Buffer against climate variability/change	Sensitivity to extreme events (droughts, floods)
Promote local entrepreneurship	Health (malaria) and environmental (pollution) issues
Limit migration and related negative impacts	Siltation
Limited social and environmental externalities	

*Source: Adapted from Venot and Krishnan (2011)*

This two-fold narrative has dominated the debate over small reservoirs for over 20 years. In the absence of a framed alternative (see Roe, 1991 for a generic argument), it appears to be an agreeable equilibrium allowing multiple actors (among which pro-reservoir decision makers, pro-empowerment civil society organization, cautious observers, etc.) to adhere to their identity and pursue their core interest while forging joint action with others. This narrative and the interpretative community that underpins it serve to make small reservoirs ‘stable boundary objects’ (i.e. anchoring devices), thereby explaining their lasting presence in the face of recurring assessments of their poor performance. The next section investigates how this narrative unfolds in the three countries studied.

### ***Multiple Views and Paradoxical Rationales in Three sub-Saharan Countries***

Table 2 presents the results of a free-listing exercise conducted during seminars organized in the three study countries. Participants were selected for their knowledge of the region and of issues related to small reservoirs therein. They included academics, practitioners, policy makers at national and local levels, civil servants, development partners, and farmer’s representatives. All were asked to identify the three most pressing topics they deem required attention regarding small reservoirs. Table 2 lists the answers in terms of planning and governance, management, infrastructure, and impacts – four themes that are routinely interrogated in the literature on small reservoirs (table 1). Our objective here is not to engage in value judgments of the relevance of these issues but rather to illustrate the multivalent character of small reservoirs, hence their ability to be cast in various ways and to trigger the interests of multiple actors.

Table 2. Small reservoirs embody multiple interests

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<b>Planning and governance (mentioned by 48% of the respondents)</b>
Involvement of the government and linkages between different levels of decision making (planning)
Ownership and institutional arrangements
Basin-wide implications of small reservoirs

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<b>Management (mentioned by 64% of the respondents)</b>
Capacity of local management systems (local government, WUAs)
Maintenance and financial capacity
Adequacy between uses and resources availability (downstream/upstream; multiple uses)

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<b>Infrastructure (mentioned by 40% of the respondents)</b>
Adequate feasibility study and needs assessment
Technical design and availability of data
Optimization (land and water productivity)

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<b>Impacts (mentioned by 100% of the respondents)</b>
Improved livelihoods/need improvements
Environmental impacts (siltation/pollution/water quality)
Health impacts

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All participants shared the view that small reservoirs can yield multiple benefits for rural livelihoods, but need to be improved. Having reached consensus on this issue, participants expressed a wide variety of opinions as to how this improvement could be achieved. These included addressing planning processes, modes of management and ownership; the capacity of local users to use, manage and maintain small reservoirs wisely; design and infrastructure problems and technical bottlenecks for improved land and water productivity; and health and environmental hazards (table 2). This range of prescriptions to a common diagnosis reflects the workings of small reservoirs as anchoring devices. They serve to create a commonality of purpose by evoking myriad remedies, each of which in turn echo broader development and environment discourses in sub-Saharan Africa (see below).

## **How and Why Small Reservoir Projects “Fail” or “Succeed”: Performance and Institutions as Mediatory Boundary Objects**

Two notions are central in allowing small reservoirs to serve as anchoring devices; firstly, the notion of *performance*, which conveys concern for efficiency, optimization and productivity, and secondly, *participation* in relation to finding the “right institutions” for managing common pool resources, such as small reservoirs. The following sections discuss these two notions. We argue that performance and institutions act as mediatory boundary objects and contribute to shape attached small reservoirs as anchoring devices. But they also contribute to framing development in dichotomous terms of success/failure rather than as a continuous process.

