University of Alberta

Institutional Diversity in Collective Action: Investigating Successful Village Level Maintenance of Hand Pumps in Malawi

by

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Dedication

Africa and Africans: There is no other drug as powerful.

I can only hope a small part of this work informs policy that improves the lot of the ‘red and purple dress sisters’, Joseph across the road, the mentally challenged boy who’s name I forget and who always offered me sugar cane, and the all landscapes in which you live. Your ilk and the place in which you live continue to influence my passions, anger, fond memories and willingness.

Abstract

Providing clean water to rural communities in sub-Saharan Africa remains a challenge. Unsanitary and distant water sources cause a host of health and humanitarian problems. A common means of remedying this situation has been the donation of improved water sources, fitted with low-cost hand pumps. Due donor capacity and/ or policy most hand pumps are donated under the guise of Village Level Operation and Maintenance (VLOM). This premises the notion that recipient communities will take ownership of the new pump and as such will ensure its maintenance. To assist with this many donors carry out programs of technical repair training and the structuring of in-village leadership and management groups. The reality is that a high proportion of these pumps break down after donation and cease to work thereafter. Measures to redress technical elements of these failures through increased training or adequate distribution of spares has seen some success but failure rates remains high.

This has led to a call for more attention to demand side issues, focusing on the communal aspects that may influence a village to act collectively in the maintenance of its hand pump. This thesis researched five Malawian villages where the community had maintained their hand pumps for a period of 10 or more years.

These hand pumps were treated as shared resources and the literature on common-pool resources and social institutions was used as a theoretical framework. Applying these theories proved to be appropriate for analyzing the norms, conventions and forms of cooperative conduct. This allowed the research to gain insights into institutional diversity and the relationship between 'formal institutions', most often exogenous in

nature, and informal' or customary collective action institutions embedded within the communities.

Findings showed the emergence of three predominant themes within these successful case studies: 1) the role of leadership at varying levels and how it is embodied institutionally as a vehicle to drive collective action; 2) the contextual norms around rules, monitoring and punishment and; 3) how it should not be assumed that cases of successful pump maintenance necessarily guarantee gender 'empowerment', as is often touted by water development proposals.

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List of Abbreviations

HSA	Health Surveillance Assistant
WPC	Water Point Committee
VLOM	Village Level operation and Maintenance

Chapter 1- Introduction

1.1 Introduction and Research Questions

The use of hand pumps fitted to boreholes and covered wells is a common approach used to supply clean and reliable potable water to rural communities in Sub-Saharan Africa. Without this assistance many rural villages rely on unsafe and unreliable sources of water that pose a number of health risks including cholera, typhoid and parasites. Unimproved water sources also typically impose demanding labour requirements which require great effort to access and commit rural people- usually women and girls- to long, heavy water hauling duties. These boreholes, or wells, and hand pumps are often supplied to rural villages by non-government organizations or by governments as part of development projects.

In many cases, these hand pumps experience unacceptably high rates of long-period or permanent breakdown. Villages are typically responsible for maintaining and repairing their hand pumps, a development approach known as Village Level Operation and Maintenance (VLOM). In practice, most rural villages receive some technical training on pump repair as well as assistance in setting up a formal water point committee. After this, many rural villages receive little to no support from the agency involved (van Beers, 2006).

There has been significant research on material issues concerning this problem of failed village level repair, including availability of spare parts, financial capacity, and technical maintenance training (Rural Water Supply Network, 2013; Duti, 2012; Harvey and Reid, 2006b; Harvey and Reid, 2004).There has also been some limited research into common failings of water point committees (Colin, 1999; DFID, 2000; Harvey and Reed, 2006a). There has, however, been no research undertaken to explore cases of collective action in villages that have successfully maintained their water pumps despite facing similar external conditions as those in villages that have not successfully maintained their hand pump systems. The research presented here used a mixed methods case study approach to explore how some rural villages manage to maintain their hand pumps

through endogenous collective action and how this system of management is institutionalized. The specific objectives of this research were to:

- Identify and research local institutions that underpin collective action[1] or other arrangements in villages where borehole and pump systems are long-lived and well maintained endogenously.
- Investigate the role that formal institutions introduced during VLOM process (at time of the water supply project) and customary networks or indigenous institutions of leadership currently play in the village management process and how these have changed over time.
- Investigate the nature of observed collective action arrangements in comparison to the theoretical prescriptions for successful collective action in literature.
- Investigate how gender roles manifest in villages that are successful in long term hand pump maintenance.

This introduction chapter provides background on the problem under enquiry and the main research aims. It also introduces the theoretical framework and further outlines the research methodology and field methods. Chapters 2, 3 and 4 are presented as individual papers; each address elements of collective action and social institutions that have led to the longevity of the hand pumps in the five village case studies. Each of the cases had successfully maintained their hand pumps for 10 or more years. In addition to the core cases, the research also involved brief field visits to 56 other villages (61 in total including the case studies) and collected some basic information regarding situations where pumps had not been successfully maintained. Chapter 2 considers the role that locally evolved leadership plays in coalescing and legitimizing collective action. The nature of leadership is considered through the institutional *bricolage* of communities adopting and blending useful elements of customary and exogenously introduced forms of leadership and influence (see Cleaver, 2012). Chapter 3 addresses the locally

[1] Collective action is defined by Jary and Jary (2000, pp 86) as "Organized action by a group to promotes its interests". It acknowledges a 'shared interest'.

evolved and contextually relevant practices of monitoring and sanctioning of behavior within the five case villages. Chapter 4 offers a view into gendered roles within the case villages where hand pumps are maintained and the goals of rural development are ostensibly achieved. The evidence of successful village level water infrastructure is considered with a view to the status and agency of women in these cases.

1.2 Background to the Water Provision Problems

Sub-Saharan Africa has the largest proportion of informal, rural and small-scale water users in the world and 50-60% of them lack reliable access to safe water (Nkonya, 2008). Lack of safe and reliable water sources promotes chronic health problems, retards living standards, and exacerbates poverty (Turton, 1999; Brooks, 2002; Nkonya, 2008; Brown and Crawford, 2009). This is highly concerning as the consequences of unreliable rural water supply may soon intensify as population growth and climate change shift the number of sub-Saharan Africans living in water scarce environments from 200 million to an estimated 690 million in 25 countries by 2025 (Brooks, 2002; van Koppen et al., 2007; Nkonya, 2008; Brown and Crawford, 2009; Gerten *et al*., 2013).

In areas where the geology is favorable, accessing groundwater with the construction of a borehole and pump offers a technical solution to domestic water supply issues. This has become the primary approach to addressing rural water supply issues in the region. However, even after such development interventions, many rural African communities quickly return to their prior condition after boreholes and hand pumps fall into disrepair (Nkonya, 2008). Improvements in project success rates will require an improved understanding of demand management, collective action, and other factors affecting community water point management in rural areas of sub-Saharan Africa (Brooks, 2002; Sugden, 2003; Summers, 2005; Perret, 2006).

1.2.1 Malawi

In many ways, rural Malawi is a dramatic example of the rural water problems faced in much of sub-Saharan Africa. The country has one of the highest population densities in Africa, and 80% of the population is located in rural areas. Population growth is rapid at 2.4%, (CIA, 2009). Despite large numbers of projects by the government and by NGOs,

there has been little improvement in the water supply situation. Approximately 57% of the rural population has access to reliable water sources (WaterAid, 2010) and this is effectively reduced to 32% on average due to infrastructure breakdown (Ferguson and Mulwafu, 2004). Duti (2012) believes Malawi to have an average breakdown rate of around 40%, a little worse than the African average of 36%. Furthermore, many of the hand pumps now in use in Malawi are aging, causing the potential for a disproportional increase in breakdowns as time progresses. Bachelor *et al.* (2000) point out that Malawi experienced a surge in pump provisions after a severe drought period in Malawi from 1992-1994. This corresponds well with evidence from this research that found many of the Afridev pumps visited in the field were supplied between 1996 and 2000. Due to population growth and a changing climate, the country is experiencing a shift from conditions of water abundance in 1995 (1933m3 p/p/p/a) to water scarcity by 2025 (estimated 917 m3p/p/p/a) (Nkonya, 2008; Brown and Crawford, 2009). This greatly complicates the future challenge of addressing the water supply situation in the country.

1.3 The VLOM Approach and (un)Sustainability of Hand Pumps

The provision of simple hand pumps holds great short term promise to create a low cost, simple and appropriate means of mitigating the costs of unsanitary and unreliable water. The 1980's saw a major shift in the development industry towards decentralizing maintenance responsibility for donated hand pumps towards end-user communities under the VLOM development paradigm (Araral, 2008). Initial efforts were aimed at designing and producing standardized hand pumps that were technically simple, easy to maintain and for which spare parts could conceivably enter rural markets cheaply. The Afridev was one of the most prominent models to emerge from this trend and the focus on VLOM in Malawi was significant enough that this model of pump had many of its early design trials in that country (Ferguson and Mulwafu, 2004; DFID, 2013).

The tenets of VLOM are attractive from a rural development perspective. End-users become active participants in their water infrastructure provision and don't need to rely on struggling or under-capacitated governments or NGO's to manage pumps that, especially in rural areas, are spread across the landscape at low densities. Furthermore

the notion that poor communities would take ownership of these new pumps, and participate in development infrastructure, was appealing (Watkins, Swidler and Hannan, 2012). Ostensibly these new pumps under a VLOM arrangement were to act as vehicles for many development goals. They were seen as being able to empower communities through new technical skills, provide new markets for spares, tools and labor and, most importantly, would give the rural poor a stake in their future water supply (Colin, 1999; Bachelor, 2000).

The results from VLOM have not lived up to expectations, yet the basic approach remains tenacious in rural development policy and practice (van Beers, 2006). Failures, that manifested as donated pumps that break subsequent to installation and are not repaired by their user community, have remained unacceptably high (Visscher *et al*., 1999; van Beers, 2006; Harvey, 2008).

What has become clear is that VLOM is less of a material and technical program than a social concept; the latter requiring a more thorough understanding beyond material concerns (Noppen, 1996; Colin, 1999). Strong evidence highlights that even where there exists an availability of affordable spare parts, technical skills training and money to finance both, unacceptably high levels of pump failure still persist (Harvey and Reed, 2006). More recently, acknowledgement has been extended to the role of demand-side management and to understanding collective action in pump using communities (Brooks, 2002; Whittington *et al*. 2008).

As part of an exit strategy after installation, borehole and pump donors often include measures to involve recipient communities as active stewards of these hand pumps. These measures often include training a small cohort of repair-people as well as advice or assistance in structuring a formal Water Point Committee (WPC) that can oversee the village pump management and maintenance (Bachelor *et al.*, 2000). Colin (1999, pg. 9) writes that experience has shown that "Hand pumps are often 'handed over' to communities in the belief that true ownership is also transferred. This has proved to be a gross under-estimate of what it takes to instill a communal sense of responsibility; in reality, communities rarely accept the ownership of communal facilities. The test of ownership comes when the community is expected to pay for maintenance or repairs;

often they do not..." He then goes on to describe how the adoption of VLOM often marks a distinct departure from existing community norms and institutions. The success of lower level technology interventions (like hand pumps) can be easily measured by virtue of the numbers installed. It is transformative development (such as crafting village institutions like the WPC) that is far more fraught with uncertainty and failure (Watkins *et al*., 2012).

It is this awareness of local norms and institutions and their interaction with external forms of training, organization and conventions that is critical and the core of the research presented here. The VLOM approach typically employs an externally crafted plan for local management; organizing WPC's and village level structures. Watkins *et al*. (2012) explain that development NGO's practices *in situ* seldom drive new policy changes but often reflect fashionable policy agendas that are formulated outside of the communities in which they work. This presents systematic barriers to acknowledging endogenous institutions and these actions often unwittingly erode or ignore pre-existing local institutions and customary laws that govern collective-action around water (van Koppen *et al*., 2007). The pre-existing institutions go unidentified or unacknowledged or attempts to alter and overlay them with new structures are shown to be unfeasible (Watkins *et al.*, 2012). In many water projects the new imported committee-based management system fails and local people attempt to return to similar management practices that existed prior to the intervention (van Wijk-Sijbesma 1995; van Wijk *et al*. 1998; Colin, 1999; Thompson *et al.,* 2001; Harvey and Reed 2006). In literature it has been noted that in successful cases of pump maintenance it should not be assumed that it was necessarily the 'imported' management committees that enable sustained functioning (Visscher *et al*. 1999; Summers, 2005; Cleaver, 2007). As will be shown in this research the subsequent erosion and modification of these exogenous conventions in favor of more context specific institutions is a topic that should receive attention.

This critique of institutions imported into the community during a water supply project is further strengthened by evidence that suggests a link between sustainable village water points and the existence of strong customary or localized institutions (Niemann, 1999; Cleaver, 2001; Summers, 2005; Harvey and Reed, 2006a; van Koppen *et al*., 2007).

Local institutions are important forms of social capital and have shown the ability to adapt and endure more readily than imposed forms of organization.

It has been suggested that the high failure rates of water supply projects are due to the fact that the typical 'village water supply project' is incompatible with local institutions and beliefs (Kähkönen 1999; Niemann 1999; van Wijk *et al.* 1998; Cleaver 1998; Mehta 2000; Dube 2001; DeGabriele 2002, Thompson *et al.,* 2001; Brooks 2002;Sugden 2003; Summers 2005; Skinner 2009). There is evidence that water supply projects have created problems of inequity of water supply access and use, that they have disempowered women, that they are incommensurable with local knowledge systems, and that they have resulted in overexploitation of water resources in times of scarcity (IRC 1994; Narayan 1995; FAO 1996a; Wakeman *et al.*, 1996). 'Imported' institutions are brought into communities under the assumption that no suitable institutions of water management exist in the community prior to the project. Over the past decade however, a small body of research has provided evidence of indigenous institutions for water point management across rural areas of sub-Saharan Africa (Niemann 1999; Cleaver 2001; Summers 2005; Harvey and Reed 2006a; van Koppen *et al*. 2007). These indigenous institutions employ long standing processes and established social capital to address water point concerns. They have also shown the ability to adapt and endure under conditions of scarcity, to address challenges of equity, to allow women to enact power as decision makers with regards to water, and to support other important aspects of local culture (see Swidler, 2013).

1.4 Gender and Water – an overview

Women bear the main burden for domestic water work in sub-Saharan Africa. Social norms that allocate particular kinds of labor by gender are often deeply entrenched in society (Kevane, 2012) and typically almost all labour related to water use is the purview of women.

Women (and girls) are, therefore, frequently the sole bearers of water for household uses such as drinking, cooking and sanitation. Coupled with their responsibility as custodians of family and domestic life they further bear the brunt of the costs related to

unsafe and unreliable water, including the onerous labour requirements necessary for its extraction and transport, diseases, dehydration and child mortality (Nkonya, 2008).

Development policies and practices have focused significant efforts to improve the well-being of women regarding access to clean and reliable water as well to enhance the efficacy of women in the decision making and control over water infrastructure (Manase, Ndamba and Makoni, 2003; Moser, 2005). It is seemingly plausible that any improvement of village water supply will automatically benefit women who will no longer be required to walk as far in order to collect water from a reliable, perennial source; nor will they have to suffer the costs of cleaning contaminated water or run the risks of introducing disease to themselves or their families.

However, development scholars and practitioners have found that efforts to modernize and improve water resources do not necessarily benefit women in the way in which it was planned or expected (Ray, 2007). Due to socially ascribed gender roles and labour divisions, development assistance and technology affects men and women differently and these outcomes are not always favorable to women.

Traditionally, women in sub-Saharan Africa are not given opportunity to make decisions or take control of water rights, nor influence the management of improved water infrastructure in a way that benefits their complex exigencies (Ndesamburo, Flynn and French, 2012). Very often they are excluded from participating within the institutions that govern infrastructure or technology such as water pumps, often culturally considered to be a male domain (Ray, 2007).

Gender concerns are often prioritized in water projects, typically by attempts at empowering village women through skills training and inclusion within decision making or management structures within their villages. While many of these attempts hold promise, often they inadvertently replicate gender roles and the institutions of gender inequality that pre-existed the development of an improved water source (Joshi, 2005). It is with this in mind that attempts to mainstream gender concerns must be viewed critically through the lens of gender theory, with an understanding of the underlying social institutions within cultures and communities (see Chapter4).

1.5 Theoretical Guidance

1.5.1 Collective Action and Common Pool Resources

Village boreholes and hand pumps in the Sub-Saharan African context exhibit many of the core characteristics of common pool and shared resources (including some attributes of club goods in cases where defined non-members can be excluded). The definition of a common pool resource is "…resources for which exclusion of users is difficult to achieve and for which joint use reduces the availability of benefits derived from the resource for others" (Steins and Edwards, 1999, pp 539). Considering the context of village hand pumps these infrastructures are not excludable without high costs in so far as they are common property for all members of the village as well a typically extended community. The users cannot exclude members from access by default, unless there is a specific agreed upon behavioral or conduct sanction in place with specific parameters (for example egregious rule breaking and misuse of the pump). The hand pump can also be considered to be a 'subtractable' resource as use by another actor contributes to wear and tear on the pump and thusly subtracts a share of available functionality time before the next communal repairs or maintenance.

A frequently presented belief about shared or public access resources is that they will suffer from neglect, degradation or rapid over consumption because a lack of formal property rights negates incentives to manage them. The seminal modern works by Olson (1965) and Hardin (1968) proclaimed that as rational, self-interested actors, people lacked an inherent incentive to cooperate without legal coercion or private property rights. This paradigm assumes that the 'natural order' follows the often cited 'Tragedy of the Commons', implying that actors in a group are destined to free ride on common property, instead of contribute (Oliver, 1993). Degradation and failure of common property is therefore inevitable. This proposed decline of common-pool resources is predicated on the theory that individuals will enjoy little benefit in curbing their consumption of a shared resource as those with whom they share it will free ride on their self-discipline and enjoy greater proportional returns. This desire to incur fewer costs and not surrender an increased share to others drives a race towards degradation and collapse.

While the 'Tragedy of the Commons' serves as a useful departure point for analyzing collective action, subsequent research has shown that many communities successfully avert the 'inevitable tragedy' trap. Common property users often cooperate to develop moral institutions (rules and norms) that allow them to sustainably manage and enforce common property regimes, (Ostrom *et al,* 1994; Becker and Ostrom, 1995; Cleaver 2001; Meinzen-Dick *et al,* 2002; Ostrom, 2005; Araral, 2008; Nkonya, 2008).

Growth in the empirical evidence of local management capacities led to the evolution of a normative framework of ideal conditions for collective action; conditions that favor cooperation around common resources (Ostrom, 1990; Baland and Platteau, 1996; Wade, 1998). The substantive factors within this framework propose that collective action is more likely if particular criteria pertaining to (1) the nature of the resource appropriating community, (2) the nature of the resource itself, (3) the institutional arrangements and (4) the influence of external factors such as technology, the state and markets, are satisfied. For example, collective action is likely when the appropriating communities are small and well defined, the resource boundaries are well defined, there are clear access and enforcement rules and the state does not undermine local autonomy in decision making (Ostrom, 1990; Agrawal,2001). While this may be true in certain cases, recent comparative studies find these prescriptions to be ambiguous, with no clear causal direction between attributes such as community size, resource type or heterogeneity in resource users, for example (Poteete and Ostrom, 2004; Araral, 2008).

Just as the 'Tragedy of the Commons' is a useful concept, so too are these 'blueprint' prescriptions of collective action structures, but neither is guaranteed to consistently prevail or fail. Actors in collective action are situated within complex sets of institutional influences that guide their choices on contributing or free-riding on common resources. Emphasis needs to be placed on understanding the interrelatedness and mutual influence between community members, historical precedents, actor agency, institutional arrangements and the exogenous influences that shape collective action incentives, rather than simply seeking out the existence of an broad set of ideal conditions (Agrawal, 2001, 2002; Cleaver, 2002).

This research was guided by those acknowledgements in literature that successful collective action around shared resources in small communities was likely to be strongly influenced by local context and intra-community dynamics. Successful VLOM is also likely the product of a mix of collective action institutions and seldom aligns with narrowly defined and highly structured ideals of how communities should be configured and arranged in order to assure collective action (Cleaver, 2012).

1.5.2 Institutional Approach – *bricolage*

The use of institutions is a critical facet in understanding collective action and as a lens through which to investigate the interactions between communities and shared resources, and between communal structures and individual actors (Cleaver, 2007; Swidler, 2013). The terms 'institutions' here is explained by Ostrom (2005, pp. 3) as meaning "…the prescriptions that humans use to organize all forms of repetitive and structured interactions…" Institutions provide a means to conceptualize and understand the rules, behavioral norms and social conventions that shape collective action through the constraints and opportunities that these factors create. Institutions shape social arrangements and generate particular outcomes (Ostrom, 2005).

The strength of local and customary institutions in shaping collective action has been emphasized by Ostrom (1990), Niemann (1999), Cleaver (2002) and Nkonya (2008). They are valuable because they don't fall into the trap of the narrow focus on solely productive concerns amongst actors or the bureaucratic efficiency that many crafted institutions do. Successful local, customary institutions are typically more socially appropriate, which lends an inherent sustainability even if it makes the institutions seem inefficient or too loosely structured. Customary institutions incorporate culture and existing social structures and have been shown to effectively manage shared resources over time (Ostrom, 1990; Cleaver, 2002; Nkonya, 2008). This evidence stands in contrast to external institutions such as statutory institutions or those institutions crafted external to resource using communities and introduced through the capacity building strategies that accompany VLOM programs. These exogenous 'imported institutions' have be criticized for failing to gain traction in communities where

collective action was necessary to maintain hand pumps under a VLOM approach, or for upsetting local norms (Cleaver, 1998, 2002).

The local or customary institutions may seem superficially less effective or less evident as they are typically in a state of constant negotiation by actors and evolution at their margins. They draw from an 'institutional resource bank' that is made of up of other social norms, conventions and external institutions, including parts of those introduced from outside specific communities (Cleaver, 2002; Ostrom , 1992). This phenomenon of institutional flux and multi-faceted nature of locally evolved institutions has been termed '*bricolage*' by Cleaver (2002, 2012). Migdal, Kohli and Shue (1994) and Rodick (2000) also emphasize the point that different social institutions readily borrow from each other and influence one another in a complementary manner. As will be shown in the following chapters the case study villages in Malawi all showed evidence of this 'institutional bricolage' in the way in which they amalgamated collective action institutions that were both endogenous as well as those exogenous to the community and introduced by outside agencies. Frequently, analysis of collective action institutions fails to identify these nuances. As a warning against falling into this trap of convenience Meinzen-Dick, DiGregorio and McCarthy (2004, pp204) warn that "Formal collective action that takes place through clear organizations may be easiest to recognize and even to compare across sites, but focusing only on such easily –measured forms may miss the most important instances of collective action".

It is valuable in collective action research to understand that the existence of resilient and sustainable institutions is therefore less about a formulaic representation of specific prescriptions or proscriptions that claim to form archetypal institutions. Institutions often evolve in a rather *ad hoc* manner, an intersection of pre-existing norms and beliefs that are organized day-to-day through embedded practices within particular social contexts (Cleaver, 2002). Swidler (2013) adds to this that groups "…almost always inherit them [institutions] with a rich embedding in complex cultural meanings and that the meanings embedded in institutions themselves define identities and shape interests" (pg. 323). Common property institutions are also typically hybrids between statutory and customary rules that are particular to the culture, region and state, and that borrow from other institutions (Maganga, 2002). The dichotomies between

'modern and traditional', 'informal and formal' or 'local and external' are typically inadequate and overly simplistic as an approach for understanding collective action institutions in rural communities, such as those presented here (Cleaver, 2002). This acknowledgement of context and complexity is vital in understanding a widespread reason for many borehole failures and donor interventions in sub-Saharan Africa.

1.5.3 Rural Water Supply in Sub Saharan Africa

"Despite these low levels of sustainability, hand pumps are likely to remain a major method of delivery of rural water supplies, as they are still considered the most appropriate and popular solution in many cases" (Harvey and Read, 2004, 6).This quote neatly highlights the importance of the research presented here. The significant rates of hand pump failure described earlier must be addressed if hand pumps are going to persist as a predominant tool for alleviating rural water supply problems in sub-Saharan Africa. Since the publication of the seminal 'Drawers of Water: Domestic Water Use in East Africa' in 1972, researchers and practitioners have been wrestling with the legion of challenges presented by supplying low cost and reliable hand pumps as a means for delivering safe potable water in Sub-Saharan Africa (Thompson *et al*, 2001). The problem of broken and non-functional hand pumps, however, remains a serious challenge.

There are clear benefits and contributions from this original research in that it fills a substantial gap in current literature that has yet to be sufficiently addressed. The research has implications for issues of sustainability, equity, gender relations and power, and traditional knowledge preservation. The value of the research presented here is that it answers a call for serious attention to the problem of unsustainable hand pumps from the perspective of social institutions around collective action (Kähkönen, 1999; DeGabriele, 2002; Thompson *et al*., 2001; Brooks, 2002; Sugden, 2003; Harvey and Reed, 2006b; ICE/Oxfam/WaterAid, 2011). Presently the author knows of no in-depth, comprehensive research results that synthesize community collective action institutions with cases of village-level sustained hand pump longevity and management in sub-Saharan Africa. Much of the available literature on village-level collective action institutions and water management is focused on agricultural irrigation (such as Kurian

and Dietz, 2004; Tewari and Khanna, 2005), or water sources other than hand pumps (such as Cleaver, 2002; Anand, 2007; Crow, Swallow and Asamba, 2009; Wutich, 2009). There is also an overall dearth of research into locally evolved institutions of water point management in general and there still exists a need to better understand demand driven attributes (Whittington *et al.*, 2009). There are however complementary studies on related issues that did help to inform the project design (such as Cleaver 1998; van Wijk et al. 1998; DFID, 2000; Summers 2005; Hanatani, 2010).

Available literature on hand pumps in Africa addresses many of the supply-side challenges that have been addressed in providing sufficient hand pump coverage for rural communities. This includes: underdeveloped rural markets for water pump spares (Harvey and Reed, 2006b), poor development project design and implementation (Blaikie, 2006; Harvey and Reed, 2006a; Van Beers, 2006; Brooks, 2002; Cleaver 2007; Njoh, 2011; Watkins *et al*., 2012), and the material design and functionality of hand pumps (Colin, 1999; Van Beers, 2006; Duti, 2012; RWSN, 2013)

Literature also exists on the role of indigenous institutions and water management, including the incompatibility of many development projects with local institutions (van Wijk et al., 1998; Cleaver, 1998; Kähkönen, 1999; Thompson *et al*., 2001; Brooks, 2002; DeGabriele, 2002; Sugden, 2003; Summers, 2005; Perret, 2006; Skinner, 2009, Cleaver, 2012), collective action in shared resource and water management (Meinzen-Dick, DiGregorio and McCarthy, 2004; Cleaver, 2007; Araral, 2008) as well as gendered analysis of water management institutions (Adams, 1997; Crow *et al.,* 2009). None, however, directly address the salient topic of VLOM sustained hand pumps in the way that this thesis does.

The existing literature on indigenous institutions was particularly germane to the research presented here. Over approximately the past decade there has emerged a useful body of research that has provided evidence of the value of indigenous institutions for the management of water points and other natural resources in rural areas of sub-Saharan Africa (Niemann 1999; Cleaver 2001; DeGabriele, 2002; Summers 2005; Harvey and Reed 2006a; van Koppen *et al*. 2007; Nkonya, 2008; DeGeorges and Reilly, 2009; Swidler, 2013). What has been highlighted through this work is that the

manifestation of endogenous institutions is often not overtly evident to outsiders (Vollan, 2011). This has meant that these institutions have been inadvertently ignored or unidentified in development efforts. Cleaver (2012) also shows how institutions are often blended and re-shaped and that exogenous or introduced institutions are often combined to co-evolve with endogenous institutions. Communities will maintain certain parts of these or modify them so that they morph into social structures that are more contextually appropriate. These institutions have also shown the ability to adapt and endure and should be more thoroughly investigated; as this research has undertaken to do. This local institutional approach has yet to be applied to village hand pump management, a gap in the research that is of particular concern given the primacy of hand pump use in sub-Saharan Africa.

The contributions made by this research into better understanding local institutions around hand pump and borehole management are likely to provide insights into how hand pump projects can be designed to fit within existing social and cultural systems, as opposed to simply ignoring and displacing them. This research will also contribute to the dearth of literature on village level institutions and locally sustained hand pumps through further developing the use of institutional approaches for researching local scale water hand pump management and through contributing to theory regarding institutional evolution.

Finally, this research will contribute to the greater literature on local scale collective action institutions including the work done by Oliver (1993), Ostrom (1990), Ostrom, Gardner and Walker (1994), Agrawal (2001) *et al.*, through adding cases of such institutions that focus on important questions around demand-side hand pump and borehole management. The theory developed regarding common property resource management has largely been developed from cases relating to topics on forestry (Poteete and Ostrom, 2004), fisheries (Cinner *at al*., 2009), and a broader focus on natural resources management (McCarthy, Dutilly-Diane and Drabo, 2004) and rural development (Meinzen-Dick, DiGregorio and McCarthy, 2004). The addition of this thesis to the larger body of research on the social institutions of collective action adds to the diversity of knowledge and insights available to academics and practitioners who

may be wrestling with the increasingly important questions of institutional diversity and collective action (Ostrom, 2005).

1.6 Methodology

1.6.1 Research Epistemology

The research is rooted in a post-positivist *critical realist* epistemology (as defined by Yeung, 1997 and Gregory, Johnston, Pratt, Watts and Whatmore, 2009). As a philosophy that guides scientific enquiry, critical realism, suggests that a 'real world', independent of our knowledge exits but that our knowledge of that real world is influenced by our cultural milieu; including gender, culture, personal history and environment (Bhaskar, 1989 and Sayer, 2002). This implies that it is difficult to 'know reality' but unlike constructivism it does not hold that reality is entirely within the perspective of the observer. Critical realists believe that a close approximation of reality can indeed be obtained through triangulating and overlapping multiple perspectives and acknowledging commensurable aspects of these different perspectives (Cloke, Philo & Sadler, 1991; Bryman & Teevan, 2005). Researchers can therefore use agreed upon categorizations and abstractions, such as the concept of institutions, to describe real world phenomena. Institutions, as understood by collective action researchers may or may not exist in reality; however, they have been demonstrated to be an effective and useful concept to explain reality, even though it is likely an imperfect one (Gregory *et al*., 2000).

1.7 Case Study Research

This research employed a mixed method, collective case study approach (Creswell & Plano Clark, 2007; Singelton & Straits, 2010). Collective, or multiple-case studies, as defined by Merriam (1998) and Yin (1994), can be used when seeking an in-depth understanding of social phenomena, and it is a methodology that has been shown to be effective in village-level African research looking at local management institutions of common property (Nkonya, 2008; Crow *et. al*., 2009; Whittington *et. al*., 2009; Semu, 2011).

The use of multiple case studies has been demonstrated to be an appropriate methodology in similar research. Poteete, Janssen and Ostrom (2010) believe that case studies have been instrumental in contributing to theory and awareness of collective action around common pool resources. A case study approach is appropriate when wanting to disentangle complex relations and to identify unanticipated relations or to build explanations that are not immediately obvious. It strength lies its suitability for triangulating between multiple methods that help elucidate informal and undocumented institutions for regulating communal use of a shared resource. Poteete *et al* (2010, pp33) continue to state that "Its [case study] the only option for empirical field-based research when cross-case data are not readily available". Flyvbjerg (2006) further argues that a context based case study is a valuable tool for deepening our understanding of social relations because "in the context of human affairs there appears to exist only context-dependent knowledge" (pp221). The closeness of the case study is key in providing a nuanced viewed of reality (and how it is perceived by those who live it). Case study contributions to theory and discoveries in social sciences have been significant because they allow for an intimate enquiring into experiences and narratives (*ibid).*

1.7.1 Case Selection and Unit of Analysis

The selection of case studies formed the first phase of the two-phase research process. Phase one was aimed at the short listing of numerous potential case study villages and conducting short visits to them both for the purpose of collecting data from a diversity of villages to provide a context for the research, and to assist in selecting villages for the second phase of the research. The author approached this case selection through a multi-pronged strategy in a manner similar to that employed by Semu (2011) in her rural research in Malawi. The first step involved seeking the advice of in-county collaborators who had extensive experience in the water, sanitation and rural development field. This included two faculty members at the University of Malawi's Bunda College of Agriculture and as well as experienced development practitioners with years of experience in Malawi.

Using their field advice they were able to recommend areas at a Tribal Authority (TA) scale, and smaller, in which they could recall seeing villages with self-sustained Afridev hand pumps. In conjunction with this the author then used an unpublished 2008 national survey of 49 518 hand pumps commissioned by the Government of Malawi. With these data it was possible to isolate the recommended areas and then cross reference data that showed Afridev pumps older than 10 years that were listed as functional (or not), sorted by TA and then village name. Using each pump's geographic coordinates it was possible to find villages that met the initial criteria and then cluster groups of three to five that were close enough to each other so that they could all be visited within a day. It was found that in order to spend enough time for each visit, three such selected villages were usually the most that could be visited in a day due to other additional area villages being visited at random and on locals' recommendations whilst in the field.

