THE POLITICAL ECONOMY OF COMMUNITY MANAGEMENT: A STUDY OF FACTORS INFLUENCING SUSTAINABILITY IN MALAWI'S RURAL WATER SUPPLY SECTOR

By

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A thesis submitted to the University of Birmingham

for the degree of DOCTOR OF PHILOSOPHY

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January 2014

ABSTRACT

Sustainability is a major challenge in the rural water supply sector, where efforts to realise the right to clean water are undermined by high levels of non-functionality. This thesis uses mixed methods to test the relative influence of ten proximate determinants of sustainability, and to critically examine the social, economic and political dynamics underlying these determinants – especially the community management model, which places responsibility for water point functionality on users.

The study finds that the key proximate determinants include both technical factors (e.g. water point type and installation quality) and management factors (e.g. availability of funds and incidence of theft). These in turn are driven by the way that community management structures interact with socially embedded institutions. Contrary to the claims made for participatory approaches, the study finds that community management is frequently inefficient and disempowering.

Drawing on the concepts of institutional bricolage and civil society failure, the analysis shows that community management generates conflict and reproduces inequality at community level, and embeds perverse incentives and consolidates clientelism at a wider level. The study concludes that community management leads to erosion of social capital and abdication of state responsibility, and argues that donors should reconsider their support for it.

ACKNOWLEDGEMENTS

I am deeply indebted to all those in Malawi who gave their time to this research as respondents to surveys and interviews. I am especially grateful to those who kindly hosted me in their homes and walked many miles with me as guides and translators.

My greatest thanks and gratitude go to my friend and research assistant in Malawi, Yanjanani Chimpokosera. She made this research possible in so many ways – rarely have I met someone so positive, capable, and hardworking. It was a real pleasure working with her, and I feel exceptionally fortunate to have had her help.

My supervisors, Robert Leurs and Fiona Nunan, have been a great source of encouragement and helpful suggestions throughout. I also very much appreciate the financial support of the ESRC and the University of Birmingham.

Last but not least I thank my family. My parents, for being wonderful au pairs and proof-readers. My children, Nathan and Ronan, for being understanding and patient, and for keeping me playing. And Bryn, for giving me the time I needed, and for having faith in me. Thank you.

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LIST OF ABBREVIATIONS

ADC	Area Development Committee
AM	Area Mechanic
BH	Borehole
CBNRM	Community Based Natural Resource Management
CM	Community Management
DALY	Disability Adjusted Life Year
DFID	(UK) Department for International Development
DHS	Demographic and Household Survey
DWO	District Water Office / Officer
GDP	Gross Domestic Product
GFS	Gravity Fed System / Scheme
GITEC	GITEC Consult GmbH: a German development consultancy
GOM	Government of Malawi
GVH	Group Village Head
INGO	International NGO
IRC	International Water and Sanitation Centre (an NGO based in the Netherlands)
JICA	Japan International Cooperation Agency
JMP	Joint Monitoring Programme for Water Supply and Sanitation (WHO/UNICEF)

L	'List' survey (i.e. list of water points provided by VDC members)
lcd	litres per capita per day
LDF	Local Development Fund (successor financing mechanism to MASAF)
M	'Manager' survey
MASAF	Malawi Social Action Fund
MDG	Millennium Development Goal
MGDS	Malawi Growth and Development Strategy
MICS	Multiple Indicator Cluster Survey
MOIWD	(Malawi) Ministry of Irrigation and Water Development
NGO	Non-Governmental Organisation
NWP	National Water Policy
OMR	Operation, maintenance and repair (of a water point)
PCS	Post Construction Support
PEA	Political Economy Analysis
RWS	Rural Water Supply
SSA	Sub-Saharan Africa
SWAP	Sector Wide Approach
TA	Traditional Authority (both the title of an individual, and the area under his/her jurisdiction)
U	'User' survey
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

VDC	Village Development Committee (both the name of a committee of (theoretically) elected representatives, and the area under its jurisdiction, which is the same as a Group Village i.e. the area under the jurisdiction of a Group Village Head).
VH	Village Head
VLOM	Village Level Operation and Maintenance
W	‘Water point’ survey
WASH	Water, Sanitation and Hygiene
WHO	World Health Organisation
WMA	Water Monitoring Assistant
WP	Water Point
WPC	Water Point Committee

Chapter 1

INTRODUCTION

The roots of this study lie in personal experience. In ten years of working in international development non-governmental organisations (NGOs), I frequently observed a mismatch between the assumptions underpinning development initiatives (i.e. that they would lead to long-term, sustainable, positive change), and the reality in many locations. One obvious problem area was rural water supply, where it appeared that a significant number of projects were prone to failure - despite the use of participatory approaches and basic technology. If sustainable benefit was elusive even for relatively straightforward projects such as these, I wondered what the implications might be for more complex and contested development interventions, such as those promoting girls' empowerment.