### ***Multiple Vantage Points on the Notion of Performance***

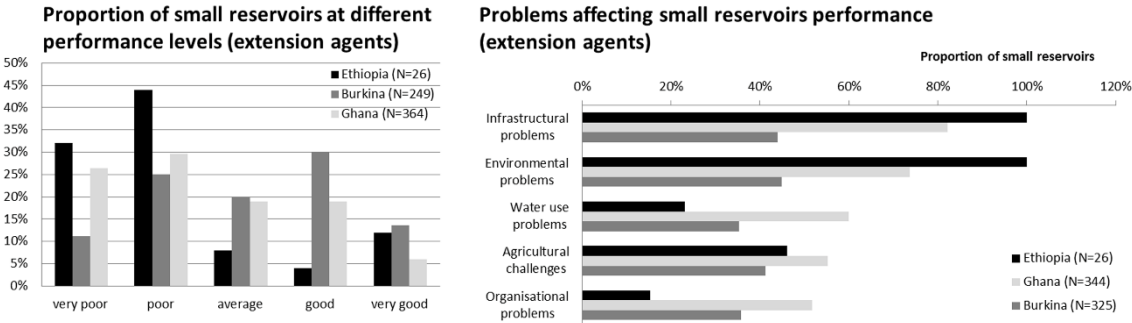
Irrigation performance assessment is presented as an important management tool to aid irrigation projects to deliver on their promises (Molden et al. 2007). Long limited to hydraulic, agronomic and economic indicators, performance assessments have been broadened to account for multiple uses of water, environmental and gender dynamics (Bos et al. 2005, Meinzen-Dick and van der Hoek 2001, van Koppen 2002). Institutional economists have also successfully argued for recognizing the institutional dimension of performance when identifying “guiding principles” for robust and enduring institutions for common property resources management (Ostrom 1990). Performance (of irrigation) can assume multiple meanings for different people and for diverse purposes (Venot and Cecchi 2011). A focus on performance also frames development projects in dualistic terms in the sense that they perform or do not. In this section, we engage with the meanings of performance for two types of actors – extension agents of ministries/bureaus of agriculture and the local users. These actors have a specific significance. The former act as brokers between policy making and project implementation; their interpretation of events is passed on to higher levels of



decision making through the state apparatus. Local users, on the other hand, are the final stewards of small reservoirs and projects are implemented in their names.

During the rapid appraisal, agricultural extension agents were asked to qualitatively assess the performance of small reservoirs. They considered that between one third and two thirds of all small reservoirs performed very poorly or poorly (figure 1 left panel). The situation was deemed particularly critical in Ethiopia where siltation was commonly identified as the main cause of poor performance (environmental problem; figure 1 right panel). In Ghana, design and infrastructure problems were identified as the main causes for poor performance (figure 1 right panel). In Burkina Faso, extension agents considered that two-thirds of the reservoirs had an average, or higher, performance. Most reservoirs performing below average were not equipped with irrigation infrastructures. Organisational problems, marked by the absence of a Water User Association, were identified in all three countries as a major cause for low performance (figure 1, right panel).

Figure 1. Small reservoirs problems and associated levels of performance



Extension agents evoke the efficiency and participation discourses in their performance assessment of small reservoirs. However, they do so in binary terms: that either small reservoirs perform or they do not; either the local population participates or it does not. The specific attention given to infrastructural issues echoes the priorities of contractors and of an

irrigation bureaucracy dominated by civil engineers. By voicing a concern over poor performance yet articulating possible improvements, extension agents provide a rationale for national governments to call upon external donors or their own governmental agencies to fund rehabilitation or construction of small reservoirs.

Another level of complexity emerges from investigating the perceptions of local users. In all the communities studied, the local population expressed a level of satisfaction similar or higher than the extension agents. We then explored the users' satisfaction regarding the physical infrastructures, modes of management, benefits derived, and equity aspects of small reservoirs. Like extension agents, local users pointed to poor technical and managerial performance. They, however, showed a higher level of satisfaction regarding the benefits they derived and the equity aspects of small reservoirs. This highlights that small reservoirs are invested with social meaning and valued for multiple reasons that may not be captured by even the current generation of more comprehensive performance assessments.

These community views contribute to framing small reservoirs as promising interventions compatible with local systems, hence reinforcing their status as sought-after development interventions in sub-Saharan Africa. But rural communities are not homogenous. The surveys revealed that small-scale water users (e.g. the poor, youth, women, fishermen) tend to be more satisfied when irrigation activities are little developed. Conversely, they face difficulties in reaping direct benefits when intensive cultivation becomes the main goal or is the main activity. Indeed, capitals and capabilities (Bebbington, 1999) are key factors mediating the access to and use of resources that are made available by small reservoirs. This brings us to the other notion –institution- that is central to explaining the workings of small reservoirs as anchoring devices.