In-field selection involved visiting these selected villages to hold informal visits with community members. The goal was often to converse with a broad spectrum of villagers and not just people of authority such as the Village Headman. Typically local leaders would emerge and approach the author and two Malawian research assistants along with a group. It was normal that the Headman and one or two people, normally men, would dominate the conversation but it was in most cases possible to question other members, including women, without seeming impolite or subversive. The purpose of wanting to question a variety of people was in order to triangulate the responses as often people may answer the questions of strange outsiders strategically, a phenomenon verified by in country peers, academics and development practitioners. Village representatives may view the visit of unknown outsiders as an 'audit' or evaluation and as such answer their questions in a manner that they deem to appease the visitors, rather than totally honest, especially when it concerns issues of donated infrastructure or other perceived external assistance.

From these visits the author would then determine initial insights into the following about the hand pump history and the community:

1) The number and nature of breakdowns since installation.

2) The duration of non-functionality during breakdowns. For example a long term breakdown (> two weeks) that happened in the preceding decade would disqualify the community from being considered one that managed to sustain its hand pump in an effective way.
3) The level, if any, and nature of external assistance the village had, or continued to receive for hand pump maintenance.
4) The geographic nature of the village – unusually large villages were avoided as were those that were located within uncommonly large clusters of other villages.

Point four above requires clarification: The primary spatial until of analysis for each community was the hand pump's community- catchment. The reality is that villages frequently share pumps, at least during emergencies; for example for a few days when a neighbor has a pump breakdown. It is seldom that a village community and a hand pump community share identical spatial boundaries (Ascher, 2007). The admission above is to clarify that the research team did not choose unusually large or unusual villages but rather avoided villages with complex and unclear boundaries. Despite the inter-village sharing of the pump, most villages enjoy a certain level of co-terminosty between the village boundaries and regular pump user catchment (emergencies and neighbors breakdowns not withstanding) (Blaikie, 2006). In most areas of Malawi the village densities are high but all attempts were made to satisfy these criteria in order to meet the ideals of a representative but 'well bounded case study' defined by Poteete *et al*. (2010).

Further discussion with the research assistants was used to cross reference the various responses and observations from these visits. It was then decided whether or not the village was a potential case study candidate, or perhaps whether more information was necessary before that decision could be confidently made.

In addition to using the field method outlined above, other villages were visited at random if the researchers saw a functional Afridev pump while *en route* to another shortlisted village. During visits, participants would also be asked if they knew of any villages in the area that had a working Afridev that they knew had functioned for a long

time under a community maintenance regime. This *snowball* method also provided opportunity to visit other potential research cases.

A significant amount of effort was put into locating case villages that the author could be sure as possible would meet the desired research requirements. This 'first phase' was conducted well into the research project timeline as once a case village was selected the work would begin there and then the next case study candidate village would need to be selected subsequent to that and so on, until five had been chosen. In total 61 villages were selected and visited, including the villages visited at random during the case selection and throughout the research process. Further to the process for visiting potential case-study villages these visits also gave the author and research team exposure to many villages where the hand pump had failed and remained non-functional. Villages with non- functional hand pumps were also visited later in the project in the areas where the case studies were undertaken. These visits helped the author gain comparative insights into the reasons for failure and helped shaped the research instruments during on-going in-field analysis.

The primary unit of analysis is each hand pump's social-catchment and each representative case village selected had a significant degree of overlap between the pump user catchment and the physical village boundary; this phenomenon of the pump being mainly used by 'the village' and partially by others being the norm. In the authors experience every hand pump encountered belonged to a particular village but would nonetheless draw users from outside that village with varying degrees of frequency. It is reasonable to treat the village and pump catchment as effectively equal units of analysis in this research. Within this main unit of analysis individual actors formed multiple embedded cases (Yin, 2009; Scholz & Tietje, 2002).

1.7.2 Overview of the Case Study Villages

. Each of the villages satisfied the requirements of being representative or 'typical' central Malawian villages. Most villages homes are made from mud-bricks or constructed in a wattle-and-daub style with mud over interlaced timber, with a roof of either thatch grass or corrugated tin sheets, depending on the owner's wealth. Floors are normally hardened clay and/or animal dung. Homes vary from one to normally two

or three room arrangements. Many homes have storage facilities made from the same materials or woven reeds or palm fronds. These are typically slightly raised to keep them off wet ground and are securely closed to stay out of reach of animals. It is predominantly maize, ground nuts and other dry crops that are stored in these. Some homes will also have livestock pens in close proximity. The photographs in Appendix 4 illustrate some of these village characteristics.

Typically homes are organized within a few meters of each other and often in family units. These family groupings may seem indistinct to an outsider or in some case they may be clearly separated by larger distances; their 'outbuildings' or gardens separating them from other homes. In some cases houses may be erected some distance from the village in closer proximity to the household's gardens or fields if those are situated at the periphery of the village boundary. Most villages have a distinct communal gathering area, often under a large tree. In addition to this there may be communal infrastructure such as a place of worship; these in the author's experience being quite rudimentary and often constructed from thatch or palm leaves.

In many cases in central Malawi villages are concentrated around seasonal wetlands known as *dambos*. These *dambos* provide easy access to shallow wells during the dry season and also proved a source of building clay. Dry season gardens are cultivated in these areas where there is sufficient soil moisture and a network of shallow wells where pails of water can be collected. Larger fields that contain maize, groundnuts, cassava or other crops are located upslope from the *dambos* and normally surround the village or in some cases surround groups of villages. These are actively cultivated in the rainy season which normally runs from about November to April.

A common feature in many of these areas are the obvious patches of indigenous forest dotted across the landscape (normally about .25-2ha in size). These almost always contain community cemeteries (often with distinct adult and child cemeteries). These sites also serve as *dambwe* or ceremonial locations and storage areas for props and costumes used in the prevalent *Nyau* traction. *Nyau* tradition is most commonly manifest in the *Gule Wamkulu* dances that are often seen at village ceremonies, funerals and other important events. The *Gule Wamkulu* has special cultural-religious

significance as a symbolic representation of the spirit world and is performed by men who have been initiated into the tradition. The practioners are believed to be spirits of the dead and they cannot communicate through language, expect that of their own. The tradition is shrouded in deep secrecy by those initiated into its ranks and is a significant part of life in much of Malawi.

A brief description of the five case study villages is as follows (a map of the locations of these five case study villages can be found in Appendix 3):

Chimphanga Village in Kwambirri Traditional Authority (a TA is a geographic jurisdiction smaller than a district which represent s a collective of village chiefs under a TA head) consisted of 28 occupied households with 137 residents. They maintained an Afridev pump on a borehole that was supplied in 1996. Chimphanga was situated west of Lake Malawi in a flat, dry landscape that starts just as the Rift Valley escarpment ends to the west. Chimphanga was the most 'isolated' village case in that their closest neighbours were approximately 300m away and others were a good deal further, separated by crops fields and groves of mango trees. The village had one other unprotected source of water in a hand dug well that was used for making bricks and watering gardens. There was dry river bed that experiences annual flows approximately 500m east of the village.

Kalonga Village in Mazengera TA area consisted of 78 occupied households with 296 residents and relied on one covered well and Afridev pump, both supplied in 1996. A second borehole and Afridev pump had been supplied in 1997 but the village had used parts from that pump to repair the current one. Vandals had dropped rocks into the pump casing, rendering that pump inoperable since 2000. Kalonga was located in the rocks hills near Nkhoma and had adjacent access to a small stream as well as *dambo* wells north and south of the village. They had adjacent neighbours immediately on their south eastern boundary, neighbours to their west approximately 200m away and no close neighbours to their north or east due to rocky kopjes (hills). Kalonga was located close to school and small trading post (within 1km).

Machilika Village in Chadza Tribal Authority (TA) area consisted of 30 occupied households with 147 residents and relied on a single borehole and Afridev pump supplied in 1996. Machilika was a 'compact' village with most homes in very close

proximity to each other. The southern boundary was bordered by a long narrow *dambo* that was flooded in the wetter months. Their neighboring village to the west adjoined their boundary and to the east and north was separated by crop fields. Neighbours to the south were located across the narrow *dambo*.

Mazinga Village in Chiseka TA area consisted on 50 occupied households with 287 residents. They used a single borehole and Afridev hand pump fitted in 1998. Mazinga was in a densely populated area close to a paved road near the trading center of Bunda. The village was surrounded by three neighbours who all used a very large *dambo* to the east and south for grazing and gardens. Dry crop fields were located to the east and east-north east that serviced all four villages.

Makumba Village in Jalasi TA on the Mozambique border maintained an Afridev pump on a borehole supplied in 2000. No survey was performed in this village due to time constraints. The village was surrounded by neighbours on all sides except the east due to their proximity to the international border where settlement is discouraged within a buffer distances from that border. Some crop fields were still within this buffer as were some *dambo* wells and gardens. Makumba was relatively spread out with some family units up to 300m away from the village center. The village also had a Mosque that was well constructed from mud bricks.

1.8 Data Collection

Case studies such as this lend themselves to using multiple methods (Creswell, 1995, Yin, 2009; Semu, 2011). This allows researchers the flexibility to adapt to changing situations within real life cases and augment the main methods with a suite of others. This multiple method approach suits the qualitative research presented as the researcher-as- instrument allowed the author and research assistants to triangulate and interpret findings from different methods concurrently (Stake, 2010).

1.8.1 Qualitative Data Collection Methods

Qualitative data formed the majority of the information that was collected during this research. Qualitative methods are the most appropriate when attempting to uncover

complex social relations and institutional nuance from a naturalistic approach within lived realities (Denzin and Lincon, 2005). One of the strengths of qualitative data collective by various methods *in situ* is that the information is grounded within the case study communities and reflects the institutions and relationships that are under enquiry in a natural setting (Huberman and Miles, 2002). These attributes also parse well with critical realism in that they help facilitate the researcher's *verstehen* by allowing the social contractedness (behavioral norms of responsibly and duty) of a physical entity (the hand pump) to be examined through the participants rich narratives (Stake, 2010).

A number of field methods were employed in the case study communities, often concurrently. These included:

- Participatory mapping
- Field observation
- Interviews
- Group Interviews

1.8.1.1 Participatory Mapping

Village mapping exercises such as those described by Kesby, Kindon & Pain (2005) and van der Riet (2008) were a valuable method for gaining insight into community and for opening dialog about community issues, including the hand pump, with the research team. Typically these exercises were held a few days after permission had been given by the chief for the team to enter the community and were announced days before the event in order to generate participation. In most cases only few village leaders would begin the exercises but by the end a much larger assembly was present. These mapping exercises formed a useful component of the sensitizing stage where the community could interact with the research team. The primary goals of the participatory mapping included:

- Learning where the village boundaries were in relation to the households and pump location.
- Distance to neighbors.
- Identify all the other water sources and their primary uses

- Identify other village landmarks including main areas of water use and 'water travel'.
- To create a feeling of comfort between the research team and the village.
- Begin dialogue about the village issues, water management and the hand pump.

On this last point van der Riet (2008) extolls the virtues of conscientizing a salient research issue through participatory mapping. The act of discussing village structures and phenomena through visual means and hands- on mapping helps break down not only barriers with outsiders but also initiates public debates about village life and can deliver insights sometime not elucidated through verbal means alone.

The village maps were made on bare ground typically in the center of the village or near the borehole and natural props such as sticks, leaves and stones were used to construct features. These were easily augmented or altered by participants and typically this process resulted in some lively discussion and negotiating. Once the ground map was complete the researcher would draw a facsimile on a sheet of paper under the guidance of community members while engaged in a to-and-fro questioning with the villagers who often found the exercise quite entertaining.

These exercises were useful in gauging a community and feeling helping the researcher in focusing some of their earlier questions and areas of observation.

1.8.1.2 Field Observation

Observations within the case villages were a constant and ongoing method for collecting information and reshaping the research instruments used in other methods. Despite observations often being considered an auxiliary qualitative method that compliments other primary methods, observation plays a vital role in collecting information and shaping research (Singleton and Straights, 2010). Observation allowed the researcher long periods of identifying both expected and unexpected village behaviors and the ability to use those observations to help shape interviews and encode village institutions. It also requires the researcher to be an active part of the village landscape which helped sensitize the communities to the author's presence, making him a familiar figure.

Nkonya (2008, pp81) also used observation in her work on water management institutions and states that it was an important tool to "…learn about their culture, gender roles, water use and adherence to water management institution's". In this research observation was particularly useful for the author who does not speak ChiChewa but was able to make observations about hand pump usage that could be interpreted later by participants, used to shape interview questions or could be used to check information taken from in field analysis (e.g. observations of peoples behaviors versus stated rules). Simply put, observation helps ascertain if people do what they say they do. While a single observation may not be generalizable or could easily be misinterpreted, the duration of the research periods of over three weeks in each case allowed the researcher ample opportunities for observation of the same spaces and participants; making possible a significant level of accuracy (Stake, 2010).

1.8.1.3 Key Informant Interviews

Semi-structured interviews with purposively sampled key informants and *snowball sampled* informants were the main methods used for gathering detailed information about hand pump collective action in the case villages. Key informants in the case villages were people who were active with hand pump managing, pump repair or in positions of leadership and respect and could offer valuable insights or specific answers into the local institutions around maintain the village pump (Bryman & Teevan, 2005; Warren and Karner, 2010).

The researchers used a *snowball* technique (Valentine, 2005) to locate subsequent interview participants. Interview participants would frequently, without prompting, mention other villagers who play key roles in leading and facilitating village cooperation around the pump, or who had been victims of community sanction for rule breaking. In addition, these informants could also provide the identities of local area pump mechanics, local government authorities or other external influences. The close nature of especially the smaller case villages meant that snowball sampling was more by process of default than discriminatory choice.

Interviews were carried out in the native ChiChewa language (in ChiChewa and ChiYawo in Makumba village) by two tertiary educated Malawian research assistants who were

intimately familiar with the semi-structured interviews and the objective of the research (Vincent Namukopwe held a BSc in Irrigation Engineering and Catherine Chisoni a Diploma in Business Administration). The author spent the first two weeks of the project familiarizing the assistants with the goals of the project and with interviewing techniques. Techniques and approaches for interviewing were an ongoing consideration through the project and during the in-field analysis sessions with the assistants. The author was present for approximately 30% of the interviews in order to monitor duration, progress and nature of the dialog being undertaken. The author was aware of as Howard (1994, 20) puts it the "…tendency for white Anglophones to be perceived as powerful and even superior" and to influence the interviews negatively. This was definitely true at times in Malawi, especially early in the research relationships in some cases when participants would interview strategically based on their perceived relationship with the new foreigner in their midst. For this reason the author frequently chose to allow the assistants to interview without direct supervision for hours at a time.

Interviews were conducted in the most comfortable and appropriate locations in order to make the participants feel as relaxed and un-intimidated as possible (Seidman, 2006; Kvale, 2007). Typically this was at the person's home or in a location that reflected a place where they frequently spent time, such as under a tree where they normally had their lunch breaks.

Table 1-1 illustrates the breakdown of the recorded interview count for each case village. Many discussions regarding village social life and hand pump management were conducted by the research team that were not recorded but were summarized in field notes. This is an expected phenomenon when a research teams spend a significant amount of time becoming familiar and more integrated into a community; not every discussion can be recorded.

Table 1-1. Recorded Interviews by village and gender

	Female		Male		
Village	**Individual**	**Group**	**Individual**	**Group**	**Total Recorded**
Machilika	11	2	5	1	19
Kalonga	8	2	2	1	13
Chimphanga	12	2	4	1	19
Makumba	3	0	1	2	6
Mazinga	10	1	2	0	13

1.8.1.4 Group Interviews

Instead of the traditional 'focus group', this research employed informal group interviews with naturally assembled groups. Within the cultural context of rural Malawian villages this has been found to be a more acceptable method that delivers valuable information (Summers, 2005; Gomm, 2008; Nkonya, 2008). As a collective, the participants in these groups were often socially comfortable and it was found that these group interviews often initiated lively debate amongst the participants over issues concerning the hand pump.

Typically these group interviews were with women (usually having three to eight participants) who were engaged in stationary work, like shelling peanuts, processing maize, eating etc. The female research assistant regularly pointed out that once she had initiated conversation about the pump she rarely need to prompt the participants much, as conservation ensued freely. The author would at times intervene and often participated in the work activities for short period of time, more as an 'ice breaker' which often resulted in much humor amongst the women. Men were also interviewed at times in pairs or threes as well.

In addition to the recorded interviews, group conversions with the research assistants were very common and the assistants would make notes of the key points discussed after each discussion, which they would present during in-field analysis sessions.

1.8.1.5 'Short Interview' Conversations

An important element of the field research was the short visits to the numerous villages not purposely shortlisted as described above. These visits were the result of random identification while in the field and also visits to villages neighboring or close to the case villages.

These visits were usually short, anywhere from 20-45 minutes, although some were considerably longer. Typically when the research team would approach the village or hand pump area the intrusion of outsiders would result in the village chief and/or other leaders coming to greet and investigate. Often the author and male assistant would talk with this main group while after a few minutes the female assistant would be able to converse with younger or less prominent women; often those who were at the pump upon arrival. She was able to do this without seeming to inappropriately by-pass the village leaders by leading anyone away for private, hidden conversation or entering homes. The small crowds that would gather would offer some privacy in the sense that the two sets of conversations would not be audible to each other.

Sometimes notes would be taken *in situ* but most often in an attempt to maintain a casual and unsuspicious tone the researchers would record key findings and admissions as notes after the visit while the author would conduct a short debrief. These findings were useful as a comparative base for the case villages and were very useful knowledge in shaping the progressive focus of the interview iterations in the case villages. The problems and constraints found in these other villages could be used to flesh out the differences between these examples and the case villages.

1.8.2 Quantitative Data Collection

The household survey was undertaken at the end of the field research period, after the completion of the qualitative research, before the final exit from each case village. The purpose of the survey was gather demographic data about each village as well and

descriptive statics concerning livelihoods, incomes, education levels and water usage frequency. Much of these data were triangulated with the qualitative data and used to provide further reference for the core qualitative findings (Singelton and Staits, 2010). The surveys were printed in ChiChewa to ensure that there were no translation inconsistencies between the research assistants. Details regarding the translation process is discussed later in section 1.9.2. The survey was administered to the household head or his or her spouse.

Enlightening insights were gained from this exercise. As highlighted by Bryman and Teevan (2005) the risk of such a survey was knowing whether or not the participants possessed the requisite knowledge to answer the questions (questions were reviewed for appropriateness by in-country partners). For certain questions, for example those pertaining to incomes, the participants were often unable to give accurate, or any, answers. Part of the strategy of administering the survey last was to rely on the rapport and trust built with the village communities. The initial 'strategic' responses that are often used with outsiders described earlier would plausibly have been very pronounced had this survey been undertaken early in the research tenure. It is quite feasible to argue that the quality of the data so-collected would have been very unreliable. Chambers (2008) makes a very strong argument regarding this. Drawing from experience in development research he believes that many survey type studies suffer from substantial systematic and investigator error, especially where cultural, political and language issues are common in developing areas.

The author was well aware of these risks and endeavored to avoid them as far as possible by ensuring appropriateness of the survey questions and trustworthiness in the research process. All survey data presented here are only those for which there are reliable measurements.

1.9 Research Process

The following is a description of the research logistics and how the fieldwork was conducted for the second phase of the research process which was that of the actual tenure within the each of the five case study villages. After case selection was

completed in phase one for each village and a decision was made on which village to focus on as a case, the research team would visit the village chief and ask permission to work with the village. Permission was never denied once the chief was made aware of the research and the author believes that the various chiefs felt happy to have had their village selected. The association of the researcher with Bunda College was likely a contributing factor. The author worked with faculty members at Bunda College as the in-country partners for this study and Bunda College is well known and respected for it agricultural work throughout rural Malawi. Figure 1-1 shows the basic structure followed during the research tenure in case village. Makumba was the exception where a shorter program was followed due to time constraints.

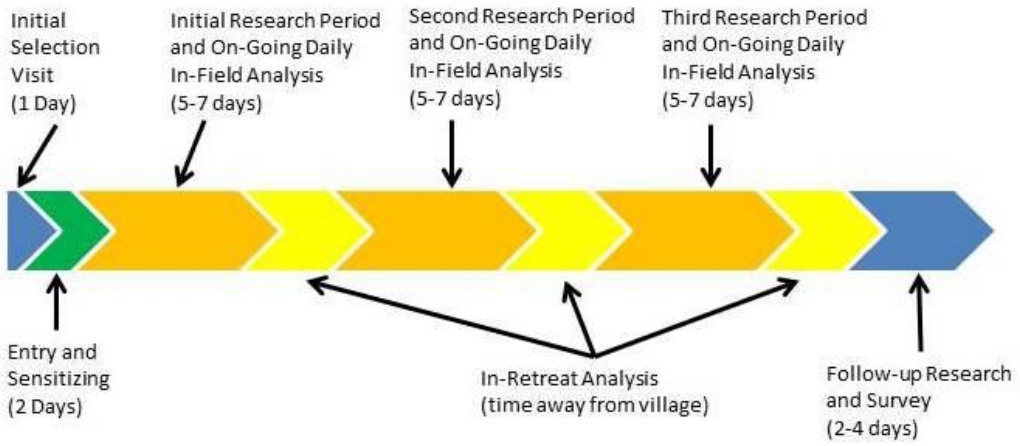

Figure 1-1. Field research process for each case village

1.9.1 Entry and Sensitizing

Once permission was granted, the return of the research team and start date was scheduled and the author asked the village chief to let community members know that there would be an informal meeting and village mapping exercise on that date. The return was normally shortly after the permission request, within two or three days. At this point it was normally organized with the chief if it would be possible for the research team to stay overnight in the village at a later date.

The start of the research tenure in each case signaled the beginning of a sensitizing period in which the research team would focus on simply 'visiting' with the village for

two days and becoming familiar with the community. The participatory mapping exercise was an important function of this process as it offered an opportunity for there to be dialog between the research team and the village. Trust building is a vital process in these kinds of participatory case studies (Rothe, 1993), especially with potentially vulnerable people. During this time no formal interviews were held and the research team was careful not to be overly intrusive around households, gatherings or property, unless invited. This included not overtly taking notes, photographs or anything else that may have made the village feel like they were being audited and tested.

To the author's knowledge the acceptance of the research team within the case villages was never an issue. The researchers quickly became well liked and welcomed in the case villages. In all of the five case villages, once the team had been present for a few days, there would often be casual gifts of food and invitations to join members for a discussion. The assistants were often seen deep in friendly conversion with village members. When briefed, they concurred that they had become friendly with many people. Upon the team's departure from the case villages it was expressed by many that they wished we would return soon. Both assistants had rural backgrounds, especially Vincent with his experience in agricultural studies. The author feels that their opinions about village acceptance were reliable.

A very important part of this sensitizing period was to emphasize that the researchers were in no way connected to the government or donors and were not there to either remove, nor provide boreholes and water pumps. It was found that this was crucially important as many participants initially thought that this was the purpose for the visit.

Having two Malawian assistants, male and female, and the clearly 'outsider' author allowed the team to adopt both an insider status when the just the assistants were present in interviews or staying over in the village, as well as the benefit of a trusted outsider (Clingerman, 2007; Butz, 2010).

1.9.2 Language

Language barriers presented a major potential for communication errors in the research. ChiChewa is the predominant *lingua franca* in most of the central Malawi and all research instruments needed to be translated into ChiChewa before field use.

The need to accurately and appropriately capture the essence and intent of the research questions, and ultimately the ability to receive rich responses, was taken seriously throughout the research project. Translation was undertaken with the help of three in-country partners – Dr. Kenneth Wiyo (Bunda College), Dr. Joyce Njoloma (Bunda College) and Dr. Henrie Njoloma (Green Belt Initiative). All three are internationally educated native ChiChewa speakers, fluent in English and with extensive experience in water related rural development research. Translation meetings were always held with the two research assistants present. Both assistants were fluent in English, native Chichewa speakers and both held English-medium tertiary qualifications.

Translation meetings were held prior to any field research, while the assistants were being trained, in order to ensure the appropriateness of the initial semi-structured interview guide. Subsequent interview questions in later iterations of research, as well as the final household survey, were also translated and thoroughly assessed with these partners. These meetings were vital in being able to choose the most suitable terminology that best reflected the authors research questions and to make sure that the experienced Malawian researchers could help prepare the assistants and author for common issues that arise during English-ChiChewa translation in this type of research.

During extended field visits the author would construct new context specific interview questions after daily in-field analysis meetings with the assistants and then typically assign translation duties to them on evenings before subsequent follow up the next day.

The assistants wrote all final observations and non-recorded discussion notes in English.

In Makumba village the community was native ChiYawo speakers but many could also communicate in Chichewa. Vincent Namukopwe is Yawo by tribal affiliation and could understand ChiYawo but not speak it with total fluency. To assist with potential

translation issues a local missionary with whom the author was liaising provided a trustworthy ChiChewa-ChiYawo translator that he had employed in the past.

1.9.3 Transcription

Transcription from the ChiChewa audio to English documents was undertaken in in Malawi by two transcribers who came recommended by Dr. Wiyo and Dr. H. Njoloma. The first transcriber had previously done research transcription for USAID in Malawi and the second had studied irrigation technology under Dr. Njoloma. Both were native ChiChewa speakers, tertiary educated and fluent in English. As a means to check the quality of the transcription the author chose four interviews (two different ones from each transcriber) to be cross-transcribed by the other. The results were perfectly satisfactory. As a further check the author had four transcriptions that were done by the second transcriber (who did the bulk of the transcribing) checked by another fluent ChiChewa-English speaker who came recommend by a local NGO. He reported that those transcriptions were accurate and complete.

1.10 Analysis

Analysis of these research data took place in two distinct phases and in two different ways. First was in-field, case based analysis where the researcher aimed to uncover and explain hand pump management institutions and the social arrangements around them within each case village. Second was post-field work cross-case analysis and coding where the researcher was analyzing information looking for replicated phenomena and institutional patterns across the case villages that, given the careful selection of 'typical village' cases, could offer insights into generalizability (Flyvberg, 2006).

1.10.1 Analysis Phase 1 – Progressive focusing and building explanation during field research

The naturalistic enquiry inherent to qualitative research and the explanation building method means that analysis during research is an ongoing process and necessary in order to build valid interpretations from the data collected in the field (Yin, 2009; Stake, 2010). The analysis throughout the research is an important characteristic of qualitative research as well as for the creation of trustworthy explanations of the phenomena of

social institutions under enquiry. Throughout this research in-field analysis was undertaken in two ways. First was daily research team debriefs where observations and field notes would be collated, compared and analyzed. The research assistants would be debriefed on their interviews and discussions with the case -village participants and answers to their interview questions. These daily analyses would help to modify questions for the interviews or formulate additional questions to be asked of community members.

In-retreat analysis encompassed the same process with the addition of interview transcriptions that were received from the transcribers at that point. These periods also allowed for a newer, evolved semi-structured interview questions to take shape (Siedman, 2006). The in-retreat analysis periods would also be used for peer debriefing, further debriefing with assistants and translation of new questions.

The process of re-shaping the interview questions through in-field analysis is known as 'progressive focusing' (Stake, 2010). The process involved abandoning those research questions that were unable to illicit responses that were satisfactory in testing the explanations that arose from each analysis, and helped to control the tendency to rely on presumptions about the phenomena under enquiry. This process formed part of *explanation building. Explanation building* is an iterative process used to determine why something happens. Yin (2009) describes the manner in which the researcher should entertain other rival or alternative explanations to test the explanations they arrive at after initial analysis. The point is to test these and show as far as possible how these cannot be supported. Key to this approach is to not stray too far from the initial guiding questions. The point of exploring alternative explanations was to test and verify ongoing research results throughout the process of in-field analysis.

Figure 1-2 shows graphically the iterative process of in-field analysis used to build explanation of the phenomena under enquiry. The process begins with the guiding questions and conceptual framework. With each iteration of research (meaning subsequent to analysis and debrief in this case) these questions and concepts are likely to change with the ensuing refocusing that produces more complex information and a greater depth of knowledge on the relationships and causes under enquiry. Once the

researcher and team had conducted in-field and in-retreat analysis it was determined from the strength of the data-convergence or theme-saturation whether or not the particular phenomenon or relationships under question could be reliably described and explained. If this was not possible it was then necessary to reevaluate the salience of that issue. If it was deemed worthy of further enquiry, for its potential to address research aims, then it would be approached again with different methods or instruments that may deliver new information. If it was deemed to be highly irrelevant to the research aims then that particular issue-for-enquiry was discarded.

If the convergence of data allowed for an issue or phenomenon to be reliably described then it was decided if an explanation of the relationship between the phenomena or actors could be trusted, or easily refuted. In the case where the explanation was not strong enough and could be refuted the use of *alternative plausible explanations* was used to strengthen the explanation. This allowed for the testing of different possible causes or relationships and for other potential explanations to challenge the researcher's assumptions about the results and interpretations (Yin, 2009). This technique is valuable for uncovering phenomena that would otherwise remain invisible to researchers. Many social phenomena are not easily identified or understood, especially those that occur in relational and informal institutions, such as those that are described here. The role of the alternative explanations is to test whether or not these rival explanations can be supported in subsequent iterations of research (through participant, research or method triangulation).

If an explanation is considered to be reasonably irrefutable within the scope of the research then this explanation can be used as a building block for subsequent iterations of research and as a means to develop richer explanations and more detailed causal links between phenomena and actors. In most cases for an explanation to have been considered irrefutable it was one that had been tested for *alternative plausible explanations.*

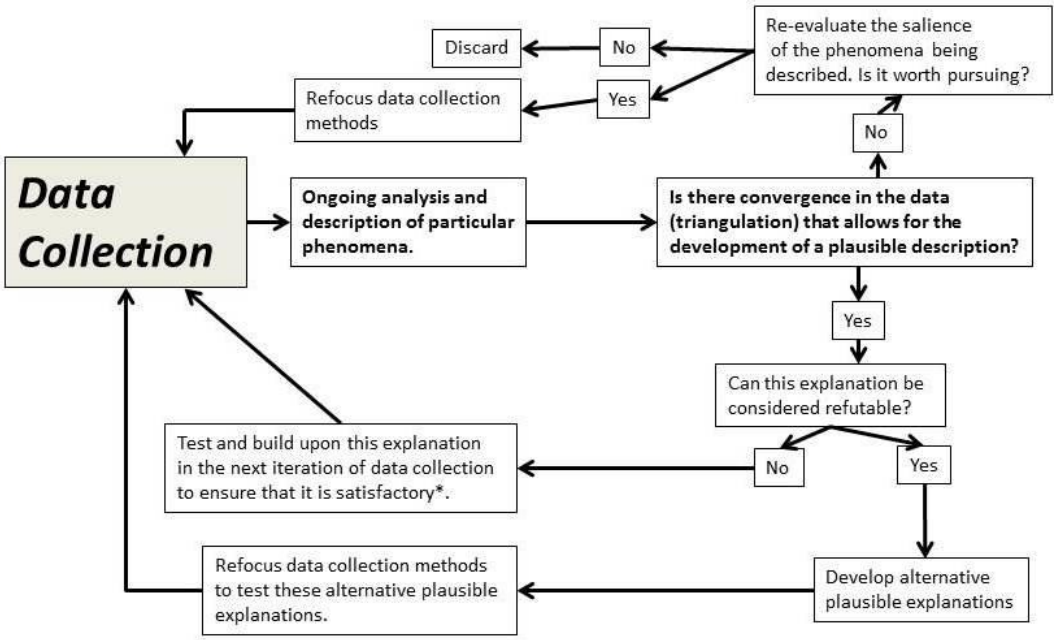

Figure 1-2. Schematic description for explanation building

1.10.2 Analysis Phase 2 – Coding and cross-case analysis

Post field work analysis first involved the *open-coding* of the transcriptions and field notes, using NVIVO software to assign thematic tags and labels in order to organize the data into useful categories (Bryman and Teevan, 2005). This type of *data reduction* coding is extremely useful in qualitative analysis as it allows the researcher to further conceptualize the data and begin to ask questions about relationships and causes –an extension of the explanation building process (Miles and Huberman, 1994). After the *open coding* the author began exploring deeper analysis and cross-case analysis for replicable phenomena. Continuing with the process of *explanation building* the author developed *axial-codes* that helped organize patterns and relationships across all of the cases that pointed to institutions of collective action (Yin, 2009; Corbin and Strauss, 1990). As part of this analysis themes and patterns that ran counter to the explanations were also sought as a means of verifying the trustworthiness of these interpretations (Longhurst, 2009). The act of cross case analysis also adds reliability and depth to the interpretation and inductive reasoning of qualitative analysis (Yin, 2009). Failing to undertake cross case analysis in research such as this there is a risk that weak data may

contribute disproportionally to explanations, that certain bias confirming yet limited responses may influence the researcher and that disconfirming explanations may be discarded (Eisenhardt, 2002).