While many NGOs and other development actors make honest attempts to explore this question, they are arguably constrained in two major respects: first, by a focus on their own work, insufficiently contextualised; and second, by the ultimate need to make a case for their own effectiveness. A doctoral thesis offered the opportunity to overcome both these limitations.

1.1 PURPOSE AND RATIONALE

The overall purpose of my research is to contribute to an understanding of why some development interventions lead to more sustainable outcomes than others. Specifically, I seek to understand why poor sustainability of water points is so widespread and enduring a phenomenon. My ultimate aim is to identify ways in which development policy and practice could be changed to improve long-term results.

Concern about the sustainable impact of development interventions in general was the initial seed for this study, and the focus on rural water supply in Malawi emerged soon thereafter. The simplicity of the water project model makes it an ideal 'case study' of sustainability: inputs (simple technology and funding) are used to build an output (a water point) which produces an outcome (people having access to clean water) leading to long-term positive impacts (reduced drudgery, improved health, and economic benefits). Whether a water point is working or not is very easily measured, in contrast to results in many other areas of development. Access to safe water is a fundamental human right (UN 2010), and remains a major global challenge (JMP 2012a). Moreover, substantial amounts of existing data are available – especially for Malawi - which can be used as a baseline and as a basis for sampling.

1.1.1 The challenge of ensuring sustainable access to safe water

Access to safe water is crucially important for human health and well-being, and can be seen as one of the most fundamental human needs and rights. Unsafe water, sanitation and hygiene (WASH) are responsible for 4.2% of the global burden of disease as measured in disability-adjusted life years (DALYs), making inadequate WASH the fourth largest global health problem (WHO 2009: 10). In low-income countries, unsafe WASH is the fourth largest cause of death, causing 6.1% of all deaths (WHO 2009: 11).

In 2010, following many years of advocacy by sector stakeholders, the United Nations formally recognised the 'right to water' in General Assembly resolution A/RES/64/292, which

'Recognizes the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights; [and] Calls upon States and international organizations to provide financial resources, capacity-building and technology transfer, through international assistance and cooperation, in particular to developing countries, in order to scale up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all' (UN 2010).

Improving access to clean[1] water is also one of the Millennium Development Goals (MDGs): Goal 7, Target C is to 'halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation' (UN 2013).

Progress towards this target is monitored by a biannual report from the Joint Monitoring Programme (JMP) of the World Health Organisation (WHO) and United Nations Children's Fund (UNICEF). While the latest JMP report shows that the MDG drinking water target has already been met, five years ahead of schedule (JMP 2012a), it also notes that progress has been very uneven and that huge disparities remain, both between and within countries. In particular, 19 out of the 50 countries in sub-Saharan Africa (not including Malawi) are not on track to meet the MDG.

In total, 11% of the world's population (780 million people) still lack access to safe water and 37% (2.5 billion people) lack access to adequate sanitation (JMP 2012a: 2, 55). The situation is worst in sub-Saharan Africa (SSA), where 39% lack access to safe water and 70% lack access to improved sanitation; the equivalent figures for developing regions overall are 14% and 44% (*ibid*: 54-55)[2]. Worldwide, access is lower in rural than in urban areas, and such disparities are particularly large in SSA, where only 49% of rural dwellers have access to clean water, compared with 83% of

[1] In this thesis, 'clean water' and 'safe water' are used interchangeably. See Chapter Two for a discussion of water quality standards.
[2] This chapter presents global and/or regional figures only. Figures for Malawi in particular are presented in Chapter Four.

urban dwellers (ibid: 55). Thus, the water crisis disproportionately affects rural Africans.

While it is true that the sanitation crisis is even greater than the water crisis (JMP 2012a) and that improving sanitation may well yield greater benefits for human health than improving water supply (Waddington and Snilstveit 2009), this study focuses on water, because water is provided collectively whereas sanitation is generally a private affair. Similarly, the study's focus is rural, not urban, because rural access to safe water is much lower, and rural access is almost always through public infrastructure (boreholes, wells, standpipes) whereas a much larger proportion of urban access is through private connections (JMP 2012a). My focus is on provision of public goods and services through public (state or collective) action.

