Water resources and rural development 9 (2017) 56–66

Contents lists available at ScienceDirect

Water resources and rural development

journal homepage: www.elsevier.com/locate/wrr

Can 'functionality' save the community management model of rural water supply?

Luke Whaley*, Frances Cleaver

Department of Geography, University of Sheffield, Western Bank, Sheffield, England, S10 2TN

ARTICLE INFO

Keywords:
Decentralisation
Water point committee
Water governance
Methodology
Sub-Saharan Africa

ABSTRACT

As attention increasingly turns to the sustainability of rural water supplies - and not simply overall levels of coverage or access - water point functionality has become a core concern for development practitioners and national governments, especially in Sub-Saharan Africa. Within the long-enduring Community-Based Management (CBM) model this has resulted in increased scrutiny of the "functionality" of the local water point committee (WPC) or similar community management organisation. This paper reviews the literature written from both practice-focused and critical-academic perspectives and identifies three areas that pose challenges to our understanding of water point functionality as it relates to CBM. These concern the relative neglect of (i) the local institutional and socio-economic landscape, (ii) broader governance processes and power dynamics, and (iii) the socio-technical interface. By examining these three areas, the paper engages with the specific issue of WPC functionality, whilst also considering broader issues relating to the framing of problems in development and the methodological and disciplinary ways that these are addressed. Furthermore, by focusing on community management of rural water points, the paper lays the ground for a more substantial critique of the continuing persistence of the CBM model as a central development strategy.

1. Introduction

Community-Based Management (CBM) has proven an enduring strategy for operationalising mainstream participatory development in the rural water supply sector. In its present form, this participatory agenda took hold in the 1980 s – the first UN 'Water Decade' - in the face of general disillusionment with top-down and supply-driven approaches (Garn, 1997; Sara and Katz, 1997). Added impetus was then given to the CBM model at the start of the 1990 s where community management, coupled with a strong focus on user financial contributions, became a cornerstone of first the 1990 New Delhi Statement (UN, 1990) and then, two years later, the influential Dublin Statement on Water and Sustainable Development (UN, 1992). This drive towards public participation and decision-making at the local level was echoed more broadly in Agenda 21, a core output of the 1992 'Earth Summit' in Rio de Janeiro. As a result of these developments, CBM became a central tenet of major policy and practitioner discourses on rural water supply (Nicol et al., 2012; Schouten and Moriarty, 2003).

With the advent of the Millennium Development Goals (UN, 2000), added emphasis was placed on extending the provision of improved water sources to the many millions of people around the world who lacked them. Despite the use of the term 'sustainable' within Target 7C of the MDGs, which sought to 'halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation', the development efforts that followed this mandate were strongly oriented towards attaining

* Corresponding author.
E-mail address: l.whaley@sheffield.ac.uk (L. Whaley).

http://dx.doi.org/10.1016/j.wrr.2017.04.001
Received 14 July 2016; Received in revised form 30 March 2017; Accepted 8 April 2017
Available online 10 April 2017

increased levels of coverage. In relative terms securing the longer term sustainability of supplies took second place to achieving the targets for coverage (Chowns, 2014; Glotzbach et al., 2013).

It could be argued that part of the implicit appeal of the CBM concept for key development players (international donors, development organisations, and governments) is that it allows them to highlight a concern for sustainability whilst at the same time distancing themselves from much of the responsibility for delivering it: in the case of rural water supply, to 'shrug off responsibility once the pumps are installed', as Colin (1999: 13) has put it. Instead, it is the community, and local level organisations, who are charged with ensuring that this criterion is met (Harvey and Reed, 2007; Mansuri and Rao, 2013). However, there has been growing concern about the high failure rates of newly installed water points, often within the first few years of construction (Duti, 2012; RWSN, 2009).

The concept of 'functionality' has emerged as a central motif within current development efforts to provide people with a safe and affordable water supply, now under the auspices of the Sustainable Development Goals (UN, 2015a). It has notably achieved currency in Sub-Saharan Africa (SSA) in relation to securing the sustainability of hand-pumped water supply (Lockwood and Smits, 2011). The need for improved functionality in this region is great due to a perceived deficit in government capacity to deliver and maintain services, and disappointing results of the MDG initiatives.[1] This contrasts with the picture globally where the target was surpassed in 2010, five years ahead of schedule (UN, 2015b).

As CBM is intended to create a relationship between the water point (WP) and the user population, it is not only the functionality of the physical infrastructure (the pumps and pipes) that is of concern, but also the functionality of the community organisation charged with managing it (Bey et al., 2014; RWSN, 2014; Welle and Williams, 2014; Whittington et al., 2009). In rural SSA, as elsewhere, this is typically the water point committee[2] (WPC). Thus the functionality of the WP is often deemed to be dependent on the functionality of the WPC and significant efforts are directed towards identifying ways in which this could be strengthened. As we discuss below, the literature has not yet produced one dominant definition of WPC functionality, but it broadly concerns the identification of operational components (such as financing and cost recovery, operation and maintenance) which contribute to longer term sustainability.

This paper reviews the literature written from both practice-focused and critical-academic perspectives and identifies three areas which pose challenges to our understanding of water point functionality as it relates to CBM. The bulk of the literature reviewed, though not all of it, focuses on SSA for reasons outlined above. Furthermore, the scope of the review relates specifically to rural water supply from handpump-equipped boreholes and wells, and not from other sources such as gravity-fed piped supplies and springs or boreholes equipped with diesel, electric, or solar pumps.

Three areas of concern are highlighted by our review:

1) A great deal of attention is devoted to the form and functioning of WPCs, whilst there is too little understanding of the local socio-economic milieu, and plural institutional landscape in which they are embedded.
2) There is a tendency to consider the functioning of WPCs as a techno-managerial exercise which can be divorced from power relations spanning scales of organisation. Even though development donors and practitioners are increasingly aware of the need to understand how broader governance processes and power dynamics influence the ability of local WPCs to function as intended, these studies are typically unsatisfactory in their conceptualisation and implementation, for reasons discussed below.
3) There is a dearth of approaches which address the socio-technical interface of rural WP supply – the 'hardware' and 'software' components of functionality are often treated separately rather than as interrelated - and more research is needed to better understand the ways in which each one affects the relative functioning of the other.

By examining these three areas, this paper engages with the specific issue of WPC functionality, whilst also considering broader concerns relating to the framing of problems in development and the methodological and disciplinary ways that these are addressed. Furthermore, by focusing on community management of rural WPs, the paper lays the ground for a more substantial critique of the continuing persistence of the CBM model as a central development strategy.

In what follows we address each of the three areas, drawing variously upon both the practice-focused and critical-academic literature.[3] Before doing this, we first briefly examine the concept of functionality as it has come to be applied in the development of rural water supply and in particular how it relates to the WPC. We conclude by outlining the methodological implications of the findings of this review, bringing the various strands of the review together to argue an agenda for future research.

[1] Even in countries where the MDG targets were officially met, such as Malawi, there is considerable skepticism about the ongoing viability of the services provided (Chowns, 2014; Glotzbach et al., 2013).

[2] Other terms are commonly in use – e.g. Water User Group, Water User Association, WASHCO, COWSO - but for simplicity we use the term water point committee (WPC) in this paper to refer generically to the community organisation for managing the water point.

[3] In making a distinction between these two bodies of literature, we draw upon Burawoy's (Burawoy, 2005) classification of types of sociological knowledge production. Thus a key difference between the two categories we use in this paper is that critical-academic knowledge is characteristically reflexive, placing a strong focus on the examination of taken-for-granted assumptions and values. In contrast, the practice-focused literature tends to be far more instrumental, involving "the expansion of research programs that are based on certain assumptions, questions, methodologies and theories that advance through solving external anomalies or resolving internal contradictions" (Burawoy, 2005: 139-140). It should be noted, however, that these are idealised categories employed for the sake of analysis and explanation. In reality, the boundaries tend to be more blurred. What's more, we are talking here of a distinction between two forms of knowledge - whether generated in an academic institution or within the NGO sector - and not between 'academics' and 'practitioners' per se.