1.10.3 Survey Analysis

Most of the survey questions were initially structured to provide *nominal* or *ordinal* measurements (Singleton and Straits, 2010). These questions simply retained their original coded during data entry to reflect these units. Certain questions were recoded into simpler and more useable numeric classes or into binominal options. Data were analyzed using SPSS software.

1.11 Research Validity

Validity can be understood as how well the research stands up to scrutiny (Bryman and Teevan, 2005). In qualitative research it can be challenging to determine if all accounts of a phenomenon, institutions or actions are equally credible. However a qualitative researcher can employ accepted methods for ensuring validity that lend credibility to qualitative interpretation and descriptions of social life (Huberman & Miles, 2002). Of these the various means for triangulation of data are considered vital for increasing rigor (Stake, 2010; Creswell, 1998).

1.11.1 Triangulation

Triangulation involves the cross referencing of information in three ways, all of which were undertaken in this research - firstly across the perspectives of multiple researchers, secondly through multiple methods and lastly through investigating multiple sources of information (Yin, 2009; Creswell, 1998). Triangulation methods lend credibility to the data as it ensures that the information captured is in fact observable by others (Guba and Lincoln, 1994). Locating similar findings at the intersection of triangulated approaches also validates the repeatability of these findings (Denzin and Lincoln, 2005). Neuman (1997) and Denzin (1978) describe the three approaches to triangulation: Source triangulation was used to corroborate findings across different research participants within each of the same cases. In this way important findings are more likely to be trustworthy. Method triangulation was through the use of multiple

methods such as the interviewing, group interviewing, observation and survey methods described in this chapter. Lastly, investigator triangulation is enabled by comparison of the results obtained by different investigators researching the same phenomenon, as was undertaken with the research team in Malawi.

1.11.2 Member checks

Member checks were frequently undertaken in the field when participants were asked to expand upon their previous explanations or re-interviewed about information they had provided in order to clarify certain details. Kesby *et al.* (2005) found that participants who were more involved in the research process through these kinds of checks were more likely to provide accurate and credible information.

The process of building explanations and progressive focusing in the field requires using current data and knowledge from ongoing analysis to re-focus the research instruments in subsequent iterations of the process (Yin, 2009; Stake 2010). This implies an automatic member check system where previously captured data are checked and used to build upon any existing explanations through re-enquiry with previously interviewed participants. Data is thus tested through member checks (and source triangulation) in subsequent iterations of research.

1.11.3 Peer Debriefing

Having knowledgeable peers review research findings can be invaluable for a researcher seeking to have their explanations and analysis confirmed or challenged (Stake, 2010). After building explanations from substantial in-field and in-retreat analysis the author sought review from credible peers who were external to the study but were familiar with the phenomena being explored. As recommended by Creswell and Miller (2000) this process was undertaken throughout the research period. Peer debriefing was sought from the author's supervisor, the in-country partners as well as professional development practitioners in Malawi

1.11.4 Truthfulness of the Research

The author ensured truthfulness by being deeply involved through all stages of the research planning, preparation, design, training of research assistants, field work, analysis and write –up. All efforts were made to adhere to the strictest standards of research conduct and all final decisions and approvals were those of the authors alone.

In keeping with the interpretive traditions of qualitative research (Creswell, 1998) the author endeavored to provide 'thick, rich' descriptions of the research data collected during extended field periods. This procedure, along with thorough recording of notes, transcriptions, images and surveys makes these research findings transferable and dependable (Bryman and Teevan, 2005).

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Chapter 2 - Formal and Informal Leadership in Collective Action for Water Supplies: evidence from five Malawian villages.

2.1 Introduction

The Millennium Development goal of halving the number of individuals who lack access to a safe and reliable source of water in the decade of 2005 to 2015 is of great significance to rural Africa. As the end of that period approaches, approximately 50-60% of rural Africans lack access to safe, reliable water sources; a problem being compounded by increasing water scarcity over much of the region (Brooks, 2002; van Koppen *et al*., 2007; Nkonya, 2008; Brown and Crawford, 2009). Improving water supply in many rural parts of Sub-Saharan Africa has long proven to be challenging, as rural domestic water projects have experienced high rates of infrastructural failure[2] (see Sugden, 2003; Harvey and Reed, 2006a and b; Skinner, 2009). Boreholes outfitted with hand pumps are one of the most predominant approaches to improving rural water supplies, and it is estimated that as many as half of these projects fail due to a lack of maintenance and repair (Harvey and Reed, 2006b; Skinner, 2009). The resulting outcome of this is the continued persistence of chronic health problems, underdevelopment, and poverty (Turton, 1999; Brooks, 2002; Nkonya, 2008; Brown and Crawford, 2009).

Pump breakdowns are an expected occurrence, and rural water supply projects are typically designed using the Village Level Operation and Maintenance (VLOM) approach where the rural user community is expected to assume responsibility for the maintenance of the hand pump. Since the 1980's VLOM has become the most common form of hand pump maintenance program amongst donors and governments (Araral, 2008); as is the case in Malawi (Ferguson and Mulwafu, 2004). The aim of VLOM has been to empower hand pump users to take ownership of their well and pump. The

[2] Failure is defined here as a complete abandonment of the newly developed water point for any reason. This is a blunt measure of failure, as many villages with successfully functioning pumps may have issues of exclusion or other factors affecting the effectiveness of the project in achieving required outcomes. This is addressed further later in the document.

approach has been touted as equitable, democratic and low cost. VLOM typically involves the external agency assisting or directing the community in setting up a formal water committee who provide leadership and authority for the managing the borehole and pump.

The widespread failure of water supply projects due to hand-pumps breaking down and not being repaired is partially the result of various challenges including the affordability and availability of spare parts and the lack of technical skills (Harvey and Reed, 2006a). However, even when these problems are addressed, many hand pumps remain in disrepair (Harvey, 2008). This has led to a call for attention away from solely providing hardware, to 'software' issues that address local village institutions and structures of cooperation around the common property water resources, such as hand pumps (Brooks, 2002; Sugden, 2003; Summers, 2005; Perret, 2006; Cleaver, 2007; IRC, 2009 and Engineers Without Borders, 2010).

Rural Malawi exemplifies the rural water problems faced in many areas of sub-Saharan Africa. The country has one of the highest population densities in Africa, with 85% of the thirteen million plus population being located in rural areas (Ministry of Irrigation and Water Development, 2008). Population growth is rapid at 2.4% (CIA, 2009). It is estimated that approximately 57% of the rural population has access to improved water sources (WaterAid, 2010) with 54% relying on boreholes (Ministry of Irrigation and Water Development, 2008). According to Ferguson and Mulwafu (2004) this coverage is reduced to as little as 32% due to infrastructure breakdown and Duti (2012) shows recent non-functionality rates at 40% for the country.

Presently the author knows of no in-depth, comprehensive research results that synthesize community collective action institutions with cases of village-level sustained 'Afridev' hand pump longevity and management in sub-Saharan Africa; despite the salience of this problem.

This paper presents findings from an investigation of villages in rural Malawi that was undertaken to better understand how some villages sustain their hand pumps for a long period of time in areas where pump breakdowns are usually long lasting and often

permanent. It explores the existing management structures that have evolved within the communities following the development of the borehole and specifically focuses upon the role of leadership, collective action, and social cooperation mechanisms in those structures.

2.2 Literature Review

2.2.1 Background on Leadership and Collective Action in Managing Common Pool Resource.

In her seminal work on collective action, Ostrom (1990) focused on small scale processes of collective action by natural resource using communities to overcome the 'Tragedy of the Commons' famously identified earlier by Hardin (1968). She demonstrated that through institutionalized processes of collective action, communities can effectively manage common pool resources. Subsequently, authors such as Agrawal (2001), Poteete and Ostrom, (2004), Meinzen-Dick, Raju and Gulati, (2002) and Cinner *et al*., (2009) have furthered this area of theory primarily through case study research on fisheries, irrigation, forested areas, and rangeland. Much of these efforts were centred upon formal institutions and more rigid frameworks of collective action (see Agrawal, 2001). Cleaver (2002) and Ostrom (2005) furthered collective action research to identify and understand institutional complexity and diversity beyond the frameworks or 'blueprint' approaches to collective action predictability. Cleaver (2012) has made further contributions to understanding the diversity and hybridity of institutions in rural water resource sharing communities and the institutional *bricolage* that occurs when local 'indigenous' institutions encounter the imposition of 'imported' institutions. Leadership, however, was not the focus of Cleaver's work, and as such her contributions to this are limited in nature.

A number of authors have investigated the role that leadership plays in collective action around common pool resources and club goods (Cai, 2002; Palmer, 2007; Earl, 2007; Hooper, Kaplan and Boone, 2010, Swilder, 2013). In most village situations, water pumps can be construed as a common pool resource and as such a focus on leaders who

act to motivate, monitor, sanction and mediate is critically important when researching successful collective action cases (Francisco, 2010).

It has been argued that the emergence of a natural –order social hierarchy under leaders is often inevitable and a structure preferable to most agents when groups exceed their capacity for leaderless collective action (Hooper *et al.*, 2010 and King, Johnson and van Vugt, 2009; van Vugt and de Cremer, 1999; Weede, 1985). 'Leadership' can be subject to wide interpretation and varying definitions. Earl (2007) argues that a leader can effectively be described as an actor who assumes 'leading tasks' and takes responsibility for key actions. She makes the case that the traditional definitions of leadership can seem less salient to those actors who occupy important social roles at certain times and for certain issues. This concept fits well with the findings from this research that will later address the emergence of village leaders around issues of hand pump maintenance. It is necessary as well to distinguish what is meant by a 'leader'. In this paper a leader is someone who is considered to be a legitimate leader by the majority; a leader is one who has earned his or her agency organically and who was not forced upon the community.

An organized distinction between legitimate leaders and followers can quite often pre-exist collective action (Lichbach, 1996) and collective action is quite often the product of effective leadership that emerges from the relational nature of community exchanges and opportunities that are present for some individuals (Baland and Platteau, 1996; Palmer, 2007; Ospina and Foldy, 2010). A problem for many leaderless cooperative groups is the cost associated with motivating, monitoring and sanctioning those involved in sharing a resource. These functions are widely held as essential for successful collective action around shared resources (Agrawal, 2001; Vedeld, 2000; Ostrom, 1990 and Ostrom, Gardner and Walker, 1994). Legitimate and accepted leaders can motivate cooperative behaviour, reduce individual costs to co-operators by assuming many of these costs and create similar pay off differences between members; thus their influence may be more important to collective action than their roles suggest (Bodin and Crona, 2011; Swidler, 2013). This is especially true when the payoff differences are small and the resource is vital, such as with water in this case (King *et al*,

2009). Someone has to legitimize collective action and what constitutes appropriate levels of cooperation (Cleaver, 2007). The day to day sense of social duty that is reinforced by a majority-accepted leader, or set of leaders, helps institutionalize these norms of cooperation.

It is important to note that members of a group do still need to make moral claims to each other and can cooperate in an altruistic fashion through non-hierarchical , moral reciprocity (Fehr, 2004; Panachanathan and Boyd, 2004). However, it is the strong incentive to free ride that is problematic for leaderless egalitarian groups (Lichbach, 1996; Hooper *et al.*, 2009). While mutual reciprocity likely evolves in a group before collective action, the selfish traits of certain rational actors are likely to contribute to some first –order free riding (non-cooperation) and second order free riding (co-operators who don't bear the costs of monitoring and sanctioning free riders). This means that for the group to cooperate certain actors will need to assume the role of motivating, monitoring and sanctioning in order to maintain any behavioural conventions that sustain the shared resource, such as the hand pump infrastructure. The costs of this may be high and Hooper *et al.* (2010) believe that in many groups a leader can reduce the likelihood that cooperation will fail and that in many cases a group may prefer to cooperate under the leader's supervision, especially when they have suffered due to previous collective action dilemmas (van Vugt and de Cremer, 1999). If leaders are held to be legitimate and accepted they can effectively mediate conflicts and serve as a focal point for legitimizing the enforcement of conduct and norms of cooperation amongst actors who can rely on the possibility of sanction by the leader(s) when their peers free-ride or defect from cooperating, and use these threats of sanction meaningfully (Baland and Platteau, 1996).

The incentive for leaders needs to be understood. Material incentives may be an attraction but are insufficient, especially where the group is poor and incentives would be small (Lichbach, 1996; Vedeld, 2000). For many leaders the reward is reputation, trust and reciprocity from other members (Fehr, 2004). These attributes help legitimize them as well liked and trustworthy leaders. Thus collective action can benefit from those who emerge as leaders through an increased agency or social endowment. They can often assume larger burdens and costs in maintenance and enforcement of

conventions and rules, for which they enjoy the rewards of prestige and respect and cultural capital (Vedeld, 2000; Swidler, 2013).

2.2.2 VLOM and Leadership Through Water Point Committees

Since in the 1980's the most practical approach for many governments and donors was to end their cost commitments for water supply projects once the initial project and start-up phase was complete (van Beers, 2006). The water development industry became largely centred on the VLOM concept, with this came the design and building of VLOM suitable pumps (Baumann and Furey, 2013). Most work in the 1980s and 1990s was focused upon the technical challenges of VLOM water points (Harvey and Reed, 2004, 2006b). However, as Bachelor, McKerney and Scott (DFID, 2000) point out, VLOM is better conceptualized as a social concept than a technical one and it is with this in mind that leadership should be seen as key social or demand side attribute.

An implicit assumption in the design of many VLOM projects is that recipient communities will immediately 'take ownership' of these pumps and this will instill a sense of communal responsibility to maintain and repair them (Harvey and Reed, 2006a). Most VLOM projects include a process of developing a formal leadership group to care for the new well and pump, usually through the development of a Water Point Committee (WPC) with established positions such as president, treasurer, one or more repair persons, and others. Typically, development agencies provide some level of guidance with regards to the establishment of the leadership committee (Colin, 1999). Elements such as gender balance, equity, and democracy are often required by the agency. Summers (2005) and Vollan (2011) identify these types of management structures as *imported* or *exogenous* management structures as they come into place under exogenous pressures. Past research into such committees has suggested that they often overlook, unwittingly erode or ignore pre-existing local institutions and customary laws that govern collective-action around water (van Koppen *et al*, 2007; Watkins, Swidler and Hannan, 2012). Although VLOM approaches, including the establishment of WPC's, have been the dominant approach water supply projects (Harvey and Reed, 2006) they unfortunately have not delivered the desired leadership

capacity or the effect of widespread village level pump maintenance (van Beers, 2006; Baumann and Furey, 2013).

Presently the author knows of no in-depth, comprehensive research efforts that synthesize community collective action institutions and leadership with cases of village-level sustained 'Afridev' hand pump longevity and management in sub-Saharan Africa; despite the salience of this problem. Specifically, this research builds upon existing literature in three areas; collective action literature, village water supply literature, and institutions and leadership literature. In addition to providing a unique case study for each (successful cases of borehole and pump management in post water supply project conditions), it makes specific contributions to each.

Van Vugt and De Cremer (1999) make the point that empirical studies highlighting leadership in social dilemmas, such as collective action, are rare outside of laboratory experiments and are hence imperative in this theoretical field. Ahlquist and Levi (2011) also identify a lack of literature that addresses the empirical emergence of endogenous leaders and this paper addresses that lack directly. This paper further builds upon the work of Cleaver (2002, 2012), Ostrom (2005) and Campbell (2010) that acknowledges the institutional diversity inherent to collective action in small rural communities'. These authors all uphold the notion that the institutions governing social interaction around shared resources are diverse, complex and often not easily identified. They argue that attempts to use institutions to analyze or understand these kinds of social arrangements must acknowledge the hybridity, non-formulaic evolution and complexity of collective action institutions beyond what appear to be obvious social structures. Leadership has been described as a critically important element embedded within these diverse collective action institutions (Zulu, 2008; Swidler, 2013). However, there is a dearth of research on the specific role of leadership in development and none that deal specifically with village hand pumps in water supply. Research in this area is also relatively nascent across collective action literature.

While Palmer (2007), Adhikari and Di Falco (2009) and Swidler (2103) have studied leadership in collective action, this paper provides a unique analysis in the focus on different levels of leadership and how these are embedded within collective action

institutions. It acknowledges explicit forms of 'formal' leadership as well the less obvious phenomenon of what will be described as 'informal' or 'entrepreneurial' leaders. It is these added layers of leadership that will be shown to be a vital additional element of collective action institutions for rural water supply. Furthermore, this paper responds to the recommendations made by Brooks, (2002) and Whittington *et al.* (2008) that water development research needs a more demand-side oriented approach that better understands local collective action. As such, this paper is an important contribution to literature and development practice, the later potentially benefiting from added clarity on how leadership and collective action many manifest in rural villages.

2.3 The Research Process

This research involved two phases: the first was a series of short visits in order to short-list villages as candidates for case studies. This took place in four Districts in Malawi including Lilongwe, Dedza, Salima and Mangochi. The geographic areas visited were determined using a combination of 2008 Government of Malawi survey data on borehole functionality, along with recommendations from partners at Bunda College of Agriculture. During this phase, unstructured interviews were undertaken with villagers to discuss the status of their current water points. These interviews were recorded by the making of notes during and after the interviews. Many villages indicated that they had pumps currently in disrepair or that their pumps had a history of extended disrepair. In each of these cases, basic information was collected regarding causes of breakdowns and the barriers to repair. In total 61 villages were visited during the research period.

The second and primary phase of the research was an intensive multi case study with five village level cases. This focused on villages that had maintained their donated hand pump, with no breakdowns longer than two weeks, for a period of at least 10 years. The villages did not have any exceptional demographic, geographic, or economic characteristics that would distinguish them from other villages in the surrounding areas. These villages were selected to investigate how or why they were able to overcome challenges that other villages had not overcome. They include the following which are introduced in more detail later in the paper: Machilika Village, Kalonga Village, Mazinga

Village, Makumba Village and Chimphanga Village. Each of the villages had experienced numerous pump repair events that they undertook themselves. In essence, these are all villages that have successfully operated and maintained their pumps at the village level, which is the key goal of a VLOM approach.

Multiple methods of data collection were employed including observation, a quantitative questionnaire, group interviews, and semi structured interviews with individuals and small groups, with the semi-structured interviews being the most extensive element. Interviews were conducted in the native ChiChewa language. Once a case study village had been selected, permission to undertake the research in the village was sought from the chief. An initial period of sensitizing was undertaken, where the researchers would simply spend the first few days in the village becoming familiar to the community, visiting and beginning to get a feel for the social structures and issues surrounding the hand pump management. Interviewing was undertaken both by *purposively sampling* and using the *snowball* method. Group interviews were typically conducted with naturally assembled groups, quite often women going about their daily activities, a method that can, and did, create favourable interviewing situations (Gomm, 2008; Nkonya, 2008).

Data collection and analysis involved an iterative process of progressive focussing (Gomm, 2008; Yin, 2008) over repeated visits to each village. This process allows interview questions to become more focussed on specific results and relevant topics as they emerge. Initial questions were fairly broad in their scope and were honed or changed with each iteration of interviewing, observation and community familiarity (Stake, 1995; Gomm, 2008; Singelton and Straits, 2010). The cumulative nature of this methodology served to illuminate findings and unexpected phenomena as discovered in the research, rather than forcing the research to conform to pre-figured theoretical assumptions that may be inappropriate (Merriam, 1998). After the initial sensitizing period the researchers would spend three, week long periods in each village, with each period separated by a week to three weeks. It was found that the process of multiple visits created a good relationship with village members in the cases. Villagers were most often very happy to welcome the researchers back to the village and a sense of friendship and trust was built between the researchers and a number of the villagers.

2.4 The Villages and Changing Management

A common theme found in the case villages was that WPC's were normally active shortly after their formation but their role typically became rapidly diminished to the point that they dissolved or were replaced by an informal group of water point leaders. A basic summary of changes in each the villages is discussed below with discussion and additional details provided in following sections.

Chimphanga Village in Kwambirri TA consisted of 28 occupied households and maintained an Afridev pump on a borehole that was supplied in 1996. In Chimphanga the water point committee was selected with the help of Save The Children in 1996. Due to member attrition a new one was selected by the village in 2003, as part of this process the active repairman at the time was replaced by two women in order to ensure gender empowerment. Despite being established by the village itself, the second formal water point committee ceased to function effectively not long after being formed. Soon after, a new self-started repairman became the *de facto* technician and borehole-chairman (he was never appointed formally). He along with two of the original committee members and a handful of other people had assumed the roles of water point leaders in the community. A number of women are active as informal leaders, especially concerning issues related to sanctioning non-contribution of repair funds. Women are especially effective at determining why some households do not contribute and at adjusting sanction responses appropriately. This system is supported by the village as they see these people as the natural choice due to their initiative and willingness to lead on this issue. Thus, the formal process has given way to an informal group of individuals who employ *ad hoc* measures in their management processes.

Kalonga Village in Mazengera TA area consisted of 78 occupied households and relied on one covered well and Afridev pump, both supplied in 1996. A second borehole and Afridev pump had been supplied in 1997 but the village had used parts from that pump to repair the current one. Vandals had dropped rocks into the pump casing, rendering that pump inoperable since 2000. In Kalonga two attempts at formal committees in

1996 and again in early 2010 both quickly dissolved and there was no WPC activity in the village. During the research tenure Government Health Surveillance Officers visited the village and recommended to them that they vote on a new WPC. Unlike the other villages where an assemblage of individuals have informally organized to fill the void left behind by the failure of the formal WPC's, in Kalonga, the repair work was largely the purview of the village chief and while contributions were collective, two different families have contributed disproportionally higher sums, motivated by a sense of civic and religious duty to clean water. Women play the least active role here in assisting with the pump maintenance but during research expressed keen interest in deeper involvement.

Machilika Village in Chadza Tribal Authority (TA) area consisted of 30 occupied households and relied on a single borehole and Afridev pump supplied in 1996. Machilika had a committee elected in with the installation of the pump in 1996. Current management and repair of the pump is undertaken by the chief and a core of volunteer leaders. Collective money contributions were good in this village and the act of collection, treasury, monitoring and repair were all undertaken by volunteers with the blessing of the chief – again the evolution of a loosely organized *de facto* WPC peopled by emergent informal leaders, legitimized by formal leadership and largely accepted by the community. These roles, other than repair, were all undertaken by elderly women.

Makumba Village in Jalasi TA area maintained an Afridev pump on a borehole supplied in 2000. Makumba was an exception to the others as they had retained a clearly defined WPC had been in existence since 2001 with formal elements such as regular meetings and identified positions. However, many of the initial committee approaches evolved quickly after the WPC was established, most notably the selection of members. WPC members were initially elected but the members changed over time to reflect those who wanted to take initiative and lead on this issue. This community also had other committees including ones for the mosque, school and forestry programs, initiated by missionaries. They had the benefit of this institutional history. This WPC is entirely responsible for the pump's management and maintenance. Some elderly women were active in matters concerning the pump, the younger women conspicuous by their absence on issue around the pump and borehole.

Mazinga Village in Chiseka TA area consisted of 50 occupied households. They used a single borehole and Afridev hand pump fitted in 1998. In Mazinga the first committee structure (1996-2007) was selected by the chief. This committee was able to keep the pump functional with help from a regional mechanic and individuals trained by donors. However this system had a high attrition of members as many volunteered for the WPC for status only and were not liked by the community or performed poorly. During this time a number of volunteers not formally part of the WPC also took initiative to help with repair and organising village cooperation. The Red Cross performed rehabilitation of pumps in nearby villages in 2008. Neighbouring villages almost immediately began to experience frequent breakdowns from pump parts they believe are highly inferior (a common complaint of recent imported parts). Mazinga refused the Red Cross rehabilitation offer after witnessing their neighbour's problems. At this point the village rallied to replace the formal WPC with the volunteers who were well liked and had already been volunteering their time and who took initiative on the borehole and pump management issues. Respondents reported greater satisfaction with this more locally evolved WPC.

2.5 The Local Evolution of Water Point Management and the Emergence of Leaders

2.5.1 The Demise of the Water Point Committee as Established

In each of the villages in the study, a formal Water Point Committee was established during the initial water project that provided the boreholes and pumps to the village. In most cases it appears as though some form of democratic or consensus based approach to selecting the committee was employed. A level of gender balance was apparently sought in each of the cases; however, in keeping with the traditional divisions of labour in the communities, those trained to be pump repairmen were all male except the two female candidates in Chimphanga.

As can be seen above, the formal functioning of the water point committees quickly faded in each of the villages following the water projects. Prescribed processes such as holding WPC meetings, the electing of members, the regular collecting of fees, and

scheduled maintenance were either abandoned or altered to reflect community practices which were typically much more informal and *ad hoc* in nature.

In most cases, there was a high level of attrition of committee members and of pump repair technicians. Across all five cases, respondents identified problems with the selection of committee members and the initial pump technicians. When boreholes and hand pumps are provided to villages the intervening donors often provide subsequent maintenance and repair training, a privilege that often includes trips to nearby towns and accompanying allowances. In four of the cases participants told of how those selected fell into conflict with the village regarding their role or simply were never interested or very good at repair work. Many suggested that both committee members and pump repair technicians were often more interested in the entitlement that came with the position, or nominated by those who saw indirect benefit to a family member or friend with status. This is supported Watkins *et al.* (2012) and Watkins and Swidler (2012) who state that those most likely to work or train with NGO's may be the 'project bards' attracted by short term status of perceived gains. The ideals of village level training often deliver uncertain results.

An example of this issue of privilege or perceived status related to such appointments is also highlighted by Zulu (2008) in a study on community forestry projects in Malawi. He explains that "...training allowance and meals had become the epitome of committee privilege, a major source of community envy and resentment, and exceptionally divisive. This was invoked as a recurrent rejoinder to committee calls to collective forest work: 'you ate the chicken alone, so tend the forest alone'" (pg 698). Many villagers in the study suggested that this notion of privilege or opportunism drove the selection of pump repairmen or WPC members in the process and that often those most concerned about water supplies were initially left out.

2.5.2 The rise of new Leaders and Stewards: Institutional Entrepreneurs, Asymmetric Agency and Endogenously Evolved WPC's

Despite the short term duration of the WPCs in their prescribed form, active forms of leadership and stewardship were present in each of the villages. Respondents would often refer to a particular person or group of people who were dominant agents in the

maintenance of the hand pump. With the demise of the WPC, certain individuals escalated their cooperation and willingness to contribute to the hand pump through monetary, labour or institutional contributions such as monitoring and motivating others to cooperate. In each of the villages these included a mix of individuals, some of whom were members of the official WPC that had been established, and others who were not. These *water point leaders* were social entrepreneurs who assumed key roles such as learning technical repair skills and donating their time and labour often without formal training or prior encouragement.

In four of the cases, the procedural requirement of re-electing new WPC members at certain intervals was replaced by a process of simply retaining some existing members who were well liked and considered effective by the village. These members were most often described as being as able to ensure a threshold of cooperation in the village and set an example of cooperative conduct. The importance of their role in the communities was evident with many respondents praising them and indicating how critical they were to maintaining the water point. One example from Mazinga Village had a male respondent lamenting the loss of two such informal leaders who became skilled at pump repairs:

> "Honestly there are two people that we miss because they were hard working people, who made sure that problems were quickly fixed if there were any."

A female from Mazinga Village: made a similar comment:

> "Therefore the hard working people will always volunteer themselves to do work because they don't want one lazy person to destroy the group".

A female respondent from Kalonga described how a volunteer leader motivates other women, in a village that lacks robust formal intuitions, like a WPC:

> "But I'm really impressed with one elderly woman called [village member] who always tries hard to keep the place clean. She would

> always come with broom to sweep and that's when some of us join her to help".

A male respondent describing the past village repairman, a person unanimously admired by Machilika Village:

> "Mr. [village member], he was one of the village members and he worked as if the borehole was his own...he did not attend any training only that he showed more interest to learn when we were repairing the borehole and that's how he came to know how repair the borehole".

In all five cases, post-training pump and well repairs were subsequently wholly or partly undertaken by entrepreneurial leaders who learned from watching the trainee's early attempts, and saw an opportunity to fill the void when the trainees left or ceased their duties.

These findings are reflective of the literature on common pool resources and leadership. It is quite common for natural or traditional leaders to emerge during times of social disequilibrium (Lichbach, 1996; van Vrugt and de Cremer, 1999; Lichtenstein and Plowman, 2009). The notion of 'disequilibrium' or institutional uncertainty described by Lichtenstein and Plowman (2009) can be found in the village cases. Events such as the provision of a new borehole and hand pump, the departure of a person, or people, with the best repair skills, changes in formal leadership and cooperation conflicts over different issues within the village can all be manifest states of disequilibrium due to a void of leadership. This too was a common theme reiterated during interviews when respondents would explain how during a difficult time someone would take action and encourage cooperation by rallying others or taking the lead in pump maintenance activities. The theme of filling the leadership void left by others was commonly presented during interviews with those who had adopted such roles.

For example the most skilled pump technician in Chimphanga Village was not one who received skills training from an NGO, he learned repair by watching the trainees. At a time when the initial trained repair technicians were unable to complete a repair and

abandoned their positions, in part due to conflict between them, he stepped in to fill the void as he explains here:

> "A certain group of people had the privilege of attending a training course which was organized by Save the Children... when they started working I would go there and watch, I watched for almost one week and at one time when it broke again I thought that it is not possible that I can fail to fix this borehole. I tried to dismantle it, put back the rods and it finally worked".

In another example an elderly women in Machilika Village often assumed the role of 'pump warden' as her duty, especially when non-contributors were continuing to fetch water after the chief had called for maintenance contributions:

> "Indeed I volunteered. What I used to do is to sit right here and ask anyone who passed carrying their buckets to draw water to pay money as contribution to fix the borehole. If anyone did not pay their contributions, I would simply ask them to leave their buckets and go back to collect the money. I collected the money like I was the chairman yet I wasn't... the main problem was that there was no chairman to take leading roles and because I volunteered I found it very difficult when it came to contributions, but what I did was to inform the village headman that I was collecting money for repairs of borehole."

Despite the abandonment of the WPC in the form developed during the water supply project, the concept and terminology of 'the committee' was at least partially retained in all of the villages. Those identified as stewards of the water point were frequently identified as being part of the WPC, with the most active individual or individuals often being identified as the chairperson of the committee. These 'committees' can be considered to be locally evolved or 'endogenous' to the communities and are built upon and work through existing social and formal institutions. They have a fuzzy membership which is determined both by self-identification as well as the important recognition by others and they employ diverse and changing approaches to decision making, rule and norm enforcement, the collection of funds, and repair processes. These endogenous

water point committees very much fit into the description that Cleaver (2002; 2012) offers as being a *bricolage* of institutions and processes taken from existing social and formal institutions as well as some of the mechanisms borrowed from the original WPC approach. In some cases, such as in Makumba village, the endogenous WPCs adopted a number of the processes from the original approach such as holding meetings and voting, whereas in others such as Machilika, and Kalonga, they had abandoned most of the practices and developed alternative approaches.

2.5.3 The Motivation and Characteristics of Leaders

When discussing their motivations, water point leaders most often felt compelled to this form of leadership through a sense of obligation. Motivation was sometimes offered simply, without elaborate reason, such as by this elderly woman in Machilika who was very active in issues around the pump

> "Q: You mentioned earlier that you volunteered to take care of the borehole"
>
> "A: Of course we do look after it because we stay close and we are obligated"

Others felt a sense of civic duty inspired by religion or knowledge about the benefits of clean water such as this woman in Kalonga who explained why she and her husband were always willing to contribute credit to the pump repair fund during breakdowns, in order to ensure immediate repair

> "Q: Were you doing it for the love of people or by realizing that water is good?"
>
> A: We know that water is good and water is life. That time it was during rainy season so we felt that it will not be good to drink water from the well as it contains a lot of rubbish. When a problem arises in this village we will help. God's child doesn't get tired in helping."

In discussing the evolutions of social entrepreneurs, King *et al*. (2009) offer that those with the most knowledge about an issue (such as the risks of water borne pathogens in

this case) often emerge as leaders, motivated by civic duties. Arguably, they may also have been responding to the incentive offered by social standing, prestige or possibly future material reward (for those who possess repair skills, the prospect of hiring themselves out as pump repair technicians). Material and pecuniary incentives are often key drivers for leaders but so are more abstract imperatives, such as social positions and hierarchical arrangements (Lichbach, 1996).

In discussing such individuals, interview respondents often indicated that they were individuals with a strong sense of community and were 'hard workers'; they possessed a keener interest in collective action that others, a phenomenon highlighted by Hooper *et al* (2010). They also identified others who were non-contributors and suggested that some people are 'just born difficult' or that some community members were just 'naturally uncooperative'. For example when asked what kind of people they respect as water pump stewards who can help the village to cooperate this woman from Mazinga replied that:

> "The hard working people will always volunteer themselves to do work because they don't want one lazy person to destroy the group"

This man from Makumba described the traits of someone who can be respected and will be able to influence others:

> "People were being chosen into various positions based on their character to command issues and get things done. The idea is to get the borehole protected".

