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Crime and punishment: the challenges of free-riding and peer sanctioning in the rural water sector – lessons from an innovation in Uganda.

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Abstract

Across sub-Saharan Africa the performance of Community Based Management (CBM) for rural water has been disappointing, with studies indicating insufficient funds collected for necessary repairs to the handpumps used to access groundwater, upon which millions depend. Free-riding, usually representing a crime against the collective good, is endemic here because peer sanctioning of transgressors proves socially divisive. This study, the result of extensive fieldwork, presents original data on the outcomes of an alternative model, *CBM-lite*, piloted in mid-west Uganda. A Water Operator from the community was financially incentivised to collect the user fees, though graduated sanctions were still to be determined and enforced by community structures. *CBM-lite* saw the repair of handpumps utilising funds released by a microfinance institution due to regular deposits. People are prepared to pay for reactive maintenance, but reject the concept of preventative contributions: free-riding resumed once handpumps were functional because sanctioning again proved too challenging. The paper makes a number of significant contributions to environmental governance debates. First, any management model not designed to overcome the public good problem of free-riding will fail to achieve sustainable results. Second, the research identified deeply ingrained social norms that counter-intuitively consider individual advancement a greater crime than free-riding, condoning social-levelling peer punishment of the pilot Water Operators. Depersonalising interactions via pre-payment technologies may hold potential. Equally, differentiating a hierarchy of social norms may present some leverage for nudging, with context appropriate communication, of less culturally ingrained behaviour, to promote for example an acceptance of preventative maintenance.

1. Introduction

An estimated 184 million people are reliant on communally-managed handpumps across sub-Saharan Africa (SSA) for their domestic water supplies (Macarthur, 2015; UNICEF/WHO, 2015). Community Based Management (CBM) has been government policy in Uganda, as in many other SSA countries, since the mid-1990s¹. The user pays principle is the second pillar of CBM, alongside collective action: voluntary Water User Committees, elected by their community and generally people of standing, are expected to collect and safely store water user fees in readiness for routine maintenance of the water points.

The system relies on regular financial contributions from users: without funds, routine and regular maintenance cannot be paid for, and handpump downtime can be protracted, sometimes for several months, until funds are collected (van den Broek and Brown, 2015; Chowns, 2015). Evasion of payment represents a threat to the viability of CBM, which also depends upon the voluntary time of the elected Water User Committee and the community for the upkeep of the areas around water points as well as the enforcement of the rules and sanctions. In sum, CBM provides two arenas for possible shirking or free-riding: first, non-payment of the water user fee and second, non-attendance at community meetings which decide rules of access and communal duties, such as aforementioned cleaning around the source.

¹ The roots and underlying assumptions of CBM are discussed by Chowns (2015); van den Broek and Brown (2015) and Whaley et al., (2019). The latter summarises that the “endurance of this model can be found in the nexus between evidence, ideology and policy” (*ibid*, p. 1). See also Brown and van den Broek, 2017.

The challenges of establishing collaborative relations and managing communal natural resources, such as groundwater, are well documented (Ozono et al, 2016; Olson 1965). CBM and its underpinning Common Property Resource (CPR) theory present a set of safeguards which address the rational temptation to free-ride, including the Demand Responsive Approach, whereby a community must show initiative in requesting a new water source and provide monetary and in-kind contributions, including labour (Chowns, 2015; Whaley et al., 2019). This, it is assumed, will engender feelings of ownership over the source that will ward off free-riding and encourage maintenance and upkeep. CPR's eight design principles promote the establishment of self-regulating institutions, whose membership is clearly defined (Ostrom, 1990). These local institutions, Water User Committees (WUCs) in our context, devise, with their community, rules of access and engagement with the resource, as well as graduated sanctions, which increase in severity depending on the nature of the free-riding transgression. Recourse to higher-level institutions to reinforce rules is the eighth principle (*ibid*). However, if the Demand Response Approach and the design principles do not overcome the temptation to free-ride, then potentially approaching 200 million people across SSA are put at risk. Herein lies the significance of this study.

There is now a body of empirical study across SSA which indicates free-riding under CBM is endemic, taking the form of non-payment of water user fees and neglect of source surroundings whilst continuing to collect water (Naiga et al., 2015). In a survey of 86 communally-managed sources in Malawi, Chowns (2015) found that out of the 54 schemes that knew how much money was in their maintenance fund, the median saved was 1,150 MWK (£2.75 in July 2012): this meant that only 11 systems had enough funds to replace a single rod (MWK

4,000). Chowns (2015) studied actual versus expected maintenance funding, and out of 30 sources only three had more than a fifth of the funds they should have, and the majority had 1% or less. This study mirrors the results of van den Broek and Brown (2015) who found that out of 100 surveyed communally-managed sources in Uganda, just over half (53) had no operation and maintenance (O&M) funds available, placing their communities in a precarious situation.

The scale of the issue across SSA is laid bare by Foster and Hope's (2017) survey of 92,594 communally-managed handpumps in Kenya, Uganda, Tanzania, Liberia and Sierra Leone. Only two fifths of those surveyed collected water user fees and only a fifth of the WUCs pre-emptively collect funds prior to handpump failure. They found that WUCs that did have systems for routine water user fee contributions struggled because "a sizeable proportion of water users fail to meet their payment obligations" (Foster and Hope, 2017 p. 86; see also Carter et al., 2010; Whittington et al., 2009).

Chowns (2015) provides two interconnected explanations for the dearth of funds in her study of Malawi, which we suggest has regional resonance. First, funds are simply not collected. The explanation provided by users is this is due to poverty and the relative urgency of other demands on their money, compounded by the seasonality of incomes, proffered as a justification for irregular payments. Second, disenchantment regarding the effectiveness of WUC members and suspicion over their syphoning of collected funds undermine efforts to collect funds (also identified by Harvey et al., 2003; Montgomery et al., 2009; van den Broek and Brown, 2015). To this we would add that when free-riding goes unpunished, it encourages more users to do the same, resulting in a downward spiral (*ibid*). In addition, there appears to be a reluctance to pay for preventative

maintenance, what Chowns (2015 p. 70) refers to as the “just in case financial model”: users are more willing to make reactive payments when the handpumps are broken (see also Whittington et al., 2009). However, if this falls during a lean period, the outcome is protracted handpump downtime while funds are collected.

WUC members in turn became disillusioned with the voluntary nature of their role and the expectation that they were to enforce graduated penalties on free-riding friends, family members and neighbours (van den Broek and Brown, 2015).