2. 'Functionality' and water point committees

Broken-down or poorly-performing water points (WPs) are not a new concern (Colin, 1999; Hinds and Nhaurire, 2013; Morgan, 1993), with large-scale assessments and anecdotal evidence testifying to the issue at least as far back as the 1980 s (Arlosoroff et al., 1987). Despite a sector-wide realisation of the threat that this problem poses to the sustainability of rural water supply projects, 'functionality' as a focal point has only emerged in the last ten years or so, and particularly in Sub-Saharan Africa (SSA) (Lockwood and Smits, 2011). For example, a recent grey literature review of the functionality concept as it relates to rural water supply found that 'of the 117 articles and publications reviewed…90 were produced since 2008′ (Wilson et al., 2017: 9).

Here it is worth noting that a sizeable proportion of the literature on the functionality of WPs (and water point committees [WPCs]) appears to emerge in large part from the development sector itself; what we have termed 'practice-focused' literature in this paper, as distinct from the 'critical-academic' literature. Much of the burgeoning literature on functionality stems from three well-resourced projects – Triple-S, WashCost, and Value for Money (VFM-WASH)[4] – conducted in the last eight years and oriented towards understanding the wider issue of the sustainability of rural water supplies.

These projects and related literature have drawn attention to the relationship between functionality and sustainability (Duti, 2012; Moriarty et al., 2013; Ross, 2015). Indeed, Lockwood and Smits (2011) observe that functionality – 'which expresses the percentage of water points working at any given time' (Lockwood and Smits, 2011: 62) – often serves as a proxy for sustainability. However, it is important to recognise the two concepts are not synonymous, as noted by Carter and Ross (2015). For example, on the day of an inspection a water point may be non-functional for one reason or another but over the course of time delivers a sustainable supply of water. On the other hand, a different water point may be functioning at the time of inspection but is challenged by one or more fundamental physical or management-related faults or issues, meaning its likelihood of delivering a sustainable supply of water is small. To this extent, functionality represents a snapshot in time whilst sustainability is about the delivery of service over time (Carter and Ross, 2015).

Within the Community-Based Management (CBM) model, WP functionality is typically attributed to two interlinked domains, sometimes branded the 'hardware' and 'software' of rural water supply systems (Arlosoroff et al., 1987; Evans and Appleton, 1993). Here hardware relates to the physical infrastructure which makes water supply possible, whilst the software relates to the governance arrangements in place to install the hardware, operate, and maintain it. As a result, it is not only the physical infrastructure whose functionality is in question, but that of the WPC or similar local management arrangement (Bey et al., 2014; RWSN, 2014; Welle and Williams, 2014). This dynamic is captured by Colin (1999: 11), who notes that '[*i*]f the operation and maintenance system is designed around the water committee, the breakdown of the committee can jeopardise the maintenance of the pump'.

In thinking about the 'functionality' of a WPC, it is necessary to first outline what its intended functions are. Here the literature is relatively clear: the role of the WPC relates to the management, administration, operation, maintenance, and repair of the WP (Harvey and Reed, 2007; Lammerink and Bolt, 2002; Ministry of Water and Environment, 2014; Moriarty et al., 2013). In order to do this, it is proposed that the WPC must undertake a number of regular activities, including holding meetings; setting, collecting, and saving financial contributions from users; devising and enforcing rules, including rules around access and use; and undertaking or securing maintenance and repair work (Directorate of Rural Development, 1993; Harvey and Reed, 2004; Ministry of Water and Environment, 2014; Naiga et al., 2015; Schouten and Moriarty, 2003; Uckrow and Stephan, 2012). In addition to ensuring the continued operation of the pump, and in keeping with participatory theory, the WPC should also be a vehicle for empowering communities whilst bringing about greater equity of use (Lammerink and Bolt, 2002; Mengistu, 2012; Narayan, 1995).

Several authors note that the picture is complex, and that a wide range of factors contribute to the ongoing functionality of WPs (Foster, 2013; Lockwood and Smits, 2011; Welle and Williams, 2014). Much of this literature discusses factors that affect the capacity of WPCs to manage the system in question, where some of these publications set out to specifically address this issue (Baumann and Danert, 2008; Degabriele, 2002; Harvey and Reed, 2007).

Within the practice-focused literature, many publications differentiate between two phases of WP development and management. Both phases contain variables that appear to affect the functionality of a WP. These are often labelled a design and implementation phase and a post-construction phase. In the literature the design and implementation phase is considered important for putting in place the social and technical preconditions for effective CBM (Carter et al., 2010; Welle and Williams, 2014). At this stage, community 'sensitization', participation, and training appear important determinants of the future operation and management of the system (Evans and Appleton, 1993; Matamula, 2008; Ministry of Water and Environment, 2014; Narayan, 1995). Key here is ascertaining user demand for an improved service, securing capital contributions from the community (either in-kind or cash), and developing an appropriate tariff structure, where together these factors are seen as crucial for instilling a sense of 'ownership' among users (Harvey and Reed, 2004; Manikutty, 1997; Whittington et al., 2009; Yacoob, 1990).

During the design and implementation phase it is also considered good practice to establish the community management structure. As noted above, this is typically a WPC in the case of hand-pumped water supply. It is claimed that the composition of the WPC, in terms of gender and socio-economic representation, can be a significant structural condition for enhancing WP functionality whilst promoting equitable access (Beyene, 2012; Mukherji and Kishore, 2003; Ryan and Sulemani, 2013; Uckrow and Stephan, 2012). The technical dimension of the design and implementation phase is also crucial, where appropriate technology that has been

[4] Triple-S - Sustainable Services at Scale Initiative and WASHCost were both funded by the Bill & Melinda Gates Foundation and implemented by International Water and Sanitation Centre (IRC); VFM-Wash was funded by the UK Department for International Development (DFID) and implemented by a consortium led by Oxford Policy Management.

decided upon with the input of the community, borehole siting, the quality of the parts and other materials, and the quality of the installation are all significant (Arlosoroff et al., 1987; Welle and Williams, 2014). A study in Uganda by Bonsor et al., (2015) draws attention to an important issue that follows on from this, whereby the WPC may often be 'doomed to fail' for reasons concerning deficiencies with these technical aspects of the programme, which the committee itself has little or no control over (Bonsor et al., 2015). We shall return to this issue concerning the relationship between the physical WP and the WPC – the 'socio-technical interface' - later in the paper.

The literature points out the significance of the post-construction phase for WP functionality, and suggests that it receives relatively less attention by donors, governments, and development agencies (Foster, 2013; Mcintyre and Smits, 2015; RWSN, 2005). During this phase, various authors stress the importance of user satisfaction with the service provided (Practica Foundation, 2013; Sara and Katz, 1997; Schouten and Moriarty, 2003; Walters and Javernick-Will, 2014). This relates in particular to water quality and quantity, and to the accessibility and reliability of supply (Carter and Ross, 2015; Moriarty et al., 2013, 2011). If the new service does not represent an improvement on pre-existing sources of water, as judged by one or more of these factors, then the community's desire to manage and maintain the system is undermined. Welle and Williams (2014: 13) therefore note that 'how much the service is valued by community members, and in how far it satisfies users' needs can be a key factor affecting scheme O&M and therefore its sustainability'.