Respondents also held a strong sense of relationship with their leaders, such as this woman from Machilika, referring to the past volunteer repairman who always turned down offers for material rewards:

> "He was just working as a volunteer since he was one of the sons of this village."

Ernstson (2011) identifies the value that this type of community solidarity with these leaders plays in institutionalizing collective action through serving as role models.

The important part of this observation is that these people have the capacity to drive cooperation and rally support for community pump-care efforts. The capacity to motivate might be through water point leaders' ability to take charge or through a physical capacity to repair pumps and assume leadership though offering their relatively scarce skills, examples of which were clearly identified in three of the case villages. This form of motivation helps instil a sense of duty or obligation into other actors through the examples set by these 'institutional entrepreneurs' who are seen as trustworthy or valuable by those around them (Bodin and Crona, 2011). Cooperation around leaders can be initiated by only a few people with valuable skills or abilities (King *et al.*, 2009). Cleaver (2007) argues that the acceptance of leaders who have the capacity to influence people – in other words the institutionalizing of these favourable hierarchies – has a strong positive outcome on successful collective action. This is echoed by Vedeld (2000) who shows that collective action can be enhanced by local elites or entrepreneurs with the capacity to assist through influence, or materially, like the wealthier household who feel compelled to assist the village repair fund. 'Transformational' leaders that have a relationship with their community often have the capacity to motivate and influence their peers (Dumay and Galand, 2012). Traditional 'transactional' or *laissez faire* leaders who occupy more symbolic hierarchical rather than relational leadership roles possess less motivational capacity than aspiring leaders who emerge from the ranks of their peers (Webb, 2007).

2.6 Sources of Authority

While individuals were often self-motivated to adopt roles as Water Point (WP) leaders, they found support and authority in many ways. The key sources of authority identified are discussed below.

2.6.1 Support from Formal Authority (Chief)

Lichtenstein and Plowman (2009) note that support from formal leadership can enhance the emergence of informal leaders as well as underwrite the norms of conduct and cooperation in the village, preventing inconsistency or personal quarrels in the monitoring, daily behaviour and sanctioning of village members. Village Chiefs can

foster the growth of informal leaders because they often retain traditional legitimacy. In this way they play a key part in producing collective action (Swidler, 2013) but, as theorized here, not the whole part as the 'informal' leaders carry much of this capacity. In four of the five cases formal leaders played an important supporting role for WP leaders. In some cases individuals noted that they were empowered because they knew the Village Chief would support them. For example a man in Mazinga who volunteers to collect pump repair donations explained how the authority of the chief enables them to confront non-contributors without fear:

> "They simply want to argue with the people who come to them to collect the money as if they are going to use the money in their home. And that time that's when you need to be strong as a leader otherwise you fail your job. Even when we were taking up these positions the chief advised us to be strong minded".

In this regard Swidler (2013, pg 327) writes that "The chief recirculates the collective capacity for creating collective goods partly by recirculating status or honour"; in this case the status and social licence of the informal WP leaders. Reciprocally, community members may draw from this commitment and feel obliged to cooperate with the WP leaders because of these identity ties (Ernstson, 2011). By way of example these female respondents from Kalonga employ the value of the actions and authority of a well-liked chief to support their appeals to rule adherence during hand pump conflicts. In a case where certain parents allowed their children to play on the pump, despite a rule against it, the warnings and admonishing to the contrary by other community members were used on the basis that these were the will of the chief and his people. Ignoring the accepted will of the chief was seen as a serious offense:

> "Now if people can underrate rules enforced by the chief and the Health Surveillance Assistance, who are we the ordinary people...unless we were authorized by the chief himself, otherwise it's not for us just to implement the rules the way we want".

The chief's influence was also felt through the hierarchy of formal support for the work of the WP leaders in most of the villages. If water point users contravened the efforts of

the WP leaders, they could face formal sanction by the chief. This point was highlighted by a female participant in Kalonga village when discussing what happens when rule breakers don't listen to other community members:

> "This borehole does not just serve one person, but serves all of us so we know that when the chief talks to the rule breakers it carries more weight."

An often mentioned problem was the fear of guilt people may have in reporting breakdowns if they were the last and potentially responsible user at the pump. The security of a consistent 'due process' in evaluating a broken pump undertaken by the leaders, can ensure that members are more willing to report breakages and contribute to effective management of the pump, rather than fear retribution for mishandling or breaking the pump. A female participant from Kalonga believed this to be reassuring when needing to report any defects she found while using the pump:

> "Yes, such comments [about being guilty of breaking the pump] are always made but we always get protection from the chief who says that there is no way you can leave the whole responsibility to one person".

In only one village, Machilika, was there seemingly less influence by the chief as a support behind the WP leaders. The chief, while well liked had less effect on pump management and the endogenous WPC was not as active as the other cases but this did not lessen the belief in the importance of leadership, as explained by this female participant:

> "It is difficult for things to work if you are in a group and certainly we need leaders for things to move".

Kalonga also lacked a WPC that was as active as the other cases and also exhibited the lowest rate of participation in collective action across the village when compared to the others. However, the chief of Kalonga was dedicated to serving the community as he felt it his duty as the leader of the village, as he explains:

"This is so because people chose me to be their leader so they believe that I can help them in anything. That's why if there is any problem I try my best to be there and fix it."

2.6.2 Social Contract with WP Leaders

In each of the communities, WP leaders also drew authority for their actions through an informal social contract whereby others ceded authority to them and deferred to them because they were willing to undertake the role and its associated costs. The desire for others to take on a leadership role was emphasized by participants. In Machilika village, this woman noted that:

"It's good to have someone to listen to such that when they say let's clean the borehole people will do it".

Similarly this woman from Chimphanga Village explains:

"Q: Are you saying that the people in the village cannot manage the borehole individually?"

"A: They cannot manage without a leader"

This man from Mazinga also expressing the same sentiment

"Q: Are you saying that without these people (informal committee/stewards) things would not work"

A: No, because in every set up we need a leader, that's why."

Essentially these leadership phenomena were part of a hierarchy structure, sometimes the evolution of a formal structure like a WPC introduced by a development Non-Governmental Organizations (NGO's) or part of the day to day social hierarchy that emerges from differing authority, status and agency capacities of individual members (Cleaver 2007). Summers (2005), in a study of management systems for traditional water points found similar forms of governance in communities that had not been involved in a water supply project. This suggests that the phenomenon of water point leaders is not specifically derived from the VLOM process and the establishment of the

initial WPC. With that noted, given the adoption of the WPC terminology by the villagers, it does appear that the process of establishing the WPC initially may have re-enforced the concept of the social contract between water point users and water point leaders.

2.6.3 Moral Norms: 'Water is for Everyone'

In addition to drawing authority from the formal village leadership, many of the WP leaders drew upon existing moral norms as a source of authority for their actions. This was further borne out empirically during research where participants would often remind each other that 'safe water was for everyone, not just the benefit of a few'. This mantra was reiterated frequently by water point leaders who added weight to the value of this phrase when used by villagers as a moral appeal to each other to cooperate and contribute to pump management.

For example, this woman in Chimphanga village sees justification in cooperative group maintenance of the pump site based on the value of clean water:

> "He is the one in charge and is also the 'chairman'. He makes sure that the duties are done accordingly; he organizes women to work on specific days starting from Monday to Sunday, as some say water is life we need to take care of it".

Related to this were social norms around the concept of 'Development' and 'Progress'. In discussion, individuals who did not contribute to maintaining a pump or who were seen as unreasonably opposed to cooperation were often singled out. The respondents typically identified them as being 'against development' and used this label in a pejorative manner. The notion of 'development' carried strong currency as a social good and to be seen as 'against development' labelled one as nonconformist or anti-social within a small village. In Machilika this woman described the small group of free riders who opposed communal pump maintenance efforts:

> "We take them as pompous, and people who don't want development".

These cultural precepts served to single out free riders and were useful village level appeals that stewards could use to emphasise the importance of communal efforts or to leverage motivation or moral duty for collective action around the village hand pump.

2.7 Discussion

The emergence of WP leaders who help sustain hand pumps and can enhance collective action aligns well with the understanding of institutional complexity proposed by Cleaver (2002; 2007) and Ostrom (2005). Cleaver argues that institutionalizing behaviour and norms that sustain a shared resource is borne more from a suite of cultural, environmental and pre-existing institutions than it is by an explicit and mechanical set of rules or often superficial social structures. This appears to be what has happened in these cases. An example of this was WPC dissolution/evolution. The WPC can be effective in some cases but in the case study examples where it dissolved significantly or completely, the organic evolution of WP leaders often supplants the leadership that was intended by the formal WPC. Cooperative communal behaviours are the product of a 'knot' of social norms that are lived and negotiated day to day. Part of this contextual nature is that within natural social hierarchies certain actors will be able to act more easily and expand their agency. The social complexity of even small communities allows some actors to emerge as leaders within an agency-hierarchy. The emergence of these leaders can be very effective in common pool resource outcomes (van Vugt and de Cremer, 1999; Zulu, 2008)

While democracy and transparency in process was evident to differing degrees in each case the over-riding theme was that the means of maintaining these hand pumps was not a purely egalitarian form of collective cooperation. Different actors held varying capacity for exerting their agency and a leadership hierarchy evolved in each case that helped ensure that institutions around hand pump conduct and maintenance could be sustained and enforced. Certain individuals also simply have a disproportionally higher interest in collective action and group cooperation (Hooper *et al.,* 2010).

The value of leadership in collective action in Malawian examples is echoed by both Zulu (2008) and Swidler (2013). In his work of community managed forests in Malawi, Zulu

found that the greatest successes in community managed forests were as a result of good leadership, not necessarily due to the strict adherence of rules or project design principles. Even in cases where village committee's possessed significant technical know-how, Zulu found communities still showed failure in forest management when leadership was poor. This is true too when considering village hand pumps. Field visits to over 20 villages with non-functioning hand pumps revealed that there was, in many cases, enough technical knowhow in the community to maintain the pumps but that the motivation, encouragement or financial cooperation was lacking. In a number of cases participants in villages with inactive hand pumps explained that 'no-one has done anything', 'we are waiting for direction from the chief or committee' or 'the person who was helping us [pump repair person] has left'.

The critique of expecting collective action from adherence to superficial rules and top down institutional design is highlighted by Cleaver (1998), Leach, Mearns and Scoones (1999), Meinzen-Dick *et al.*, 2004, Cleaver (2007) and Palmer (2007). The fact that successful collective action conventions emerge organically from a combination of different pre-existing social institutions and are the product of day-to-day social exchanges (Cleaver, 2002) parses well with the emergence of entrepreneurial leaders in the case study villages. The emergence of leaders was not necessarily only due to prior planning or training, but due to village contexts that enhanced the agency of these entrepreneurial characters. The factors encouraging emergence were through other leader's facilitation and ideological support as well as solidarity from the community for WP leader's moral claims and the physical efforts of followers (see Vedeld, 2000).

The above critique is not to imply that all crafted institutions – such as committee structures or skills training introduced by NGO's- are malappropriate. At times these actions allow certain individuals to find their niche as leaders and motivators due to the disruption of existing patterns that opens opportunities, or allow entrepreneurial leaders to amplify their agency, enabled by those higher up in the community hierarchy (Lichtenstein and Plowman, 2011). It is, however, important to recognize that these external structuring actions may impede effective leadership and retard collective action around the shared hand pump.

The benefit of locally evolving leadership is that it avoids the 'steady state' imposed by many design principles and allows effective and contextually suited leadership to emerge from the institutional dynamism that typifies social relations around a shared resource (Leach *et al.* 1999). Collective action and leaders who enhance cooperation are less likely to emerge when strict processes restrain a small community from choosing and supporting their leaders through tacit day to day interactions, and when leaders are not as committed to their communities as those who share an ideological tie with their followers (van Vrugt and de Cremer, 1999).

Followers are also more likely to support leaders where they perceive them to be effective at mitigating collective issues and where they can elevate them to positions of leadership through ongoing, consensual and incremental support (Kopelman, Weber and Messick, 2002; Swidler, 2013). This is best manifest in the research cases when WPC's shrugged off many of their initial rules and evolved into leadership structures that negotiated rules *in situ*.

These simple, appropriate WPC structures evolved into habitual and practical institutions because of effective leaders (Cleaver, 2007), not necessarily because they had strictly adhered to and non-negotiable rules. Often times these appointments were contrary to any prior WPC constitutions regarding democratic process but the trusted and respected leadership had emerged and the reciprocated identification between leaders and followers resulted in an effective leadership institution. These individuals also remained in the WPC because they were committed to their duties, and this commitment earned trust and respect, legitimizing them in the eyes of the other villagers. The presence of these kind of 'imaginative leaders' also contributes to conflict mitigation (Stephenson, 2010) and a communities likelihood of being able to build resilience and remain adaptive (Berkes and Ross, 2013).

A benefit of the relationship between leaders and followers that stems from the cooperation in rallying around a respected leader and using their currency to underwrite normative conduct is that this form of cooperation coalesces into social conventions. These social norms are themselves a common good and can enhance collective action or influence other forms of collective action within the community. Once a convention is

learned it may serve as the framework for other cooperative contexts (Sabia, 1988; Lichbach, 1996). Ostrom (2005) considers the existence of other cooperative institutions in a community to be a good predictor of further collective action.

Important considerations' in the promotion of leadership as a catalyst for collective action are the criticisms against leadership and hierarchy as potentially unaccountable and inequitable. While the hand pumps in 'successful' cases may be called successful in an outcome based evaluations, the process under the social hierarchy may be criticized as the product of social inequality. Community based management or development interventions have often been touted as being socially equitable and empowering. However, the notion of egalitarian participation in collective action has been widely criticised as rhetorical and often unrealistic (Botes and van Rensburg, 2000; Kellert, Mehta, Ebbin & Lichtenfeld, 2000; see Cooke and Kothari, 2001). Cleaver (2007) reminds that institutions for managing a shared resource are not always equitable. Some actors naturally self-discipline and accept an order of inequality, especially where the benefits remain higher than an alternative leaderless state where the individual costs of ensuring cooperation from their peers or assuming the role of punishing defectors from cooperation, would be higher (Hooper *et al.*, 2010). "Not only can a single individual promote high levels of cooperation, but when punishment [or at least the underwriting of co-monitoring] is restricted to a leader, all individuals do better because fewer group-mates suffer the costs of administering punishment" (King *et al.*, 2009, pg914). An example of this would be the provision of information by leaders that reduce monitoring costs and incidence of free riding (Hooper *et al.*, 2010). In Chimphanga, Makumba and Mazinga case study villages this would take the form of village meetings where, after a grace period for contributions, village leaders would read the names of those who had contributed the required funds to the pump repair account. This information would allow villagers to monitor those who hadn't paid and either coerce them to pay or offer assistance in their private daily interactions. An important corollary to this is that in order for the leadership to remain legitimate on this issue they needed to be viewed as accountable for the village funds and committed to the village's interests.

Leadership maintains a state of 'favourable inequality' for followers because of the material benefits the followers receive from the hierarchical cooperation (reliable clean

water in this case) and the ideological commitments to the people who help achieve this. Leaders are held accountable and accepted because they are seen as trustworthy and legitimate, a fundamental trait in order for leadership to drive collective action (Bodin and Crona, 2011). Hierarchical structures can influence accountability (Lichbach, 1996) in that leaders require support in order to abate the personal costs they incur from their actions. As such, legitimate leaders need to refrain from rent –seeking or other unpopular behaviors in order to enjoy these benefits of trust and respect that are the rewards of their personal costs (Swidler, 2013). If these leaders were unliked and distrusted it is likely that their followers would dissent and collective cooperation would diminish, resulting in non-working hand pumps. A common problem with monetary donations in some villages is the belief that leaders 'eat the money', in other words misappropriate the funds for personal use. In four of the case villages the members would see short term gains from their expenditure, such as material acquisitions like spare parts kept by a repair person. More frequent and smaller donations as credit for pump repairs were also favoured over larger, less frequent contributions. Lichbach (1996) supports the favourability of short term collective contributions as a means to mitigate theft, dishonesty and rent seeking from leaders. He also believes that labour and time contributions are preferable to money. A similar system was evident in Chimphanga village where members could 'pay' pump contributions by labouring with the village's rental plough, *in lieu* of cash.

Research elsewhere has shown that ego-centrism and autocracy in leaders is also abated by the process that allows leaders to emerge (Palmer, 2007). Groups often only lend legitimacy to leaders with whom they identify. While they favour a hierarchy most people also want to maintain some autonomy and the ability to continue with habitual institutions (van Vugt and de Cremer, 1999) and the day-to-day-around-the-pump interactions in which they reinforce the cooperative behaviours that sustain collective action. Van Vugt and de Cremer (1999) found that groups prefer a leader whom they view as prototypical of their group and with who they feel a relationship. In three of the case study villages there were these type of bonded relationships with village leaders and statements about leaders past labelling them as 'our boy' or 'one of us in the village'. As shown earlier, personal qualities, for example 'hard working' or 'kind', were

also often mentioned by respondents as key in choosing leaders, highlighting that leaders are more than just instrumental in achieving material goals but that the relational aspects of good leadership are vital in collective action and cooperation (Swidler, 2013). This process of emergence and its effect on accountability is especially true for entrepreneurial leaders who earn legitimacy in increments.

2.8 Conclusion

Research in five rural Malawian villages that maintained their donated hand pumps for more than 10 years found that the influence of leaders was a common theme throughout. Research participants pointed to the fact that certain individuals functioned to motivate and promote collective action both instrumentally through their authority, and relationally by legitimizing claims to cooperation between villagers. Non-hierarchical, egalitarian cooperation is uncommon in most groups and where social cooperative dilemmas around the management of a shared resource arise, the tendency is towards a socially entrepreneurial leadership hierarchy to form (van Vugt and Cremer, 1999; King *et al*, 2009). The effect of leaders who are seen as legitimate and with whom others share identity is an important component of collective action where there is a costly necessity to monitor actors and sanction those who break behavioural conventions. Leadership assists is reducing individual costs to actors who in turn are satisfied with some costs as returns to leaders who maintain a favourable rate of individual return from the shared resource (Hooper *et al*, 2010; Vedeld, 2000; Ostrom, 2002).

Both the evidence of leadership in social groups managing shared resources, and the prevalence of leadership in the research cases should serve to highlight the importance of future attention to this issue. If governments and donors are trying to better understand how certain villages act collectively in order to maintain water infrastructure (I.C.E/Oxfam/WaterAid, 2011 and EWB, 2010), then leadership should form a part of their focus on humanitarian interventions and VLOM policies beyond claims to 'participation' and 'empowerment' (Cleaver, 2007). Locally evolved and 'internal' village leaders serve to strengthen collective action and successful community management (van Vugt and Cremer, 1999). Policies than enhance the emergence and role of leaders

(Zulu, 2008), especially informal leaders who may remain unidentified by development practitioners, is key. Currency must be given to tacit internal hierarchies that may be too easily ignored in the attempts to craft clear centralized authority structures such as committee designs or elevate the wrong actors into positions of power. Along with this, education that continues to teach communities about empowerment and accountability may help to keep leaders honest and maintain states of 'favourable inequality' where hierarchies work in favour of the leaders and followers who are faced with the social dilemmas inherent to collective action and shared resources. Notions of egalitarian equality within village level institutions should be reviewed with a better understanding of how leadership hierarchies can be instrumental in fostering cooperation and maintaining VLOM conventions.

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Chapter 3- The Evolution and Importance of 'Rules-in-Use' and Low Level Sanctions in Village Level Collective Action.

3.1 Introduction

Social institutions[3] that govern the use of common property resources typically rely on rules and sanctions that influence the resource users' actions, with the intention of mitigating free-riding or non-cooperation. Earlier theories of collective action strongly emphasized clear rules and strict sanctions as vital institutions in stipulating how and when shared resources can be used as well as to structure forms of cooperation that work towards the collective management and maintenance of shared property (Ostrom, 1990, Agrawal, 2001). Sanctions, most often in the form of punishments in graduated levels of severity, are seen as important disincentives to free-riding for members of a shared-resource user community. Sanctions for non-cooperation, rule breaking and misconduct are integral to the ideal frameworks for collective action around common-property and are considered to be crucial for the maintenance of collective action (Gibson, Williams & Ostrom, 2004).

The use of rules and sanctions is effective when the explicit benefits that accrue to members of a resource using community exceed the costs of their cooperation and collective action (Gibson *et al.*, 2004). In other words, the attraction of the gains from free riding, as posited in the classic theories from Hardin (1968) and Olson (1965), need to be tempered by the repercussion of explicit sanctions for rule breaking and other selfish actions. Furthermore, the costs of rule enforcement, monitoring and subsequent sanctioning typically need to be worth incurring by the individuals who choose to enforce rules. The rule enforcer and sanctioner must accept the costs of their action in the name of the public good. High cooperation costs are a potential disincentive that easily allows this 'cooperators dilemma' to undermine collective action around the shared resource (Lichbach, 1996).

[3] The term institutions here is used to described what North (1990, pg. 4) calls "any form of constraint that human beings devise to shape human interaction".

In contrast to earlier prescriptions that favour ideal communal conditions or institutional 'blueprints' to enhance collective action (see the frameworks described by Ostrom, 1990 and Agrawal, 2001), more recent theories acknowledge that formalized and highly structured rules and sanction mechanisms can be costly to enact and cumbersome for some communities to fit into social practice (Cleaver, 2012). These more cumbersome rules and sanction systems often evolve into less explicit forms or appear to fade into disuse. However, rules and sanctioning systems often remain prevalent in the form of nuanced and customary 'rules in use' that some small resource sharing communities develop in order to manage common property (Cleaver, 2001; Nkonya, 2008). Communities sharing a resource may not regularly enforce the explicit and formalized rules that surround their common property management regimes. Instead, they may develop less overtly structured rules and appeals to conduct that are contextually appropriate, dynamic and a lower-cost first level approach to managing collective action and minimizing free riding (Ostrom, 2005; Nkonya, 2008; van Laerhoven, 2010; Yami, Vogl & Hauser, 2011).

The research described in this paper examined communal management in five Malawian villages that have cooperated to manage and maintain communal water hand-pumps over long periods of time (10 or more years) while many other similar villages fail at this. Many rural Malawian villages rely solely upon donated hand pumps fitted to boreholes or covered wells as their only access to safe drinking water. Those without these pumps typically rely on drinking water taken from surface water in rivers or wetlands, or drawn from uncovered wells. Unsafe water sources perpetuate chronic health problems, retard living standards and exacerbate poverty (Turton, 1999; Brooks, 2002; Nkonya, 2008; Brown and Crawford, 2009). An estimated 50-60% of rural Sub-Saharan Africans lack access to safe water supplies (Nkonya, 2008). The problems associated with accessing clean water are escalating. Due to population growth and climate change the number of sub-Saharan Africans living in water scarce environments is predicted to grow from 200 million to an estimated 690 million in 25 countries by 2025 (Brooks, 2002; van Koppen, Giordano, Butterworth and Mapedza, 2007; Nkonya, 2008; Brown and Crawford, 2009).

Awareness of how recipient communities employ collective action institutions and practice shared-resource rule enforcement and sanctioning is important for governments and donors who provide communal hand pumps. As discussed below, unrepaired hand pump failures are an endemic problem hampering efforts to improve rural water supply in Africa and this research addresses this challenging issue.

3.2 Literature Review: The Value of Cooperative Management and Institutional Research

The primary approach to address the rural water supply problems in much of rural Africa has been for governments and donors to sink boreholes or covered wells in villages. These are often fitted with a low cost, simple technology hand pumps. These interventions are premised on the Village Level Operation and Maintenance (VLOM) approach –the notion small rural communities will have the financial and skills capacity to maintain and repair technically simple units if they are given ownership of them (Colin, 1999; DFID, 2000). Unfortunately more than half of these projects have been known to fail when the hand pump breaks down and remains in disrepair, forcing users to revert to previous unsafe water sources (Harvey and Reed, 2006b; Skinner, 2009). The reasons for this phenomenon are legion – poor availability of water pump spares (Harvey and Reed, 2006b), poor project implementation (Blaikie, 2006; Harvey and Reed, 2006a; Cleaver 2007), community apathy (Cleaver, 2001; Plateau, 2008), gender role barriers and user group conflicts (Nkonya, 2008; Crow, Swallow & Asamba, 2009), village mobility, skill level and community wealth (Harvey and Reed, 2006a; Araral, 2008).

While further focus on 'hardware solutions' that address spares, design, materials and markets are important, any improvements in project success rates will require a more thorough understanding of demand management, collective action, and social factors affecting community water point management in villages that rely on VLOM approaches (Brooks, 2002; Sugden, 2003; Watson, 2003; Summers, 2005; Perret, 2006). Beyene (2009, pg. 175) advises that "better knowledge of the role of norms and other factors affecting collective action in water point management is essential to development agencies who would like to strengthen community based institutions…"

This is important to note as many VLOM type projects include a process of developing a formal authority group to care for the new well and pump, usually through the development of a Water Point Committee (WPC) (Njalam'mano, 2007). It is the WPC structure that is intended to institutionalize the monitoring of hand pump use, enforcement of clear constitutional rules, adherence to collective maintenance duties and the sanctioning of any free riders or rule breakers (Colin, 1999). The imposition of these these exogenous institutions by external organizations has been found to either overlook, ignore or erode pre-existing local institutions and customary laws that govern collective-action around water (van Koppen et al, 2007; Watkins, Swidler and Hannan, 2012). It is vital to understand VLOM as a social concept, as opposed to just a technical repair program, in that if it is to be successful it requires the cooperation of a community that has inherited and embedded social institutions that influence their norms and values (DFID, 2000; Swidler, 2013) form before the development intervention took place.

Cleaver (2002) argues that successful local VLOM type institutions are a product not only of explicit rules and organization of the type that are normally associated with WPC's, but are largely contextual, diverse, *ad hoc* and to a certain extent constantly under re-negotiation. In this paper these phenomena that she describes will be termed 'informal institutions'- those forms of organization that are often not explicit or outlined in highly structured conventions or constitutions (de Sosa and Jutting, 2007). It is often these informal institutions that remain invisible or misinterpreted and that are too often ignored or glossed over in development research (Njoh, 2011; Chambers, 2008).

The focus of this paper on the norms around rule adherence and the preference for lower-cost sanctioning institutions contributes to the literature on both collective action in water provision projects, as well as that on institutional diversity (Ostrom, 2005). Existing research has typically focused on more structured and predicative frameworks for collective action. These frameworks carry the assumption that collective action is more likely to succeed when there are clear rules and strict graduated sanctions applied through formalized social structures within the resource using community (Ostrom, 1990; Wade, 1998; Agarwal, 2001). More recent efforts have come to view these collective action 'blueprint' prescriptions as only partly useful and to give more currency

to flexible norms around rules and punishments (Henrich and Boyd, 2001; Fehr, 2004; Kiyonari and Barclay, 2008). Bastakoti and Shivakoti (2012) and Nemarundwe and Kozanayi (2003) recognize that without unpacking these informal 'unwritten' rules, attempts at researching collective action institutions are incomplete, as these contextual rules-in-use can have significant effects on collective action.

This research takes these insights on rules and punishment in social dilemmas and examines them outside of experimental models (Vyrastekova and van Soest, 2008), using empirical case studies at the village level, looking at donated hand pumps. Investigating the nature of relationships, ongoing communal negotiations around 'rules-in-use' and more flexible applications of punishing free-riders is necessary in order to understand these diverse institution's (Sanginga, Kamugisha and Martin, 2005; Beyene, 2009 and Cleaver, 2012). There are also contributions to the 'thick model' of institutionalism that acknowledges power, agency and livelihood concerns within complex institutions and under the influence of formalized social structures, like donor initiated WPC's (Gibson *et al*., 2005; Cleaver,1998, 2007, 2012).In so doing this paper answers the calls made by de Soysa and Jutting (2007) and Smajgl (2007) for further work on the informal components of rule adherence and the interactions between formal and informal institutions in development research.

There is currently a dearth of research into better understanding the social institutions in rural Sub-Saharan African communities where donated hand pumps have been successfully maintained without long periods of breakdown. The author knows of no in-depth, comprehensive research results that synthesize collective action institutions and norms around rules and punishment within cases of successful village-level sustained 'Afridev' hand pumps.; despite the salience of this problem.

3.3 Background and Research Cases

Rural Malawi is a good example of the rural water problems faced in many areas of sub-Saharan Africa. This small country has one of the highest population densities in Africa and 85% of the thirteen million plus population being located in rural areas (Ministry of Irrigation and Water Development, 2008). While country specific statistics vary across

sources it is estimated that approximately 57% of the rural population has access to reliable water sources (WaterAid, 2010) with 54% relying on boreholes (MIWD, 2008). According to Ferguson and Mulwafu (2004) this coverage is reduced to as little as 32% due to infrastructure breakdown.

Primary research was conducted in five rural case study villages in central Malawi (see Table 3-1).

Table 3-1. Case-study villages

Village Name	Tribal Authority Area	Occupied Households	No. of Interviews	No. of pumps	Pump Notes
Machilika	Chadza	28	19	1 Afridev on a borehole	Pump supplied in 1996
Kalonga	Mazengera	69	13	2 Afridev's, one on a covered well, one on a borehole.	Covered well pump supplied 1996, second borehole pump in 1997. Second pump non-functional – parts taken by village to repair the first pump and borehole casing subsequently vandalized.
Mazinga	Chiseka	65	13	1 Afridev on a borehole.	Supplied in 1998.
Chimphanga	Kwambiri	30	19	1 Afridev on a borehole	Supplied in 1996
Makumba	Jalasi	31	6	1 Afridev	Supplied in 2000.

Four of these villages have not received any significant assistance or interventions regarding their hand pumps since installation. Mazinga Village was visited by the Red Cross in 2008 during a regional campaign to rehabilitate boreholes, pump aprons and pump mechanisms. Ironically since that intervention they experienced proportionally higher rates of breakdowns that needed repair than ever before: three breakdowns in two years.

3.4 Methodology

The overall approach was completed through a two phase process. The first phase incorporated case selection and entailed using a combination of 2008 Government of Malawi surveyed data on borehole functionality along with recommendations from partners at Bunda College of Agriculture. From this the author and two Malawian research assistants would short list potential cases based on the apparent status of their water infrastructure. Visits would then be made to these villages as well as others within specific areas. During these visits information could also be gathered on other local cases of well-maintained and long lived Afridev pumps, as well as insights into the reason why many villages had pump maintenance problems. In total 61 villages were visited during this process.

The second phase was comprised of the five in-depth case studies that were selected during phase one. Information collection primarily took place through semi-structured interviews (70 dyadic and group interviews), conducted in the native ChiChewa and ChiYawo languages. An initial period of sensitizing was undertaken for a few days in each village. The researchers would spend the first few days in the village getting to know the community, beginning initial observations and formulating future interview probing questions. The information gathered by the regional visits in phase one also helped shape interview questions. This allowed the team to begin building descriptions of the social structures and issues surrounding the hand pump management. Interviewing was undertaken both by *purposively sampling* participants and using the *snowball* method subsequent to that. Group interviews were typically conducted with naturally assembled groups, quite often women going about their daily duties or taking work breaks, a method that can, and did, create favorable interviewing situations (see

Gomm, 2008; Nkonya, 2008). The research adopted an iterative process of progressive focusing (Gomm, 2008; Yin, 2009) over repeated visits to each village. After the initial sensitizing period the researchers would spend between three to five, week long periods in each village. Each of these week long periods was separated by between one week to three weeks during which one of the other five case study villages were visited and in-retreat analysis sessions were conducted. During initial stages of explanation building, initial questions were fairly broad in their scope and were honed or changed with each iteration of interviewing, observation and community familiarity (Stake, 1995; Gomm, 2008; Singleton and Straits, 2010). The cumulative nature of this methodology served to illuminate findings and unexpected phenomena, rather than forcing the research to conform to pre-figured theoretical assumptions (Merriam, 1998). It was also found that this process assisted in trust building with village members.

At the end of the research period a structured household level survey was conducted in four of the five case villages[4]. This survey was designed to measure socio-demographic data, livelihood data and illicit opinions and stated preferences regarding hand pump use and hand pump management. A total of 192 household surveys were collected. These ChiChewa language surveys were conducted by the then familiar research assistants in an interview style with the household head or their spouse.

The research was designed to understand how the case studies managed to maintain their Afridev (the most prevalent model) hand pumps. This meant not only focusing on the pumps, boreholes and wells, but attempting to uncover nuances relating to social structures, village institutions, money and labour contributions, relations with neighbours and collective action around other communal issues and activities.