Research identifies high levels of WUC member resignations and the near collapse of collective action upon which the CBM model is based (*ibid*; Carter et al., 2010; WaterAid, 2012; Golooba-Mutebi, 2012). We fully concur with Foster and Hope’s (2017, p.85) regional assessment that “[o]ne of the foremost collective action challenges of keeping waterpoints functional is the financing of O&M activities” (see also, Kalulu et al., 2012; Peter and Nkambule, 2012; Chowns, 2015). We argue that inadequate O&M funds is behind the depressing statistics that between a quarter (Foster et al; 2019) and third (Oxford/RLF 2014; RWSN 2010) of handpumps are non-functional at any given time across SSA.

This study, the result of extensive fieldwork, surveys, interviews, focus groups and observation (set out in section 3.1), presents original data on the outcomes of piloting an alternative management model known as *CBM-lite*, briefly set out below, in four villages in Kiryandongo District in mid-west Uganda. It is a response to the call to provide details of “actual payment behaviours” following programme introduction, to determine levels of “divergence” from willingness to pay surveys (Foster and Hope, 2017, p. 86). Ultimately, the study aims to provide an empirically-grounded critical examination of why both the user pays principle

is so difficult to implement, and free-riding in the SSA context is so prevalent, and in so doing makes a significant contribution to environmental governance debates.

1.1 CBM-lite: an alternative to CBM

The second author, initially a programme manager for a rural water and sanitation NGO in Uganda from June 2012 until January 2014, devised and piloted with her team an alternative rural water management system which modified elements of the CBM model. An earlier paper (Brown and van den Broek, 2017) documents the design and introduction of *CBM-lite*. This present paper evaluates the outcomes of piloting *CBM-lite*, which ran between August 2013 and April 2015. The *CBM-lite* innovation diagnosed the problem of non-payment of water user fees and CBM free-riding as a lack of trust in the financial probity of Water User Committees (WUC) and opaque accountability mechanisms. In addition, having a WUC per source with different rules was also viewed as inefficient: it facilitated rent-seeking behaviours amongst WUC members and free-riding amongst users. *CBM-lite* postulated that consistency of rules could be achieved by replacing voluntary WUCs through the clustering of all the sources² in a village under one Water Operator. As a result, the regional water user fee norm of 1,000 Ugandan Shillings (UGX³) per month could be retained as well as the list of those communally-agreed to be unable to pay. A further benefit would be the provision of a financial incentive to the Water

² Clustering of water sources was also recommended by Foster et al., (2015) and Oxford/RLF (2014).

³ 1 GBP £ was worth 3,952 UGX in August 2013, so 1,000 UGX was worth £0.25. 1 USD \$ was worth 2570 Uganda Shillings in August 2013, so 1,000 UGX was worth \$0.39.

Operator and caretakers at each source out of the user payment. So, while the *CBM-lite* model maintains the institutional framework of the CBM model – full citizen control and user payments for O&M – it reorganises governance arrangements. Additionally, collected funds were banked with a micro-finance Savings and Credit Co-operative (SACCO) that offered an insurance-style financial product that would fund repairs. *CBM-lite* was still, however, reliant on community cooperation and peer sanctioning.

CBM-lite was an earnest attempt to solve a problem, free-riding, without necessarily considering the significance of social norms. The role of the second author has evolved from a practitioner, who commissioned and conducted feasibility studies, to an academic researcher, post December 2013, who, in conjunction with the first author, evaluated and critically reflected upon *CBM-lite*.

The paper is subsequently organised into five sections: a review of the literature on public good problems and social norms; an overview of the case study area, data collection and analysis; a case study of the outcomes of the *CBM-lite* pilot; a discussion and finally a set of conclusions with sector-wide relevance.

2. Public good problems and social norms with relation to communal water management

Optimum collective outcomes result when all group members subscribe to collective endeavour, constituting a public good. The free-rider problem is a “socially inefficient situation” (Ozono et al., 2016, p. 1) and has been widely

written about with both empirical and experimental examples. Free-riding and shirking are examples of first-order public good problems or dilemmas: they occur when individuals put their own interests above the collective by recognising they can maximise their own welfare by not contributing their money or time whilst still accessing the Common Pool Resources (CPR), in this case groundwater.

Contribution of money or time represents an opportunity cost for the individual: thus free-riding may be individually efficient.

If free-riding becomes the dysfunctional norm, because of the apparent inability of Water User Committees and the elected Local Councillors to sanction transgressors, and there are no funds available to repair broken handpumps, the resulting situation is an example of the tragedy of the commons (Hardin, 1968).

This has become the position in Uganda under the CBM system. The breakdown of the user pays principle and collective action, the twin pillars of the CBM approach, necessitates understanding why people may cooperate and contribute financially and give of their time and labour, how that cooperation is engendered and maintained and why it might falter.

Theories put forward to explain cooperation include firstly, kin selection: cooperation makes sense amongst genetically related individuals (i.e. nepotism). Secondly, cooperation can be explained by the expectation of direct reciprocity, viewed as “selfish incentives in bilateral long-term or repeat interactions” (Fehr and Gächter, 2002, p. 137) i.e. the idiom you scratch my back and I’ll scratch yours. Olson (1965) argued that collective action, including efforts to conserve common property resources, is only rational in small group situations because evasion is more difficult to effect without detection or exposure, or if special

measures are deployed which hinder free-riding temptations. However, in larger group situations, an important question is why contribute financially and participate where it is possible to free-ride? Cooperation here has been explained through the motivation of reputation building, but fear of punishment is more generally acknowledged to incentivise cooperation: “if those who free-ride on the cooperation of others are punished, cooperation may pay” (Fehr and Gächter, 2002, p.137). According to the CBM model and Ostrom’s CPR theory, sanctions and open confrontation are effective tools in resolving public good problems. Ostrom’s (1990) design principles support this belief.

It is recognised that everyone benefits, and social order is maintained (i.e. a public good), if free-riding is checked because it curbs future transgressors by acting as a deterrent. However, there is no incentive for an individual to sanction free-riders: the rule enforcer pays a price i.e. an emotional toll (Udehn, 1995). This dilemma is known as the second-order public good problem. Because “[t]he act of punishment does provide a material benefit for the future interaction partners of the punished subject but not for the punisher”, those who are prepared to enforce personally a costly sanction are classed as altruistic, or moralistic punishers, because it may be damaging and does not result in material benefit (Fehr and Gächter, 2002, p.139). The sanctioning of transgressors is defined as a second-order public good: a first-order public good problem (free-riding) can be overcome if there are present those with “a tendency for altruistic punishment” (*ibid*, p. 137). To clarify, Table 1 summarises the three orders of public goods and their associated problems.