3. Plural Institutions, power relations, and community management

From a Community-Based Management (CBM) perspective, a core feature of the post-construction phase concerns the day-to-day operation of the community governance arrangement. In the critical-academic literature there have been several critiques levelled at the requirement for water point committees (WPCs) to fulfil many of these expectations, oftentimes drawing on feminist analysis of the everyday politics of water. Broadly speaking, this literature suggests that the model of WPC functionality put forward in the practice-focused literature fails to take account of important contextual factors such as historical processes, livelihood constraints including the gendered divisions of labour, and the extent to which water management and use is socially embedded in a plural and gendered local institutional landscape (Joshi and Zwarteveen, 2012; Mandara, 2014; O' Reilly, 2012).

A strong emphasis in the practice-focused literature is on regularised and formalised activities such as periodic committee meetings and financial book keeping. This emphasis has been questioned by some authors who note that regularisation and codification of management arrangements can be used as a way to amplify the voice and influence of some water users over others (Dikoto-Wachtmeister, 2000). Additionally, they have noted an incongruity between this bureaucratically-informed model and the *modus operandi* of village life in much of rural Africa and elsewhere. Thus, for example, meetings may typically be held and user payments made only when the need arises rather than in accordance with a pre-set timetable. Furthermore, activities like book keeping fail to materialise not only because of a lack of training and often high levels of illiteracy, but because they may not fit with historically and culturally appropriate ways of doing things (Cleaver and Elson, 1995).

The critical-academic literature suggests that rather than over-focusing on bureaucratic regularity we should pay more attention to the contingencies of rural people's livelihoods and the ways that they shape participation in WP management. So, for example, expectations that WPCs should collect finances at regular periods throughout the year belies the fact that the availability of funds in a community is often strongly dependent on livelihood patterns and strategies, which in turn are closely linked to the rhythms of the seasonal calendar (Degabriele, 2002). This is especially evident when considering agrarian cycles of production, around which many rural dwellers' lives revolve (Parker et al., 2016; Tucker et al., 2015).

As is consistent with a good governance conceptualisation of institutions, the practice-focused literature also highlights the need to periodically re-elect the committee, which is seen as an important democratic mechanism for avoiding capture by local elites and others (Schouten and Moriarty, 2003; Stawicki, 2012). In keeping with the theme of WPC co-optation, one performance indicator adopted by Adank et al., (2014) when investigating the state of handpump services in Ghana was 'political interference', where the benchmark for this indicator related to whether 'any change that had occurred in the [WPC] was not due to political or chieftaincy interference' . This is one of a number of factors allegedly relating to the transparency of the WPC and its accountability to both the user base and the government. Whether the WPC represents the needs of the broader community and the role of women on the committee are other important factors in this respect (SNV, 2012; Uckrow and Stephan, 2012). Welle and Williams (2014) suggest that transparency can in part be measured through an assessment of the committee's financial record keeping.

In contradistinction to these practice-focused prescriptions and assessment criteria, much critical-academic literature instead draws attention to the fact that water management is socially embedded and, because of its contested nature, inherently political (Bakker, 2012; Boelens, 2015; Linton and Budds, 2013; Schnegg, 2016; Swyngedouw, 2009). To this extent, power relations infuse local water governance arrangements, mediating patterns of access and use in ways that reflect broader community dynamics, social relations, and inequalities (Cleaver, 2012; Mosse, 1997; Schnegg and Linke, 2015; Zwarteveen, 2008). Authors who subscribe to this political sociology framing of water management (see Mollinga, 2008) are therefore sceptical about the extent to which formal processes such as periodic elections and the representation and roles of women on committees are the most appropriate or effective route to countering deeply ingrained social and cultural factors (Dewan et al., 2014; Masanyiwa et al., 2015; Zwarteveen and Neupane, 1996). Recently some authors have attempted to bring in-depth knowledge of context, culture and embedded practices into engagement with pragmatic concerns for delivering development and have argued for an approach that 'goes with the grain' through the adoption of 'hybrid institutions' rather than the design of new ones (Booth, 2012; Merrey and Cook, 2012; van Koppen et al., 2007). However, Rusca and Schwartz (2014) issue a cautionary note, drawing attention to the dangers of such an approach because of its potential to reflect and entrench existing inequalities.

As noted in the previous section, one factor the practice-focused literature highlights as being key for a WPC's capacity to carry out its various duties is a sense of ownership, whereby the WPC feels it has the power and the responsibility to act (Naiga et al., 2015; Skinner, 2009). More recently, however, Lockwood and Smits (2011: 76) have argued that what is important is not necessarily ownership or a sense of ownership but rather that the WPC has a 'sense of being a service provider' or is a service provider in the legal interpretation of the word. This recasting of the ownership concept has emerged as part of a new discourse that has moved from CBM per se, to a wider Service Delivery Approach (Lockwood and Smits, 2011; Moriarty et al., 2013). As with such notions as participation and empowerment, 'ownership' has been critiqued in some of the critical-academic literature (Cleaver and Elson, 1995; Cleaver and Toner, 2006; Marks and Davis, 2012; Srivastava, 2012; Toner et al., 2004). To this extent, several authors have highlighted the link between CBM concepts such as ownership and the 'rolling back' of the state in the 1980 s and 1990 s during a period often associated with a broad (if variegated) international neoliberal agenda (Dewan et al., 2014; van den Broek and Brown, 2015). With the label of 'service provider', new questions emerge concerning what is being implied for the role of communities and about their capacity to perform these roles.

4. Beyond community: a wider, more critical governance framing

In the practice-focussed literature, the capacity of the water point committee (WPC) to perform as intended is seen to be significantly influenced not only by the factors discussed above, which largely concern the operational activities of the WPC, but also by the availability of external support throughout the post-construction phase (Jansz, 2011; Lockwood and Smits, 2011; Mcintyre and Smits, 2015; Practica Foundation, 2013). The practice-focused literature's emphasis on external support has been reinforced by the growing realisation that voluntary community management arrangements do not adequately ensure the continued enthusiasm and involvement of committee members (Koestler, 2009; Lockwood and Smits, 2011; Moriarty et al., 2013). As a result, Baumann (2006) has proposed 'community management plus', a concept which implies clearly defined roles and responsibilities for central and local government as well as the community in delivering a sustained service, and which 'requires a paradigm shift in how to tackle O&M' (Baumann, 2006: 11).[5]

Post-construction support tends to be portrayed as a techno-managerial issue in the practice-focused literature, and can take a number of different forms. For example, WaterAid's Sustainabiliy Framework (2011) details five main areas, where these are external support to management, as when a WPC needs outside assistance to address mismanagement of revenues; external technical support, which is required when technical problems arise that exceed the WPCs ability to cope; recurrent cost sharing, which might be required if communities cannot raise the necessary revenues; support to supply chains and service providers, which is crucial if communities are to access the spare parts necessary for operation and maintenance; and support relating to externalities, such as rapidly increasing population growth, climate change, and other large-scale shocks.

This requirement for WPCs and other community organisations to receive external support is echoed throughout much of the practice-focused literature (Carter et al., 2010; Harvey, 2003; Lockwood and Smits, 2011; Mcintyre and Smits, 2015; Narayan, 1995; Smits et al., 2013). For example, Harvey and Reed (2007) contend that CBM is only sustainable when a strong local institution is in place to provide support. The authors note that out of their sample of four study countries, 'the highest operational sustainability levels were recorded in specific districts in Ghana, Uganda, and Zambia, where local government and/or NGOs play a dynamic role in supporting communities' (Harvey and Reed, 2007: 372). Likewise, Mcintyre and Smits (2015) discuss the benefits of direct support which is regularised and structured and which goes beyond ad hoc technical assistance. They conclude that 'with effective support, [a community-based service provider's] ability to fulfil administration, operation, and maintenance functions improves and the sustainability of water services becomes more likely' (Mcintyre and Smits, 2015: 1).