3.5 Rules, Sanctions and Collective Action

Rules, rule enforcement and sanctions for rule-breaking are a cornerstone of successful collective action institutions for shared resources (Agrawal, 2001; Ostrom, 2005; Sefton, Shupp & Walker, 2007; Chen, Pillutla & Yao, 2009). When faced with a public goods dilemma and the collective burden of free riding, rules provide valid motives for

[4] Time constraints precluded surveying the fifth case village.

structuring behaviour and lend vital credibility to the use of sanctions to support these rules or covenants (Thomas, Walker & Zelditch, 1986; Sefton *et al*, 2009). In the absence of rules, and sanctions for breaking them, evidence shows that collective action and cooperation typically gives way to non-compliance and selfish behaviour (Sefton *et al.*, 2007; Vyrastekova and van Soest, 2008). Tullberg (2006) and Chen *et al.* (2009) also found that subsequent to a social world framed by rule enforcement and punishment, collective cooperation typically declined when those mechanisms where removed. Ongoing rule enforcement and rule negotiations result in improved conditions of shared resources (Gibson *et al*., 2004) and poor rule enforcement hampers collective action around communal resource management (Yami *et al.*, 2011).

The problem with analyzing the effectiveness of rules can be found in the difference between those that are 'formal' – explicit and structured rules found in constitutions and contracts, and those more 'informal' – *ad hoc* rules that appear malleable or negotiable in different contexts and for different actors, and that are often less obvious in their application. Bratton (2007) warns against using strict 'constitutionalism' when attempting to understand social institutions and that an overly structured way of approaching social organization belies the value of informal rule and sanction evolution within social interactions. This distinction is also addressed by North (1990, pg. 4) when he outlines that institutions can be "both formal constraints – such as rules that human beings devise- and informal constraints – such as conventions and codes of behavior".

Many earlier prescriptions for collective action institutions (including Ostrom 1990) point towards mechanical and bureaucratic definitions of rules and graduated sanction approaches. Ostrom (2005) later demonstrates an evolution of collective action theory which recognizes the nuance of dynamic, informal rules. Cleaver (2001, 2012) emphasizes the value of day-to-day rule making and rule negotiating as part of an *institutional bricolage*. Many communities that openly share a resource often don't need to rely solely on formal, scripted and unchanging institutions but tend to borrow from various institutions and mold conventions of conduct from pre-existing norms in manner that is appropriate within context. The nature of these 'informal' institutions is their ongoing evolution and negotiations by those who act within them (Cleaver, 2012). This socially evolved way of constructing resource management institutions typifies

many collective action situations, where informal and nuanced rule enforcement and sanctioning may be a more parsimonious approach in comparison to more rigid rules that may be ill-adapted to norms or culture. Zulu (2008) and Yami *et al.* (2011) found that written contracts and strict rule based constitutions did not necessarily favor positive collective action outcomes in village settings and were not always well aligned with the manner in which informal codes of conduct and 'rule-in-use' were applied to collective action.

3.6 Formal Rules vs. *ad hoc* 'rules-in-use' in Malawi

In all of the case study villages there was an initial reference to a strict set of rules regarding the use of shared hand-pumps. Most of these pertained to user conduct, maintenance and cleaning schedules, and most significantly to strict obligations for financial contributions to repair and maintenance. Participants initially stated that these rules were enforced strictly, swiftly and explicitly by the village Water Point Committee (WPC). These committee structures are typically introduced by donors who supply the hand pumps and then conduct training for the village as part of VLOM strategy. The WPC's normally are meant to conduct the sanctioning of free-riders and rule transgressors. What is important to note is that in all of the case villages the nature of WPC had changed from being one of managing the hand pump monitoring, rule adherence and sanctioning by formal constitution, to one that had adapted to reflect a more locally appropriate way of carrying out these tasks. More to the point was that the way in which the WPC's were structured and the way in which they functioned had become quite different from their original incarnation; in some cases they ceased to exist in any way as a recognizable WPC in their earlier forms. These changes in the nature of the WPC also aligned with changes in the nature of the rules and approaches to monitoring and sanctioning in the villages.

This alignment between the changes in WPC and changes in sanctioning is considered here to be a proxy measurement for the differences between stated rules versus the revealed rules-in-use. This difference between stated and the revealed rules and monitoring institutions was evident in the inconsistent household level responses given to a specific survey question. During the survey portion of the research respondents

were asked 1) 'Does your village have an active borehole committee?' and 2) 'Has anyone in this household ever been denied access to the pump for breaking rules or not contributing?' What is striking about the results shown in Table 2 is that in the two villages with weak or no formalized committee some respondents still believed that there was an active committee, bringing into question the communal understanding and involvement with formal institutions in the first place. This error may be because there were village leaders and entrepreneurs who took initiative to be more active in hand pump matters and may have become a default informal committee- type group in the eyes of their community. In other words the notion of a 'committee' had changed to reflect those entrepreneurial village leaders who had assumed greater responsibility for the pump and had become a default WPC. This group were still called a 'committee' but no longer reflected the elected or appointed structure from before (See Chapter 2). It could also be explained because some respondents were possibly answering 'strategically', wanting to appease the outsiders who, understandably, may be perceived to be a potential source of further material assistance[5]. Kalonga Village, for example, had no committee in place and relied heavily on a handful of local entrepreneurial leaders and the chief to sustain its hand pump. It is assumed that this leadership core was possibly seen by many as the 'the committee' even though there was no longer a formal water point committee in the village and hadn't been for some years. The same is true of Machilika although this village had more intrinsic volunteerism and informal leadership. Their committee had become inactive fairly recently and many of those ex-members also still volunteered as leaders interested in managing the borehole and hand pump. However, as a formalized WPC, they were no more.

3.7 The Evolution of WPC Membership and Structure

The two villages that did have a WPC structured with identifiable membership in a way that resembled those established in VLOM projects – Mazinga and Chimphanga- had both undergone transformations from their initial inception. The change in members had come to represent structures with which the communities were more satisfied and they had not perpetuated the organizational templates that had been offered by NGO's

[5] This unfortunate reality is a common phenomenon in development research (Chambers, 2008).

when the hand pumps were first supplied. They were WPC's in name but functioned quite differently than at their genesis in their respective villages. Importantly this change in these rule enforcement and sanctioning structures reflected the way in which these tasks were undertaken across the village.

3.8 The Evolution of Rules and Sanctioning Processes

Most of the villages gave similar examples of the clearly stated rules expressed early in the research process. For example, if a woman didn't conduct her scheduled cleaning of the hand pump area she would be immediately reported to the borehole committee, chief or person officially mandated with managing the sweeping roster. All of the villages also had the 'ban rule' in place that forbade use of the pump for financial non-contributing free riders. Participants initially stated in their responses that those who didn't contribute to communal repair coffers during a breakdown would be barred from using the pump after a grace period of normally one to two weeks in which they had to find the funds for the set contribution levels. Yet when queried about the rates of bans from the pump it became evident in the four surveyed villages that these were very low (see Table 3-2); this also was evident during interviews in the fifth village. This stood in contrast to more common accounts of people who did not manage to contribute within the set time periods. The high rate of banning in the small village of Machilika stems from the vociferous nature of some of the elderly women who take an interest in the hand pump. Being a small village they are vigilant of the borehole area and are quick to approach any members who try to sneak water without paying dues or when they miss their periodic labour contributions. Even these banning's are seldom by formal decree but more often through informal 'bans' entailing younger women being scolded at the pump site by their seniors and told to 'go home and get water elsewhere until you contribute'; although often not having to actually leave empty handed. They are bans in name only and seldom assumed the capacity of an official, enforced ban; the perpetrators would have to show remorse and acknowledge that they broke a rule.

Table 3-2. Inconsistencies in evidence of formal committee structures as well as rates of application of the ubiquitous 'ban rules'

	Does the village have an active borehole committee?		Evidence of borehole/WPC committee in village	Has anyone in your household ever been denied access to the pump?	
	Yes	No		Yes	No
Chimphanga	28	1	Functional, active committee.	1	29
Kalonga	22	46	Not active, only some ex-committee members still in the village.	1	67
Machilika	7	21	No, committee faded from duty in 2007.	11	17
Mazinga	63	1	Functional active committee	5	60

After initial iterations of interviewing and observations it became clear that many of the early proclamations about rule enforcement and sanctioning were not taking place. As better trust was established with the communities many participants confessed that this strict adherence to formal sanctioning was in fact an infrequent phenomenon. Perhaps the most serious sanction was the banning of those who do not pay their contributions when the hand pump breaks or is in need of periodic maintenance. Often times, in all five cases, we were assured that non-contribution results in unsympathetic banning, but it became evident that this was a punishment that seldom came to fruition. What is salient here is that to an outsider it may appear that there has been an erosion or total failure of the constitutional rules and sanction systems in the village. What became evident though was that these villages still managed to sustain their common property hand pumps through varying levels of collective action and cooperation. This phenomenon represents an important focus point for collective action theory and development research.

In Chimphanga Village it was explained that severe punishment was rare, even though people do break rules and free ride. This woman, like many others, stated that punishments typically take the form of warnings by other village members, typically during daily interactions:

> "Q: Do you give any punishment? (to rule offenders)
>
> A: Punishments are given in isolated incidents but normally we just warn them."

Another Chimphanga Village participant pointed out that leniency is the norm but that rule-abiding members have the ability to generate more severity for offenders if they so choose or if offenders do not show remorse or attempt to rectify their offenses. The cooperators in the community seldom felt the need to resort to more onerous processes but held the potential for greater punishments if they desired:

> "Yes they still use it [the hand pump after not contributing to repair funds], but of course they keep reminding them. They will just continue, but if women decide to start talking at the meeting that's when things will really turn ugly for those who didn't pay their contributions."

In many cases it was reported that free-riders would be dealt with *in situ*, by other villagers, without resorting to formal proceedings or reporting to committees (if they exist) or leaders. These participants all reiterate that *in situ* peer group or family discipline is the norm. In Makumba village this woman explained that if free-riders face disciplinary proceedings, even the formal leadership normally applies lower –cost graduated sanctions, attempting less severe and less costly penalties first.

> "There are many issues that will be sorted right at the borehole. There are also certain issues that will be taken to the committee, but if the committee fails to handle certain issues then they would go to the chief for assistance."

This man from Mazinga echoes the prevalence of *in situ* sanctioning:

"If someone has broken the rules, we go to his/ her house and talk to them and everything ends there after talking to them."

In addition to the frequency with which *ad hoc* or creative sanctioning became apparent in the case villages, it was also clear that many of the stated rules were often openly ignored and the offender's actions were judged on a case by case basis. Examples included bans on washing close to hand pumps and especially proscriptions on children playing around the pump unsupervised; the latter being evident in each case village.

3.9 Moral appeals vs. rule enforcement as incentive

In these poor rural communities where even a simple hand pump is a significant communal benefit, moral appeals to the public good were frequently used to incentivize cooperation in addition to the threats of rule enforcement. The appeal to non-contributors was normally to reciprocate the cooperation of others and 'do the right thing' for communal well-being, such as this participant explains:

"Q what is the advice that you can give someone who does not want to pay any money contributions

A I think the best thing is to sit down with this person and explain to him the importance of using the borehole water rather than the water from the unprotected wells, and other is that I would explain to this person the importance of working as a group."

These moral appeals employ the critical mass of the cooperative majority to legitimize conforming to 'pro-development' behaviours and cooperative behaviour as a social norm (see Callero, 2009). This was also closely related to the use of threats of sanction, the impact of which was closely tied to the legitimacy of the rules-in-use and their sanctions. When collective working rules and conventions are evidently well entrenched the community, these threats could be underwritten by these institutions by virtue of their social currency in the community. Feinberg, Willer and Keltner (2011) remind us that "...a collective moral order does not presuppose consensus or uniformity of belief,

it does presuppose that there is a known institutionalized order within the collective" (pp. 380).

Interviewees often explained that non-contributors were called out and labeled as 'anti-development'; part of publicly embarrassing them and motivating them to conform to collective institutional order of being 'pro-development'. Being singled out as 'anti-development' was an advanced form of moral appeal and sanction by embarrassment. It was not part of a clear constitution or formal institutional process but rather an informal institution that leveraged behavioral norms. These two women, from Machilika and Mazinga villages respectively, explained that some people will always try and free ride. Instead of incurring significant costs to sanction them the village will appeal to the sense of community duty and simply leave them as free riders until they personally initiate to resolve their defection from the rules:

> "They might even stop using the borehole because of the village pressuring them, but when such things happen [ignoring rules], we don't bother at all, because what we say is that such kinds of people are against development."

> "Yes, we don't back them up, because we know that they are against development. They would go to the wells to fetch water."

On the surface this informal development of *ad hoc* rules and creative *in situ* sanctioning may indicate weak collective institutions and a failure of the formal rule systems but this is not necessarily the reality. These informal institutions allow for often effective low cost systems of monitoring, sanctioning and motivating to develop within these villages. The evolution of these tacit collective institutions may indeed indicate strong collective norms (Cleaver, 2012).

3.10 Perpetuating lower-cost, 'informal' enforcement and sanctioning

Monitoring, enforcement and sanctioning are costly (Tullberg, 2006; Kiyonari and Barclay, 2008). Sanctions are potentially costly not only for free-riders but, importantly,

are costly for contributors and other members of the user community who enforce rules. These high costs associated with delivering punishment and the preceding monitoring can be high enough to dissuade the sanctioning of non-contributors and free-riders (Tullberg, 2006). Keeping enforcement and sanctioning costs lower can increase the willingness of more cooperators to undertake day-to-day rule enforcement and sanctioning through their personal relationships and social interactions. This willingness counteracts the reticence of regular cooperators who may otherwise avoid enforcement and sanctioning because of the fear of high costs or personal conflict. Having more willing monitors essentially prevents second order free riding, which is a common collective action dilemma when only a small minority of cooperators carries those extra enforcement duty costs and the other cooperators do not (Kiyonari and Barclay, 2008; Heckathorn, 1989). The expansion of those willing to enforce and sanction alleviates marginal costs for all cooperators willing to engage in sanctions and as the personal costs of enforcement decline, the rate of intrinsic cooperation often increases as users of a resource will emerge as default rule enforcers in a an intrinsic manner (Gibson *et al.*, 2004).

The rigid and costly enforcement of highly structured rules and high level sanctions can alienate people from those rules intended to convince them to cooperate, and from the people who enforce them, effectively working against the common good (Kiyonari and Barclay, 2008). Furthermore, costly sanctions for rule breaking can also provide a perverse incentive that motivates people in a user group to tolerate free riding in order to avoid sanction costs - enhancing second order free riding and deepening the social dilemma of poor cooperation (Tullberg, 2006). Chen *et al.* (2009) found that severe, high social-cost sanctioning can reduce collective action more than when these were absent, because it may only motivate people artificially, resulting in short term cooperation that wanes when sanctions are lifted.

Thomas *et al.* (1986) posit that cultural forces against cheating can be pervasive. Acting collectively can come about without always adhering to explicit rules and highly rigid sanction mechanisms- a belief that favors communal conventions and low cost normative appeals entrenched as working rules much like those rules that evolved within the Malawian villages. The prevailing manner in which rule breakers were dealt

with informally in the case villages supports the notion that collective action may not be the outcome of bureaucratically efficient organizations but the result of on-going negotiations and low, perpetual transaction costs over rule enforcement and social conduct (Cleaver, 1998).

Cooperation in these villages took on the form of on-going negotiations over rules and hand pump conduct that Sanginga *et al.(*2007) argue actually serves to drive cooperation rather than impede it. These emergent perpetual 'rules-in-use' are a reasonable evolution as a means to reduce direct costs associated with overly bureaucratized enforcement and sanctioning (Kiyonari and Barclay, 2008) and these appropriate mechanisms of punishment and reward are crucial in the context of social learning (Vollan, 2011). These forms of collective action may work towards an ideal situation where people are motivated to cooperate intrinsically – "If an individual believes that others are contributing because of certain contextual factors they are likely to infer that individuals will not contribute in the absence of those factors. If, on the other hand, they believe that others are contributing because of intrinsic factors, they will have stable expectations of the others contributions regardless of the presence or absence of the contextual factors" (Chen *et al.*, 2009 pg. 244). This echoes the approach found in this research where free riders were sometimes left to their own devices until they acquiesced to the village norm of acting collectively with others who use the hand pumps. Gibson *et al.* (2004) also report communal acceptance of the transgressors of formal rules in many cases where informal institutions had emerged to modify the pre-existing formal laws into a more appropriate manner of organizing cooperation. In other words, new rules-in-use allow certain formal 'constitutional rules' to be explicitly broken but the context of the transgression determines whether or not the cost or necessities of sanction are appropriate.

Socially and culturally incentivizing collective action as the 'right thing to do' through personal moral appeals, legitimized threats of sanction and social embarrassment, such as the means identified here, can all be undertaken successfully with reduced costs. The phenomenon of the 'anti-development' label was just an example of a low-cost enforcement and moral appeal that had emerged as an informal sanction method.

3.11 Benefits of low consequence sanctioning

Lowering the costs of sanctioning is also an effective means of ensuring longer lived collective action. Severe punishment can increase long term social antagonism towards the punisher and increase anti-social relations in small communities (Kiyonari and Barclay, 2008). These authors also found that verbal reward was often preferred as a means of sustaining the will to act collectively and maintaining reciprocity for adhering to moral appeals. The announcing of the names of those who contribute readily to water pumps in the case study villages is just such a means of rewarding cooperation while sanctioning free-riders.

While severe formal sanctions may impede collective action and long term payoff over time, it is important to acknowledge that some level of sanction is of great value. Sefton *et al.* (2007) found that the rate at which players are likely to give up rewarding people is faster than the rate at which they will keep trying to sanction non-contributors. Punishment needs to be dealt out in the correct balance. Too much punishment incurs the aforementioned costs and can also potentially cast the punisher in a poor light amongst peers. Punishers need to sanction non-contributors quietly and without seeming too harsh – such as those in the villages who would go and 'talk to the offenders in private' and enforce rules of conduct through social learning (Vollan, 2011). In so doing they can actually build trust and boost the status as leaders who are willing to incur some personal costs without passing a tipping point of creating excessive communal costs (Kiyonari and Barclay, 2008). Levels of trust can also be eroded when severe sanctions are enacted; conversely rates of sustained cooperation can be found where levels of communal trust are high (Chen *et al.*, 2009). As already mentioned, in some cases having a community member who was allowed to free ride with impunity was not rare. For example this woman in Machilika explained how a village member was constantly opposing cooperation. Formal punishment was seen as too costly and ineffective:

> "Q How do you handle them when they come back? (when they keep using the pump despite not contributing to the maintenance)

A We just look at them; there is nothing we can really do.

Q Is it difficult to confront them?

A Yes, it is quite difficult

Q Wouldn't the village headman confront them instead?

A It is even difficult for him to confront them; he would look as if he is being harsh to his people."

Sanctioning these free riders was seen as too personally costly and the defector was left, hopefully to assimilate to cooperation through exposure to the collective majority and day-today personal interactions. The lower-cost informal sanction systems can have the added benefit of fostering community trust and lowering overall rates of conflict even where rule transgression persists.

3.12 Embarrassment as Low Cost Sanctioning

As participants began to expound on how their communal hand pump institutions work it also became clear that a common tactic for social sanction was to publicly name rule transgressors and free-riders, the purpose of which to cause embarrassment. An approach used in all of the five case study villages was to hold village meetings shortly after contributions were required, or to have a volunteer at the pump to warden the free riders and inform people who they were. The names of those who paid their contributions to the hand pump repair fund would be read out or announced from memory. Those unannounced were easily known within the small community. Causing embarrassment for genuine free riders (except those who were exempt from contributions like the old and infirm) was a common approach, as explained by these participants from different villages:

Chimphanga Village: "...yes, after people have paid the money, they call a meeting where the committee and everyone are present to announce the names of those that have paid. This is done right at the borehole. Everybody sits there and the names are announced .The main reason

> for gathering people and announcing names is to make sure that everyone has an idea of who has paid and who hasn't, and they also want people to know how much money there is."
>
> Machilika Village: "...the names of those who have paid are written in the notebook and the chief will announce that there are some people who have not made the contributions. The names are announced so that we all know those have not paid."

Acknowledgments about creating 'embarrassment' were evident in the five case studies and were typified by statements such as these:

> Mazinga Village "if you are one of them [who have not yet paid the maintenance contribution], you will not even dare to come close [to the borehole] or you risk being embarrassed."
>
> Makumba Village (When asked about if a free-rider will eventually pay when the whole village knows that they have not yet contributed to communal pump repair funds)
>
> "It doesn't take that long, actually people feel embarrassed."

In the first quote the participant indicates that being embarrassed is possibly worse than not enjoying the health and labour benefits of the pump. Using embarrassment with non-contributors is a useful first step in keeping the costs of sanctions low for those applying punishments. Feinberg *et al.* (2011) found that showing embarrassment for indiscretions helps to restore social order when it has gone awry. Embarrassment is a pro-social marker – those who feel embarrassment for not cooperating tend to be seen a more likeable, trustworthy and are more likely to be forgiven. Most people are sensitive to criticism and public disapproval, they are motivated to seek and maintain positive evaluations of themselves (Kiyonari and Barclay, 2008). Avoiding being embarrassed allows this low cost sanction to be an incentive for other pro-social behaviour, such as collective action around shared resources. Taking from Feinberg *et al.* (2011) the use of public embarrassment, as was evident in the case study villages, is an effective means to enforce rules and sanction non-contributors in an efficient and

contextually appropriate manner without resorting to the use of cumbersome formal sanction processes.

Having high order sanctions that can potentially be handed down (e.g. an actual banning from using the communal hand pump) can also be used to embarrass non-cooperators through threats of sanction following their actions. "...the threat or promise of higher order sanctions might maintain the lower order sanctions that enforce cooperation in collective action problems" (Kiyonari and Barclay, 2008; 826). Once collective action is entrenched as a social institution amongst the majority of the user community, threats of sanction are likely to cause embarrassment amongst non-cooperators and help sustain collective action (Sefton *et al.*, 2007). This claim makes further sense when applied to Gibson *et al*. (2004) notion of having an increasing body of 'enforcers' add legitimacy to normative claims and keep marginal costs of enforcement down. The ability to make moral appeals can be argued to be the result of a critical mass of community cooperators who can bring to bear the weight of a pervasive social order (views that are 'pro-development') on defectors through informal and local institutions that function outside of the formal sanctioning process (such as fines or access bans). This participant reinforced this phenomenon, explaining that non-contributors avoid people out of embarrassment and acknowledgement of their free-riding:

> "Those people [non-contributors] don't even dare to come and fetch water from the borehole. They are too shy."

3.13 Implications for Development Planning and VLOM Strategies

It is evident from the research presented here that robust and resilient collective action institutions' can evolve through a series of lower cost mechanisms that parse well with local structures. Most notably, institutional rules and sanctions can prove to be highly successful and effective even when they don't follow a strict set of formalized constitutional rules. These 'unseen' institutions for rule enforcement and sanctioning develop as day to day seemingly *ad hoc* arrangements that can be easily overlooked, but

are in themselves indicators of social cooperation (Ostrom, Gardner & Walker, 1994; Cleaver, 2001 and Blaikie, 2006). Gibson *et al.* (2004) remind us that rule enforcement is a strong predictor for the condition of a shared resource, independent of whether or not that enforcement conforms to strict organization or not. These authors reveal that while rule enforcement is typically evident in both experimental games and empirical examples where collective action is in play, the key point is that the way in which sanctions are applied is often unpredictable and seldom follows an obvious path or clear blueprint.

It is important for rural development planners to take heed of these often invisible institutions and foster the growth of autonomous community institutions and leadership structures (van Laerhoven, 2010). The external crafting of communal management institutions in the form of committees and other social structures that accompanies donor interventions, while important, is worthy of caution and 'technical interference' by experts can render negative outcomes (Vollan, 2011; Yami *et al.,* 2011*;* Gibson *et al.*, 2004; Watkins, Swidler and Hannan, 2012). Zealous focus on the overt maintenance of these constitutional structures does not guarantee successful common property cooperation and may create only 'empty shells' while the significant collective rule making and enforcement happens in the ebb-and-flow of daily life (Cleaver, 2001 and Nkonya, 2008). Cinner *et al.*(2009, pg.495) warn that, "some of these design principles may not be appropriate in a specific local context and should not be 'forced' on local institutions... a lack of consideration for important contextual factors which are often critical to the success or failure of commons institutions". An example of a perceived failure could be when certain village members don't cooperate at all. Instead of following up with severe sanctions that could amplify the tension, other members appeal to them in an ongoing and pervasive manner in an attempt to convince them to 'do the right thing'. Outwardly this seems like a failure to enforce hand pump contribution rules and sanction the free riders. However the appropriate means of sanction is less overt and may have longer term benefits through lowered social costs for the majority and willingness to accept cooperation by the defectors, as opposed to short term cooperation through force. Collective action around a shared resource is

often born from wider empathetic relationship, not purely from strict rule calculus (Beyene, 2009).

In addition to being potentially more commensurate with community life, informal rules and sanctions also suffer less from actor mobility and attrition. Both the committees of Kalonga and Machilika villages suffered from committee member attrition which compounded their fragility and helped render them defunct. Informal conventions are likely more resilient to the ebb and flow certain individuals within the community. In many villages the phenomena of migrant labour opportunities and mortality from the scourge of HIV means that the necessity of rule enforcement and sanctioning hitched to rigid structures like committees might experience large periodic shocks when people leave.

The value of informal sanctioning does not imply a support for gross social inequality or 'bullying' as the correct approach to ensuring socially embedded norms of conduct. Baland and Platteau (1999) highlight that inequality does not necessarily impede collective action around common property but can in fact boost it. Inequality in social standing and hierarchy plays out in the ability of some villagers to reprimand defectors and sanction them. While some types of inequality may be unproductive, it can also drive pro-social behaviours and provide incentive to cooperate through the will to gain trust and respect within the common property using community. Hierarchies between those who cooperate and those who don't can affect moral sanctioning mechanisms that keep costs low for cooperators who become default enforcers and monitors of hand pump conduct. In this respect, socially legitimate leaders can also be seen as an important hierarchical element for institutionalizing communal sanctioning (Swidler, 2013). Even where a leader may refrain from applying harsher punishment, as described above, a well-liked leader plays an important role in embedding norms of conduct and support for low-cost peer-sanctioning (see Chapter 2 for more insights on leadership from this research).

The strength of these low cost rules-in-use is that is perpetuates transactions costs which helps keeps the institutions of pump management cooperation alive and within the scope of peoples' day-to-day communal lives. It helps entrench rules-in-use as

behavioral norms so that they become institutionalized. The perpetuation of transaction costs, a phenomenon supported by Cleaver (1998), may seem in direct opposition to the notion of informal rules and sanctions but it helps keep the institutions of cooperation in the forefront of social life when these issues are being negotiated, discussed and navigated on low-cost and day to day basis.

3.14 Conclusion

VLOM based rural development projects are predicated on the notion that communities that receive vital infrastructure like hand pumps for clean water will develop a sense of ownership that will motivate collective action for it maintenance. Assistance with this often comes in the form of externally crafted social institutions bundled into the concept of the 'water point committee' that is intended to operationalize rules and sanctioning, and provide capacity for collective action (DFID, 2000). Ironically, evidence shows that assuming ownership may be less likely when these new institutions structure social life in manner that reinforces the project as 'someone else's' (Njoh, 2011).

The research presented here found that important collective action institutions in villages that were successfully maintaining their donated hand pumps had evolved into a form that no longer followed strict edicts and conduct protocols. Firstly, formal rule, enforcement and sanction institutions did not persist in stasis. They changed from their inception to included different forms of organization or were completely replaced these alternatives Secondly, rules of conduct and their enforcement were definitely evident but were seldom applied rigorously. Instead rules were balanced by relevant social or actor costs and moral considerations. These considerations were negotiated frequently and not just through formalized frameworks like scheduled meetings but rather in the ebb-and-flow of peoples' daily interactions. Thirdly, sanctions and non-cooperation punishments were regularly applied in informal, low cost ways, most often through relational means. The use of moral normative claims was widespread as a means of reducing cooperator costs avoiding, entrenching intrinsic collective behavior and avoiding high-cost conflicts and long term distrust.

Means of sanction that can reward cooperators and punish free-riders without excessive severity may be one of the keys to sustaining collective action in the long term by incentivizing 'the right thing to do' in the form of contributions to the public good, in this case the village hand pump. These informal 'rules-in-use' allow members to adapt and create reward and punishment that is relative to *in situ* contexts and in a manner that over-arching formal rules cannot, if strictly applied to the letter.

3.15 References

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Chapter 4 - Gendered Institutions and Women's Agency in Water Point Management

4.1 Introduction

In much of rural Sub-Saharan Africa the provision of water for domestic and other livelihood activities is typically the sole purview of women (Chancellor, 2005; Kevane, 2012; Thompson *et al.*, 2001). The time and labour costs associated with these commitments are normally arduous (Ray, 2007) and the costs to women and girls, who bear the primary burden of gathering and transporting this water, are typically onerous. Moreover, the common health effects of unprotected and un-improved water sources typically also affect women disproportionally, as they bear responsibility for family health, nutrition and child rearing (Nkonya, 2008).

Fifty to sixty percent of rural Africans lack access to reliable, clean water sources (*Nkonya, 2008*). While many areas of Africa are facing water stress and water scarcity of physical water supply, many rural people lack clean water because of 'structural scarcities' – they lack the infrastructure to ensure their available water is potable and reliable (Skinner, 2009). The provision of protected groundwater and communal hand pumps can be an effective means of addressing this problem. Unfortunately many of these projects fail in that shortly after the provision of these new shared village assets the pumps often break down and remain in a state of disrepair, leaving the users to revert to unsafe sources. It stands to reason that improved water sources – such as simple hand pumps fitted to protected wells and boreholes -would improve women's well-being and drastically reduced time, labour and health costs associated with their duties to provide domestic and often agricultural water. The successful maintenance of these infrastructures can plausibly be thought to allow for greater autonomy and enhanced agency for many rural African women because of the substantive benefits that they potentially bring. This is not always the case. Nkonya (2008) has shown that even where women enjoy improved water sources they can in fact experience a diminished sense of agency and decision making ability, and eroded gender equality.

These unintended consequences stand in contrast to the goals of these water provision projects (Moser, 2005).

Both the 1992 Dublin Principles and the 2000 Millennium Development Goals enshrine access to clean water and gender equality as key issues for global development redress (Ray,2007). The 2005 Beijing 'Platform for Action' enshrines 'gender mainstreaming' (working towards gender equality and empowerment) as a core development goal and the United Nations has adopted the goals of gender mainstreaming in all UN programmes and policies (Moser, 2005). Subsequent to this, many governments and donors have tailored their own policies and approaches to include women as active participants in water development strategies. As will be demonstrated in this paper, the inclusion and even appearance of participation of women in village level water infrastructure development does not necessarily result in gender equality, empowerment or the enhancement of women's agency. The explicit inclusion and focus on women's participation in new water technology can in fact diminish gendered autonomy and agency.

These findings emerged from research conducted in rural Malawian communities in 2010. The research project focused on the nature of collective action institutions in small rural villages where the community had maintained their hand pumps and improved water source for a period of at least 10 years. This means that these communities, outwardly similar to others that had failed to repair and maintain the same type of infrastructure, had managed successful village level cooperation in conducting periodic maintenance and had responded rapidly to repair any pump breakdowns. From the point of developing communally managed hand pumps for improved water access, these cases were a success but under a gendered analysis there was little correlation between successful water infrastructure management and women's agency or empowerment.

4.2 Literature Review of Gender and Development – understanding women's participation in water projects

Acknowledging that women bear the brunt of water related responsibilities in many rural areas of Sub-Saharan Africa has led to many intervention actions making an explicit focus on the active participation of women. The promotion of participation by women in improved water projects has often been accompanied by claims that it leads to gender equality and the empowerment or the uplifting of women (Cleaver, 1998). While this may true in certain cases, Ray (2007) and Cleaver (2001) show that this is not always necessarily true and that many of these claims are largely unsupported. The provision of new water infrastructure can negatively affect women despite these effects not being initially obvious (Joshi, 2005). This of course is not to imply that women could not benefit from improved water sources, but rather that the way in which women's participation in these new initiatives is considered, and how these technologies may affect them, needs a richer institutional and relational understanding (Sen, 2007).

Often women are seen as passive recipients in development interventions and an ostensible attempt at improving their well-being through water improvement projects can lead to further disempowerment through increased burdens (Wallace and Coles, 2005; Ray 2007). For example, in order to ensure gender representation, many of the village level water management committees that form alongside the provision of new hand pumps often purposefully include equal or representative numbers of men and women in new positions of leadership or authority. These additional and highly structured time commitments can severely disadvantage village women who typically work far more hours per day than men (Sen, 1999; Nkonya, 2008). McFerson (2010) reminds us that "…time scarcity severely limits women's participation in collective actions which are time intensive but crucial to improve the economic condition" (pp. 54). Women may struggle to participate in the formal sense of collective action by attending meetings or through other structured commitments. In these situations women may appear to failing in their duties, leaving men as autonomous in their decisions, or lack of, even though women are the natural stewards and almost sole users of these new or improved water sources (Beard and Cartmill, 2007). Because of

time scarcity, high opportunity costs or cultural constraints on women's agency as effective participants "…women often depend more on informal relationships and so form stronger kinship and friendship relations than men who tend to rely more on formal relationships" (Westermann, Ashby & Pretty, 2005, pp. 1785). In her work on gender and water management intuitions in Zimbabwe, Cleaver (1998) has also described how women's institutions tend to be less about formal manifestation of collective action, as typified by meetings and committees, but rather ongoing, informal and *ad-hoc* networks that adapt to the 'exigencies of daily life'.[6] Sen (2007, pg. 52) adds further that "…women often have greater presence in spaces in which informal institutions abound, they may be able to use and even shape some informal institutions to meet those needs".