Table 1: Three orders of public good and public good problems with relation to CBM

<p>Public goods: the management of a collective resource achieved via either the desire for social approval or to avoid disapproval through a fear of punishment i.e. social norm compliance.</p>	<p>Public good problems: a failure to punish and restore a public good.</p>
<p>First-order public good Achieved through collective action and overcoming of the inherent temptation to free-ride through fear of punishment.</p>	<p>First-order public good problem Water users succumbing to free-riding and shirking, which undermines the first-order public good.</p>
<p>Second-order public good Restoration of the public good is possible through the sanctioning of first-order free-riders.</p>	<p>Second-order public good problem Failure of the e.g. WUC and Local Councillor 1 to sanction community members who take water without paying i.e. first-order free-riders.</p>
<p>Third-order public good In Uganda this is to be realised by the sub-county (a higher level of official) imposing its authority and in effect reprimanding the WUC (the failed punishers, or second-order free-riders) for not enforcing the user pays principle.</p>	<p>Third-order public good problem The failure of the highest level of nested institutions, the sub-county, to honour their responsibilities to CBM by sanctioning the WUCs. This may be because there are no funds to facilitate the sub-county (see van den Broek and Brown, 2015). Ultimately the financial and or social cost of punishing second-order free-riders is deemed too high.</p>

Free-riding and shirking, experiments have demonstrated, engender feelings of consternation amongst contributors and co-operators in a peer punishment system: it is these emotions that drive the sanctioning of free-riders. Experiments by Fehr and Gächter (2002) suggest that sanctioners tend to be naturally higher contributors i.e. give more to the enterprise, which makes, in comparison, the transgression even greater, generating deeper negative emotions. They also

found that negative emotions became more intense as the level of transgression diverges (free-riding increases) i.e. moves away from average contributors. Finally, because outrage motivates sanctioning, it is suggested that the punishment of transgressors has legitimacy even amongst transgressors.

However, seemingly altruistic behaviours may belie other motivations. Impure altruism, and the theory of 'warm glow' is also worthy of consideration (Andreoni, 1990:464). Becker (1974, p.1083) suggests that "apparent charitable behaviour [which would include punishing free-riders] can also be motivated by a desire to avoid the scorn of others or to receive social acclaim". As Olson (1965, p.60) reminds us, "people are sometimes motivated by a desire to win prestige, respect, friendship, and other social and psychological objectives". This may mean that punishers are not above-average contributors, or outrage may not be motivating their charitable works. The assumption is that those who punish are beyond reproach.

Nevertheless, if the disincentives for punishment and enacting sanctions prove too powerful, for example because of the potential destabilisation of social relations, or the allure of prestige disappears, the second-order public good problem cannot be overcome. We move then into the realm of the third-order public good problem, which in essence necessitates punishing those who have failed to punish the first-order transgressors. If the will or the means to punish the failed punishers are not forthcoming, then we invoke the fourth-order public good problem and so on, and the system is effectively in free-fall.

Ozono et al. (2016) suggests that in systems reliant on peer punishment there is in reality little incentive for an individual to instigate and shoulder the costs of sanctioning. Coleman (1990) differentiates between individual punishers – termed heroic rule enforcement (due to the high personal losses, akin to altruistic punishment) and incremental rule enforcement, or pool punishment, which is carried out by several people who share the transaction costs of rule enforcement. Here members pay into a system such as a police force, and the collected contributions facilitate punishment, i.e. punishers are not altruistic (Ozono et al., 2016). Pool punishment implies a group of enforcers, though in reality there tends to be an executor, often a community leader, a feudal lord of the manor or village chief, who is incentivised to punish in order to reinforce their position and maintain support, which in turn reinforces the incentive to punish (*ibid*). This is an example of impure altruism. It thus appears that legitimacy of leaders and their motivation to punish is again based on the level of support they have amongst their constituents. This is an important consideration given the introduction of CBM-*lite*, which replaced the WUC with a Water Operator. It is also interesting to consider if, as the experimental work of Fehr and Gächter (2002) implies, they also need to be above average contributors, i.e. their level of contribution also has a role to play. So, in our pool punishment scenario, incentives for the executors, monetary or in terms of present or future reputation gains, appear to be important.

2.1. Social norms, social roles and the social meaning of action

Much of the discussion on sanctions has taken place in a societal vacuum, but sanctions are the effect of social norms, not the cause (Hirschey et al 2009). Thus societal norms play a key role in determining what is or is not deemed a

crime worthy of punishment, as well as the severity of sanctions and any exemptions. Sometimes referred to as the “grammar of society” (Bicchieri, 2006, p. ix), a norm “exists in a given social setting to the extent that individuals usually act in a certain way and are often punished when seen not to be acting in this way” (Axelrod, 1986, p. 1097). Therefore these customary rules specify and ultimately govern, through “approval and disapproval”, what is and conversely is not acceptable behaviour in any given group or society (Sunstein, 1996, p. 914). However, it is argued that norms, a social phenomenon, develop in an uncoordinated fashion (Axelrod, 1986). It is recognised that norms do not always result in socially efficient outcomes: indeed some norms are “obstacles to human wellbeing and autonomy” (Sunstein, 1996, p. 910). Classic examples include the discriminatory treatment of minority groups and women. Further, norms of loyalty (for example the code of silence in the Mafia) may be beneficial to those in the sub-group but not to wider society. We need to be alert to dysfunctional norms that may harm wider society *ibid*.

If sanctions develop out of social norms, we need to understand the norms of the given society we are investigating and not make assumptions, based on a western lens, of what behaviours warrant punishment. In order to better understand social norms in a specific context, Sunstein (1996) suggests exploring their relationship to social roles and the social meaning of actions related to that norm. “Social norms determine the social meaning of action”, and help us apportion meaning to conduct, and congruently social roles are a consequence of social norms. The social meaning of an action may be “a confession, an accusation, or a statement”, and there will be a corresponding norm that seeks to curb that behaviour (Sunstein, 1996, p. 928). Crucially, for

researchers working outside their immediate environs, the “meaning of acts is very much a function of context and culture” and language, and how it is conveyed, signals meaning (*ibid*, 1996, p. 926).

The existence of a norm does not guarantee compliance. When evidence of contravention emerges, a norm’s conforming power is eroded. In truth, norms must be complemented with the widely-held assumption that everyone is abiding by the norm (Bicchieri and Xiao, 2009). From the foregoing we need to question whether free-riding really is the social ill we think it is, and secondly, even if it is, understand that community members have to believe that others are conforming: otherwise, the convergence of norm and behaviour will not be realised.

Norms can and do evolve, although they can be stubborn (Axelrod, 1986; Sunstein, 1996). Examples of a norm change in the UK might include the new unacceptability of smoking where irrefutable medical evidence has played a part, or attitudes to cohabitation of non-married couples. Norm changes can come about when beliefs change (*ibid*, p. 930). Finally, we also need to consider in our study context whether there is a hierarchy of norms, whereby some norms are more resolute than others.