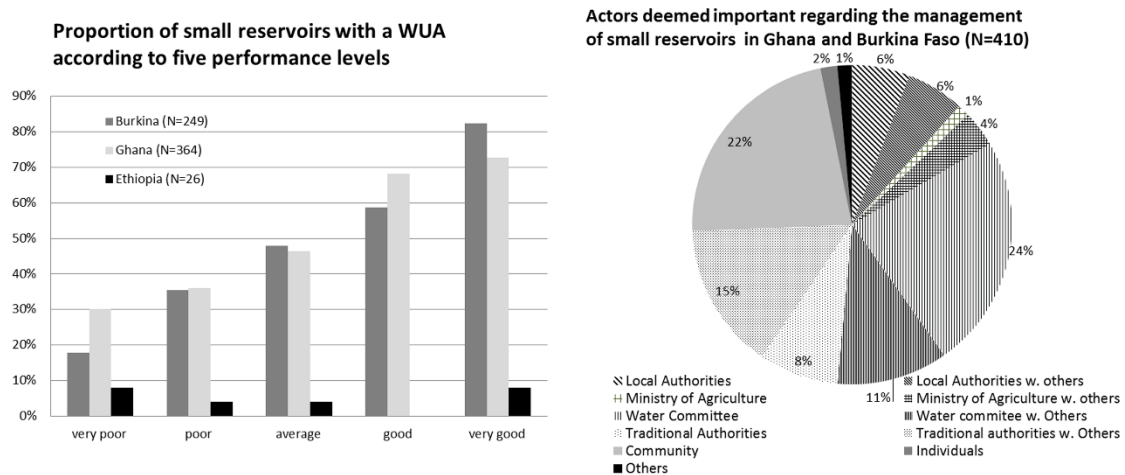
### *Shaping Understandings of Institutions*

Building on the idea of institutional crafting, as epitomized by the early work of Elinor Ostrom who described design principles for robust and enduring institutions for common property resource management (Ostrom, 1990, 1992), development actors have been looking for the 'right institution' to manage their investments, though Ostrom herself has recently warned against this elusive search for panaceas (Ostrom et al., 2007). Based on observations of farmer-managed irrigation schemes in South Asia (Yoder, 1994), promoters and implementers of small scale irrigation projects, such as small reservoirs, have asserted the primacy of Water User Associations (WUA) as the rightful entities for maintaining and managing them and enhancing their performance. But though they have acquired tremendous traction among development partners, WUA face mounting critiques among researchers who highlight the extraordinary sway the model continues to hold despite little evidence of its success. Scholars point to the over-formalized approach to institutional formation as adopted by development partners to explain past shortcomings and oppose to it the observation that 'institutions elude design' and that institutional formation is a socially embedded process shaped by historic factors, power relations, norms and values (Cleaver and Franks 2005).

Figure 2 highlights that extension agents articulate this polar debate. On the one hand (left panel), extension agents support the view that the presence of a WUA is positively correlated to good performance of small reservoirs (the proportion of WUAs among well performing reservoirs is higher than among poor performing ones).<sup>2</sup> On the other hand (right panel), they identify not less than seven categories of actors contributing to the governance of small reservoirs. Those actors are said to assume different and complementary roles. Water committees (e.g. WUAs) were identified as the main decision making body over small reservoirs in about one quarter of the cases only, and their main tasks were considered to be minor maintenance and daily management. Line ministries and government agencies are

rarely identified as the main decision makers but their role in procurement and construction processes and in supporting farmers (extension, marketing) is considered crucial. Finally, traditional authorities are seen as the most important decision makers regarding the uses and management of reservoirs in about 25% of the cases. They appear to be crucial in settling disputes, resolving conflicts, maintaining social cohesion (when ad-hoc resolution mechanisms have not yielded any results), and oversee land allocation and redistribution. On the one hand traditional authorities can lend their authority to the members and actions of the WUAs, on the other there is evidence where traditional authorities simply corner responsibilities and associated benefits. Finally, many decisions are also said to be reached through consensus building at the community level (the community is said to be the main decision maker in 22% of the cases) without a specific organization being singled out.

Figure 2. Management and performance of small reservoirs: WUA or institutional bricolage?



Again, the point here is not to engage in value judgments over which institutional arrangements are the most adequate to govern small reservoirs. Rather, we argue that this debate is an integral dimension of the workings of institutions as boundary objects. Researchers, international donors, development practitioners, extension agents, and local communities find in institutions a common platform to act and pursue their own objectives.

That small reservoirs are amenable to distinct institutional discourses –one on polycentric governance and the contingency of institution formation (McGinnis, 1999; Cleaver and Franks, 2005); the other promoting a specific institutional model, the WUA- reinforces their nature as anchoring devices. What is important to note, however, is that the debate over institutions unfolds essentially around their performance or their bearing on the performance of specific interventions (here the small reservoirs). Such debates frame socio-political dynamics as externalities rather than inherent dimensions of development, thus contributing to lock small reservoirs and the agricultural water sector in a ‘business as usual’ approach.

### **Small Reservoirs and ‘Big Development’**

The lasting presence of small reservoirs in the rural development agenda of sub-Saharan Africa hinges upon a stable, yet seemingly contradictory, narrative on their potential and outcomes. Small reservoirs are said to offer the promises of improved livelihoods and poverty alleviation, but they are also said to have fared well below expectations. The notions of performance and institutions play an active role in setting up the terms of this debate. But such interpretation of events has proved immutable only because it allows for a discourse coalition (Hajer 1995) and an interpretative community (Mosse 2004) to form and support small reservoirs against the backdrop of multiple higher level discourses.