Village women also typically exhibit a wide range of material and social endowments. As such, treating women as having a unified identity, agency or capacity to participate is unrealistic (Ray, 2007; Westermann *et al.*, 2005). When informal institutions are replaced with more formal ones, women who are economically or socially disadvantaged may lose what influence they did have. The added time costs as well costs associated with changing relationships, financial contributions, conflicts and extended duties are more easily assumed by some women than others (Joshi, 2005). While some women may adapt to these changes easily, many women may lack the monetary or family support to participate effectively. It is these less endowed women who may experience the worst marginalization and be the most reliant on informal institutions in order to truly participate in collective action around their village hand pump. Such socially and economically disadvantaged women are less likely to be able to contribute to a structured collective process but more able to participate in small scale, informal institutions which are adaptive and can easily be modified to incorporate slight changes without costly process or renegotiation (Baland and Platteau, 2007). For example, this may mean that while they cannot afford the time for scheduled

[6] This research project in fact revealed that many of the most effective village institutions concerning the management of the hand pumps were 'informal' in their nature. Much of leadership (especially female leadership), entrepreneurship, monitoring and sanctioning of rule breakers were conducted not through formal structures like committees but through informal communal relationships and day-to-day interactions.

committee responsibilities or to pay maintenance fees they may be able to flexibly contribute extra labour to weekly pump cleaning or to contribute to feeding those who repair the hand pump (a common form of reciprocity in Malawian villages). Ray (2007) distinguishes between the actual roles women can and do play within water development and the social positions and titles they may hold within a community as often being quite different in their effectiveness. Often measures of women's agency or potential to participate in water management can be difficult to disaggregate if they have been considered inclusive of a larger community or household, or as a measurable part of formal duties (Ray, 2007; Kevane, 2012). Even women with measurably larger wealth endowments may not be effective participants in decision making and managing donated water infrastructure if the institutionalized gender relations in which they live at household or village level, for example, do not facilitate sufficient autonomy for them to act effectively (Ray, 2007). Attempts to empower or enrich women through infrastructure projects without acknowledgement of relational or social constraints may also work against women's well-being.

Differences in gender agency within formalized social institutions also stem from division of labour and cultural norms around technology and changes in technical infrastructure (Sen, 2007). Many rural African women suffer from acute asset poverty and access to improved water sources holds great potential to alleviate this (McFerson, 2012). However, in much of the developing world, including sub-Saharan Africa, technology and technical infrastructure is seen as a male domain. Changes in technology, such as from traditional to improved water sources, may provide women less access if they are expected to participate effectively in typically male dominated labour institutions like technical infrastructure repair (Joshi, 2005; Sen, 1999). Changes in material endowments, while holding great potential for women, do not necessarily change gender relations or embedded new divisions of tasks within communities or households (Kevane, 2012), and like participation in formal decision making fora, the introduction of new technology may inadvertently hurt rural women. Skills training in hand pump maintenance and repair can contribute significantly to address female asset poverty but still needs to overcome institutionalized notions of gendered labour roles and women as primarily only the 'drawers of water' (McFerson, 2012; Cleaver, 1998).

The nature of women's social networks, needs and endowments means that women organise around shared water differently to men and often these forms of engagement are not clear. Westermann *et al.* (2005) and Cleaver (1998) call for institutional analyses of collective action and cooperative conventions to acknowledge not only gender differences but also to avoid the notion of 'rural women' as a social monolith. The fault of many institutional approaches is that they treat collective action around shared resources in an overly bureaucratic and formalized way, one that avoids gendered agency and capacity, and abstracts the individuals from their life-world (Cleaver, 1998; Summers, 2005). Women who are expected to participate or represent gender equality may only be able to do so symbolically. While policy upholds them as newly empowered recipients of improved water sources they may be having their decision making agency downgraded in new fora (such as hand pump committees which are typically seen as lending credibility and robustness to water management) where they hold little power in comparison to their ability to negotiate less visible rules-in-use as the main users of water points (Cleaver 1998; Chancellor, 2005).

The Ministry of Irrigation and Water Development of the Government of Malawi (2008; 2009) proposes in its Water and Sanitation Policy that "Gender equality and increasing women's empowerment have been shown to be key determinants of development…though women are often the primary collectors, transporters and managers of domestic water; as well as promoters of sanitation and hygiene activities, their views are not always systematically represented in decision-making bodies at village and national level" (2009, pp18). A review of reports, plans and policy documents from NGO's operating in Malawi reveals that gender issues are seldom mentioned (BASEDA, 2009; Marion Medical Mission, 2008; IRC 2010; Interaide, 2009). When gender empowerment and women's well-being are mentioned it is usually an acknowledgement that women bear the brunt of domestic water responsibility and that their participation and training is important in VLOM. Moser (2005) reveals that fourteen major government development agencies and large global NGO's all prioritise gender equality and the need for gender training.

Attempts to empower women and improve their lives through donated hand pumps and participatory policies certainly can be successful in alleviating some work burdens

and providing positive material and social benefits. It is, however, important to identify that even in villages where shared hand pumps are successfully maintained and repaired by the village community, women do not necessarily enjoy an enhanced agency, increased empowerment or improved endowments, as may seem intuitive.

'Mainstreaming gender' through development projects has a history of inconsistent outcomes and failing to live up to its claims of empowering rural African women or providing them with the material and skills benefits that often accompany development motives (Manase, Ndamba and Makoni, 2003; Moser, 2005, Ndesamburo, Flynn and French, 2013). Much of this is correlated with the often poor rates of success that many Village Level Operation and Maintenance (VLOM) based water provision projects experience in sub-Saharan Africa (Cleaver, 2001). It therefore seems plausible to assume that cases of successful village level collective action around water infrastructure management could directly benefit women – those most intimately tied to this infrastructure.

Development literature addresses the often incongruent ideals and perspectives between development bureaucracies, village institutions and gender (Ray, 2007; Watkins and Swidler, 2013) but there is scant mention of how even projects that are clearly successful in their humanitarian goals (maintained water hand pumps in this case) can still fall short of addressing the overarching gender empowerment claims that are commonplace in development literature. Certain authors (Cleaver, 1998; Prokopy, 2005; Westermann *et al*., 2005; Teffo, 2012) have investigated the way men and women differently experience institutions of collective action and social capital through development projects and I draw on their results here. Sen (2007) and Nkonya (2008) have written about the interplay between formal and informal institutions, arguing that both can be harmful or beneficial to women in development initiatives, depending on context. Sen (2007) warns that we should not take for granted any *a priori* assumptions about institutions, women and development. She argues that gendered analysis of collective action needs to acknowledge the effects of diverse formal and informal institutions when trying to understand their impacts on women and evaluations of development success.

This paper responds to Sen's call for an examination into the effects of different development institutions. In so doing it also contributes to literature on both collective action theory and gendered analysis of water development interventions. The author employs existing literature that acknowledges the cost to women of domestic water management in the developing world (Ray, 2007; Nkonya, 2008; Teffo; 2012) and operationalizes this gendered analysis through the framework of collective action institutions. There remains a distinct dearth of gender focused literature on the critically important topic of successful VLOM maintained hand pumps, despite calls for broader understanding of demand side institutions (Brooks, 2002; Sugden, 2003; Harvey and Reed, 2006b; ICE/Oxfam/WaterAid, 2011). This research addresses the gap in the literature on the nascent topic of gendered roles within the relationship between formal and informal institutions. It also makes further contributions to hand pump based water development policy that affects the lives of millions of women in sub-Saharan Africa.

4.3 Case Studies

This research was aimed at better understanding the social institutions that underpin successful village-level collective action around shared water sources; in this case 'Afridev' style hand pumps. This research contributes to better understanding of how some villages manage to maintain their hand pumps beyond evaluations of hardware performance, a research focus that has been largely lacking but considered necessary (Brooks, 2002). Primary research was conducted in five rural case study villages in central Malawi. Table 4-1 contains an overview of the five case villages.

Table 4-1. Case-study villages

Village Name	Tribal Authority Area	Occupied Households	No. of Interviews	No. of pumps	Pump Notes
Machilika	Chadza	28	19	1 Afridev on a borehole	Pump supplied in 1996
Kalonga	Mazengera	69	13	2 Afridev's, one on a covered well, one on a borehole.	Covered well pump supplied 1996, second borehole pump in 1997. Second pump non-functional – parts taken by village to repair the first pump and borehole casing subsequently vandalized.
Mazinga	Chiseka	65	13	1 Afridev on a borehole.	Supplied in 1998.
Chimphanga	Kwambiri	30	19	1 Afridev on a borehole	Supplied in 1996
Makumba	Jalasi	31	6	1 Afridev	Supplied in 2000.

This research involved a two phase approach. Case selection took place in the first phase and the knowledge gained here proved extremely useful to the research overall. During this phase a series of short visits to likely candidates for case study's took place in four Districts, including Lilongwe, Dedza, Salima and Mangochi. The geographic areas visited were determined using a combination of 2008 Government of Malawi survey data on borehole functionality, along with recommendations from partners at Bunda College of Agriculture. During this phase, unstructured interviews were undertaken with villagers to discuss the status of their current water points. These interviews were recorded by the making of notes during and after the interviews. Many villages indicated that they had pumps currently in disrepair or that their pumps had a history of extended disrepair. In each of these cases, basic information was collected regarding causes of breakdowns and the barriers to repair. In total 61 villages were visited during the research period.

The five villages selected were those where hand pumps had been working effectively and had been kept in good repair for at least ten years. These villages did not have any exceptional demographic, geographic, or economic characteristics that would distinguish them from other villages in the surrounding areas. These villages were selected to investigate how or why they were able to overcome challenges that other villages had not overcome. Each of the villages had experienced numerous pump repair events that they undertook themselves. In essence, these are all villages that have successfully operated and maintained their pumps at the village level, which is the key goal of a VLOM approach.

4.4 Methodology

The second and primary phase of the research was an intensive multi case study with five village level cases. The main approach to information gathering were semi-structured interviews, conducted in the native ChiChewa language, augmented with observations and an exit survey. Once a case study village had been selected in phase one, permission to conduct interviews and observations and to maintain a presence in the village was sought from the chief. An initial period of sensitizing was undertaken for normally two to three days, where the researchers would simply spend time in the village getting to know the community, visiting and beginning to get a feel for the social structures and issues surrounding hand pump management. Interviewing was undertaken both by purposively sampling participants and using the 'snowball' method subsequent to that. Group interviews were typically conducted with naturally assembled groups, quite often women going about their daily duties or taking work breaks, a method that can, and did, create favourable interviewing situations (see Gomm, 2008; Nkonya, 2008). The data collection involved an iterative process of progressive focussing on emergent themes and topics (Gomm, 2008; Yin, 2009) over repeated visits to each village. After the initial sensitizing period the researchers would spend three or four, week long periods in each village, with each period separated by a week to three weeks. During this process of progressive focussing, initial questions were fairly broad in their scope and were honed or changed with each iteration of interviewing, observation and community familiarity (Stake, 1995; Gomm, 2008;

Singleton and Straits, 2010). The cumulative nature of this methodology served to illuminate findings and unexpected phenomena as discovered in the research, rather than forcing the research to conform to pre-figured theoretical assumptions that may be inappropriate (Merriam, 1998). It was found that the process of multiple visits created a good relationship with village members in the cases. Villagers were most often very happy to welcome the researchers back to the village and a sense of friendship and trust was built between the researchers and a number of the villagers.

At the end of the research period a structured household level survey was conducted in four of the five case villages[7]. This survey was designed to measure socio-demographic data, livelihood data and elicit opinions and stated preferences regarding hand pump use and hand pump management. A total of 192 household surveys were collected. These ChiChewa language surveys were conducted by the then familiar research assistants in an interview style with the household head or their spouse.

4.5 Research Findings

4.5.1 Gendered Frequency of Use and Indicators of Gender Agency

In all five case study villages it was immediately apparent that women perform, by far, the most water related duties. Across the main water use activities women and girls performed almost all the hand pump collections. Typically male related water use activities, such as livestock watering and brick making[8], also relied heavily upon females for collection of this water. Table 4-2 shows the clear dominance of female participation in the main hand pump use categories.

[7] Time constraints precluded the fifth village from being surveyed.

[8] Livestock watering from the hand pump is infrequent. The use of hand pump water for brick making is typically banned or tightly controlled in most villages. Brick making normally happens in later winter and requires substantial amounts of water. These requirements translate into increased queuing and wear on the hand pumps; hence brick making water is typically required to be sourced from open wells. However, many women choose the hand pump if they can as it is usually a shorter trip to transport heavy water loads back to the village.

Table 4-2. Female water use rates for main domestic purposes, by household number, for four case villages (excludes other hand pump uses that are still female dominated but less frequent such as gardens, brick making and livestock watering)

	Water use responsibility			
Village #Households	**Drinking (Handpump use: 100%[1] of households N=192)**	**Cooking (Handpump use: - 86%[1] of households N=192)**	**Bathing (Handpump use: – 96%[1] of households N=192)**	**Laundry (Handpump use: – 81%[1] of households N=192)**
Machilika N=28	Women – 28[2] Girls – 7[2]	Women – 28 Girls - 9	Women – 28 Girls - 8	Women – 25 Girls - 7
Mazinga N=65	Women – 62 Girls - 10	Women – 63 Girls - 11	Women – 62 Girls - 9	Women – 61 Girls - 9
Kalonga N=69	Women – 64 Girls - 20	Women – 64 Girls – 18	Women – 66 Girls - 17	Women – 66 Girls - 17
Chimphanga N= 30	Women – 26 Girls -6	Women – 26 Girls - 6	Women – 26 Girls - 5	Women – 25 Girls - 4
Total % of households[3]	Women – 94% Girls – 22%	Women – 94% Girls -23%	Women – 95% Girls – 20%	Women – 92% Girls – 19%

1 The frequency of households that report using the hand pump for this purpose.

2 Number of households in the specific village where women and girls are responsible for that specific hand pump use category.

3 Percentage of households where women and girls participate in this hand pump use category.

In contrast none of these four case villages reported more than five households where boys (<18years) participated in hand pump use and no more than one where adult males used the hand pump for these activities. Machilika Village reported no adult male

use of the hand pump for these core functions and in the other three villages the single households that did were single men. In most cases where single men live alone they still rely on women or girls from other households to deliver water.

Financial contributions to periodic hand pump maintenance and repair efforts were a key collective action indicator in the case villages and an important measure of cooperation. The ability to make contributions promptly when requested was considered to be a very important collective gesture in the case villages. Despite the clear prevalence of almost exclusive female use and stewardship of the hand pumps, almost all financial responsibility and decision making rested with men. Of the households that reported on their last three financial hand pump contributions (N=178), 127 reported that this function was the sole purview of the male household head. The cases where women were responsible for financial cooperation were the 31 households that reported as being headed by a woman. Only 14 male-headed households reported that women had helped with financial contributions in at least one of the last three rounds of village contributions. The primacy of males in these contributions served to cement them as the key formalized contributors and decision makers to pump management, despite their almost total disconnection with its use.

Also a common theme throughout was the gender discrepancy in technical skills and training. While many participants, both male and female, responded that women should be more responsible for the pump, and while women are clearly the main users of the hand pumps, the pump repair in all five case villages was undertaken by men. Women had been trained or at least claimed familiarity with technical repair in four of these villages (excluding Kalonga), yet were no longer active. In all cases where women had been trained they had stopped their repair duties due to conflict or for reasons that were unclear. Often when interview respondents were asked why they thought local women had quit their repair work they appeared uncomfortable and would often answer that ‘that is their business, it’s not for me to explain’. When queried themselves, the women in question would typically admit that collective conflicts had demotivated them and that they found the duties to be onerous because of conflicts and arguments.

Despite these frequent failures with female repair technicians during the in-depth interviews female research participants almost unanimously stated that women should have more autonomy regarding the hand-pump and it's management; most notably they believed that they should be endowed with the ability to repair and maintain the pumps. Common were responses like this one from Kalonga village:

> "To tell you the truth, women play a pivotal role when it comes to the issues of boreholes. If a woman can know how to dismantle and fix back the borehole then you be rest assured that things will always move as far as boreholes are concerned…Suppose the borehole dysfunctions while these men are not home, what would we do? That is the reason why we need women to be included because they are always home taking care of things."

A similar admission from Machilika Village:

> "…us women, we can be very happy if we have been trained how to fix the borehole."

In all cases women were *de facto* responsible for reporting pump wear and breakage due to their almost exclusive use of the pumps that translated into ongoing pump vigilance. Their desire to increase their effectiveness and responsibility as more than just reporters-to-men of pump breakdowns was also reflected by female respondents to the household survey. A series of stated preference questions asked the household head or spouse to select one of two options from ten questions. The exercise offered a hypothetical scenario where their village pump was broken. Situation one was the option for resources to be used to make the pump functional again, option two offered an alternative use of resources. The alternatives ranged in value and utility and included: 1) *Gule Wamkulu*[9] dancers at a village ceremony 2)irrigation furrows for gardens 3) new clothes 4) fertilizer for their gardens 5) a goat 6) malaria medication 7) training in pump maintenance and repair 8) access to more unprotected shallow wells 9) abandoning the pump for cost reduction 10) a chicken. The response to question 7

[9] *Gule Wamkulu* traditions are a predominant part of Chewa culture and feature frequently in village life.

revealed that 46% of male household heads (n = 42) would prefer to be trained in pump repair, opposed to 54% who would prefer the pump to be fixed by some other means. Sixty six percent of female household heads, or the spouses of the male household heads, stated that they would prefer to be trained in pump repair (n = 150) as opposed to 44% of female respondents who preferred a pump repaired by other means.

A common theme identified in analysing the interviews is that most women were willing to incur the time costs associated with training and pump repair. In many instances interview respondents would emphasise this, such as this participant from Machilika village who responded to the question about whether women will have the time to fix the pump:

> "…but how can she be busy while the borehole has a break down? She has to stop some of her work. For instance, this is the farming season now but when the pump has a break down she will have to repair the borehole first before she goes to the field since even you know that water is life."

A number of women mentioned that they would be well served by ongoing in-village training opportunities but that they did not receive support for this. Due to their other labour commitments they were frequently sidelined when it came time to do pump repairs, as the following participants revealed. When discussing why women had such a poor knowledge of technical pump maintenance in Machilika village:

> "Women do not know anything at all, and he [their previous repairman] never invited us to watch so that we may learn basic repairs in case he travelled."

This male participant in Makumba village explained that women didn't need to come and participate or learn as they had other commitments:

> "…these [repair] jobs are for men only, the women stay home to do other household chores, and they don't need to come to the borehole when the work is in progress."

This last admission is emblematic of the dissonant role women play as being stewards of water through lives intimately tied to the hand pump, and also being largely interested in assuming more technical roles, yet largely being external to the formal decision making and management processes around these pumps. The prevalence of this paradox was neatly summarized by this response from a woman in Chimphanga Village while discussing women's formal status in managing the hand pump:

> "Q: are there any women who have authority over the borehole?
>
> A: I have never heard of any"

While some women were often seen as leaders amongst their female peer's, men typically gave final consent to any issues surrounding the hand pump. In all the case villages, women's groups were active in cleaning the hand pump area and ensuring that rules were adhered to. In many cases women would be punished by men if they were neglecting their duties. For example the chief of Chimphanga village, a young and progressive chief by all accounts, admitted that gender roles needed to modernize but still oversaw a gender structure typical of most villages. In that village a male chairman had taken charge of supervising women's labour roles after an incident of conflict when a woman trained in pump repair quarreled with other women.

> "[The chairman] is the one in charge. He makes sure that the duties are done accordingly; he organizes women to work on specific days starting from Monday to Sunday as some say water is life we need to take care of it."

In Machilika village women were acutely aware that they were *de facto* stewards of the pump but were vulnerable to sanctions imposed by male decision makers:

> "…the main responsibility of making sure that the borehole area is taken care of belongs to us women. But if men discover that women are failing in their duties, they will then lock it for a little while as a way of punishing us and let us appreciate the importance of keeping the area clean".

In Makumba village a participant lamented that despite their initiative and motivation to act collectively around the borehole and hand pump they are still beholden to enforced male leadership:

> "…we have women who volunteered and they work all the time, but men are the ones who head the committee. But as at what happens at the mosque, there is nothing we can say."

4.5.2 Gender and Collective Action Institutions

It was apparent that there was a clear incongruence between the way village women often structured their version of pump management institutions and the way in which WPC's and formal leadership institutions had been structured. This research found that in all cases the WPC's that were introduced to the villages' by external agents along with their boreholes and pumps had all but disappeared in their original, intended forms. Most times the structure called a 'committee' in the villages was found to be a group of social entrepreneurs who had become 'water point leaders'. They, in concert with village members, had evolved and shaped the WPC in an *ad hoc* and more contextually appropriate manner. Still, many of the stated rules persisted in the village lexicon and the legacy of these first committees and skills training programs were still evident within the thoughts of many villagers and the conduct of some formal leaders. Statements about having had a WPC with 'gender representation' and having a woman or two trained to repair the pump were common. These forms of earlier organization were different to the way in which most village women prefer approach the collective management of the hand pump and at times were in opposition to the endogenous gendered institutions that fit well with women's lifestyles and commitments.

The manner in which women approached rule enforcement, sanctioning and their response to hand pump conflict was typically different from a number of the villages' stated 'constitutional rules'. A number of women explained that they seldom resort to formal sanctioning and discipline measures when other women free-ride on labour duties or break hand pump use-rules. In most cases women conducted these institutional negotiations amongst themselves, without men, often around the hand pump or while interacting during the course of their day. A pointed explanation from a

woman in Makumba village highlights this after she explains how women typically operate within their own institutions that are better suited to the exigencies of their lives, “We women are comfortable to talk about stuff that takes place at the borehole”. This following participant from Chimphanga described their response to a woman who had not completed her duties on time, the day she was interviewed:

> “Q: What would happen if the women refused to go and work?
>
> A: Actually it has happened today; one of the women refused to work but other women talked with her and finally she joined them to do the job.
>
> Q: Suppose that there are four women in a group and two or three of them are absent; do the others present still work or what exactly happens?
>
> A: Those that are present will still work but they will make sure that they find out why their friends didn’t report on that particular day.”

Similarly this woman from Mazinga village described how women will normally handle disputes without resorting to reporting the conflict to those who had become hand pump leaders after the formal WPC’s waned, or the chief:

> “…if that [conflict] happens one of the ladies is supposed to come to one of the senior members like myself. She explains what the problem is and later it is me who will do the job on their behalf after understanding their problems.”

The phenomena of breaking communal work schedules or set rules because of other priorities or due to the realities of daily life was evident from the use of the children as water carriers. In all five case villages one of the first formal rules that were described was always that ‘children may not play on the pump and may not operate the handle’; the rationale being that smaller, weaker children often cause more wear because they bang the handle at the bottom of its stroke. Yet in every case it was observed that

children were always around the pump, often playing and often operating the pump. This rule had merit from a wear and tear perspective but for many women it was untenable as their children could be very useful for fetching water if they were busy or for carrying extra containers when accompanying their mothers. In Kalonga Village the Government of Malawi Health Surveillance Assistants (HSA's) had also recommended that children be disallowed from using their hand pumps. When the village still had a functioning WPC its members at times would try and enforce this rule which proved to be unpopular with many women who would revert to using children after being reprimanded. The incongruence between the WPC rules and the norms practiced by women to alleviate their workloads was explained by this participant in Kalonga:

> "The 'committee' may go there and talk to the children and advise them to leave the place. But you would find that there are a certain group of women within that will start backing up the children saying that you cannot send them away because they are the ones who fetch water for them."

HSA's visited that village during the research tenure and strongly recommended to the chief that a new operational WPC be reinstated, with equal gender representation. There was unfortunately nothing they could do about the pump which was broken but crudely repaired while awaiting four new bolts at that time.

Gendered social protocols and labour arrangements also affect women's capacity as actors for the water pumps upon which they rely (Nkonya, 2008). Chimphanga village was arguably the most progressive and well organized case study village, as evidenced by their leadership's willingness to show off their stock of pump parts, their well-maintained ledger of pump and borehole related accounts and the overall infrastructural state of this village. For a small village they were very well organized and possessed a number of communal assets including a village ox wagon and clay oven, both of which were used to generate shared income. The chief, on a number of occasions, promoted the ideals of gender equality and the modern ideals of women being able to perform any technical tasks. However, the village had recently sent two women to a pump repair training course held by the French NGO Inter Aide. They had

performed a few duties and then abruptly quit their role as repair technicians due to what most members termed 'arguments' with other villagers'. In their place a young man had been appointed by the chief as the new repair technician and as the 'leader of the women'. He was to direct the shared work responsibilities of women and direct their scheduling. In addition, any problems noted with the pump were to be reported to him. The institutionalized notion of women's roles - drawers of water- and men's technical responsibilities – decision makers and hand pump repair technicians - was still clear even in this village that outwardly appeared to be very progressive by local standards. When asked in an earlier interview in the same village what women do when they notice a problem with the pump, this participant explained that they are to report the problem and then defer to their husbands to source the funds for repair contributions:

> "Normally the chairman will ask the women to gather and inform them what exactly needs to be done at the borehole. And whenever there is need to make any contributions, they will be asked to inform their husbands."

Gendered separation of labour roles was also articulated through deeper cultural institutions. In opposition to Chimphanga village, Kalonga village could be described as the least progressive case study community. The village exhibited more undesirable social traits like high levels of intoxication amongst men and the lowest levels of school attendance amongst children out of the four villages surveyed (average years in school for under 18's in surveyed villages was 2.7 for girls and 2.8 years for boys. Kalonga was 1.8 years for girls and 2.3 for boys). Most of the collective action and shared labour was undertaken by the chief and small core of informal and entrepreneurial leaders and volunteers. In this case it appeared that women felt a constrained agency due to entrenched gender roles. During a group interview with four women they agreed with the acknowledgement of one that wanting to learn to repair the hand pump is difficult for women with initiative:

> "…us women do not show interest [in going to participate in repairs] because we respect him as our chief. He might feel that you do not

> respect him if you come near him more often according to Chewa culture. That's why we said men are ones who should go but they don't show interest."

Overall, what was evident from the field work was that women in the case study villages were the main users of the shared communal hand pumps and were by virtue of this fact the most vigilant of the pump's condition and of its inherent value. The benefit of the of pumps as a means of saving time and labour and mitigating a myriad of health related problems was well articulated by research participants. The most interesting revelations by women in these case studies were that they felt a distinct alienation as actors who could not definitively influence these infrastructures with which they were so intimate. They felt poorly trained and lacked the authority to make technical decisions regarding the management of these pumps. Financial contributions to repair efforts in these cases were central to collective actions to maintain the hand pumps and women for the most part lacked capacity in this regard. Similarly they were required in most cases to defer to their husbands or male leaders when they identified the need to report mechanical wear or to warn of impending breakdowns.

In contrast to this strictly gendered hierarchy in the more formal structures, women typically had a more robust set of informal institutions, external to the strict formal village rules, which they used to sanction each other, organise collective duties and negotiate rules of conduct around the use of the hand pump. These informal women's institutions stand as evidence that often the formalized rule and sanction systems around water infrastructure were in many ways inappropriate to the daily exigencies of village women. The simple act of organizing a gender representative WPC for instance does not ensure improved gender agency or equality. On the contrary, as in one of the case villages (Kalonga), a participant described how women seldom attend village meetings as a significant proportion because of their other duties and because they don't see themselves as effective in those fora. These results show that even in villages with successfully managed hand pumps village women may experience little or even a declining capacity to affect their wellbeing and may need to acquiesce further to gendered divisions of labour that divorce them from the agency that both the hand pump and formal collective action structures were meant to improve.

4.6 Discussion

The evidence from these cases shows that although the supply of hand pumps has a number of positive health impacts on the lives of women and girls, often they assume the status of passive technology recipients, rather than harnessing these pumps as agents for change. Although the rural development rhetoric and policy aims to foster gender equality, in the case studies the minimised autonomy women experience was reified through this infrastructure that favours male agency (also see Wallace and Coles, 2005). Having symbolic gender representation in some structured institutions with continued reinforcement of male management authority only reinforces the role of women as bearers-of-water. In the case study villages the ostensible attempts at improving gender agency through the highly useful hand pump has done little to empower village women.

The normative ideals found in gender representative WPC's (a phenomenon that historically occurred in all the cases) or training to ensure a form of gender equality belies the institutional reality found in the case villages. Vollan (2011), Ostrom, (2005) and Zulu (2008) all caution against the reliance on these highly structured and crafted institutions in order to shape social and gender relations. Cleaver (1998; 2002) further warns that implementing new bureaucratic institutions (e.g. a gender representative cadre of repair technicians) can over-homogenize the notion of gender and abstract diverse individuals from their life-worlds, where their capacity to act in their new role is constrained by pre-existing identities or social endowments. Acknowledging women within a formal leadership group does not necessarily translate into elevated agency. This was clear in the observations and narratives above where women had adopted their own dynamic institutions when dealing with issues around the hand pump while having to negotiate some of the formal rules and leadership structures in their community's rules and institutions that were often unsuited to women's daily commitments or carried high costs for adherence. When deviating from the explicit rules of conduct around water pumps women are challenged with undermining the apparent credibility of an effective pump management system even though these are often systems that have not been shown to favour women's needs at all (Cleaver, 1998).

As Cleaver (1998; 2002) further points out, if the formal rules of management structures are seen to be the credible vehicle for determining conduct and ensuring norms of behaviour then any attempt by women to renegotiate these or deviate from them leads to deeper gendered conflict. The examples of needing to use children to assist in water hauling are a good example of this. The practicality of this need was at odds with a village rule and resulted in costly conflicts and ongoing views that women were often to blame for conflicts over breaking hand pump rules. This is especially true when the bulk of decision making and authority remains a male domain, as highlighted in this research.

The finding that development efforts aimed at bringing women into symbolic positions of leadership and autonomy often produce institutions that undermine their efforts is made worse by the fact that women quite often rely more on less costly alternative forms of collective decision making (Cleaver, 1998, Agrawal, 2002). Like the evidence presented here of women managing free riding or conflict within their groups through organic relational means, Westermann *et al.* (2005) also found that women are likelier to collaborate on collective action issues outside of formal processes. Due to their daily commitments in these situations they favour more informal, *in-situ* collaboration, for example collective rule negotiation while involved with the labour process (like collecting water at the pump), rather than costly meetings – such as the village or WPC meetings. Westermann *et al.* (2005) also found that women tended to be less inclined to preserve institutional orthodoxy and were more willing to negotiate changes, such as the pervasive ongoing debates over children's use of the water pump to help their mothers or older siblings. The evidence of women preferring their own 'informal' institutions aligns closely with these authors own findings that women often lower their social transaction costs; this too was evident in this case research that showed low, ongoing transaction costs (e.g. 'informal institutions') were preferred to less frequent but high per-event transaction costs like large village meetings (see Chapter 3).

The acknowledgments by Ostrom (2005), Vollan (2011) and Cleaver (2002) that the existence of highly structured, formalized institutions like WPC's do not ensure resilient collective action and community trust have bearing on these research findings. This can be argued to be of increased relevance when gendered divisions are deeply entrenched; the creation of social arrangements ostensibly to improve this must be treated with

caution, lest it create deeper divisions - for example the recommendations by government HSA's that village strive for gender representative WPC's despite their weak social traction, especially amongst women . In the village cases the decision making power of men had the effect of impugning the efforts of women within the more formal institutions likes the WPC's. Within these structures women would be seen as obstructive and relatively powerless to make explicit changes. Impediments to women's agency arise from strict labour roles that favour male autonomy over technology, like hand pumps. Ray (2007) states that these infrastructures are often seen as within the sphere of male control, despite women's greater use of them, and this is apparent in the results from this research where women were often excluded from technical repair either because it was deemed that they had more appropriate work to do or simply because it was not something to which they could contribute. Similarly where women were trained to maintain pumps they inevitably grew tired of the conflicts that arose around their new, unusual roles, as in Chimphanga village.

The lack of gender agency often stems from cultural norms that inhibit challenges to male authority. Women may be reluctant to argue or assert themselves, as seen above in Kalonga Village, even if they disagree or would like to act (Chancellor, 2005). As technology changes in many of these villages the nature of labour demands and social relations may be required to change even if traditional expectations remain the same. Sen (1999) argues that these gender conflicts are often solved implicitly, essentially through the informal means and contextual rules-in-use approaches like those that emerged amongst women in the case villages during this research. It is important therefore that these processes are not impeded by gender roles that are further normalized by overarching formal social arrangements, like new WPC's, that diminish the evidently different style of collective institutions the better suit women in these contexts (Cleaver, 1998).