Over the past decade the Nobel prize-winning nudge theory (Thaler and Sunstein, 2009), has been used successfully in many countries⁴ and may provide a lead in facilitating norm change. It is a form of libertarian paternalism promoting choice architects to self-consciously organise the context in which people make decisions. Nudge theory utilises the human herd instinct and the tendency to

⁴ For example, hand-washing programmes in Bangladesh (Dreibelbis et al., 2016).

prevaricate, to apply gentle persuasive tactics to tweak human conduct for the benefit of the individual and wider society. Positive behaviour change can be realised by firstly, clarifying misconceptions stemming from the natural tendency to inflate: from our field the widely-reported belief that all WUCs are syphoning off funds is used as justification for not paying fees. Secondly, by informing people about what others are doing i.e. actual payment levels, we may see an increase in payment levels. Additionally, using positive statements is likely to yield positive behaviour change, and visuals and images, combined with information, may also be usefully deployed for an additional emotional nudge. Thaler and Sunstein (2009) suggest that while nudging can be used for nefarious aims, transparency is key: so, provided the choice architecture can be publicly defended, it passes Rawls's (1971) publicity principle.

It is imperative that we now weave the human right to water into our discussion on social norms and sanctions. Ambivalence surrounds the status of water as a natural resource: it is classed as both a human right and an economic good (the two are often in conflict) and this adds another level of complexity (Bakker, 2007). Unlike other resources water is essential for life on a daily basis, referred to as a gift from god and endowed with spiritual significance. The intrusion and background presence of emotions surrounding water impact on the obligatory monetary contributions of the user pays principle: how can access be denied? Does the status of water as a human right make free-riding so unexpected? These are questions to bear in mind.

The ability to exclude is an essential prerequisite for the sustainable management of CPRs (Ostrom, 1990) yet the challenge of doing so in view of the human right

to water presents a crucial obstacle for communal management of handpumps. Negative attitudes towards transgressors are likely to be softened by this special status of water, and the free-riders themselves may use it to justify their actions to others and to themselves.

3. Case study area, data collection and analysis

The study focuses on the four CBM-*lite* pilot villages, Table 2 sets out their particulars, in Kigumba sub-county, Kiryandongo District, in mid-west Uganda (refer to Figure 1). The pilot encompasses 14 shallow hand-dug wells with handpumps and one protected spring.



- CMB-*lite* Pilot Village
- District Capital
- District boundary
- Kigumba Sub-county
- Major roads



Figure 1: Map of case study

Table 2: CBM-*lite* pilot village particulars and their respective Water Operator details.

Pilot village water sources and particulars	Water Operator details
1) Nyakatugo	
<ul style="list-style-type: none"> • Three handpumps. Some residents had piped water connections. • Close to town of Kigumba with 132 households. • Perceived as richer and less isolated than other villages. • Strong Local Councillor 1. 	<ul style="list-style-type: none"> • Male. • Owned a mobile phone repair shop.
2) Mpumwe	
<ul style="list-style-type: none"> • Six handpumps. • Large dispersed village with 297 households. • Local Councillor 1 frequently absent. 	<ul style="list-style-type: none"> • Male. • Village outsider from a migrant family. • Teacher turned successful farmer.
3) Mboira II	
<ul style="list-style-type: none"> • Two handpumps and a protected spring. • Poor immigrant village with 147 households. • Weak Local Councillor 1. 	<ul style="list-style-type: none"> • Male. • Village outsider – family not originally from the village. • Ran the local market and often the point of contact for NGOs wanting to work in the village.
4) Nyakabette	
<ul style="list-style-type: none"> • Three handpumps. • Large relatively remote village with 264 households. 	<ul style="list-style-type: none"> • Female. • Outsider who married into the village. • Previously water source caretaker under CBM. • Ran a successful market stall selling second-hand clothes.

3.1 Data collection and analysis

The original and comprehensive longitudinal mixed methods data set we present encompasses a feasibility study commissioned by the second author as programme manager between July 2012 and January 2013, and undertaken by NGO staff, specifically two surveys: a ‘willingness to pay’ (1,138 households in

six potential pilot villages) and a separate 'willingness to participate' survey with 150 households in the finalised four pilot villages. Then as an academic researcher, following her departure at the end of December 2013 from the NGO, the second author, who continually clarified her new academic role, undertook 62 in-depth interviews over the course of four research trips between June 2014 and November 2015. 47 interviews were undertaken with pilot recipients⁵ (including Water Operators and caretakers), who were asked to reflect on *CBM-lite*; their experiences of O&M, the management of sources, payment and collection processes, their payment of water user fees, storage of funds and enforcement of locally agreed rules, known as byelaws. Eight interviews were conducted with the representatives of the implementing NGOs; two with the Savings and Credit Co-operative (SACCO) manager and five with local government officials. In addition, five focus groups were undertaken with 41 community members, and two public meetings (with 86 participants) concerned with water source governance were observed. NGO staff accompanied, interpreted and translated interviews where necessary. Finally, the pilot accounts with the SACCO as well as the records of the Water Operators were consulted.

The research was interested in understanding the interplay of contextually derived prevailing social norms, social roles and the social meaning of action, and what they signal, concerning the user pays principle, free-riding and introduction of *CBM-lite*. The iterative research strategy and thematic analysis of transcripts allowed time for discussion and critical reflection and reinterpretation, with new data leading to a reassessment of meaning.

⁵ 14 in Mpumwe; 13 in Nyakabette; 10 in Mboira II and 10 in Nyakatugo.

4. Case study on the outcomes of piloting CBM-lite

In order to facilitate collective action, which constitutes a first-order public good⁶, every effort was made prior to launching CBM-lite (see section 1.1 and Brown and van den Broek, 2017) to get the preliminaries in place. For example a 'willingness to pay' 1,000 UGX (£0.25, \$0.39) per household per month survey (N=1,138 households) yielded a 99% positive response, and a 'willingness to participate' in the pilot survey (N=150 households) saw 89% in favour of the Water Operators' financial incentive; all preceded multiple community meetings with the NGO, SACCO micro-finance manager and a local government official on hand to answer queries. Water points in each village were mapped and the financial viability of each scheme calculated: the result of the feasibility study was to pilot in four of the six identified villages. Public consent to pilot was obtained in the four villages and the final selection of short-listed Water Operator candidates, who demonstrated some prior business experience (refer to Table 2 for details), was made by public voting.