The realisation that a well-functioning, voluntary WPC acting without structured and regularised support represents the exception rather than the rule, suggests a need to analyse governance dynamics beyond the domain of the village or community in order to understand a committee's capacity to function. Since the turn of the Millennium in particular, a wider framing of rural water supply has indeed become an increasingly prevalent feature of the practice-focused literature. In keeping with a burgeoning 'good governance' agenda, earlier studies of this sort centred on a 'governance analysis' approach (AfDB, 2010; Hirsch et al., 2003; USAID, 2009). An impetus for this approach was provided at the Second World Water Forum in 2000 where it was declared that 'the world water crisis is mainly a crisis of governance' (GWP, 2000). Central to this claim is the contention that achieving widespread and sustainable access to water is not dependent simply on its physical availability. Instead, attention must also turn to the social, political, and economic systems in place to deliver water, as it is through these governance processes that many water supply outcomes can be explained.

As Harris et al. (2011) discuss, water sector governance analyses tend to be highly normative, oriented towards identifying deficiencies in the performance of the governance arrangements of a country as compared to a predefined set of desirable characteristics. Whilst governance analyses continue to be utilised, over the last ten years or so the practice-focused literature has also witnessed the rise of a political economy approach to analyses of the water sector (Arsano et al., 2010; Kooy and Harris, 2012a, 2012b; Manghee and Poole, 2012; Sing, 2008). This approach has more directly attended to the central place of power and power relations in systems of water governance, including the relationship between structural elements of these systems, institutions, actors

[5] The extent to which this embodies a paradigm shift is debatable. Prior to the widespread neoliberal reforms of the late 1980s and 1990s, many governments and development agencies did indeed plan for the linking of communities into local and central government systems for O&M – for example, the 3 Tier system in Zimbabwe (community, ward level technician, district level maintenance team) (Cleaver, 1991; Colin, 1999; Morgan, 1993).

and incentives (Harris et al., 2011; Manghee and Poole, 2012). Furthermore, in contrast to governance analyses, which are largely prescriptive, practice-focused political economy analyses in the development sector instead seek to be diagnostic (Fritz et al., 2009). That is to say, rather than working from an idealised (typically Western) version of how governance *should* be, these political economy analyses instead focus on the specific historical and present-day context of the case in question in order to understand why particular challenges or issues exist.

To the extent that the practice-focused literature has concerned itself with the wider power dynamics of rural water supply, it is not necessarily easy to differentiate these studies from the critical-academic literature. However, at least two points can be raised to draw a distinction between the two. Firstly, the very fact that in the practice-focused literature political economy analyses of the water sector are undertaken by practitioners working from within this system brings into question the degree to which such studies can be critical, and therefore how radical or wide-reaching the conclusions that follow. This is because more critical political economy analyses potentially challenge the position, conduct, and effectiveness of the individual or organisation undertaking the study (De Haan and Everest-Phillips, 2007; Unsworth, 2009). Furthermore, a critical political economy analysis may point to conclusions that do not allow for the win-win situations that donors and development NGOs typically seek to achieve (Jones, 2015).

A second point of differentiation concerns the suggestion of several observers that, within the development sector more generally, political economy analyses are often founded upon a conception of politics and political dimensions of change that are under-theorised and overly-simplistic (Hughes and Hutchison, 2012; Leftwich, 2006). To the extent that this is the case, it is not easy to see how these analyses can truly succeed in providing the diagnostic power to understand why situations are the way they are in the rural water supply sector and how, therefore, they can inform interventions to bring about meaningful change. This is problematic given that the practice-focused literature claims these objectives as a central reason for undertaking a political economy analysis in the first place (Harris et al., 2011).

This section of our review has so far highlighted two interrelated challenges for understanding WPC functionality. The first is a requirement to extend the analytical gaze so as to encompass wider systems of governance and the political economy of rural water supply. As we have just discussed, to a large extent the practice-focused literature has made useful attempts to address this requirement. The second challenge relates to the need to employ theories and methods capable of providing critical insights into the workings of governance arrangements. To this end, our review points to the more recent work of two authors, Jones (2015, 2013a, b) and Chowns (2015, 2014), who could be considered to bridge the practice-focused and critical-academic perspectives delineated in this article. Both of these authors have combined political economy analysis with a more critical way of conceptualising change in institutions - and governance arrangements more generally - by drawing upon theories and concepts from three areas of scholarship in particular. These areas are critical institutionalism and institutional bricolage (Cleaver, 2012; Cleaver and de Koning, 2015; Hall et al., 2014), practical hybridity (Booth, 2012), and public sector reform (Andrews, 2013; Andrews et al., 2012).

Jones (2013a, b) approach has focused on the action of WaterAid in Mali. Here he examined attempts by WaterAid to create municipal-level Wash Technical Units that provide direct support to community WPCs and other local service providers. Although apparently effective, one outcome of the research raises question marks over the sustainability of WaterAid's model, given the long-term financial commitment required by the Government. Furthermore, the broader picture Jones articulates through what he calls an 'extended political economy analysis' (Jones, 2015) shows how some of the changes in Malian water governance, especially at the national and local government levels, represent 'reforms as signals' (Andrews 2013) whereby government actors pay lip service to governance reforms - such as democratisation or decentralisation - in order to appease donors and development organisations, rather than attempting to bring about effective and meaningful alternatives to the status quo.

In contrast to this, Jones observed other instances where village-level institutions for financing the long-term costs of water services 'emerge through institutional bricolage, as a mixture of both traditional arrangements and imported ideas.' (Jones, 2015: 81). Yet at the same time, 'the use of the wider political economy approach also demonstrate[d] the effect of structural factors on how these arrangements emerged, such as the influence of Mali's aid dependency and decentralisation reforms' (Jones 2015: 80). And so the continued functioning of WPCs in a number of cases analysed by Jones were dependent on processes which do not simply mirror national policy discourse, normative development sector claims, or instances of 'best practice' . Rather, these processes emerge as a dynamic interplay between local and regional actors as they tread a path that navigates the formal and informal, old and new, as suggested by the concept of institutional bricolage (Cleaver, 2001, 2012).

Chowns' research has specifically considered the sustainability of hand-pumped water supply in rural Malawi. Here she adopted a two-part methodology, where in the first stage she reviewed the literature to arrive at a list of ten proximate determinants of WP functionality. Quantitative and qualitative data were gathered from WPs and study respondents in four districts of Malawi, and used to test the influence of these proximate determinants. The author found that key influences on WP functionality were both technical, relating in particular to WP type and installation quality, and managerial, where the most significant factors were seen to be availability of funds, skills, and incidence of theft. Chowns notes that misuse of funds by WPCs emerged as a particular problem.

In the second stage of her research, Chowns critically examined the broader social, political, and economic dynamics underlying the ten proximate determinants. The analysis resulted in a highly sceptical assessment of the community management model, where rather than generating greater efficiency and empowerment, as commonly claimed by its proponents, CBM instead engendered conflict and tended to reproduce and entrench existing unequal village power relations. The conclusion is that 'Users and Managers alike appear resigned to WPC dysfunctionality; unable to use 'voice' to shape the institution, Users 'exit' by refusing to contribute financially, and Managers 'exit' by ceasing to be active' (Chowns, 2015: 5). This finding is consistent with others who have undertaken a more critical analysis of rural WPCs (Cleaver, 2012; Mtisi and Nicol, 2003), and lends support to the voices who question the appropriateness of CBM, particularly as a blanket prescription (Adank et al., 2014; Baumann, 2006; Harvey and Reed, 2007; Koestler, 2009; van den Broek and Brown, 2015; Whittington et al., 2009).