Joshi (2005) makes a strong case for the need to understand women's contributions from the position of costs associated with collective action and ways in which they can reduce their costs, ways that may not be initially evident from the outside. "Scant attention was paid to whether different women had the resources or institutional support for effective social involvement in previously male-dominated domains" (*ibid*,

pg 139). Failures to identify this can mean having women trained in pump repair who were the wrong choice for the job (as seen in Chimphanga Village). The 'failure' of these female actors invariably leaves some to doubt the effectiveness of women in management roles and often results in the reinstatement, and inadvertent reinforcement, of male centred control. The women most likely to be able to adopt leadership or technical roles will likely emerge from pre-existing local relations, rather than being selected through committees and user groups that might in fact impede the emergence of more effective female actors (Joshi, 2005 ; see Zulu, 2008). Westermann *et al.* (2005) highlight the vulnerability of women's autonomy to rigid authority structures and also helps explain how strict forms of organization may crowd- out or disregard women's commitments to cooperate, or create a disincentive for collective action if different attempts at action by women are seen as incompatible with the rules or a threat to existing norms (Vollan, 2011; Ndesamburo *et al.*, 2012).

The evidence of women constrained by traditional gender roles cannot be ignored, even in these cases that have varying degrees of improved gender acknowledgment or subtle states of women's autonomy, where there have been attempts to facilitate their agency with water pump involvement. Cultural taboos or practices prevent women from doing 'men's work', as highlighted in the results shown here. And yet the physical evidence does not support the idea that women are incapable of manual labour, in fact the contrary is the norm in agriculture (Nkonya, 2008; Adams *et al.*, 1997). For example the much valued *Gule Wamkulu* tradition amongst Chewa people in Malawi even contributes to impeding access for women to clean water sources. It was observed during this research in Kalonga Village that *Gule Wamkulu* practioners would 'camp-out' for periods of up to two days at the water pump during certain ceremonies. Women and children are universally terrified of these 'spirits' and the practitioners hold the water pump hostage as a means of extorting funds from them, forcing them to either request access to neighbouring pumps or use unhygienic open wells. It is thus that women often live in very different cultural realms, even if there are superficial attempts to change this (Sen, 1999; Moser, 2005; Ndesamburo *et al.*, 2012).

These gender inequities also highlight the contrast between women as water pump stewards nonetheless reliant on male decision making and financial largesse. The

reliance on male-administered funds at household level, as was predominant in the case villages, further downgrades women as being seen as meaningful contributors to the communal infrastructure projects and as less self-sufficient, especially when men frequently migrate for labour (Adams *et al.*, 2005). The participant women who stated that they should be the ones with better training and authority make not only claims about their agency but also practical proposals. Despite the time burdens women experience they said in this research that they would be committed to the water pump and that men are often away at work, leaving them vulnerable to breakdowns. Adams *et al.* (2005) also raise this issue of migrant male labour in Kenya, as well as a lack of motivation from village men who abuse alcohol and are rendered unmotivated – a critique also evident in Malawi. Although issues with alcohol appeared uncommon during this research they were frequently observed in Kalonga village where conspicuous consumption of the traditional corn husk *Kachaso* was evident daily. This was also a village where women cited a lack of male motivation (other than the chief) and one where strict gender roles were evident. Furthermore matrilineal traditions are common amongst the Chewa and this often means a higher mobility of young males who may leave their home villages with much needed pump-repair skills.

Moser (2005) and Chancellor (2005) both acknowledge the problems of trying to institutionalize gender equality and empowerment through interventions like water pump infrastructure or assistance with village level bureaucracies, and the nature of traditional gender identities. Teffo (2012) argues that traditional leadership and customs can play a vital role in creating congruence between normative development policies that focus on women's agency, and traditional social structures. Teffo believes that the role of traditional leaders can useful in beginning to transform patriarchy and the tacit beliefs that women can only fulfil certain social roles like domestic work and food production, but not technical infrastructure duties. Sen (2007) agrees but highlights that it is also some informal or customary institutions that supress gender equality and that in these cases certain kinds of introduced or exogenous institutions from the state and/or development organization may help turn this tide. Women certainly have been successfully trained as pump mechanics in Malawi and elsewhere – like Kenya (Ray, 2007) but even with these skills women often find themselves sidelined

in communal decision making and actual genuine authority hierarchies (Ndesamburo *et al.*, 2012 and Ray, 2007). Teffo (2012) makes a firm case for the role that traditional and customary leaders can play in making useful inroads in the gender mainstreaming polices of governments and development NGO's. He believes that these leaders and need to experience capacity building and education from polices that focus not just development interventions like water pumps but also on gender integration at all levels of governance, a recommendation often espoused by development NGO's but often poorly carried out (Moser, 2005).

4.7 Conclusion

It is clear from this research that even where village hand pump projects are successful in terms of initiating some kind of VLOM over the long term they can still fall short of the gender equity or empowerment goals that often underpin these development interventions. Mainstreaming gender is significant challenge in African development projects; one that goes well beyond policy or one-off forms of participation in training or new bureaucracies (Chancellor, 2005; Moser 2005). Actions like training women in pump repair are very important and can be successful, but success means that women in these roles need to enjoy institutionalized support from men and male leaders. These often engrained social perceptions are an obstacle that must be overcome if policy or initial efforts are to enjoy traction in the hand pump using communities. If not there is the risk is that these development programs may perpetuate gender stereotypes or further disempower women as simple bearers of water (Wallace and Coles, 2005; Beard and Cartmill, 2007).

The reliance on structuring institutions to enhance gender equity or empower village women must be viewed critically. The efficacy of formal institutions like WPC's can be valuable but the over-formalizing of village institutions and the reliance on technology, ostensibly to uplift women into positions of leadership, can be detrimental (Vollan, 2011; Cleaver, 1998). The effects of development interventions that will explicitly address women's burdens (such as hand pumps) may not lead to improved gender roles and the bureaucratic social structures that accompany them may in fact crowd out any intrinsic or organic gender agency or female leadership (Vollan, 2011; Zulu, 2008).

It should be noted that development interventions and planned social structures like WPC's can and do have value but it is critical that policy makers, researchers and practitioners acknowledge tenacious traditional institutions. The superficial layering of policies and infrastructure onto these may create a false sense of developmental achievement, even where the material outcomes (functioning water pumps) enjoy a measurable success. Ndesamburo *et al* (2012) recommend that polices focus not only on the visible and often superficial inclusion of women in participatory processes but concentrate purposefully on local leadership hierarchies which may help sway local opinion on gender perception and gender roles. In so doing it may be possible to surpass the semantics common in many gender policy documents (Moser, 2005) and achieve some congruence between development goals and customary gender institutions.

Development policy practitioners need to be astute in identifying gender relations within recipient communities and how collective action around communal water infrastructure is institutionalized from a gendered perspective.

4.8 References

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Chapter 5 – Conclusion

This dissertation offers theoretical, substantive and methodological contributions. Theoretically is offers additional insight into the existing body of work on collective action around common-pool resource institutions research and contributes to the literature on rural development theory in Africa. Substantively it offers some key findings that are applicable to development planners and practitioners. Methodologically it offers some lessons in the suitability of specific research methods and tools as well as approaching these issues of collective action institutions from a critical realist position.

5.1 Research Contributions

5.1.1 Theoretical Contributions

Examining the institutions of collective action around hand pump maintenance in these five case villages has contributed to the theoretical understanding of institutional diversity. It has also contributed to the advancement of understanding within the broader common pool management theory, these bodies of theory being highly interrelated. Empirical research of this kind on communal hand pump management is lacking in the literature, and thus this research makes an important contribution to that. Considering that hand pumps are so prevalent in water development interventions the empirical, field-based investigations using the institutional and collective action theories are valuable for furthering scholarly understanding as well as in the development and application of water supply projects.

A key contribution was to provide empirical evidence of how these rural villages employ institutional arrangements. Most notable was how communal practices and principles are arranged, combined and blended to become effective at institutionalizing collective action. The evidence of modifying and translating new exogenous institutional influences with those more deeply rooted within tradition and context is extremely useful to researchers and theorists in this field. The work on by institutional complexity authors such as Cleaver (1998, 2002, 2012), Ostrom (2005) and Campbell (2010) has

pointed to the manner in which external institutions, such as those promoted by governments and NGO's, often don't benefit development recipients and how local institutional adaptations to new phenomena are typically less functionalist and strictly ordered than many theorists have believed. This focus on *institutional bricolage* and institutional translation is relatively new and breadth of evidence from contributions such as this makes a worthwhile contribution to theory.

Meinzen-Dick, DiGregorio and McCarthy (2004) point out that development projects have often failed because of the lack of theoretical understanding of how collective action institutions arise in shared-resource user communities. The theoretical evolution beyond the 'blue-print' prescriptions for conditions that foster collective action (Ostrom, 1990, Agrawal, 2001) can be augmented through case studies such as these presented here. The more nuanced understanding of how institutional diversity and modification manifests have great potential for further building upon the institutional complexity and collective action literature. Some of these important aspects addressed in this research include the value of leadership and entrepreneurship by key individuals (see Marwell and Oliver, 1993), rule enforcement and sanctioning (see Ostrom, Gardener and Walker, 1994) and gender empowerment (see Cleaver, 2012).

5.1.2 Methodological Contributions

The use of translator-interpreter assistants is a frequently employed, yet often under examined field research method when investigators conduct qualitative research in the developing world (Camfield, Crivello and Woodhead, 2009; Shimpuku and Norr, 2011). The role and influence that assistants have on capturing qualitative data can be profound and if not given methodological attention by researchers can bring into question how thoroughly the targeted social phenomena have been recorded (Squires, 2009). The challenge for many researchers is to capture the nuance of social structures, like collective action institutions, through translator-interpreter assistants. The advantage of qualitative field work is that it enables the understanding of the subject-structure, what Rojas (2007) terms "…the person of flesh and blood in her circumstance…rather than the well-being of an academically constructed agent" (261). It

is the transfer of this knowledge in one language and cultural lens into another with minimal loss that is key to valid research results.

The work presented here contributed to the body of research that relies upon translator-interpreter research assistants by using methods to validate and triangulate the findings and to flesh-out nuanced descriptions of collective action in the case villages. Shimpuku and Norr (2011) recommend that translator-interpreters be involved in collaboration more deeply than just providing basic translations and simple data collection. This is especially true when the research questions require the understanding of phenomena such as social norms that are shaped by tacit perceptions of peoples lives' and their environments. This research involved the assistants in all levels of field research and the author sought feedback on cultural interpretations, translations, observations and translated responses to important questions. Chapter 1 section 3.5.1 describes the analysis process of *'Explanation Building'* and the ongoing process of working with the research assistants to verify descriptions of village phenomena and to build descriptions through an iterative testing process. The assistants were trained and familiarized through the research with ongoing awareness training of gendered responses, the role of a researcher, bias and notably the importance of capturing detail and nuance from clues to information about topics being explored. The author felt that this was critical to meaningful research as the assistants initially had to be coached to appreciate the value of detail and nuance. Salient issues listed by Squires (2009) that add trustworthiness to cross-language qualitative research were undertaken by the author. These included:

- Translation verified on random transcripts by a fluent bilingual third party.
- Used tertiary level educated transcribers and assistants who were known to and trusted by professionals.
- Employed the same translator-interpreter assistants through the research project.
- Had translator-interpreters who conducted the interviews double check random transcriptions for validity.

- Extensive description of the aims of the interview guides during the translation process.

Camfield *et al.* (2009) emphasize that researchers need to be vigilant of the errors that may arise with using translator-interpreter assistants in the situational type of research presented here. This research describes clearly the processes employed to ensure trustworthiness and validity in the research results while conducting field work with translator-interpreters. As such the author considers it to be a valuable methodological contribution to the literature on this type of field work.

Further methodological contributions stem from insights gained while working in these rural villages. The author noted earlier in the research tenure in each village that participants would sometime answer 'strategically'. When questioned about borehole, well or hand pump issues they would heavily emphasize the dire water situation in their village as a reason for further assistance, or would emphasize the clarity with which they apply strict formal rules and institutional procedures to managing their pumps. The latter to imply a strict adherence to the crafted rules that accompanied the arrival of the donated pump, rules that had, as shown in this thesis, often changed or vanished. Both responses are completely understandable. 'Outsiders' such as the foreign author or even educated, wealthier Malawians normally only visit villages as part of government or donor projects. Strategic answers are simply a way in which villagers hope to secure further (and necessary) development assistance from these unknown outsiders who are seen as a source of help. These kinds of answers, however, do not favor trustworthy research.

This phenomenon of 'strategic answering' was also verified by local academics and in-country partners at Bunda College. Furthermore, Chambers (2008) writes critically of many international development and aid research efforts as falling victim to this problem and hence suffering from systematic errors. His own experience of rapid incursions into rural villages in cross-cultural research also highlighted the problems of strategic answering along with distrust and withholding of information from research teams. The research presented here was the result of careful sensitizing and relationship building between the researchers and the participants. A sense of trust was

built (that often took days or even weeks) that was evidenced by the nature of responses changing as the research tenure in each case village progressed. Initial, obviously strategic answers often changed; depth and honesty became more common in replies and initial answers were sometime shown to be completely untrue by the end of the research tenure. Therefore the author believes that this work makes practical methodological contributions on this issue. Had this research adopted a field method of 'parachuting' into a village for a rapid survey on a complex issue such as social institutions and behavioral norms it is unlikely that the valid and trustworthy result presented here would have emerged. The outcome would more likely have represented 1) an exaggeration of the severity of the water problems 2) answers that pointed at how the village structures perfectly reflected the training the they received when the borehole/well and hand pump were supplied.

5.1.3 Substantive Contributions

Flyvbjerg (2006) makes a strong case for small N in-depth case studies as critical to the development of human learning about social phenomena. He articulates how the value of generalizability from this type of research is far larger than acknowledged by proponents of hypothetico-deductive approaches. It is with this in mind that the author considers this research work to offer development practitioners and policy makers important substantive constitutions. These recommendations don't take the form of strict blueprints for actions – a paradigm critiqued through this work – but rather as critical considerations for policy and practice. Contributions can be divided into three areas:

The first contribution relates to the identification and training of village technicians and enhancing village leadership (Chapter 2). The notions of formalized leadership that overlook the emergence of entrepreneurs or 'organic' leaders who may develop when opportunity arises need serious revision. This research highlighted repeatedly the phenomena of 'informal' leaders who assumed critical roles in leading, motivation and performing technical tasks, yet who were never formally identified, trained or supported by external agents with an aim to improving water management.

Policy and practice could use these findings to modify training approaches in villages. For example training more people, even at low levels which result in a broader dissemination of skills. Should repair people stop their duties for whatever reason these skills are more likely to remain resilient and emerge with an informal leader of village entrepreneur who takes the opportunity to lead on this issue. Training could cut across a broad swath of village demographics and include men, women and children, not only those chosen due to formal hierarchical or family connections, or those seeking short term status. It is worth noting that the costs of training are a very small cost relative to the costs of well construction and pump installation.

Secondly this research offers critical insights into the evolution, acceptance and application of social institutions around hand pump and water source management (Chapter 3).

Most noteworthy is how *ad hoc* institutions will evolve to supersede or significantly modify introduced institutions, morphing them into a different form. This is important to note these local institutions are lower cost and fit better with local social and cultural constraints. This insight offers a clue to development practitioners that crafting an 'ideal' social structure that is exogenous to the context in which is will be applied, may fail to ensure longevity of crucial water supply and hand pump infrastructure. As shown in this research the exogenous influences were often not fully displaced and continued to partially inform the new village institutions as elements of each them were blended by the community. On that note the notions of success and failure must also not be evaluated by measuring the persistence or tenacity of exogenous institutions that development practitioners may try to establish in recipient villages. The key realization is that a certain level of depth in understanding the social institutions and norms within a community can be critical to implementing successful VLOM water development.

Thirdly and somewhat related to the issues around externally crafted and introduced institutions, this research contributes further to the work on effective gender mainstreaming in development. Chapter 4 offers further support to the evidence that promoting women's interests and having women occupy what are often symbolic roles in name only doesn't lead to improved gender empowerment; at times it may further

impede women's agency around improved water infrastructure. Development practitioners can draw from these results evidence that placing women in simple structures like water point committees or promoting them with titles doesn't necessarily lead to empowerment or the improved well-being promised by policy prescriptions. Indeed it may have the opposite effect by disempowering the existing institutional processes that women engage in.

5.2 Recommendations

The author can offer further contributions from insights gained during research in the form of the following recommendations:

It is vital for policy makers, academics and field practitioners to understand, and to have development actions informed by, the notion that hardware and technology are only the first steps in alleviating poverty and improving livelihoods. Any kind of infrastructure (or resource management plan) existing under a VLOM-type regime will require collective action. If there is insufficient leadership or motivation, if too many people feel alienated by the imposed process or by internal conflict then the project will very possibly have a high likelihood of failing. Community behavioral norms and social institutions will ultimate determine the success of any VLOM or partnership development program. The application of simple, overarching and highly structured rules has been shown here (and elsewhere) to be tenuous. Locally evolved indigenous institutions may formulate and apply rules differently to development practitioners. Furthermore the approach through which institutions function in villages may be more fluid than the rigid bureaucratic style that development agents, government and academics tend towards.

A more thorough understanding of these forms of social organization can also be used to locate new water points in places that better serve cohesive user communities. Where physical variables permit, new boreholes/wells and hand pumps should be located in areas that would service social units that already act collectively, as far as possible.

Ongoing education linking health beliefs to clean water are vitally important as incentive to act collectively and value functional water infrastructure are linked these beliefs (Summers, 2005). Evidence of this understanding was prevalent through the field work presented here but in some locations still not saturated.

Any external selection of training recipients, leaders or village representatives could do well to incorporate innovative ways of selecting 'the right people'. For example village entrepreneurs who are strong candidates for further support could be identified by local shop keepers for example, when they purchase pump parts. In most areas it would be easy for a shop keeper to identify a local person who buys pump spares. In this way the leaders and repair technicians would initially be self-selected. It is with this in mind that self-selected demand driven approaches could be enhanced and encouraged as a way to drive higher success rates for VLOM type projects. Certain organizations have adopted similar approaches, for example requesting that a community collectively accumulates a small sum of money and/or materials before they receive assistance. However, this still doesn't fully enhance elements of demand driven development in those communities.

5.3 Study Limitations

Any studies of limited time and scope will present limitations to the information gathered. Case studies have been criticized because they lack the broad generalizability of other methods (Stake, 1995; Creswell, 1998). However, as previously noted, case studies such as these can offer very valuable insights that are transferable to other similar contexts and theoretical propositions, for example how other similar villages may structure their collective action and behavioral norms around water hand pumps (Yin, 2009; Flyvbjerg, 2006). It is important to note that the goal of the research was not to infer broad generalizability but rather to gain a more rich understand of the selected case studies. It is the author's belief that the case selection was such that insights can be drawn from these case studies that may be applicable to other cases of similar context.

The use of subjective qualitative research tools such as interviewing and observation, as well as investigator bias, can easily lead to misinterpretation and misinformation (Stake, 2010; Merriam, 1998). In order to mitigate false responses, controls to validate and

triangulate findings were employed (see Chapter 1) to ensure acceptable rigor and trustworthiness.

Further methodological limitations may also arise from the 'strategic answering' described in this work. The 'outsider' status of the research team may have resulted in their occupying a position of perceived authority in the case villages that influenced participants answers – with efforts to appease the researchers for fear of failing an 'audit' of village conduct, or exaggerating the severity of conditions in the hope of added material assistance from the 'outsiders' (Siedman, 2006; Valentine, 2005). This potential limitation was abated by thorough sensitizing and accurate noting of respondents statements that changed once trust relations were built with the team; these 'mature answers' then being thoroughly validated (Stake, 2010).

The language barriers addressed in this chapter and Chapter 1 are an implied potential limitation in the transfer of detailed information from ChiChewa (and some ChiYawo) into English. A strength of this study is that all participants in each case spoke the same language. This fact means that in group interviews for example there was no-one excluded because of multi-lingual issues. The author believes strongly that the methods used to translate and verify the accuracy of translations ensured that information loss and misinterpretation were minimized.

A further follow up visit to each case village may have proven useful after the initial in-depth analysis was performed back in Alberta. Using the explanation building approach it may have been useful to re-visit the case villages after more in depth analysis as there were still some questions that the author would like to have re-confirmed. The nature of the target social phenomena that underpin collective action are complex and multi-faceted. It is challenging to capture them all and make useful sense of these. If therefor stands to reason that some phenomena or explanations may have been overlooked. The nature of a research project and case study such as this implies a spatial and temporal constraint. The research aimed to gain insights into historic developments of collective action institutions but in real terms can only offer first hand insights into am limited time period.

5.4 Author's Positionality

I am white middle class male who has never lived in a village in Malawi, nor visited the country before this research project. I did, however, live in South Africa until my early 30's and have travelled extensively in Southern Africa. I have studied Bantu cultures and languages and have a lifelong passion for Sub-Saharan Africa.

Although approaching this work with vulnerable people from a position of privilege I believe that my personal history and interests equip me with insights and understanding that others who lack that African background may not appreciate. I sincerely believe that these attributes were assets in this research. With that stated I have no illusions that I am in these cases most definitely an 'outsider', both by ethnicity and culture. I cannot claim to intimately understand the lives of Malawian villagers, either male or female (I don't believe any other academic can either, unless they are from the same cultural context and lived experience).

Throughout this research project I was conscious of my historical bias and how my views on African culture, politics, international development and my own identity as a white male African may affect my work and may affect the views others had of me. To mitigate any bias that may have affected my work I ensured some level of 'checking' through the '*explanation building'* and interpersonal relationships with the research assistants and academics at Bunda College (who had rural village backgrounds and cultural ties). This helped provide additional cultural insights that I may not have identified on my own.

5.5 Conclusion

It would be fair to conclude that issues around the development of sustainable water infrastructure in rural African villages requires a nuanced understanding of social lives and manner in which village's evolve social institutions. 'Everything is not as it seems' would be a very wise mantra for development practitioners and researchers when attempting an enquiring or to implement development programs. The development industry has a long history of limited successes and only recently has the focus away from hardware and physical resources been given significant attention. Vast amounts of

money have been committed to fixing undersupplied resources in these types of cases and the outcomes are often disappointing. Failures can often be attributed to forces outside of end-user communities – markets, environments, conflicts, politics and poverty- but often times the communities themselves hold the potential to sustain development interventions. The key lies in facilitating this endogenous capacity (however small or robust it may initially be), and this research adds to a growing body of work that contributes to that realm of understanding.

5.6 References

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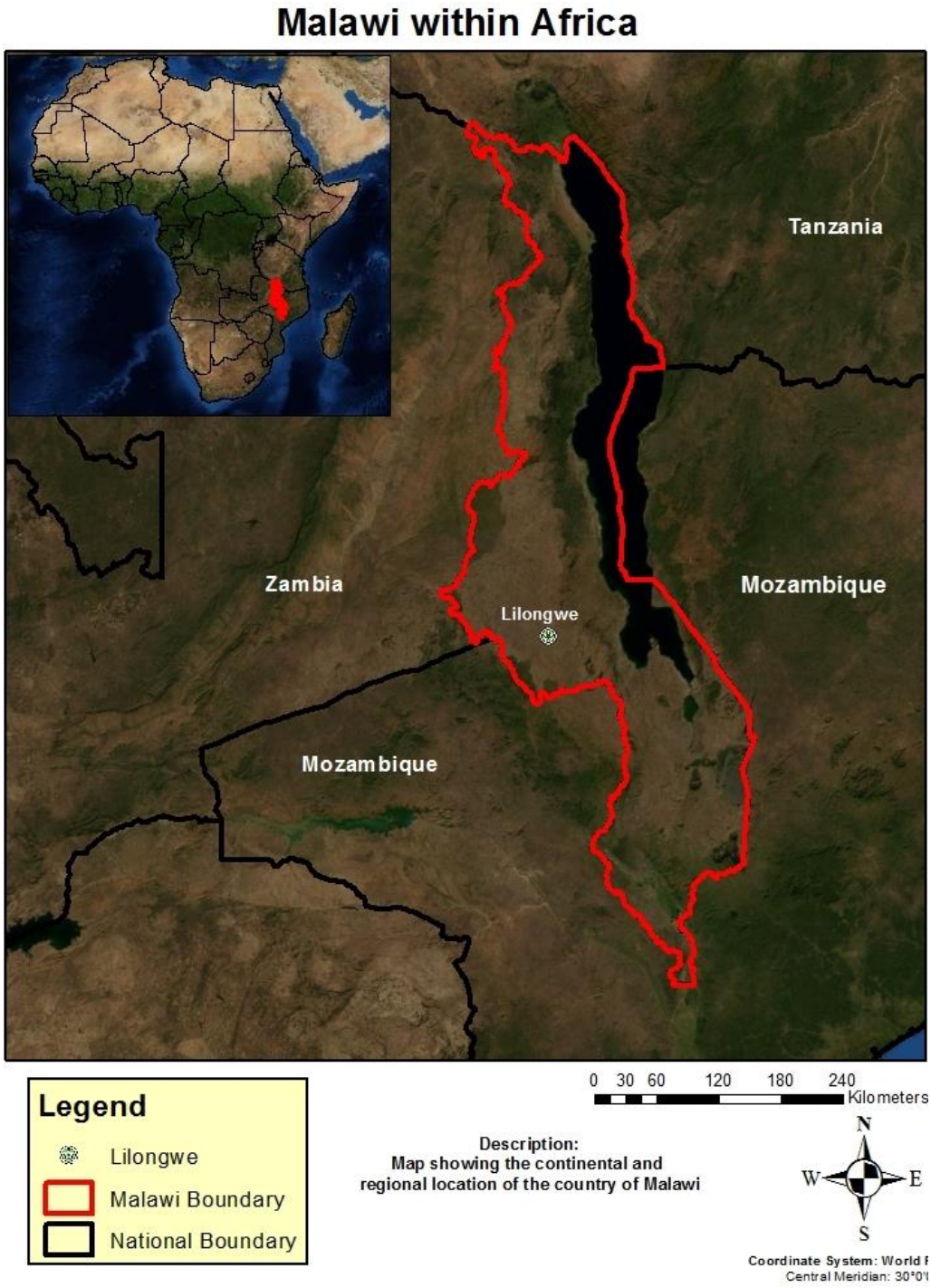
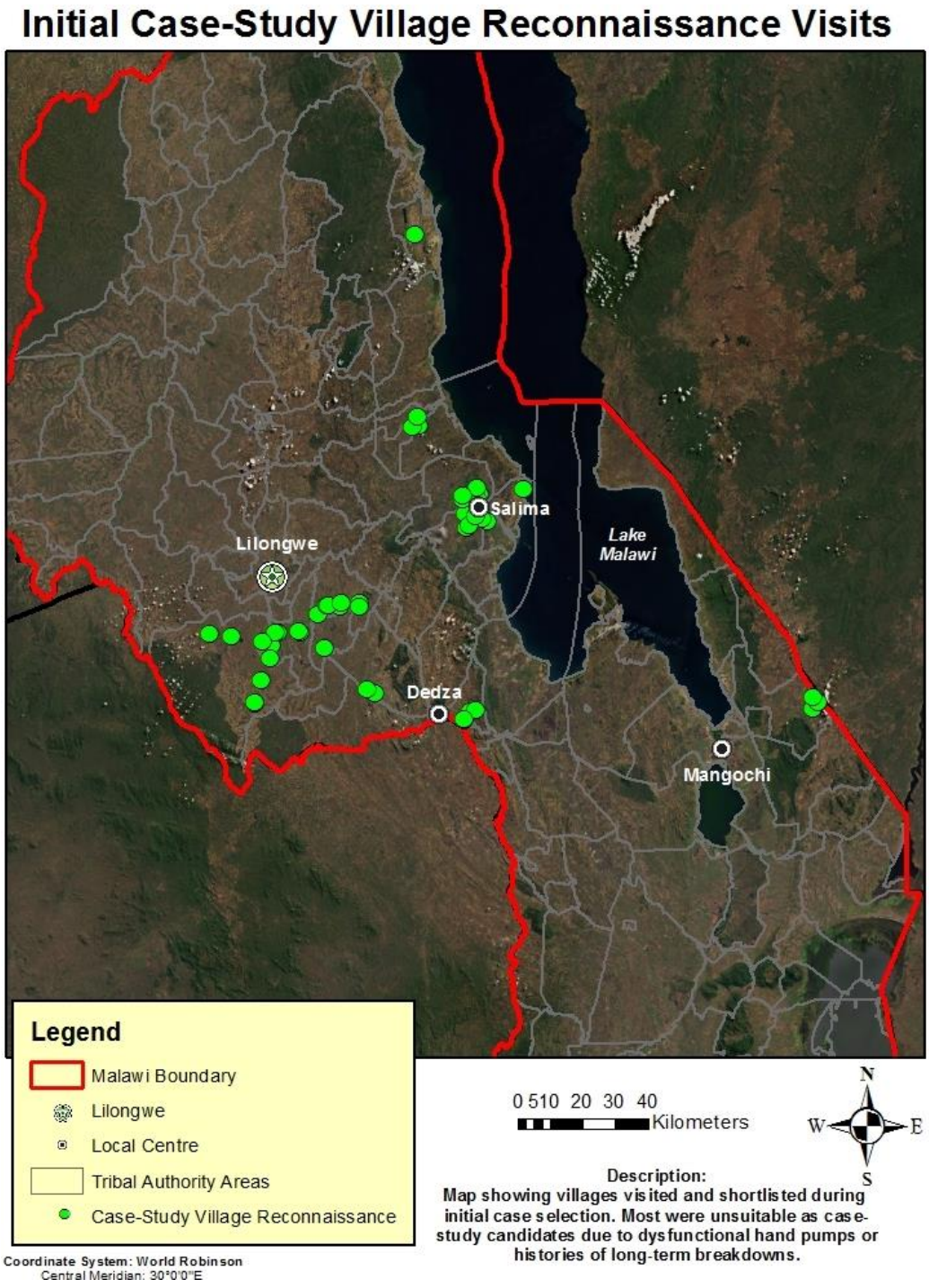
Appendices

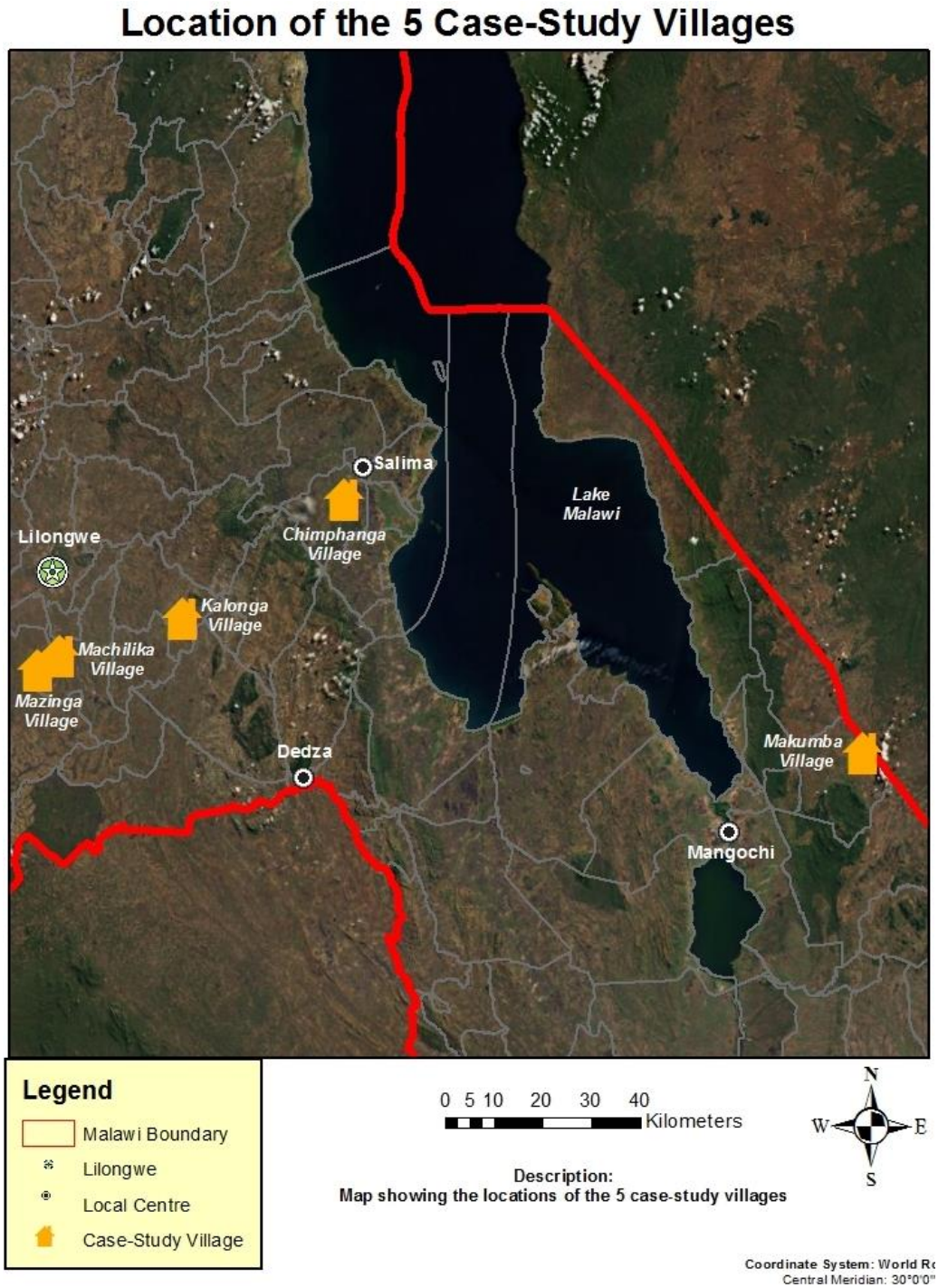
Appendix 1 – Map of Malawi showing regional context



Appendix 2 – Map of Malawi showing case study reconnaissance villages and short listed case study candidates



Appendix 3 – Map of Malawi showing the locations of the case study villages



Appendix 4 - Photographs of village boreholes and hand pump conditions

(Note: All photographs taken by the author in 2010, unless otherwise noted).