Malawi was selected for this study primarily because of the availability of baseline data: all water points in the country were mapped between 2002-2005, in a process initiated and coordinated by the NGO WaterAid (Welle 2005). The resulting database (WaterAid 2005), now hosted by UNICEF Malawi, is not published but can be accessed on request. My initial intention was to use this data as a baseline for a longitudinal research design, since a study of sustainability requires a strong temporal dimension. However, for reasons explained in Chapter Five I adopted a cross-sectional research design instead, and used the database both to structure my sample and as a source of secondary data to test determinants of sustainability.

Malawi is one of the few sub-Saharan African countries that has already met the water MDG of halving (by 2015, relative to 1990 baseline) the proportion of the population without sustainable access to safe drinking-water (JMP 2012a, JMP 2012b). Its water sector is thus something of a success story. Malawi is also a relatively small and (despite recent political upheavals) stable country with good communication and transport links, and is not significantly affected by factors such as conflict or population displacement. As such it provides an opportunity to study a 'best case scenario' where many of the most obvious threats to sustainability are absent.

However, because the MDG indicator used to measure 'sustainable access to safe water' does not actually measure sustainability, it may be that performance in Malawi (and elsewhere) is not as good as it first appears. Sustainability of access depends on the sustainable functioning of water infrastructure, which is not measured by the JMP. Instead, the JMP uses a proxy indicator, 'use of an improved drinking water source', which it defines as either a 'piped household water connection located inside the user's dwelling, plot or yard' or 'public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, [or] rainwater collection' (JMP 2013: 13). This indicator says nothing about whether this access is sustainable.

Other data sources suggest that sustainability is a major concern (Harvey and Reed 2004, Harvey and Reed 2007, RWSN 2009, Lockwood and Smits 2011, WaterAid 2011). Many existing water points and systems simply don't work; estimates from the Rural Water Supply Network for 20 African countries suggest that on average about one-third of all water points are non-functional (range: 10% to 67%) (RWSN 2009). Research from Tanzania suggests that one-quarter of new water points become non-functional within two years of installation (Taylor 2009a). If accurate, such figures indicate a major failure of sustainability and imply that a significant proportion of investment in the rural water supply sector may be ineffective. This apparently high level of failure exists despite strong community demand for clean water, significant investment in the sector, and considerable academic attention.

1.1.2 Understanding sustainability: proximate determinants and underlying dynamics

A large number of factors have been suggested as possible determinants of sustainability – where determinant means 'an influencing factor', and sustainability means 'continued functioning over time'. While some factors – for example the availability of spare parts for water points - are proximate determinants, with immediate and direct bearing on sustainability, their influence is driven by underlying social, political and economic dynamics.

Much of the literature on rural water supply is written by practitioners who share a concern with practical efforts to improve sector performance (Schouten and Moriarty 2003, Harvey and Reed 2004, Lockwood and Smits 2011). These authors highlight many of the challenges facing efforts to ensure clean water for all, including both technical and financial issues – but often stop short of specifying which are the most important influences on sustainability. Key factors identified in this sector-specific literature include refresher training and post-construction support (Whittington, Davis et al. 2008), and financial management issues (Haysom 2006).

The argument that participation plays an important role in ensuring sustainability has been put forward by several authors (Narayan 1995, Kleemeier 2000, Marks and Davis 2012) and is a key reason for the promotion of 'community management', in which users are responsible for collectively managing their own water points. Participatory theory suggests that the benefits of participation include empowerment and equity as well as improved efficiency and effectiveness of development projects (Nelson and Wright 1995). However, these claims are contested by those who argue that participatory approaches take insufficient account of questions of power and politics (Mohan and Stokke 2000, Botchway 2001, Ribot 2007). The literature on politics suggests that clientelist relationships are a major influence on outcomes, including access to services (World Bank 2004, Olivier de Sardan 2011, Booth 2012, van de Walle 2012).

Over the past two decades, community management has come to dominate rural water supply in many low income countries. Questions remain, however, as to whether this institution is an efficient or empowering way to ensure sustainable service provision, or whether it is vulnerable to 'civil society failure' (Mansuri and Rao 2013). The perspective of 'institutional bricolage' (Cleaver 1999, Cleaver 2012) highlights the process by which actors piece together hybrid institutions, and suggests that introduced structures – such as community management - may interact with socially embedded rules and norms to produce unexpected outcomes.