The pilots commenced with a community meeting called by the Water Operators, with an NGO representative present, with the purpose of agreeing on the sanctions for non-compliance with the communally-agreed rules of use (byelaws). Penalties varied by village, but all increased in severity, culminating in potential exclusion from village sources, and/or a disciplinary appearance before the Local Councillor 1 (LC1). It is noteworthy that according to NGO representatives, the levels of attendance at meetings to discuss the pilot and byelaws was patchy,

⁶ The reader is referred to Table 1, which charts the stages of a potential decline and possible recovery pathway of a public good.

with a good number of inebriated attendees. Crucially, the majority of the now disbanded WUC members were absent from these initial meetings.

For the first four months, water user fees by and large were paid, as Figure 2 for Mpumwe shows, and the Water Operators maintained the handpumps and organised the restoration of broken ones. A same day repair was recorded at Nyakatugo (10 December 2013), and two long-term breakdowns were attended to in Mpumwe, all enabled by loans from the SACCO on the strength of the regular deposits by the Water Operators. Optimism prevailed with community members reporting in meetings with NGO staff members: “now people are seeing a benefit of having a manager....at the moment there is a sure way of getting the pumps repaired” (Nyakatugo, 13 September 2013). Similarly, the sub-county chief of Kigumba prematurely declared:

“Roll this project out in other communities and everyone shall pay” (5 November 2013).

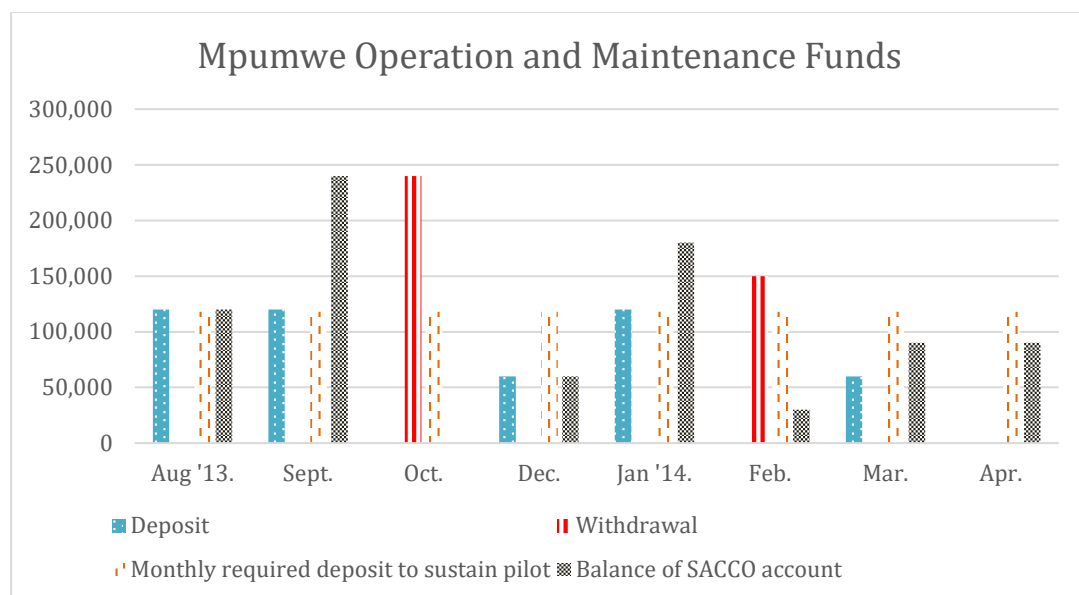


Figure 2: SACCO accounts for Mpumwe village CBM-*lite* pilot.

A few months later, however, payment had lapsed in all four pilots, yet people continued to take water, and a first-order public good problem loomed. Actual payment behaviours are very telling here. Interestingly, waning contributions coincided with handpump repair. A Mboira II community member provided a useful insight into this behaviour pattern which indicates that reactive maintenance is recognised as both important and tangible:

“I can pay money if there is importance for it. Like you go to the market. You should see what you are buying and why you are paying” (31 March 2015).

There are a number of other reasons proffered for non-payment and these are documented below. Alternative sources of water that did not collect fees influenced 40 households in Mpumwe to defect, and the presence of a protected spring in Mboira II accounted for others: “it cannot break down” (Mboira II community member, 18 June 2014). Some households close to Kigumba Town, in Nyakatugo, were connected to piped water, and objected to paying for only occasional use of handpumps. A number of non-payers resorted to affordability as a pretext, sometimes playing for time by promising payment post-harvest: it never materialised (see Figure 2). An NGO official summed up:

“even someone who drinks five beers a day [at the time 3,000 UGX each, £0.76, \$1.17] can say he has no money” (23 March 2015).

Mistrust that spilled over from the WUCs days accounts for some of the objection to payment, as the LC1 of Nyakatugo explained it was “a continuation of wounds of the WUCs that used to eat the money” (11 June 2014). The caretakers, who were taken on to assist the Water Operators in an otherwise overwhelming task,

themselves proved to be a source of vexation: in all the pilot villages, Water Operators experienced misuse of funds by a caretaker. Failure to hand over collected funds because of discontent over their low earnings was commonplace. A Nyakabette caretaker was accused of retaining 73,000 UGX (£18.47, \$28.40) of user fees for this reason. Instances of such conduct provided an excuse not to pay the water user fee.

Disbanded WUC members according to an NGO staff member “don’t like the project because they are not benefiting any more” (18 June 2014). Previously exempting themselves from payment, and not above syphoning collected monies for personal emergencies, WUC members refused to hand over any remaining collected fees to the Water Operators, and set out to sabotage CBM-*lite* by spreading toxic rumours: a community member in Mpumwe said:

“during drinking they (former WUC members) are misleading people. They say that the manager is eating the money” (20 June 2014).

Thus Water Operators, installed to allay mistrust, became the object of jealousy which in turn led to non-payment. The example of the Water Operator in Mpumwe is telling: reflecting upon his earlier insistence in an observed community meeting in August 2013 that he would be doing the role voluntarily, he justified this falsehood because “[p]eople don’t like to hear that you are earning money from their contribution” (2 April 2015).

Water Operators were aware that user contributions, the agreed source of their remuneration, were seen as further financially elevating the Operators, which for many was a bitter pill to swallow. The Mboira II Operator summarised:

“[p]eople don’t want others to develop in this village. They are jealous because I have a job and because I am often the point of contact in the village for outsiders” (4 November 2014).

Some community members expressed dissatisfaction with the standard of upkeep of source surrounds in Mpumwe: “[h]e only collects money and does not do anything. If he had cleaned around, I would still be paying” (20 June 2014), citing this as a reason not to pay fees. The snowballing effect of these numerous excuses is illustrated by this final pretext:

“[m]ost people refused to pay, so I don’t want to be the only one paying” (community member Mboira II, 18 June 2014).