5. The socio-technical interface

The review has highlighted a lack of understanding in both the practice-focused and critical-academic literature concerning the local socio-technical interface of rural hand-pumped water supply. Work is needed in order to unravel and identify the influence of local technical ('hardware') and governance ('software') effects on WP functionality. As noted above, it might often be the case that the relative functioning of either of these domains is masked by the performance of the other; for example, when an inappropriate design or poor quality installation drastically undermines the future operation and maintenance capacity of the community governance arrangement.

There have, however, been a small number of studies that attempt to identify the relative influence of different factors on WP functionality. For example, a Global Water Initiative (GWI) study (Welle and Williams, 2014) sought to understand the relative influence of governance factors affecting rural water supply in East Africa. The work is based on a structured questionnaire conducted in 219 GWI-supported schemes across Ethiopia, Uganda, and Tanzania, as well as semi-structured interviews with district water sector stakeholders. Having identified a range of governance factors, the authors employ a Fisher-Exact test to examine their relationship to scheme functionality. Across the three countries, a number of factors were found to be significant, where among these the committee's performance, frequency of meetings, and ability to raise O&M funds, showed the highest significance levels. The attempts of Foster (2013) and Chowns (2014, 2015) also represent notable exceptions with respect to this issue. However, in many cases the critiques of the previous sections can again be levelled at the factors identified in these studies, such as 'frequency of meetings' and 'finance-generating ability'.

Drawing on insights from socio-technical studies of other aspects of water use and management,[6] we might argue that the above approaches over-focus on the unravelling of different elements and the attribution of significance to them individually. Socio-technical studies rather suggest that these elements are inextricably entwined and that it is the ways that they mutually shape outcomes that should be the focus of enquiry. A common assumption is that material (technology, infrastructure, landscape) and social elements (governance arrangements, cultural practices, social configurations) shape each other – they are 'co-constituted' (Ahlers et al., 2014). If we apply this view, rural water supply technology (the pumps, pipes and associated structures) becomes part of 'technopolitical networks' (Barnes, 2012: 519) that mediate the relationship between people and water and which shape the costs and benefits to people in particular ways. So, for example, in the case of a handpump for rural water supplies, the physical location of the pump and its capacity to produce water in large part defines the user community, and the configuration of technical parts in the pump demand of the community particular forms of maintenance (with implications for the deployment of time, money, organisation and skills). As de Laet and Mol (2000) suggest in their study of the Zimbabwe Bush Pump, the pump requires a community if it is to work – to be functional – whilst at the same time it also constitutes that community.

Both De Laet and Mol (2000) and van der Kooij et al. (2015) (writing of drip irrigation technology in Morocco) stress the mutable rather than 'concrete' nature of technology – suggesting that this adaptability is key to durable functioning. For van der Kooij et al. (2015), this means that the technology (in this case irrigation canal gates) must be amenable to being tinkered with to meet different needs, to enforce or even to replace public rule making. For De Laet and Mol (2000), it means that the technology must be adaptable to different contexts and environments for it to be durable as a model (rather than an individual installation).

Key to socio-technical analyses of water are the ideas that infrastructure and technology is inherently political, enabling or constraining technical, managerial and socio-political elements of water control (Bolding et al., 1995). Furthermore, being produced by and embedded in such relationships, technology carries meaning beyond its technical function. In a study of water metres in poor urban areas in South Africa, von Schnitzler (2008) shows how the technology, intended as a means to enable policies for saving water and recovering costs, also became a focus of resistance and non-payment.

6. An agenda for future research

Throughout the previous sections we have elaborated upon the findings of a review of the practice-focused literature on rural water supply in Sub-Saharan Africa (SSA). In particular, we have examined the Community-Based Management (CBM) model and its relationship to the emerging concept of 'functionality'. We also drew variously upon authors working in a critical-academic tradition, highlighting a number of critiques aimed at many of the more mainstream positions and assertions, outlined above, whilst also observing points where the two bodies of literature complemented or informed one another. In so doing, we identified three areas that pose challenges to our understanding of water point (WP) functionality as it relates to CBM. Each of these areas have methodological implications for researchers and practitioners seeking to move beyond some of the normative constraints that frame current efforts to understand issues relating to the functionality of rural water supply.

Firstly, we posit a need at the community level to look beyond the form and functioning of formal organisations such as the water point committee (WPC). Instead, attention must turn to the socio-political milieu in which such organisations are embedded and the ways in which wider community dynamics influence both the relative functioning of the WP and the degree to which equitable access is secured. In the last few years, the case has been made for 'working with the grain' whereby 'pre-existing institutions need to be treated as a potential resource for reforms that improve development outcomes, not swept aside regardless of their perceived ability to contribute' (Booth. 2012: 84–85). Locating and analysing such 'hybrid arrangements' poses both a methodological and practical

[6] The dearth of studies addressing the socio-technical interface of rural water supplies is rather odd given the vibrant stream of literature taking this approach in both irrigation studies and urban studies.

challenge in order to identify, track, and support arrangements which may be less visible and more embedded in everyday practices than WPCs. A further challenge may be the trade-off between approximate functionality of such embedded institutions and their variable effect on equity of access and benefits.

By moving beyond a focus on the WPC to instead consider how wider village-level dynamics influence the management of the WP, we suggest an approach that instead starts by investigating context-specific 'water management arrangements' . Here it may be useful to turn attention to the attributes that comprise a 'functioning' management arrangement and the different ways in which they are or are not addressed in particular instances. In doing so, the questions researchers ask of communities move from normative suppositions about how things should be done to how they are actually done in the practice of everyday life, regardless of the individuals, organisations, institutions, and processes involved. In thinking about a functioning water management arrangement, we suggest the following 8 attributes[7] as a useful starting point:

1) Authoritative leadership exists
2) Has the capacity to make and enforce decisions, including on rules-in-use
3) Collects or sources, manages, and accounts for funds
4) Undertakes and/or secures maintenance work
5) Represents all users in a way that ensures equitable access to water supply
6) Recognised as legitimate by both users and the local governance structure
7) Is aware of its roles and responsibilities and the roles and responsibilities of others
8) Is meaningfully linked to other relevant stakeholders

Secondly, we argue for approaches that extend the analytical gaze beyond community governance arrangements in order to understand how social relations, and especially power relations, operating within and between different scales of organisation come to bear on local management efforts. Approaches which combine a concern with techno-managerial functionality and wider political economy and governance analyses may offer interesting ways of addressing such challenges. At the same time, approaches of this sort must be founded on sound theoretical and conceptual understandings of the relationships between politics, power, and change. Here a related and under-researched area is the relationship between the community and local governance actors, such as officials in District Water Offices or NGOs workers. An interesting question concerns the extent to, and ways in which, these individuals are able to exhibit agency within given structural constraints, in order to work with and support community water-supply initiatives.

Thirdly, we have highlighted a dearth of approaches which seek to understand the social and technical aspects of WP functionality as inherently inter-related. Here promising insights may be borrowed from the socio-technical studies (STS) of irrigation water. Challenges to pursuing such a focus include those of fostering inter-disciplinary analyses and, on a practical level, working across sectoral/ministerial divisions. Though much talked about and vaunted, interdisciplinarity is difficult to actually achieve in practice and requires facilitation through considered strategies. Here suggestions about the use, for example, of boundary concepts and objects to facilitate interaction across disciplines may prove fruitful (Mollinga, 2008). There are numerous and mostly under-researched examples of issues at the socio-technical interface which could yield insights into WP functionality but one example will suffice here to indicate our suggested direction. How does a particular pump technology place demands on human labour, requiring individual or collective forms of pumping and carrying, perhaps excluding children who cannot reach the pump arm? Does the necessity for group pumping (for example) facilitate collective discussion and decision-making about pump management and maintenance? And how does the speed, intensity, frequency, and care with which different users pump in turn shape the technology and its functioning?