This study therefore has two aims. The first is to contribute to the sector-specific literature (reviewed in Chapter Two) by seeking to identify the most important factors influencing sustainability of rural water supply in Malawi. The second aim is to examine what I have called the political economy of community management, or the way that interests and incentives shape institutions, policies, and outcomes. To do this, I have looked to both the literature on participation (Chapter Three), and the literature on political economy analysis (Chapter Four).

1.2 RESEARCH QUESTION, DESIGN AND METHODS

1.2.1 Research question, strategy and analytical framework

This study seeks to answer two linked questions: 1) *what* are the main factors contributing to variation in the sustainability of improved public water points in rural Malawi, and *how much* of an influence does each factor have?; and 2) *how and why* do these factors influence sustainability? The first aims at accurate description, the second aims at explanation.

To answer the first question, I identify and test ten proximate determinants of water point sustainability. To answer the second, I use political economy analysis and the perspective of critical institutionalism to examine the underlying dynamics influencing these determinants. In particular, I critically assess the operation of the community management model that is so widespread in rural water supply.

1.2.2 Design, sampling and methods

This study employed a cross-sectional mixed methods design using stratified purposive and probability sampling, with a sampling frame based on a database of nearly 50,000 water points in Malawi which were mapped between 2003-2005. I collected new primary data on 679 water points and from 276 survey respondents in 24 villages in 4 districts (two high-functionality and two low-functionality), and combined this with field observations and survey notes, and interviews with 26 key informants at village, district and national level.

Table 1.1: Data sources for this study

	Primary	Secondary
Quantitative	Surveys: 177 users, 99 managers, 338 surveyed water points, 341 listed water points. Dataset has 955 cases, 266 variables.	2005 WP Database: 49,517 cases, 20 variables.
Qualitative	Survey notes: 177 users, 99 managers, 338 water points. <u>Interviews</u> with 26 respondents: 6 local government, 5 national government, 6 donors, 9 NGOs, 1 area mechanic. <u>Factor ranking exercise</u>: 19 respondents among the 26 interviewees.	Blogs: 28 bloggers, 739 posts, spanning Sept 2008 – Feb 2013.

The mixed methods design of this study reflects its concern with both description and analysis. The study first uses deductive reasoning based primarily on quantitative data to analyse the relative influence of ten key determinants of sustainability, and then integrates this with inductive analysis based largely on qualitative data to develop a theoretical explanation of the findings. Different types and sources of data are used to triangulate the results in order to strengthen the warrant of the conclusions. This mixed methods approach provides the framework for a study that is rooted in large-N empirical data collection and analysis, while also engaging in depth with theory.

1.3 CONCLUSIONS

1.3.1 Key findings and implications

This study addresses the question of 'which factors influence water point sustainability, and why' at two levels.

At the immediate presenting level I find that, among the ten main determinants of sustainability discussed in the literature, several - including the number of users, the age of the water point, and access to spare parts - have only a minimal effect on sustainability, whereas others - both technical factors (the type of water point and installation quality) and management factors (access to funds and skills for maintenance and repair) - are highly significant.

Linking these findings with insights from theory, I analyse the political economy of the community management model by which sustainability is supposed to be ensured. The findings demonstrate clearly that community management is not an effective way to ensure sustainable provision of public goods and services; on balance, it is inefficient and ineffective, inequitable and disempowering. The insertion of community management institutions into a context already contested by modern and traditional authority results in a process of institutional bricolage that often ends in the erosion of trust and undermining of social capital. Community management provides an excuse for duty-bearers – donors, politicians, and officials – to abdicate responsibility, and it strengthens neo-patrimonialism and undermines the social contract. Ultimately this study concludes that community management has failed the people it was designed to empower, and cannot be a substitute for provision of universal public services through an effective state.

1.3.2 Limitations

A number of challenges regarding data reliability and internal validity were encountered and are discussed in detail in Chapter 5, together with my approach to anticipating and managing them. Courtesy bias, respondent difficulties in recall, and translation problems all affected data quality. My identity as a privileged white researcher from the former colonial power influenced both my own assumptions and approach, and the way I was perceived by Malawians; these barriers of language, culture, and expectations inevitably impacted on the extent of my insights. I mitigated this by working with an excellent local research assistant, modifying my own dress and behaviour to demonstrate respect for local culture, and emphasising my status as an independent student not associated with any donors.