For the restoration of the first-order public good (i.e. effective collective action) it falls to the Water Operator in conjunction with the village LC1, to enforce the user fees and agreed penalties. These parties proved unwilling or unable to re-establish the first-order public good. The sequence went as follows, Water Operators often instructed their caretakers to threaten to implement the byelaws, but free-riders were undeterred: “there has only been a threat: ‘you cannot access water’. But Mzee (caretaker) is old and weak and cannot stop someone from fetching water” (Nyakatugo, 30 October 2014). The following statement from a caretaker in Mpumwe exemplifies the lack of resolve to enforce payments:

“I report to Adam (Water Operator) if people are not paying and then it is up to Adam because I have told him people have not paid. Let him go to the LC1 and they can see the way forward” (20 June 2014).

Both caretakers and Water Operators claim they faced physical violence in attempts to discipline free-riders: “they can beat you up and take advantage of your mistakes in the past” (Nyakatugo caretaker, 30 October 2014). Another caretaker in the same village alluded to witchcraft “[s]omebody can injure you and will say it is a wizard. I fear, that is why we take things slowly” (6 November 2014). Violence extended to the children of disgruntled community members, with the Mboira II Operator recounting:

“[p]arents had sent their children to my home. They threw stones at me and bullied my children at school. They threatened me that they would beat me up” (5 November 2014).

The enforcement of sanctions was thus potentially dangerous and also socially disruptive: “if I implement the byelaws people would hate me”, Mboira II Water Operator (5 November 2014). The Mpumwe Water Operator made the point that enforcing sanctions was not possible because he was part of the community:

“[t]he sub-county will come and go away, the police will come and go away, but I am the one who remains in the community” (6 November 2014).

A particularly difficult situation is the enforcement of payment and sanctions on friends and relatives. The Water Operator in Nyakatugo explained:

“one of the caretakers is an Alur (tribe) and most people in this part of the village are Alur, therefore if people plead (not to pay) it is hard for him to stop them from fetching water” (28 October 2014).

Clearly it is difficult to penalise some and exempt others without repercussions, which is why the reported constant quarrelling at the sources is unsurprising.

In sum, Water Operators lacked the authority or resolution to enforce the rules of resource use, and backup was not forthcoming from the LC1, the only support available to get collective action functioning at village level. Only the LC1 at Nyakatugo was able to influence community compliance, “he is tough and a man of principles” (community member, 6 November 2014), but even he could not ensure a steady flow of payment. Fear of losing popular support was a factor in the case of LC1s: these elected officials do not have hereditary links to chieftains and the authority that commanded.

The second-order public good, through the restoration of collective action, was not realised. Indeed *CBM-lite* reached the stage of a second-order public good problem soon after payments tailed off. In an attempt to avert the third-order public good problem, higher-level sanctioning was sought from the sub-county, but *CBM-lite* lacked finance to facilitate their per diems: despite a contracted agreement prior to the pilot, follow-up visits never took place, citing lack of funds and transport.

Two additional factors hastened the demise of *CBM-lite*: the change in priorities of the NGO to focus on new sources and, as one NGO staff member ruminated, “any innovation is like an egg that needs to be nourished, but management priorities have not been with the pilot” (7 November 2014). Secondly, and significantly the lead developer of *CBM-lite* left Uganda in December 2013. Without her oversight and supervision, the sub-county neglected to enforce rules and effectively curtail free-riding (disciplining those who had failed to impose sanctions on free-riders) and thereby establishing a third-order public good. As a consequence, *CBM-lite* fell victim to a third-order public good problem, and the

pilot faltered. Thereafter demoralised Water Operators put little time into their role and the loan facility was withdrawn. The SACCO manager confirmed “since you [programme manager] left nothing happened” (June 2014).

An NGO staff member summed up the failed trial in reflections on the prevailing norm: “people are not used to pay. They think it should be provided by government free of charge” (23 March 2015). This same view was expressed the District Water Officer the previous year:

“people look for reasons not to pay. They give excuses here and there; they want it for free”. (18 June 2014).

5. Discussion

A search for explanations for the behaviour patterns reported leads us to consider the norms that govern choices, the social meaning of actions taken, and the roles expected of community actors.

The case study demonstrated there was initially evidence of a first-order public good: communities were paying, and the SACCO was able to release funds for repairs on the strength of deposits made. The social meaning of any rare instances of not cooperating and free-riding would be selfish motives or peevishness. At this point the ‘willingness to pay’ survey results matched payment behaviours. The interview data indicates that reactive maintenance is an accepted social norm: reinstating a broken handpump is tangible and importantly provides immediate benefit. People will pay for something they can see, which appears to discredit the affordability argument. Further, *CBM-lite* did not increase

the monthly charge, and the communally-agreed list of vulnerable community members who were exempted from payment was respected and upheld. It was commonly accepted that people could afford the fee. However, payment levels soon tapered off post repair and evidence of free-riding grew, at which point we started to see divergence from the 'willing to pay' survey outcomes: this lends weight to recommended caution on over-reliance on these surveys as the basis for investments (Foster and Hope 2017). *CBM-lite* effectively runs as an insurance scheme with users paying in order to access advanced funds should their sources need repairing. The concept of insurance or 'just in case' provision, appears in our case study area to have little traction (similarly, Chowns, 2015; Whittington et al., 2009) and is not an accepted social norm, despite the fact that mechanical parts are subject to wear and tear: participants viewed premiums as an opportunity cost for a risk that might never happen. We need to reinterpret the 'willingness to pay' survey as being willingness to pay for reactive maintenance not preventative, 'just in case' maintenance.

Unravelling the explanations for the observed behaviour, post pump repair, revealed a web of justifications for free-riding beyond merely an opportunity cost or accessibility of alternative free sources, culminating in the realisation that punishment was unlikely. This pattern mirrors that identified for CBM (van den Broek and Brown, 2015). The social meaning of cooperation and continuing to pay for water, in this context, would be a willingness to be seen as gullible (Sunstein 1996), or virtue signalling.

A first-order public good problem followed swiftly, and to rectify the situation, peer sanctioning is required - a second-order public good in both CBM and *CBM-lite*.

In the first case this was meant to be carried out by the voluntary WUC members who were expected to undertake altruistic punishment of transgressors, whilst an expected role under CBM, it was not necessarily a role stemming from a social norm. The syphoning of funds by WUC members was widely believed to be rampant, as also reported in research by Harvey et al., (2003) and Chowns (2015). WUCs were not honourably fulfilling their roles under CBM and could not therefore conjure up or justify the outrage necessary to enforce altruistic punishment since they were not above average contributors: indeed they regarded free water as one of their perks.