Taken together, these insights combine to form a new research agenda for analysing rural water governance in SSA and beyond. This agenda identifies the need to bridge disciplines in order to examine how power, meaning, and technology enmesh within particular ecologies and hydrogeological conditions. To this end, analyses of the biophysical and material world can combine with 'thick' social science approaches that do a better job of capturing the actual processes through which water management, access, and use is mediated. Such analyses need to situate variegated and dynamic local institutional landscapes within broader systems of governance. In doing so, they have the potential to bring to the fore the ways in which social, cultural, and material factors both constrain and enable the agency of individuals, delineating 'corridors' in and through which novel and innovative arrangements may emerge and evolve. These arrangements will be 'functional' only to the extent that they are able to ensure water supply in ways that are equitable.

We conclude by suggesting that the concept of 'functionality', as it is currently employed, will not save the CBM model of rural water supply. Rather, we see this model as unnecessarily circumscribed by the emphasis given to formal organisations such as the WPC. It is also fundamentally challenged by such factors as the demand placed on communities to raise funds for O&M and the general lack of support communities receive, where this is often symptomatic of a wider governance system that is massively under-resourced and that does not have the necessary capacity to act. We suggest instead focusing attention on context-specific water management arrangements and the various attributes needed for these arrangements to properly function. By combining such a focus with a concern for both the local socio-technical interface as well as wider systems of governance, a research agenda emerges that

[7] It is important to emphasise that the 8 attributes proposed here should not be considered a checklist of indicators that are either present or absent in any given situation. Indeed, we are weary of any lists that become normative frameworks for assessing governance arrangements. Rather, the list we provide is intended to stimulate avenues of enquiry into case-specific water management arrangements, from which researchers may make their own inferences about management capacity over time, equity of access, social fit/embeddedness, and the like.

provides just enough structure to tackle the complexity and heterogeneity that characterises rural water supply situations across an array of different contexts. The outcomes of such research can be used to inform responses more in keeping with the requirements of these contexts, rather than attempting to tweak the current blueprint or develop the next 'big thing'.

Acknowledgements

The authors would like to thank the two anonymous reviewers for their thoughtful and insightful comments.This work has been undertaken as part of the Hidden Crisis Consortium research project – part of a seven year international research programme (UPGro) focusing on improving the evidence base around groundwater availability and management in Sub-Saharan Africa (SSA), and jointly funded by UK's Department for International Development (DFID), Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC).

References

Adank, M., Kumasi, T.C., Chimbar, T.L., Atengdem, J., Agbemor, B.D., Dickinson, N., Abbey, E., 2014. The state of handpump water services in ghana: findings from three districtsIn: Sustainable Water and Sanitation Services for All in a Fast Changing WorldHanoi, Vietnampp. 1–7.
African Development Bank, 2010. Water Sector Governance in Africa. Volume 1: Theory and PracticeWater Sector Governance, Tunis Belvedere, Tunisia doi:ISBN 9789973071484.
Ahlers, R., Cleaver, F., Rusca, M., Schwartz, K., 2014. Informal space in the urban waterscape: disaggregation and co-production of water servicesWater Altern. 7, 1–14.
Andrews, M., 2013. The Limits of Institutional Reform in DevelpmentCambridge University Press, New York, USA.
Andrews, M., Woolcock, M., Pritchett, L., 2012. In: Escaping Capability Traps through Problem-Driven Iterative Adaptation (PDIA) Working Paper 299 June 2012 24 World Inst. Dev. Econ. Res.
Arlosoroff, S., Tschannerl, G., Grey, D., Journey, W., Karp, A., Langeneffer, O., Roche, R., 1987. Community water supplyThe Handpump OptionUNDP and WB.
Arsano, Y., Mekonnen, E., Gudisa, D., Achiso, D., Meally, S.O., Calow, R., Ludi, E., 2010. Governance and Drivers of Change in Ethiopia's Water Supply SectorOverseas Development Institute, London, UK.
Bakker, K., 2012. Water: political, biopolitical, materialSoc. Stud. Sci. 42, 616–623.
Barnes, J., 2012. Pumping possibility: agricultural expansion through desert reclamation in EgyptSoc. Stud. Sci. 42, 517–538.
Baumann, E., 2006. Do operation and maintenance pay?Waterlines 25, 10.
Baumann, E., Danert, K., 2008. Operation and Maintenance of Rural Water Supplies in Malawi Study Findingsskat.
Bey, V., Magara, P., Abisa, J., 2014. Assessment of the Performance of the Service Delivery Model for Point Water Sources in Uganda Final Research Report, IRC WASH.
Beyene, H.A., 2012. Factors affecting the sustainability of rural water supply systems: the case of mecha woredaAmhara Region, EthiopiaCornell University.
Boelens, R., 2015. Water, Power and Identity: The Cultural Politics of Water in the AndesRoutledge, Oxon, UK.
Bolding, A., Mollinga, P.P., Van Straaten, K., 1995. Modules for modernisation: colonial irrigation in india and the technological dimension of agrarian changeJ. Dev. Stud. 31, 805–844.
Bonsor, H.C., Oates, N., Chilton, P.J., Carter, R.C., Casey, V., Macdonald, A.M., Alowo, R., Wilson, P., Tumutungire, M., Bennie, M., 2015. UPGro Catalyst Grant Report - A Hidden Crisis: Strengthening the Evidence Base on the Sustainability of Rural Groundwater Supplies – Results from a Pilot Study in UgandaBGS, Edinburgh, UK.
Booth, D., 2012. Development as a Collective Action Problem: Addressing the Real Challenges of African GovernanceOverseas Development Institute, London, UK.
Burawoy, M., 2005. For public sociology: 2004 presidential addressAm. Sociol. Rev. 70, 4–28.
Carter, R., Harvey, E., Casey, V., 2010. User financing of rural handpump water servicesIn: IRC Symposium 2010: Pumps, Pipes and PromisesThe Haguepp. 1–12.
Carter, R., Ross, I., 2015. Beyond "functionality" of handpump-supplied rural water services in developing countriesWaterlines 35 (1).
Chowns, E., 2015. Water point sustainability and the unintended impacts of community management in MalawiIn: Water, Sanitation and Hygiene Services Beyond 2015: Improving Access and SustainabilityLoughborough, UK.
Chowns, E., 2014. The Political Economy of Community Management: A Study of Factors Influencing Sustainability in Malawi's Rural Water Supply SectorUniversity of Birmingham.
Cleaver, F., 2001. Institutional Bricolage, Conflict and Cooperation in Usangu, TanzaniaIDS Bulletin, 32 (4), 26–35.
Cleaver, F., 2012. Development Through Bricolage: Rethinking Institutions For Natural Resource ManagementEarthscan, Oxon, UK.
Cleaver, F., de Koning, J., 2015. Furthering critical institutionalismInt. J. Commons 9, 1–18.
Cleaver, F., Elson, D., 1995. Women and Water Resources: Continued Marginalisation and New PoliciesInternational Institute for Environment and Developmentpp. 1–10.
Cleaver, F., Toner, A., 2006. the evolution of community water governance in Uchira, Tanzania: the implications for equality of access, sustainability and effectivenessNat. Resour. Forum 30, 207–218.
Colin, J., 1999. VLOM for Rural Water Supply: Lessons from ExperienceLoughborough University, London, UK.
De Haan, A., Everest-Phillips, M., 2007. In: Can New Aid Modalities Handle Politics?UNU-WIDER.
de Laet, M., Mol, A., 2000. The Zimbabwe bush pump: mechanics of a fluid technologySoc. Stud. Sci. 30, 225–263.
Degabriele, J., 2002. Improving Community Based Management of Boreholes: A Case Study from MalawiBASIS, Wisconsin, USA.
Dewan, C., Buisson, M.C., Mukherji, A., 2014. The imposition of participation? The case of participatory water management in coastal BangladeshWater Altern 7, 342–366.
Dikoto-Wachtmeister, M., 2000. Women's Participation in Decision Making Processes in Rural Water ProjectsUniversity of Bradford.
Directorate of Rural Development, 1993. Handbook For Water Point Committees. Directorate of Rural DevelopmentMinstry of Agriculture, Water and Rural Development, Windhoek, Namibia.
Duti, V.A., 2012. Theme paper: tracking functionality for sustainabilityIn: Annual Review Conference of the Community Water and Sanitation Agency, 2011; Theme: Tracking Functionality of WASH Facilities- A Key to Sustainable ServicesKumasi, GhanaIRC Water and Sanitation Centre, pp. 1–11.
Evans, P., Appleton, B., 1993. Community Management Today: The Role of Communities in the Management of Improved Water Supply Systems Delft, Netherlands.
Foster, T., 2013. Predictors of sustainability for community-managed handpumps in Sub-Saharan Africa: evidence from Liberia, Sierra Leone, and UgandaEnv. Sci. Technol. 47, 12037–12046.
Fritz, V., Kaiser, K., Levy, B., 2009. Problem driven governance and political economy analysisGood Practice HankbookWashington DC, USA.
Garn, H.A., 1997. Lessons from large-scale rural water and sanitation projects: transition and innovationIn: UNDP-World Bank Water and Sanitation Program.
Global Water Partnership, 2000. Towards Water Security: Framework for ActionGlobal Water Partnership, Stockholm, Sweden.
Glotzbach, R., Barakzai, S., Adisu, J., Tiwari, C., 2013. In: Functionality: The Challenge to Sustain Rural Water Supply Services SNV Practice Brief.
Hall, K., Cleaver, F., Fanks, T., Maganga, F., 2014. Critical institutionalism: a synthesis and exploration of key themesEur. J. Dev. Res. 26, 71–86.
Harris, D., Jones, L., Kooy, M., 2011. Analysing the Governance and Political Economy of Water and Sanitation Service DeliveryOverseas Development Instititute, London, UK.
Harvey, P., 2003. Sustainable handpump projects in Africa: report on fieldwork in ugandaWEDCLoughborough Universituy, UK.