The sampling frame for the study used random sampling wherever possible in order to maximise external validity. However, as with all research, care must be taken in extrapolating from my findings. While I do not claim that they are representative of all water points in Malawi, I would argue strongly that they illuminate critically important issues of national relevance.

1.3.3 Original contribution

This study offers an original contribution in two ways.

First, the research design. This study innovatively uses both qualitative and quantitative data from both primary and secondary sources to build up a rich picture of the rural water supply sector in Malawi, combining deductive hypothesis-testing with inductive theory generation. It explicitly links a technical analysis of the proximate factors that appear to explain variation in water point sustainability, with a theoretical analysis of the underlying political, social and economic dynamics influencing those factors. Such an approach is rare in the existing literature.

Secondly, the conclusions. By linking technical and theoretical analysis this thesis not only demonstrates empirically that community management is deeply flawed in practice, but also extends the analysis theoretically to show how and why this happens. The study uses the concept of institutional bricolage to analyse how an exogenous institutional form (the water point committee) is shaped by the existing social context, with unintended and counterproductive consequences. The study further provides an explanation for the enduring strength of the community management model by using political economy analysis to demonstrate the powerful incentives that perpetuate it, despite its flaws.

My findings and conclusions thus extend both the empirical literature on rural water supply, and the theoretical literature on participation, political economy, and public service provision.

1.4 STRUCTURE OF THE THESIS

The thesis is structured as follows.

The next two chapters review two broad sets of literature. Chapter Two examines the 'technical' literature on sustainable access to safe water, in order to identify the key factors that influence water point sustainability. It concludes by outlining the first 'proximate determinants' part of my two-stage analytical framework.

Chapter Three widens the focus to the more 'theoretical', and analyses the political economy of decentralised provision of public goods and services through community management, rooted in the theory of participation. It concludes by outlining the second 'underlying dynamics' part of my analytical framework.

The Malawian context for this study is outlined in Chapter Four, which presents a political economy analysis of Malawi in general, and of its rural water supply sector in particular.

Chapter Five then sets out the study's research paradigm, design, and methods. I discuss questions of research ethics and data quality, and describe my approach to analysing the data collected.

Chapters Six and Seven present the study's findings, in line with the two-part analytical framework developed in Chapters Two and Three. Chapter Six uses both quantitative and qualitative data to test the ‘proximate determinants’ of sustainability identified in Chapter Two. In Chapter Seven I then analyse the underlying dynamics that influence these results, using the second part of my analytical framework. In particular, I critically examine the performance of the community management model of public service delivery.

Finally, Chapter Eight reflects on both the process and the findings of the research, and concludes by drawing out the implications of this study for rural water supply in Malawi, and for development initiatives in general.

Chapter 2

SUSTAINABLE ACCESS TO SAFE WATER

Introduction

This chapter reviews the literature on sustainable access to safe water in low-income countries, and identifies the main hypothesised determinants of sustainability.

Section 2.1 sets the scene with an overview of inputs (technology and funding) and results (outputs, outcomes and impacts) in the rural water supply sector.

Section 2.2 discusses the definition of sustainability, including both financial and environmental sustainability. I outline the influence of these concepts on development policy and practice in recent decades, and touch on some critiques suggesting that the discourse of sustainability has had counterproductive effects. I then explore definitions of sustainability as applied specifically to the rural water sector, and adopt the straightforward 'continuation over time'.

In Section 2.3 I draw on existing models to develop an analytical framework for hypothesised determinants of sustainability, distinguishing between these direct determinants and the underlying political economy dynamics that influence them.

The critically important yet problematic location of ‘participation’ in these models is discussed.

The chapter concludes with a summary of the first ‘hypothesis-testing’ stage of my analytical framework, and outlines the need for a second ‘theory-generating’ stage to explore the underlying dynamics.

2.1 INPUTS AND RESULTS

Rural water supply involves the transformation of inputs (technology, funding) into outputs (infrastructure or water points) that will enable an outcome (access to safe water) to be achieved, resulting in positive impacts (reduced drudgery, improved health, and economic benefits) in terms of human welfare.

People require water for a variety of purposes, both domestic (drinking, cooking, bathing, hand-washing, washing clothes and cooking utensils) and productive (irrigation, watering livestock). While consumption needs may vary in response to individual factors such as health and livelihood strategies, and environmental factors such as climate, the World Health Organisation suggests that ‘a minimum of 7.5 litres per capita per day [lcd] will meet the requirements of most people under most conditions’ for drinking and cooking (Howard and Bartram 2003: 3) while 20 lcd for drinking, cooking and washing could be considered ‘basic access’ (*ibid*.). In practice, actual consumption levels in low-income countries are often considerably lower (Thompson, Porras et al. 2001, Howard and Bartram 2003, Bhandari and Grant 2007, Whittington, Davis et al. 2008).