By making their remuneration dependent on the levels of payment, *CBM-lite* assumed that Water Operators would be incentivised to sanction transgressors, ushering in formalised commodification of sanctioning: the payment to the Operator and caretakers under *CBM-lite* meant that sanctioning was seen as their job. This payment was meant to be transparent, it formed part of the 'willingness to participate' survey, but as reported in the case study some Water Operators were reluctant to advertise this, possibly preferring users to assume they were altruistic punishers. This also shows they were not comfortable with the arrangement and could sense potential problems. Collected funds dwindled and the financial incentive to follow up transgressors disappeared.

Both CBM and *CBM-lite* assumed that the community would lend support to a peer punishment regime, since they had been involved in drawing up the rules of use and misuse (byelaws). It is worth considering exactly how organic and valid these byelaws actually were, given they were made in the presence of the promoters of the scheme. Attendance at these meetings was reportedly patchy,

so how legitimate are rules based on a low turnout, including the reported inebriated condition of some of the participants and the absence of influential figures in the community. Rational ignorance may have been a deliberate tactic here (Tullock, 1993). The dangers of poor levels of engagement and participation are associated with potential capture or destabilisation of processes by vocal groups (Brown 2011). Here, former WUC members deployed a range of subversive activities throughout the short-lived pilot, from boycotting to disruptive tactics both in later community meetings and beyond through the spreading of malicious rumours.

While it is argued by Coleman (1990) that social capital negates the need for punishment, our findings suggest that close social ties and thus high levels of social capital actually facilitate free-riding. The social role of the Alur caretaker, finding it impossible to sanction those from his tribe, is a case in point. Indeed, it could be argued the Alur caretaker was partaking in kin selective collective action with other Alur, an expected sub-community social norm, to the detriment of the wider community. Thus higher levels of social capital may actually have hastened the demise of the pilot and once again put community access to water in a precarious situation, an example of the dark side of social capital (Portes and Landolt, 1996).

The demise of the pilot coincided with the development of second and third-order public good problems. The case study indicated that village Local Councillor 1s were not, by and large, prepared to support Water Operators in their sanctioning duties – it was suggested reputational damage was a reason. In line with Ostrom's (1990) design principles, recourse to external support from higher level

officials, sub-county chiefs, was to be sought in order to enforce a third-order public good and restore collective action. However, and perversely, government officials would require the pilots to cover their per diems in order for them to provide sanctioning support. With the departure of the developer of *CBM-lite* in December 2013, and without forthcoming external support by the sub-county, there was no supervisory body taking on responsibility. Subsequent NGO programme managers, under direction from their headquarters, pursued construction over exploring measures to improve the maintenance of sources in the period after the *CBM-lite* developer left.

Reinterpreting the data we can see that the pilot suffered an unexpected reversal when those who were meant to be enforcing the rules, which should have seen the restoration of a second-order public good, were subjected to public remonstrations, threats and physical abuse directed at them and their family members. The pilot did not predict the level of animosity resulting from singling out and promoting a community member, and the ramifications for the pilot. We know from comments by the Water Operators that community members were jealous of them. The knowledge that Water Operators were potentially growing “fat” on their money was an on-going source of bitterness and irritation to water users. The Water Operators became exposed to a form of collective punishment sometimes administered by children. Those who were meant to punish became punished: the tables had been turned on what was the crime and who was the punisher.

The threat of witchcraft is an area that requires further investigation, but from the literature it appears it is used as a social leveller, with Maranz (2001, p.111)

observing that people in rural settings are "... afraid to accumulate more goods or property than their neighbours and kin, for fear of creating jealousy which may lead to reprisals being carried out against them on an occult level" (see also Golooba Mutebi, 2005; Chabal, 2009). Water Operators may have originally been attracted to the role by possible enhanced prestige, but the fear of social reprisals became too great: they were not prepared to become altruistic punishers and derived no warm glow from enforcement, which significantly contributed to the collapse of the pilots.

Research demonstrates the importance of having influential stakeholders on side in any process of reform. If the costs to elites outweigh any potential gains, their passive or active resistance can be expected (Scott and Meyer, 1994), which with *CBM-lite* would be the case with the loss of prestige of being a WUC member, and access to funds and free water. The former WUC members, generally considered to be people of standing within their community, hence their initial election to the WUC, were clearly aggrieved and had strong negative emotions towards Water Operators and were prepared to punish what they saw as "their underlings....obtain[ing] opportunities for upward mobility" (Das Gupta, 2001, p. 4). This resonates with comments made by Water Operators about the contempt one is held in if you have the presumption to be aspirational.

To recap, this paper is asking why the user pays principle is so difficult to implement and seeking the reasons behind the prevalence of free-riding in the SSA context. The answer has to lie, we believe, in understanding the social norms within the heterogeneous context of study, and not importing social norms (both in terms of NGO innovations and in researching their outcomes) from other

contexts which promote individual aspiration or recognise the value of insurance. A fundamental realisation therefore has been that seemingly irrational, confusing or inconsistent behaviour is in reality the “product of social norms and moral judgements” (Sunstein 1996 p.945) that through a western researcher’s opaque lens are obscured. It is thus misleading to make assumptions, of what is, and is not, socially unacceptable behaviour warranting punishment. Disaggregating our own social norms from norms we may not fully comprehend allows us to ask important questions: for example, is free-riding and not making regular water user fee contributions, i.e. ‘just in case’, preventative maintenance, considered a social ill in the Uganda context?

It is worth considering whether when establishing the locally determined rules and sanctions for both CBM and CBM-*lite*, which occurred under the auspices of NGOs or local government District Water Office, communities were behaving as they think they were expected to (Bicchieri and Chavez, 2010). That is, have the sanctions evolved spontaneously and organically from a social norm or were they guided by well-meaning NGO or government officials, possibly as a route to change norms?

Looking at actual behaviour – free-riding, following the repairs of pumps - we need to determine if this is a case of collective non-compliance or in reality collective norm compliance (i.e. not paying for preventative, ‘just in case’ maintenance is the norm). It is argued that to be effective, norms must be accompanied with the commonly held belief that everyone else is complying with the norm (Bicchieri and Xiao, 2009; Sunstein 1996). So, were users free-riding because they discovered people were not abiding by the norm, or because in

reality paying was not a deeply ingrained norm? Does this explain the multitude of excuses proffered for non-payment and the reluctance to punish? If we accept that the “desire to contribute to a collective good is palpably a function of social norms” (Sunstein, 1996, p. 945) we must consider if, where there is no desire, there is no social norm.