Harvey, P., Reed, R., 2007. Community-managed water supplies in Africa: sustainable or dispensable?Commun. Dev. J. 42, 365–378.
Harvey, P., Reed, R., 2004. Rural water supply in Africa: building blocks for handpump sustainabilityWEDCLoughborough University, UK.
Hinds, R., Nhaurire, A., 2013. In: Monitoring and Sustaining Services – Lessons Learned from WaterAid's Post-Implementation Monitoring Surveys and the Use of Information and Communications Technology London, UK.
Hirsch, P., Carrad, N., Miller, F., Wyatt, A., 2003. Water Governance in Context: Lessons for Development Assistance. http://www.gsdrc.org/document-library/water-governance-in-context-lessons-for-development-assistance/.
Hughes, C., Hutchison, J., 2012. Development effectiveness and the politics of commitmentThird World Q 33, 17–36.
Jansz, S., 2011. In: A Study into Rural Water Supply Sustainability in Niassa Province, Mozambique.
Jones, S., 2015. Bridging political economy analysis and critical institutionalism: an approach to help analyse institutional change for rural water servicesInt. J. Commons 9, 65–86.
Jones, S., 2013a. Sharing the recurrent costs of rural water supply in MaliThe Role of WaterAid in Promoting Sustainable Service DeliveryUniversity of London.
Jones, S., 2013b. How can INGOs help promote sustainable rural water services? an analysis of wateraid's approach to supporting local governments in MaliWater Altern 6, 350–366.
Joshi, D., Zwarteveen, M., 2012. Gender in drinking water and sanitation: an introductionIn: Zwarteveen, M., Ahmen, S., Gautam, S.R. (Eds.), Diverting the Flow: Gender Equity and Water in South AsiaZubaan Books, New Delhi, India, pp. 161–175.
Koestler, L., 2009. Private sector involvement in rural water supply: case studies from UgandaIn: Water, Sanit. Hyg. - Sustain. Dev. Multi-Sectoral Approachespp. 1–4.
Kooy, M., Harris, D., 2012a. Political economy analysis for waterSanitation and Hygiene (WASH) Service DeliveryOverseas Development Institute, London, UK.
Kooy, M., Harris, D., 2012b. Political Economy Analysis for Operations in Water and Sanitation: A Guidance NoteOverseas Development Institute, London, UK.
Lammerink, M., Bolt, E., 2002. Supporting Community Management: A Manual for Training in Community Management in the Water and Sanitation Sector Delft, Netherlands.
Leftwich, A., 2006. From Drivers of Change to the Politics of Development: Refining the Analytical Framework to Understand the Politics of the Places Where We Work York, UK.
Linton, J., Budds, J., 2013. The hydrosocial cycle: defining and mobilizing a relational-dialectical approach to waterGeoforum 57, 170–180.
Lockwood, H., Smits, S., 2011. Supporting Rural Water Supply: Moving Towards a Service Delivery ApproachPractical Action Publishing, Rugby, UK.
Mandara, C.G., 2014. What policy says and practice does: genderHousehold and Community in Rural Water Provision in TanzaniaWageningen University.
Manghee, S., Poole, A., 2012. Approaches to Conducting Political Economy Analyses in the Urban Water SectorThe World Bank.
Manikutty, S., 1997. Community participation: so what? evidence from a comparative study of two rural water supply and sanitation projects in IndiaDev. Policy Rev. 15, 115–140.
Mansuri, G., Rao, V., 2013. Localizing Development: Does Participation Work?The World Bank, Washington, DC.
Marks, S.J., Davis, J., 2012. Does user participation lead to sense of ownership for rural water systems? Evidence from KenyaWorld Dev. 40, 1569–1576.
Masanyiwa, Z.S., Niehof, A., Termeer, C.J.A.M., 2015. Users' perspectives on decentralized rural water services in TanzaniaGender Place Cult. 22, 920–936.
Matamula, S., 2008. Access to sanitation and safe water: community based management for sustainable water supply in MalawiIn: 33rd WEDC International Conference on Access to Sanitation and Safe Water: Global Partnerships and Local ActionsAccra, Ghana.
Mcintyre, P., Smits, S., 2015. Direct Support Post-Construction to Rural Water Service ProvidersThe Hague.
Mengistu, B., 2012. Empowering Women and Girls: How Water, Sanitation and Hygiene Deliver Gender EqualityWaterAid, Addis Ababa, Ethiopia.
Merrey, D.J., Cook, S., 2012. Fostering institutional creativity at multiple levels: towards facilitated institutional BricolageWater Altern. 5, 1–19.
Ministry of Water and Environment, 2014. Effectiveness of the Community-Based Maintenance System for Rural Water Supply and Sanitation Facilities in Uganda Kampala, Uganda.
Mollinga, P., 2008. Water, politics and development: framing a political sociology of water resources managementWater Altern. 1, 7–23.
Morgan, P., 1993. Maintenance, the key to handpump survivalWaterlines 11, 2–4.
Moriarty, P., Batchelor, C., Fonseca, C., Klutse, A., Naafs, A., Nyarko, K., Pezon, C., Potter, A., Reddy, R., Moriarty, P., 2011. Ladders for Assessing and Costing Water Service DeliveryThe Hague.
Moriarty, P., Smits, S., Butterworth, J., Franceys, R., 2013. Trends in rural water supply: towards a service delivery approachWater Altern. 6, 329–349.
Mosse, D., 1997. The symbolic making of a common property resource: history, ecology and locality in a tank-irrigated landscape in South IndiaDev. Change 28, 467–504.
Mtisi, S., Nicol, A., 2003. Water Points and Water Policies: Decentralisation and Community Management in Sangwe Communal Area, ZimbabweInstitute of Development Studies, Sussex University, UK.
Mukherji, A., Kishore, A., 2003. Tubewell Transfer in Gujarat: A study of the GWRDC Approach Colombo, Sri Lanka.
Naiga, R., Penker, M., Hogl, K., 2015. Challenging pathways to safe water access in rural Uganda: from supply to demand-driven water governanceInt. J. Commons 9, 237–260.
Narayan, D., 1995. The Contribution of People's Participation: Evidence from 121 Rural Water Supply Projects Washington, DC.
Nicol, A., Mehta, L., Allouche, J., 2012. Introduction: "some for all rather than more for some"? Contested pathways and politics since the 1990 New Delhi statementIDS Bull. 43, 1–9.
O'Reilly, K., 2012. Modern water for modern women: questioning the relationship between gender, empowerment and participationIn: Zwarteween, M., Ahmed, S., Gautam, S.R. (Eds.), Diverting the Flow: Gender Equity and Water in South AsiaZubaan Books, New Delhi, India, pp. 273–303.
Parker, H., Oates, N., Mason, N., Calow, R., Chadza, W., Ludi, E., 2016. Gender, Agriculture and Water InsecurityOversead Development Institute, London, UK.
Practica Foundation, 2013. Handpump Sustainability. (Online at: https://practica.org/wp-content/uploads/2014/10/Report-Handpump-Sustainability-PRACTICA-Foundation-October-2013.pdf).
Ross, I., 2015. Operational sustainability of wash services - findings of nationally-representative household surveys and regional assessmentsIn: Value for Money and Sustainability in WASH Programmes (VFM-WASH).
Rusca, M., Schwartz, K., 2014. "Going with the grain": accommodating local institutions in water governanceCurr. Opin. Env. Sustain. 11, 34–38.
RWSN, 2014. Water Point Mapping: Indicators, Pump Functionality, Accuracy of GPS, Using and Sharing Data.
RWSN, 2009. In: Handpump Data, Selected Countries in Sub-Saharan Africa, Notes.
RWSN, 2005. In: RWSN Strategy Paper: Sustainable Handpumps.
Ryan, P., Sulemani, R.S., 2013. Moving Sustainability Concepts to On-the-Ground Improvements – The Sustainable Water Service Delivery project in Ghana.
Sara, J., Katz, T., 1997. Making Rural Water Supply Sustainable: Report on the Impact of Project RulesUNDP - World Bank Water and Sanitation Program, Washington.
Schnegg, M., 2016. Lost in translation: state policies and micro-politics of water governance in NamibiaHum. Ecol. 44, 245–255.
Schnegg, M., Linke, T., 2015. Living institutions: sharing and sanctioning water among pastoralists in NamibiaWorld Dev. 68, 205–214.
Schouten, T., Moriarty, P., 2003. Community Water, Community Management: From System to Service in Rural AreasITDG Publishing, London.
Sing, A., 2008. Political economy of reforms: learning from the Delhi water sector experienceIn: Odugbemi, S., Jabobson, T. (Eds.), Governance Reform Under Real-World Conditions: CitizensStakeholders, and Voice. The World Bank, Washington DC, USA.
Skinner, J., 2009. Where Every Drop Counts: Tackling Rural Africa's Water Crisis London, UK.
Smits, S., Rojas, J., Tamayo, P., 2013. The impact of support to community-based rural water service providers: evidence from ColombiaWater Altern. 6, 384–404.
SNV, 2012. Involvement of Water Users in the Management of Water Supply Facilities: Guidelines for Rural Water Users Committees in Rwanda Kigali, Ruwanda.
Srivastava, S., 2012. Swajaldhara: "reversed" realities in rural water supply in IndiaIDS Bull. 43, 37–43.
Stawicki, S.A., 2012. Assessing Water Scheme Functionality and Governance in South GondarEmory University, Ethiopia.
Swyngedouw, E., 2009. The political economy and political ecology of the hydro-social cycleJ. Contemp. Water Res. Educ. 142 (1), 56–60.
Toner, A., Msuya, E., Mdee, R., Mfinanga, Y., 2004. The illusion of community ownership: community-based water management in Uchira, Kilimanjaro regionIn: East African River Basin ConferenceUSAInternational Water Management Institute, pp. 1–17.
Tucker, J., MacDonald, A., Coulter, L., Calow, R.C., 2015. Household water use, poverty and seasonality: wealth effects, labour constraints, and minimal consumption