There is an important link between convenience and consumption: people consume more water if the source is relatively close to the home, and vice versa, although the relationship is not linear (Carter, Tyrrel et al. 1999, Mathew 2004). If water collection takes more than 30 minutes per round trip, there is an increased risk that people will fail to meet their minimum water needs (JMP 2010); hence, this is recommended as a criterion for a basic level of service (WHO 2011, WASHCost 2012).

Water quality is typically considered to have four aspects: microbial, chemical, radiological and acceptability (i.e. taste, odour and appearance) (WHO 2011). For users, the most salient aspects are often taste and hardness: excessively salty water cannot be drunk, and excessively hard water cannot be used for washing. Bacteriological water safety is especially important for drinking water, and is often of particular concern to water point installers – but users may not be aware of this issue, or may not value it highly (Bhandari and Grant 2007).

In fact, it is likely that a significant minority of 'clean' water sources do not deliver adequately clean water (JMP 2012a). The JMP is making efforts to improve assessment of water quality through its Rapid Assessment of Drinking Water Quality (RADWQ) methodology (JMP 2010), but there is a long way to go before quality is routinely monitored. Of course, only a few of the 'basic access' 20 lcd are needed for drinking, and lower-quality water may be acceptable for other uses such as washing; in practice, households may use different sources for different purposes, depending on the required balance between water quality and convenience. Additionally, increased quantity of water is often more important than increased quality, because many diseases are 'water-washed' rather than 'waterborne / faecal-oral' (Thompson, Porras et al. 2001).

In summary, both quantity and quality of water are significant factors influencing the achievement of benefits from rural water supply.

2.1.1 Inputs

<u>Technology: Hardware</u>

There are multiple hardware options for rural water supply, including hand dug wells, boreholes (both hand and machine drilled, and fitted with handpumps or powered pumps), protected springs, dams, rainwater harvesting, and gravity fed systems (Harvey and Reed 2004, WaterAid n.d.). The most appropriate technology for a given situation depends on a range of factors, including geology and level of demand. For each technology type there are also multiple varieties - for example, there are 18 different public-domain handpumps (RWSN 2013) and many more proprietary designs. However, some countries – including Malawi - have successfully enforced standardisation of pump type (Baumann and Furey 2013).

Currently, handpumps on boreholes or shallow wells supply nearly half of all rural Africa's protected water supplies (Harvey and Narkevic 2009: 3), and approximately 60,000 new handpumps are installed on the continent each year (Sansom and Koestler 2009). The most widespread type in Africa is the Afridev, which was developed in the 1980s in Malawi and Kenya specifically to be suitable for 'village level operation and maintenance' (VLOM) (Hankin 2001, Baumann and Furey 2013). It has been suggested that there is a direct trade-off between simplicity and durability in the case of handpumps (Kleemeier and Narkevic 2010), and it is widely acknowledged that operation, maintenance and repair (OMR) – 'software' or management issues - are critically important for ensuring continued pump functionality.

Technology: Software

Since the 1990s, the main management option for rural water supply in most low-income countries has been community management (CM) – 'the idea that communities should operate and maintain their own water supply systems' (Schouten and Moriarty 2003: 1). The CM model's roots can be traced to donors' disillusion with perceived poor government performance in public service provision, coupled with the explosion of interest in participatory approaches in the 1980s and 1990s (ibid.). CM's proponents argue that the best people to manage a water point are its users, since they are both motivated and available to ensure its continued functioning.

While there is no blueprint for community management, it exists in broadly the same form in a wide range of locations. The core of the model is the Water Point Committee (WPC), typically a group of ten villagers delegated by their community to take responsibility for the water point. The WPC is intended to be gender-balanced and democratically elected, with formal roles including a Chair and Treasurer. Its responsibilities are both technical - maintaining and repairing the water point - and financial - collecting and saving community contributions so that funds are available for maintenance and repairs. Villagers contribute through regular payment of user fees, as well as through initial contributions towards installation, in cash or in kind. WPC members are typically provided with a week's training when they are first appointed, and it is then assumed that the WPC will be able to take on permanent responsibility for management of the water point.