A common sight in Malawi – dysfunctional and stripped hand pump (near Nkhoma)

Open water in a *dambo* (seasonal wetland); a daily water source for many in the absence of improved infrastructure (Machilika village gardens)

A covered well that lacks a pump and has been modified to for rope-and-bucket use (south of Mitundu).

A crudely covered open well in a village; a serious health and safety threat (Filimoni area)

A partially protected open-well used for drinking water (Salima area)

A hand pump managed by a local mission school. The chains serve to lock it at night to prevent vandalism and theft (Dedza area)

A village that erected barriers to ensure orderly queuing and to exclude livestock access (Dedza area)

Village mapping exercise in Kalonga Village

Mapping exercise in Chimphanga Village (Photo: C. Joubert)

The absence of simple head-bolts can render a hand pump ineffective. This photograph shows a temporary fix while head-bolts were being sourced from Nkhoma (Kalonga Village)

Here a woman demonstrates how a protected well can be accessed with a rope and bucket if the hand pump is inoperable. This is better than an open well but in many case this become the default condition in the village (The temporary wire binding in Kalonga Village was insufficient and did not last while bolts were being sourced)

Here the same hand pump has been repaired and the access door wired shut. Note the prevalence of children using the pump, despite clear stated rules proscribing this activity (see Chapter 3) (Kalonga Village)

Here too, children use the hand pump despite a clear stated rule proscribing the activity (see Chapter 3) (Machilika Village)

Children in Chimphanga also used the hand pump despite a clear stated rule proscribing the activity (see Chapter 3) (Chimphanga Village)

Research assistant C. Chisoni conducting an interview with a ‘naturally assembled’ group of women going about their daily chores. Use of recording devices was not effective here but very insightful notes were taken from these discussions (Kalonga Village).

Appendix 5- Copy of Participant Oral Consent Form

ORAL CONSENT FORM

To Participate in the University of Alberta and University of Malawi Research Project:
Borehole Sustainability in Rural Malawi

This form is to be translated to Chichewa by Prof. Ken Wiyo and Prof. Joyce Njoloma and to be read to village heads and liaisons

Brian Joubert, Department of Earth and Atmospheric Sciences 1-26 Earth Sciences Building University of Alberta Edmonton, Alberta, T6G 2E3 Fax: joubert@ualberta.ca ***To add – In country mobile phone number***	Prof. Robert Summers 1-26 Earth Sciences Building, University of Alberta Edmonton, Alberta,T6G 2E3 robert.summers@ualberta.ca Fax: 1(780) 492-2030 Prof. Ken Wiyo PO Box 219, Lilongwe, Malawi Fax: (265) 1 277 364 Phone: (265)1-277 412 card@bunda.unima.mw

Note: Consent will be audio taped as many villages are illiterate.

You understand that I have been asked to participate or have offered to participate in this study on the local management of boreholes and other water sources in rural Malawian villages. I have given permission to be audio taped. You have read the information sheet or had it read and explained to you and have had the opportunity to ask questions. You also understand that you can quit taking part in the study at any time and withdraw the interview at any time before the information is published by contacting the researchers. You understand that the researchers will have access to the interview data and that they will keep it confidential. It has been made clear to you that the information may be used to inform future research on rural water management strategies, and possibly be used in presentations, publications and publicly available reports, without identifying me.

Do you give consent to participate in this interview? Yes No

Do you give consent to be audio taped Yes No

Do you give consent to be photographed Yes No

Special conditions the participant requested to do the interview:

This study was explained to the participant by:

Signature of Investigator Date

Appendix 5- List of core guiding interview questions for first iteration of field interviewing

Hand Pump Sustainability in Rural Malawi

Semi-Structured Interview Guide – Core Questions

Individual/Dyadic Interview

Local Institutions and use

1) How often do you use the borehole?

- Who else uses it in your family? Frequency?

- Do you think you use it more or less than most people?

2) Can you discuss how the borehole is maintained?

- Who repairs it?

- Who pays for parts and other repair costs?

- Who else contributes time, labour or other non-monetary inputs?

- What is your role in the management of the borehole?

3) Has the way in which the village manages the borehole changed since it was installed?

- How has it changed?

- Why do you think these changes came about?

4) How are decisions made about borehole maintenance?

- Who makes these decisions?

- Why do these particular people make these decisions about the borehole?

- Do people listen to them, why?

5) Would you say that most people who use the borehole are happy with the way it is managed?

- If not, why?

-If not, how do you think the management could change?

External factors

6) Do you know who built the borehole system in the village?

- If yes, do they still help you with the borehole maintenance?

7) Does anyone from outside the village help with the borehole maintenance?

- Who?

- How? (Funding, skills training, maintenance etc.)

- Why does this particular external party assist with the borehole maintenance?

8) Does anyone from the government ever visit the borehole?

9) If the borehole needs to be repaired, how do you source spare parts and tools?

- Who does this?

- Where do they normally go?

Alternatives

10) What other sources of water are there available to the village?

- What are they?

- How far are they?

- Are they shared with other villages?

11) Who mostly uses these alternatives?

- When?

- Why?

Rules, access and context

12) Can you discuss how the basic rules for using the borehole work?

- Are there different rules for different water uses like household use, animals and gardens?

13) How are the rules enforced?

- Do people take the rules seriously?

- Why or why not?

- What happens to rule breakers?

14) Do the rules ever change and does the village allow some people to break the rules?

- E.g. single mothers, the elderly, people of status, young children

- How do they let people break the rules?

- Who makes and changes the rules and how do they agree to this?

15) Who is allowed to use the borehole? How do you acknowledge who in the village is a community member with access to the borehole?

- For example, are visiting family and friends allowed access? What about neighbouring communities? People passing by?

- Is the borehole shared with another village of group of people?

16) Do all borehole users in the village have equal access to the borehole?

- If not, what rules are in place to limited certain people?

- Do men and women users have different access rules? If yes, how is it different?

- Who does most of the water collecting?

- How do people like the elderly or those with limited mobility use the borehole water?

- Is anyone excluded from accessing the borehole? Who? Why?

- Does anyone suffer from lack of access to the borehole?

17) Is there ever any conflict around the borehole?

- Why is this?

- How is the conflict dealt with?

18) Is there a change in water use rule at different times of the year or for different water use purposes?

19) Is there any information about the boreholes that you would like to add?

This form is to be translated to Chichewa by Prof. Ken Wiyo and Prof. Joyce Njoloma

Hand Pump Sustainability in Rural Malawi

Semi-Structured Interview Guide – Core Questions

Group Interviews

Local Institutions

1) Can you discuss how the borehole you use is maintained?

- Who repairs it?

- Who pays for parts and other repair costs?

- Who else contributes time, labour or other non-monetary inputs?

2) Has the way in which the village manages the borehole changed since it was installed?

- How has it changed?

- Why do you think these changes came about?

- Did you as a group have any input into any of these changes?

3) How are decisions made about borehole maintenance?

- Who makes these decisions?

- Why do these particular people make these decisions about the borehole?

- Do people listen to them, why?

4) Are you as a group of borehole users happy with the way it is managed?

- If not, why?

-If not, how do you think the management could change?

5) How do the borehole users like you contribute to managing and maintaining it?

6) If the borehole needs to be repaired, who tell the relevant person or people?

7) Do you borehole users have a representative person who reports to the relevant person/people (Chief, borehole committee etc).

External factors

8) Does anyone from outside the village help with the borehole maintenance?

- Who?

- How? (Funding, skills training, maintenance etc.)

- Why does this particular external party assist with the borehole maintenance?

9) Does anyone from the government ever visit the borehole?

Alternatives

10) Do you ever use any other sources of water other than the borehole?

- When?

- Why?

- Where?

Rules, access and context

11) Can you discuss the basic rules that you all obey when you use of the borehole?

- Are there different rules for different water uses like household use, animals and gardens?

12) How do you enforce the rules when someone breaks them?

- Do you as water users take the borehole rules seriously?

- Why or why not?

13) Would you let certain people in the village break the rules for using the borehole?

- Who?

- Why?

14) How do you discuss and decide who can break rules or what rules should change or be adopted?

- Formal meeting?

- Amongst yourselves?

15) How do you decide who in the village is a community member with access to the borehole?

- Who is allowed to use the borehole?

- Only community members, family from outside the village?

- People from other villages?

16) Do all borehole users in the village have equal access to the borehole?

- Do men and women users have different access rules? If yes, how is it different?

- Who does most of the water collecting?

- How do people like the elderly or those with limited mobility use the borehole water?

- Is anyone excluded from accessing the borehole? Who? Why?

- Does anyone suffer from lack of access to the borehole?

17) Is it normally the same people who you see collecting water regularly?

- Who is this normally?

18) Is there ever any conflict around the borehole?

- Why is this?

- How do you deal with conflict around water collecting from the borehole?

19) Is there a change in water use rules at different times of the year or for different water use purposes?

20) Is there any information about the boreholes that you would like to add?

This form is to be translated to Chichewa by Prof. Ken Wiyo and Prof. Joyce Njoloma

Appendix 6 – Translated village household census questionnaire.

1. **Date:_____ (Month – Day – Year) .Village _____**
2. **Survey Administrator _____**
3. **Household Name_____**
4. **Waypoint Number_____ Survey Verified _____**

HOUSEHOLD DEMOGRAPHICS

ZAMBIRI ZOKHUZA PAKHOMO

	M/F *Mamuna/Mkazi*	**Age** *Zaka*	**Martial Status** *Zokhuza banja*	**Status of Residence** *Wokhazikika kapena osakhazikika*	**Education Level** *mamphunziro*	**Years in Household** *Mnyumba mwakhalamo zaka zingati*
Male Head *Bambo/ Mutu wa banja wa mamuna*	**M**		**1.S 2.M 3.Pl 4.D 5.W 6.Se**	**P or NP Est. %**	**JP UP SE 1 2 3 4 5 6 7 8 F1 F2 F3 F4 PS N**	
Female Head *Mayi/ mutu wa banja wa chizimayi*	**F**		**1.S 2.M 3.Pl 4.D 5.W 6.Se**	**P or NP Est. %**	**JP UP SE 1 2 3 4 5 6 7 8 F1 F2 F3 F4 PS N**	
Adult 1 *munthu wamkulu*	**1.M 2. F**		**1.S 2.M 3.Pl 4.D 5.W 6.Se**	**P or NP Est. %**	**JP UP SE 1 2 3 4 5 6 7 8 F1 F2 F3 F4 PS N**	
Adult 2	**1.M 2. F**		**1.S 2.M 3.Pl 4.D 5.W 6.Se**	**P or NP Est. %**	**JP UP SE 1 2 3 4 5 6 7 8 F1 F2 F3 F4 PS N**	
Adult 3	**1.M 2. F**		**1.S 2.M**	**P or NP Est. %**	**JP UP SE 1 2 3**	

			3.Pl 4.D **5.W 6.Se**		**4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Girl 1 ***Mtsikana***	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Girl2	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Girl3	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Girl4	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Girl5	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Boy1 ***Mnyanata***	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Boy2	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Boy3	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Boy4	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
Boy5	**1.M 2. F**		**1.S 2.M** **3.Pl 4.D** **5.W 6.Se**	**P or NP** **Est. %**	**JP UP SE 1 2 3** **4 5 6 7 8 F1** **F2 F3 F4 PS N**	
_____	**1.M 2. F**		**1.S 2.M**	**P or NP** **Est. %**	**JP UP SE 1 2 3**	

			3.Pl 4.D 5.W 6.Se		**4 5 6 7 8 F1 F2 F3 F4 PS N**	
_____	**1.M 2. F**		**1.S 2.M 3.Pl 4.D 5.W 6.Se**	**P or NP Est. %**	**JP UP SE 1 2 3 4 5 6 7 8 F1 F2 F3 F4 PS N**	
_____	**1.M 2. F**		**1.S 2.M 3.Pl 4.D 5.W 6.Se**	**P or NP Est. %**	**JP UP SE 1 2 3 4 5 6 7 8 F1 F2 F3 F4 PS N**	

S = Single *Osakwatiwa / Okwatiwa* **M** = Married *Okwatiwa / Okwatira* **Pl**= Married (Polygamist) *Wamitala* **D** =Divorced *Banja linatha* **W** =Widowed *Wamasiye* **Se** =Separated *Asiyana kwanthawi yochepa*	**P** = Permanently *Wokhazikika* Residing **NP =** Non Permanent, (*wosakhazikika*)try and get some estimate of the amount of time the person stays in the house and give a % based estimate	**JP** = Junior Primary (1-4) **UP** = Upper Primary (5-8) **SE** = Secondary Use JP, UP or SE if the respondent doesn`t know the exact level of education attained. **N**= None **PS** = Post secondary

6) How many people normally eat dinner in this house? _____

***Ndi anthu angati amene amadya mgonero / chakudya chamazulo mumnyumba muno*?**

7) What is your Relationship to the Family head? *1.None 2. Respondent is Family Head 3. Brother 4. Sister 5. Parent 6.Son 7.Daughter 8.Niece 9.Nephew 10.Cousin 11.Grandson 12.Granddaughter*
13 Other _____
Pali ubale wanji pakati pa inu ndi mutu wa banja lino?
1.palibe ubale 2 Ndine mtu wa banja 3. Mchimwene 4. Mchemwali 5.Kholo 6. Mwana wamamuna 7. Mwana wamkazi 8 Mwana wamkazi wa mchemwali 9. Mwana wamamuna wa mchemwali 10. Msuweni 11 Mdzukulu wa mamuna 12. Mdzukulu wamkanzi. . .

8) What was your household head's Relation to the chief? *1.None 2. This is the chief's household*
3.Brother 4. Sister 5. Parent 6.Son 7.Daughter 8.Niece 9.Nephew 10.Cousin 11.Grandson 12.Granddaughter
13 Other _____

Pali ubale wanji pakati pa banja lino ndi amfumu?

INFORMATION ON HOUSEHOLD HOLDINGS
ZA KATUNDU AMENE ALINAYE

9) Does the household own the following items (circle any that apply)?
Kodi pa nyumba pano pali katundu wotsatirayu?

1. Radio, 2. Cassette Player 3. Ox Cart 4. Sewing Machine 5. Furniture 6. Bicycle 7. Tin Roof (Observe) 8. Glass Windows 9. Cell Phone 10. other (observe and note)_____
1. Wayilesi 2.Wayilesi ya kaseti 3. Ngolo 4. Makina osokera zovala 5. Mipando 6. Njinga 7. Denga lamalata 8. Mazenela a magalasi 9. foni ya mmanja 10. zina
10) (Observe) House is constructed of? *1.Mud 2. Sun Dried Brick 3. Burnt Brick 4. Timber / Mud*
Nyumba ndi yomangidwa ndi chiyani? 1. matope 2. zidina 3. njerwa zootcha 4. matabwa/matope

11) (Observe) Floor is constructed of? *1. Cement 2. Mud 3. Other_____*
Pansi ndipozira ndi chiyani? 1. simenti 2. matope 3. zina

12) Household Religion (Circle all that Apply)?
1. *Catholic 2. 7th Day Adventist 3. Muslim 4. Jehovah's Witness 5. Church of Abraham 6. CCAP 7. African Church 8. No Church /Other_____*
Chipembezo / Mumapemphera mpingo wanji

13) Household Water Use (*momwe amagwilisira ntchito madzi*)

Type of water use (*ntchito yomwe madzi amagwira*)	**Main water source (P SW PW R D RW S O)** ***Komwe amatunga madzi***	**Who is responsible for collection?* (HH AF, AM, B, G, HL, NC)** ***Amatunga madzi ndindani?***	**When is water for this purpose normally collected?** ***Madzi amenewa mumatunga nthawi zanji?***	**How frequently is water normally collected for this purpose during the season (*NC*?)*** ***Mumatunga kokwana kangati?***	**For this purpose how strenuous is water collection normally?(1)** ***Ntchito yotunga madzi amanewa ndiyophweka/yolemetsa motani*?**
	- mjigo -chitsime chosavundikira -chitsime chovundikira -mtsinje -dambo -kasupe -zina	-mutu wabanja -tsikana wamkulu -nyamata wamkulu -nyamata			

		-tsikana -antchito -satunga			
Bathing ***Kusamba***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D -*chaka chonse -miyezi yake ndi iti***	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times 1.*kupos era kamodzi patsiku 2.kamodzi patsiku 3.5-6 patsabata 4.3-4 patsabata 5. 1-2 patsabata***	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard** **1.*yosavutitsitsa 2.yosavuta 3. yovuta 4. yovutitsitsa***
Drinking ***Kumwa***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**

Cooking ***Kuphikira***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**
Clothes Washing ***Kuchapira zovala***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**
Beer Brewing ***Kuphikira mowa***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**
Watering vegetable garden ***Kuthirira mbewu zamasamb***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**

a			**10.O 11.N 12.D**	**week. 4. 3-4 times 5. 1-2 times**	
Animal Watering ***Kumwetsa ziweto***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**
Moulding bricks ***Kuumbira njerwa***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**
Construction work ***Ntchito zomangamanga***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**

Other (list) ***zina***	**1.P 2.SW 3.PW 4.R 5.D 6.RW 7.S 8.0**	**1.HH 2.AF 3.AM 4.B 5.G 6.HL 7.NC**	**13. All Year 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D**	**1.More than once a day. 2. Once Daily. 3. 5-6 times a week. 4. 3-4 times 5. 1-2 times**	**1. Very Easy 2. Quite Easy 3. Quite Hard 4. Very Hard**

* If the water usage and / or source do not require collection (e.g. watering animals in river or dambo then mark as NC for 'No Collection'

(1) Strenuous can be considered a function of how physically difficult the water collection is (e.g. size and number of water containers and the amount of time this takes them).

P – pump **SW –** Shallow well (unprotected well) **PW –**protected well **R-** River **D-** Dambo **RW –** Rainwater harvesting **S** -Spring **O** – other (specify) -mjigo -chitsime chosavundikira / chostetezedwa -chitsime chovundikira / chotetezedwa -mtsinje -dambo -madzi ochita kukolola -kasupe -zina	**HH** – Household Heads **AF** – Adult females **AM** – Adult Males **B** - Boys **G**- Girls **HL** – Hired Labour **NC** – Not collected (would mean the activity takes place at the water source, water is not transported). ---mutu wabanja -tsikana wamkulu -nyamata wamkulu -nyamata -tsikana -antchito -satunga

LIVELIHOODS INFO (zokhuza ulimi ndi ntchito)

14) How large of an area do you farm?_____ (acres).

Munda wanu ndiwaukulu bwaji? _____(ekala)

15) Is this household engaged in any of the following and what are the approximate annual earnings?

Kodi mumachita nawo zinthu zotsatirazi ndipo muma peza phinda lotani

		Approximate annual income (*ndalama zimene amapeza pachaka*)	**Who spends time on this activity? (*kodi ntchito imeneyi amgwira ndindani?*)**
CROPS (tick if yes) ***Mbewu***	**Measure of abundance: 'We grow enough to…'(*mumalima zochuluka bwanji*)**		
Maize ***Chimanga***	**1.More than the household needs for the year. 2. Just enough for the household needs. 3. We normally run out in 1.J 2.F 3.M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D** ***1.Zoposa zimene banja lifuna pachaka. 2.zotikwanira 3.zosakwanira makamaka miyezi iyi***		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Cassava ***Chinangwa***	**1. 2. 3. J F M A M J J A S O N D**		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Vegetables ***Masamba***	**1. 2. 3. J F M A M J J A S O N D**		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Groundnuts ***Mtedza/msawa***	**1. 2. 3. J F M A M J J A S O N D**		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Sugarcane ***Mzimbe***	**1. 2. 3. J F M A M J J A S O N D**		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Cotton ***Nthonje***			**1.HH 2.AF**

			3.AM 4.B 5.G 6.HL
Tobbacco *Fodya*			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Potatoes *Mbatata*	**1. 2. 3. J F M A M J J A S O N D**		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Sweet Potatoes *Mbatatesi*	**1. 2. 3. J F M A M J J A S O N D**		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
	1. 2. 3. J F M A M J J A S O N D		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
	1. 2. 3. J F M A M J J A S O N D		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
LIVESTOCK *ZIWETO*	**Number of head belonging to the household (*Zilipo zingati)***		**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Cattle *Ng'ombe*			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Goats *Mbuzi*			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Chickens *Nkhuku*			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Pigs *Nkhumba*			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Guinea Fowl *Nkhanga*			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**

Pigeons ***Nkhunda***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Rabbits ***Akalulu***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Ducks ***Abakha***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
			1.HH 2.AF 3.AM 4.B 5.G 6.HL
OTHER LIVELIHOODS ***ZICHITA ZINA***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Beer Brewing ***Kuphika mowa wamasese***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Kachaso Distilling ***Kuphika kachaso***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Trading stall or Business ***Bisinesi***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Wage Employment ***Ntchito***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Brick Making ***Kuumba njerwa***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Construction / Roofing ***Zaumisiri***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Remittances ***Kutumizilidwa ndalama***			**1.HH 2.AF 3.AM 4.B 5.G**

			6.HL
Weaving ***Zolukaluka***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
Sell Charcoal / firewood ***Kugulitsa makala/nkhuni***			**1.HH 2.AF 3.AM 4.B 5.G 6.HL**
			1.HH 2.AF 3.AM 4.B 5.G 6.HL

HOUSEHOLD LOCATION CHOICE
CHIFUKWA CHOSANKHILA MALO OKHALA

16) How long has the household been located in it's present location? _____ *years*
*Mwakhala kuno kwa nthawi yayitali bwanji?*_____ *zaka*

17) Were you and/or your spouse born in this village?
Respondent: *1.Yes 2. No* **Male head**: *1.Yes 2.No* **Female head:** *1.Yes 2.No*
Kodi inu ndi mkazi wanu munabadwira mudzi muno?
Ofunsidwa: **1.** inde 2. ayi Bambo: 1. inde 2. ayi Mayi: 1. inde 2. ayi

18) If none are yes, when did you move into the Village? *Year* _____ *or* _____*Years*
Ago
*Ngati simunabadwire kuno, mudabweramo liti mmudzi muno? Chaka*_____*kapena zaka*_____*zapitazo*

19) Why did the household choose to live in this location / in this family unit area?

Nchifukwa chiyani munasankha kukhala kuno/pano

_____
_____

_____
_____

PUMP AND BOREHOLE CONTRIBUTIONS

MMENE ANTHU AMATHANDIZIRA POKONZA/POSAMALIRA MJIGO

20) Tell us about the last contributions this household has made to the repair, service or maintenance of the pump and borehole.

Tiuzenei kodi posachedwapa banja lino mwandandizapo motano pokonza mjigo

Money Contribution ***Masonkhedwe a ndalama***	**Amount from the household (MK)** ***Kuchuluka kwa ndalama zimene banja lasonkha***	**When** ***Munasonkha liti***	**Contributed by who?** ***Anasonkha/anpereka ndalama ndindani***
1			**1.HH 2.A F 3.AM 4.B 5.G**
2			**1.HH 2.AF 3.AM 4.B 5.G**
3			**1.HH 2.AF 3.AM 4.B 5.G**
4			**1.HH 2.AF 3.AM 4.B 5.G**
5			**1.HH 2.AF 3.AM 4.B 5.G**
6			**1.HH 2.AF 3.AM 4.B 5.G**
7			**1.HH 2.AF 3.AM 4.B 5.G**
Labour and Time (What kind of labour) ***Ntchito imene mwagwira(ntchito yanji mwamgira)***	**How long did they spend helping?** ***Ntchitoyi inagwiridwa kwanthawi yayitali bwanji?***		
1			**1.HH 2.AF 3.AM 4.B 5.G**
2			**1.HH 2.AF 3.AM 4.B 5.G**
3			**1.HH 2.AF 3.AM 4.B 5.G**
Materials and Tools (What Items?) ***Zipangizo kapena zida zimene mwapelekapo (zipangizo zanji?)***	**How much?** ***Zochuluka bwanji?***		
1			**1.HH 2.AF 3.AM 4.B 5.G**
2			**1.HH 2.AF 3.AM 4.B 5.G**

Support (What kind?) ***Chithandizo china***	**How long or how much?** ***Mwathandiza kwa nthawi yayitali bwanji/mochuluka bwanji?***		
1			**1.HH 2.AF 3.AM 4.B 5.G**
2			**1.HH 2.AF 3.AM 4.B 5.G**

Money – write down the amount of each contribution
Labour and Time – Write down the type of labour in the number column and about of time spent under the amount column
Materials and Tools – write down what was contributed (e.g. if the household donated bricks or their spanner)
Support – what kind of support? (e.g. some household members made food for the repairmen for 2 days).

21) Does this household make regular contributions to the pump and borehole maintenance (e.g. a seasonal or annual money contribution) *YES* *NO*

Kodi mumasonkha nawo ndalama za mijigo nthawi zonse? Inde *ayi*

22) When are contributions normally made?

Nthawi zambiri mumasonkha nthawi yanji?

Month (1.J 2.F 3. M 4.A 5.M 6.J 7.J 8.A 9.S 10.O 11.N 12.D)

mwezi

or Season: Dry Beginning / End *Wet Beginning / End*

nyengo/nthawi:kumayambiriro/kumapeto kwachilimwe *kumayambiriro/kumapeto kwazinja*

*or Specific Event (describe e.g. when the pump breaks)*_____

_____
_____

kapena Pakachitika chinachake(longosolani)

23) Who normally fixes the pump when it breaks? (mark all that apply)

Ndani amakonza mjigo ukawonongeka?

1. Chief 2. Committee Members 3. Village Repairman 4. Local Repairman from another village 5. Health and Sanitation Officer who is employed by the Government 6. NGO 7. Other _____

1.*Amfumu 2. gulu lakomiti 3. okonza wammudzi 4. okonza wochokera mudzi wina 5. wadzaumoyo 6. bungwe loima palokha 7. ngati pali ena*

24) Who SHOULD have the responsibility to fix the pump? (mark all that apply)

Woyenera kukonza mjigo umenewu ndindani?

1. Chief 2. Committee Members 3. Village Repairman 4. Local Repairman from another village 5. Government (Boma) 6. NGO 7. Other _____

25) Are you happy with the way the borehole and pump is managed in this village? *1. Unhappy 2. Moderately happy (i.e. it is acceptable but could be better) .3 Very happy*

Kodi muli okondwa ndi momwe mjigo umasamalidwira mmudzi muno

1.sindili okondwa 2. okondwa pang'ono 3. okondwa kwambiri

26) If *.1* or *.2* *discuss why?*

Chifukwa chiyani simuli okondwa/okondwa pang'ono?

27) Is there a borehole and pump committee that is currently active in this village? 1.*Yes 2.No*

Kodi muli ndi komiti ya mijigo imene ikugwirabe ntchito mmudzi muno?

28) How effective is the borehole committee?

Kimiti imeneyi ndiyidalilika bwanji?

29) Do you believe (feel) that you have better or worse opportunity/access to the borehole pump than other households? *1.Better 2.Worse 3.Same*
Discuss if better or worse

Kodi ufulu wanu ogwiritsa ntchito mjigo umenewu ndiwotani? Kodi ndiwofanana ndi anzanu?
1.ufulu wambiri 2. ufulu wochepa 3. chimodzimodzi ndi anzanga
Fotokozani chifukwa chiyani uli ochuluka/ochepa

30) Do you feel that your area of village has better or worse opportunity/access to the borehole and pump as the other areas in the village? *1.Better 2.Worse 3.Same*
Discuss if better or worse
Kodi dela lanu la mudzi uno muli ndi ufulu ofanana/ ochuluka/ ochepa kupotsa madela ena?

Longosolani mchifukwa chiyani muli ndi ufulu ochuluka kapena ochepa?

31) Have you ever been refused access to the borehole and pump? *1.Yes 2.No*

Kodi munayamba mwakanisidwapo madzi pamjigo umenewu? 1.inde 2. ayi

32) If yes, Explain why, how many times and when.

Ngati zili nchoncho nchifukwa chiyani, ndikangati ndipo ndi liti?

33) Should other villages be allowed to access the borehole and pump like you do? *1.Yes 2.No*

Kodi midzi ina idziloledwa kudzatunga madzi ngati momwe mumatungira inuyo? 1.inde 2. ayi

35) Should people in other villages contribute money to the pump and borehole: *1.More 2.Less 3.The Same* **as you do?**

Kodi anthu amidzi ina azisonkha nawo ndalama 1. mochuluka 2. muchepa 3. chimodzimodzi ngati momwe mumasonkhera inu?

35) Should some people in this village contribute different amounts of money to the pump and borehole? *1.Some should contribute less 2.Some should contribute more 3.It should all be the same 4.Some should not contribute at al*

Kodi anthu ena amudzi uno azisonkha mosiyana ndi anawo?1. ena azisokha zochepa 2. ena azisonkha zochuluka 3. asonkhe chimodzimodzi. 4. ena asamasonkhe ndipang'ono pomwe

36) Who should have more rights to access the borehole and pump

_____

_____

_____

Ayenera kukhala ndi ufulu wambiri otunga madzi ndindani?

37) Who's responsibility is it to keep the borehole area clean from dirt?_____

Amene ali ndi udindi osamalira pamjigo ndindani?

_____

38) Imagine the pump in your village was broken and you could not get water from the borehole. If you had the choice between fixing the pump and being able to get borehole water and one of these things, which one would you take?

Tingoyerekeza kuti mjigo wanu waonongeka ndipo mukuyenera kusankha pakati pa kokonza mjigo wanu kapena kusankha izi. Mungasankhe chiti?

Fix the pump or have:*kukonza mjigo kapena*	**Choice *Chitsankho***
1)... Gule Wamkulu's at an important ceremony. ***Kukaonera gule wamkulu***	**Fixed pump Kukonza** **Alternative choice Chisankho china**
2)... irrigation furrows for the gardens. ***Kuchita ulimi wothirira***	
3 ...new clothes. ***Zovala zatsopan***	
4)...fertilizer for our food crops Feteleza wa mbewa	
5)...be given a goat ***Kupasidwa mbuzi***	
6)...medicine to prevent malaria ***Mankhwala opewera malungo***	
7)...be trained to the person who can fix the borehole and pump and then fix it myself. ***Kumphunzitsidwa zakakonzedwa kamjigo kenako mukonze nokha***	
8)...access to more shallow wells in our village ***Ukukumbireni zitsime zina mmudzi muno***	
9)... abandon the pump ***Kungowunyanyala mjigowo***	
10) ...or be given a chicken ***Kupatsidwa nkhuku***	

Name of respondent_____

Dzina la ofunsidwa

Thank You very much

Zikomo kwambirri

Appendix 7 – Notification of Ethics Approval

Notification of Ethics Delegated Approval

Study ID:	Pro00012636
Study Title:	Village-Level Water Management Institutions in Rural Malawi: Conditions for Sustainability.
Study Investigator:	Brian Joubert
Supervisor:	Robert Summers
Funding/Sponsor:	Faculty of Science Start up Funds
Approval Expiry Date:	May 17, 2011

Thank you for submitting the application above to the Arts, Science, Law REB. I have reviewed your application for human research ethics and find that your proposed research meets the University of Alberta standards for research involving human participants (GFC Policy Section 66). On behalf of the Arts, Science, Law REB, I am providing **delegated research ethics approval** for your proposed research.

Your application will be presented to the Board at its meeting on May 31, 2010. Any questions or comments raised about your project will be communicated to you as soon as possible after the meeting.

The research ethics approval is valid for one year and will expire on May 17, 2011.

A request for renewal must be submitted prior to the expiry of this approval if your study still requires ethics approval at that time. If you do not renew before the renewal expiry date, you will have to re-submit an ethics application.

If there are changes to the project that need to be reviewed, please file an amendment. If any adverse effects to human participants are encountered in your research, please contact the undersigned immediately.

Sincerely,

Christina Gagne, Delegated Reviewer - REB Member
Arts, Science, Law REB

Note: This correspondence includes an electronic signature (validation and approval via an online system).