Our interpretation is that reluctance to pay, which would financially benefit the Water Operator, is also a signifier of a higher-level meta norm: that of the law of Jante “an unwritten code of conduct....:people should not feel or act as superior to their neighbours” (Brown and van den Broek, 2017, p. 219). This helps explain the bullying behaviour backed up by threats of witchcraft towards the Water Operators in order to defend and re-establish this higher-level social norm, that of social order, and social homogeneity, via compression and social levelling. The seemingly myopic behaviour of free-riding, potentially putting their community at risk if the pumps did break down, represents a lesser social ill than promoting individual aspiration: for this the community was prepared to enact altruistic punishment of the Water Operators because it gave rise to strong emotions. Community behaviour was not irrational or confused but consistent: they saw that an existing cardinal norm was being transgressed and they showed disapproval and sanctioned.

6. Conclusions

The outcomes of our case study, an attempt to pilot a modified version of CBM in four villages in mid-west Uganda, have yielded some useful insights as to why sustainable provision of rural water is so problematic. *CBM-lite*'s failure was

disappointing, but failure allows one to pinpoint troublesome elements, and gives space to explore more promising avenues.

Fundamentally CBM and *CBM-lite* are attempts to craft institutions for the governance of shared resources, and they assume there are universal norms about what constitutes a social ill warranting punishment. Understanding social norms as they exist in the study area emerged as key to accounting for the avoidance of payment. The case study, through a consideration of social roles and the social meaning of action, implies that there is in existence a swirling constellation of social norms with force fields of varying strengths, some of which may be more or less amenable to change.

It has taken a substantial amount of time and reflection to unravel the meaning of unspoken rules and codes of behaviour, which are not immediately apparent even to those living and working closely with communities. It has to be remembered that NGO officials are often working under pressure on fixed-term contracts, and the sort of ethnographic studies required to gain a better understanding of potential unintended consequences of innovations would not be foremost on their agenda. To illustrate, in the case of *CBM-lite*, the decision to work with those with business acumen, the Water Operators, inadvertently put them in a precarious position, despite the fact they initially applied for the role. What we learn is that promoting relatively thriving individuals above their perceived station within society (especially when payment is involved) will result in social levelling of some form. In the hierarchy of social norms, this is seen as a far worse transgression than taking water without paying. Crime and punishment are seemingly turned upside down with the free-riders and the community as a

whole directing their venom at the appointed rule enforcers. Expecting the Water Operators to be able to curtail free-riders from within, and with the support of their communities, was overly optimistic and business experience did not confer upon them social standing.

From our case study we are able to say with confidence that peer sanctioning of the widespread free-riding is unlikely to happen because of social consequences. Any rural water management model will need to consider how it will realise collective action and overcome the inherent tendency to free-ride because if it is not checked, then there will be an issue over the availability of funds for O&M and thus the sustainability of the programme.

Undoubtedly the sector is at a critical juncture. Millions of dollars have gone into extending the supply network⁷; it is time to reassess the situation. An obvious change that might address the dearth of O&M funds would be a rebalancing of expenditure on the part of international donors away from expanding the supply network towards supporting O&M initiatives of already constructed systems. A positive arena for funding would be for new initiatives or pilots that focus on improving the sustainability of systems and to share the results: the successes and the failures.

Unpacking the hierarchy of norms in terms of the strength of force fields around them, may offer us through the lens of nudge theory some interesting avenues to explore. We may be able to plan initiatives that work with, circumvent or seek to

⁷ The Africa Development Bank's Rural Water Supply and Sanitation Initiative alone has mobilised 5.93 billion Euros between 2003 and 2015.

change norms. The case study suggests that the social levelling norm, akin to Jantelagan, may be a meta norm, deeply engrained and fundamental to the structure of society and thus resistant to change. Depersonalising payment seems to be an important implication of this study and also for CBM (see van den Broek and Brown 2015). We propose two potential approaches that recognise the existence of this social levelling norm but seek to circumvent its pull. Firstly, the use of Water Operators not drawn from the communities and who may not be subject to this meta-norm. It would be useful to explore the experiences of more professionalised service delivery approaches and their payment levels⁸.

A second more coercive approach might be pre-payment technologies which bypass social interactions. It is possible to retrofit existing handpumps and pilots are under way in Uganda and in Kenya⁹. Handpumps can be released only with credit pre-loaded onto an electronic tag, though because the tags are registered to individual households, it is possible to provide the at-risk with subsidised water, thus ensuring the human right to water. The pilots indicate that while pre-payment technology side-steps underlying norms and generally results in higher payment levels for O&M activities than CBM, it also brings new or other problems that need to be considered. As Heyman et al's 2014 study found in the urban context, pre-payment systems are expensive to install, which raises the question as to who should pay for the units: if they are not donated, an increase in the cost of water may be necessary. Ensuring accessible water credit purchase points and on-going monitoring and meter reading is also essential. Ultimately the systems

⁸ For example, Whave in Uganda.

⁹ With technical support from PRACTICA Foundation, systems were piloted by JESE, HEWASA and GOAL in Uganda. Aqua For All have funded pilots in Kenya.

need to have community support in order to avoid potential vandalism, and as Heyman et al. (2014, p. ix) remind us: pre-payment systems should not be viewed as a “technological magic wand to fix underlying management issues” (*ibid*, p. ix).

A third approach worthy of exploration focuses on evolving norms that may be less deeply entrenched and potentially amenable to nudging: for instance, a move towards recognising the value of preventative maintenance i.e. insurance. Nudge theory, promoting a libertarian paternalism approach, takes a more indirect influencing approach, adhering to Rawls’s (1971) publicity principle, that seeks to create an environment where in this instance water users can be primed to make the choice, without coercion, to pay for water ‘just in case’. Clarifying misconceptions where they exist (e.g. potentially the scale of misuse of funds by WUCs) and providing accurate information about actual payment behaviour presented in a positive manner, in conjunction with visuals, may provide an emotional nudge. Exploring the most appropriate mode of communication is an important arena for research. In the field of peace and reconciliation or maternal health¹⁰, some NGOs have identified opinion leaders with potential within communities, those individuals with credibility and influence, and mentored them, to become in effect norm entrepreneurs within their communities to communicate and nudge, through acting as positive role models. Mitigating any potential risk to these fledgling norm entrepreneurs is an important consideration. The research has indicated that there are limits to what cultural outsiders can do in terms of

¹⁰ Whitaker Peace and Development Initiative and Action Against Hunger in Kiryandongo Refugee settlement, Uganda.

understanding norms and consequently designing contextually appropriate nudges: they may not be the most appropriate nudgers to influence our nudgees.

Piloting nudge approaches to O&M may lead to success with minimal outlay, although established behaviour patterns may take years to evolve, and O&M funding needs are immediate. We need to consider whether nudging is too cautious an approach? Thus, overall we propose a combination of technology alongside locally derived nudge stratagems as offering greater sustainability than technology alone.

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