However, problems with community management became evident in the late 1990s (Colin 1999): maintenance was almost never done, communities were unable to manage many repairs, and consequently poor functionality plagued the rural water supply sector. Despite the emergence of a significant and critical practitioner literature in recent years (Schouten and Moriarty 2003, Lockwood and Smits 2011), as well as wider critical engagement with the theory of participation (Cooke and Kothari 2001, Brett 2003, Cleaver 2012, Mansuri and Rao 2013), the community management model today remains the software option of choice for governments and donors alike, as confirmed by respondents in this study.

Funding: Costs

Both capital and recurrent costs of water supply vary significantly depending on the hardware and software adopted. Considerable effort has been invested in recent attempts to develop cost benchmarks (Hutton and Haller 2004, Fonseca, Franceys et al. 2011, WASHCost 2012), in line with the current emphasis on 'value for money' in development spending (DFID 2011).

Capital

For boreholes, the main capital cost is drilling, which varies depending on the geology of the drill site (i.e. type of rock and depth of water), distance from urban centres, and construction quality (Danert, Carter et al. 2009). Additionally, drilling is not always successful, and several bores may need to be drilled before a good source is found (Harvey 2004). Other significant capital costs are the pumpset, the civil works (concrete base, drainage channel, and laundry stand), and the 'software' costs of mobilising communities and training WPC members.

In per capita terms, the WASHCost research initiative suggests that capital costs are in the region of $20-60 per person for a borehole and handpump, with piped systems costing roughly double this (WASHCost 2012: 2). World Bank research suggests $100-200 as the capital cost per person of an average rural water point, with a borehole and handpump estimated to cost $20-90 per person (Ghosh Banerjee and Morella 2011: 198, 200) – meaning the two sources' estimates are more or less in line. Hutton and Haller (Hutton and Haller 2004: 14) estimated the cost of basic water supply improvements (borehole with handpump) as under $1.70 per person per year in Africa, much cheaper than piped water ($12.75 per person per year). However, this assumes a 20-year lifespan of the technology, which may be very over-optimistic.

Recurrent

Recurrent operation, maintenance and repair (OMR) costs are critical to ensuring water point sustainability. For some systems such costs are quite clear, and can be high: for example, fuel costs for diesel or electric pumps, or wage costs for systems that employ caretakers or pump attendants. But for many water points, OMR costs can be hard to estimate in advance, and can vary considerably depending on factors including technology type, quality of installation, regularity of maintenance, and user numbers. A rough estimate of $100 per water point per year is sometimes used (Whittington, Davis et al. 2008, Baumann and Danert 2008a). In per capita terms, the WASHCost consortium gives higher estimates of $3 to $6 per person per year for boreholes and handpumps, and $3 to $15 per person per year for piped systems (WASHCost 2012: 2).

Any water infrastructure will eventually require replacement or upgrading. Full cost recovery takes this into account, but appears to be very rare in the water sector. Full capital costs are very rarely (if ever) recouped from users; most users are completely unaware of the full capital cost of a water point, and user contributions often do not even cover basic OMR costs (Whittington, Davis et al. 2008). Total lifecycle costs for a handpump have been estimated at $235 per year[3] (Baumann 2006), but Carter, Harvey et al. (2010) estimate that the average community collects only $30 to $40 per year, just one-seventh of the amount required.

Global requirements

Total global expenditure required to meet the WASH MDG was estimated by the WHO in 2008 to be $72 billion per year ($18 billion capital and $54 billion recurrent) (Hutton and Bartram 2008: 13). In contrast, actual expenditure on WASH was estimated at $14 to $16 billion per year, only about a fifth of the amount

[3] In line with the literature, this section give figures in US dollars.

required (ibid.). For Africa alone, World Bank research estimates that the total spending required to meet the WASH MDG is $22.6 billion per year or 3.5% of GDP, with more than three-quarters of this required for water (Ghosh Banerjee and Morella 2011: 202). Nearly half (43%) is needed for new infrastructure, 31% for operation and maintenance (O&M), and 26% for rehabilitation; almost two-thirds of the total is needed in rural areas (ibid.)

<u>Funding: Sources of funding</u>

Funding for rural water supply may derive from three sources: tariffs (user payments), taxes (domestic revenue), and transfers (aid) from donors, including bilateral, multilateral and non-governmental (Trémolet and Rama 2012). In practice, donors are dominant.