First, small reservoirs fit *development discourses* that typify sub-Saharan Africa. As poverty and population dynamics (growth, urbanization, and migration) are depicted as the two main challenges facing the region, the future of agriculture is presented as one of intensification and diversification (NEPAD 2003). Small reservoir projects are seen as an option to achieve these objectives *via* the development of a market-oriented irrigated production and, in the process, the “sensitization” and capacity building of the population. This makes them particularly appealing to national decision makers and the international community alike.

Second, by their small size, small reservoirs are said to be adaptable to local conditions and compatible with local farming systems (table 1); they can be held up as examples of bottom-up development. This makes them amenable to prevailing *governance discourses* of community-led management that are appealing to donors and national governments alike. Further, by highlighting the role of local communities and institutions in the management of natural resources, small reservoir projects fit in, and reinforce, the discursive trend towards devolution that underpins decentralization reforms. In some other instances, such as in Burkina Faso, small reservoirs also play a central role in the shaping and implementation of Integrated Water Resources Management policies (Sally et al. 2011).

Third, small reservoirs are said to be an effective means to face *environmental challenges* that threaten the region. By providing water storage locally, they are seen as a viable option to adapt to desertification and climate change (McCartney and Smakhtin 2010) that further hamper the productivity of rainfed agriculture. This is linked to the fact that small reservoirs lend themselves to *eco-technology* discourses, casting them, on one hand, as modern and efficient infrastructures (Aberra 2004) and, on the other, as low key and low cost options providing a managerial solution to development problems (table 1). This makes them attractive to development agencies that are increasingly worried about “bad investments”. They also become a viable alternative for national governments that are said to ‘lack both the resources to launch the investment projects and programmes necessary for expanded and improved water control and crop irrigation on the required scale’ (NEPAD 2003, p.28).

Finally, by the sheer complexity of the processes they induce, small reservoirs lend themselves to *knowledge dynamics*. Development researchers<sup>3</sup> engage with this complexity and with what they consider being gaps, uncertainties or contradictions in the debate over small reservoirs (such as their under-representation in official databases, the difficulties in detecting them and accounting for them in macro-level analysis, their level of performance

and their modes of management to name a few). But this apparent knowledge vacuum remains an integral part of a clearly articulated dual narrative which, in the absence of framed alternative, appears to be resilient vis-à-vis social and scientific fluxes.

## **Conclusion**

The objective of the paper is not to assess whether small reservoirs are ‘good’ or ‘bad’ options for rural development in sub-Saharan Africa, nor is it to interrogate the validity of the multiple perceptions and discourses at stake (the reader could have easily spotted contradictions among some of the arguments). Rather, our main contention is that perceptions, discourses and associated social networks are an integral part of small reservoirs projects, and more broadly of any development or policy model.

It is the ability of a rural development model to act as an ‘anchoring device’ that sustains it in the face of changing circumstances. Anchoring devices allow for holding separate communities of practice together around a minimal common denominator (in our case, the potential yet unfulfilled promises of small reservoirs), while at the same time allowing multiple interpretations at the “boundary” (in our case, the framing of small reservoirs along developmentalist, governance, environmental, eco-technological, and scientific lines).

Science and technology studies bring our attention on the dynamics of knowledge production and associated social networks. Following Forsyth (2003), we argue that such framing can help us to revisit our understanding of environment and development processes. Looking at discourse and knowledge formation offers the opportunity to rethink policy recommendation and formulation by moving away from cause-and-effect narratives that frame policy failures as socio-political ‘externalities’ and instead recognizing these externalities as integral to the policy process.

## **Acknowledgments**

This work was funded by a grant from the Bill & Melinda Gates Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.



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<sup>1</sup> What constitutes a small reservoir is subject to debate (Venot and Krishnan, 2011). Here, we consider earth dams of less than 7.5 meters high that can store up to 1 million cubic meters. They sometimes have a downstream adjacent irrigated area generally covering less than 50 hectares. Capital investment is externally driven (government, NGOs, donors) while management is meant to be assumed by local communities. In Ethiopia, the term micro-dam is preferentially used (due to deep valleys and gorges, micro-dams can be 10 to 15 meters high and store up to 3 million cubic meters).

<sup>2</sup> Ethiopia stands alone with less than 10% of the small reservoirs having a WUA, irrespective of their performance level. This is linked to a more centralized system giving the primacy to the Bureau of Agriculture and farmers' cooperatives over Water User Associations.

<sup>3</sup> We included; this research project originated as an enquiry of local management of small reservoirs.