in EthiopiaWater Resour. Rural Dev. 3, 27–47.
Uckrow, K., Stephan, Y., 2012. Structure and Functions of WASH Committees in Rural Areas: A Guideline Dresden, Germany.
United Nations, 2015a. Transforming Our World: The 2030 Agenda for Sustainable Development.
United Nations, 2015b. The Millennium Development Goals Report United Nations 72.
United Nations, 2000. In: 55/2. United Nations Millennium Declaration, Resolution adopted by the General Assembly.
United Nations, 1992. The Dublin Statement on Water and Sustainable Development Dublin, Ireland.
United Nations, 1990. Global consultation on safe water and sanitation for the 1990 s, The New Delhi Statement. New Delhi, India.
Unsworth, S., 2009. What's politics got to do with it?: why donors find it so hard to come to terms with politics, and why this matterJ. Int. Dev. 21, 883–894.
US Agency for International Development, 2009. MENA Regional Water Governance Benchmarking Project: Concept and Approach Framework Washington DC, USA.
van den Broek, M., Brown, J., 2015. Blueprint for breakdown? Community based management of rural groundwater in UgandaGeoforum 67, 51–63.
van derKooij, S., Zwarteveen, M., Kuper, M., 2015. The material of the social: the mutual shaping of institutions by irrigation technology and society in Seguia Khrichfa, MoroccoInt. J. Commons 9, 129–150.
van Koppen, B., Giordano, M., Butterworth, J., 2007. Community-based Water Law and Water Resource Management Reform in Developing CountriesCABI Publishing, Wallingford, UK.
von Schnitzler, A., 2008. Citizenship prepaid: water, calculability, and techno-politics in South AfricaJ. South. Afr. Stud. 34, 899–917.
Walters, J., Javernick-Will, A., 2014. Gaining Insight into Long Term Functionality of Rural Water Services in Developing Countries: The Dynamic Interaction of Causal Factors Boulder, Colorado.
WaterAid, 2011. Sustainability Framework London, UK.
Welle, K., Williams, J., 2014. Monitoring and addressing governance factors affecting rural water supply sustainability. Global Water Initiative – East Africa (Online at: http://www.gwieastafrica.org/media/GWI_RegionalGiFT_01_01_2014.pdf)
Whittington, D., Davis, J., Prokopy, L., Komives, K., Thorsten, R., Lukacs, H., Bakalian, A., Wakeman, W., 2009. How well is the demand-driven, community management model for rural water supply systems doing? Evidence from Bolivia, Peru and GhanaWater Policy 11, 696.
Wilson, P., Bonsor, H., MacDonald, A., Whaley, L., Carter, R., Casey, V., 2017. UPGro Hidden Crisis Research Consortium: Initial Project Approach for Assessing Rural Water Supply Funcionality and Levels of Performance Edinburgh, UK.
Yacoob, M., 1990. Community self-financing of water supply and sanitation: what are the promises and pitfalls?Health Policy Plan 5, 358–366.
Zwarteveen, M., 2008. Men, masculinities and water powers in irrigationWater Altern. 1, 111–130.
Zwarteveen, M., Neupane, N., 1996. Free-Riders or Victims: Women's Nonparticipation in Irrigation Management in Nepal's Chhattis Mauja Irrigation Scheme Research Report 7.