<u>*Transfers*</u>

In many African countries, half or more of WASH funding comes from ODA rather than from domestic government sources (Ghosh Banerjee and Morella 2011: 219). The largest multilateral donor is the World Bank, and by far the largest bilateral is Japan (DFID 2012). However, the share of WASH in global aid has declined from over 8% in the mid-1990s to below 5.5% in 2009 (WaterAid 2011: 29). DFID allocates approximately 2% of its budget (£172 million in 2010/11) to WASH, with roughly half of this being disbursed through multilateral organisations, and has recently committed to doubling its WASH programme (DFID 2012).

Comprehensive information is generally only available for official (governmental) donors, via the OECD's Creditor Reporting System (CRS) database and the International Aid Transparency Initiative (IATI). There is no equivalent dataset for private or non-governmental aid flows, which are significant in many countries (Ghosh Banerjee and Morella 2011), but Koch, Dreher et al. (2009) suggest that NGO aid tends to cluster, and to be concentrated in the same countries as their official 'backdonors'. International efforts are under way to establish a global standard for reporting financial flows for WASH (Trémolet and Rama 2012) but current information remains limited. It is nonetheless clear that financing for WASH is inadequate in terms of both quantity (it is insufficient to meet needs) and quality (it is poorly targeted).

Taxes

Government expenditure on WASH in low-income countries is much lower than required, at only 1.1% of GDP in low-income non-fragile countries and 1.7% of GDP in low-income fragile countries (Ghosh Banerjee and Morella 2011: 216). Allocations to WASH are far lower than allocations to education and health (WaterAid 2011). Overall, the 'water infrastructure funding gap' amounts to 1.8% of GDP for sub-Saharan Africa as a whole, or nearly $12 billion per year (ibid: 228-229). The African Ministers' Council on Water identifies failure of governments to mobilise domestic revenues as a key problem, and suggests that African countries should earmark 5% of domestic revenues for WASH expenditure (AMCOW 2011). Previously, UNDP suggested a benchmark of 2% of GDP, half from public spending and half from cost recovery from households (UNDP 2006).

Tariffs

Since donors have focused on capital investment, and governments have proved unable or unwilling to provide adequate funding for WASH, users themselves have been increasingly held responsible for bearing the costs of operation, maintenance and repairs (OMR). These user fees are a key feature of the community management model that grew out of the financial crisis in public services in the 1980s (Schouten and Moriarty 2003) and are now a central plank of government rural water supply strategy in almost all African countries (Harvey 2007). However, they remain a topic of much debate within the WASH sector (Whittington, Jeuland et al. 2012).

Those in favour of user fees put forward two main arguments. First, they claim that user fees are necessary for financial sustainability - if the recurrent costs of water service provision cannot be covered by governments or donors, users must share the burden. The cost of maintaining access to clean water is not unreasonably high, and although availability of cash may be seasonally constrained, users can almost always find cash for other purposes such as funerals (Msukwa and Taylor 2011) and indeed alcohol (Haysom 2006). Thus, proponents argue that user fees are both necessary and affordable. Indeed, some go further and suggest that 'self-supply' must be a major element of the solution to water access (Sutton 2010, Sutton 2011). Secondly, proponents argue that user fees encourage a sense of ownership and empowerment, by giving people a financial stake in their water point.

On the other hand, critics of user fees argue that they neither generate sufficient funds to ensure sustainability, nor foster ownership. A very large majority of WPCs do not manage to collect anywhere near the amount required for OMR: for example, in Ghana 'rural households … are paying very little for the improved water services, and as a result, the finances of many [WPCs] are in poor shape' (Whittington, Davis et al. 2008: 13). Community co-financing requirements are more likely to create feelings of injustice and resentment, rather than of empowerment and ownership (Babajanian 2011). And evidence from Tanzania (Haysom 2006) suggest that even where people are willing to pay for water, this does not translate into taking responsibility for the water point, in the sense of holding leaders accountable for performance.

Furthermore, there is clear evidence that, even at very low levels, user charges put people off using clean water, as demonstrated by a recent systematic review of willingness-to-pay for clean water in Bangladesh, Ghana, Kenya and Zambia (Null, Kremer et al. 2012). Low willingness-to-pay is not exclusively due to poverty; rather, people underestimate the benefits of clean water. These results echo other research demonstrating that charging for privately-consumed public goods, such as anti-malarial bed-nets and deworming drugs, significantly reduces uptake of those goods, resulting in sub-optimal levels of use (Kremer and Miguel 2007, Dupas 2009). The clear implication is that tariffs are both ineffective and counter-productive as a source of funding for water provision; instead, clean water should be subsidised as a public good. Nonetheless, user contributions currently remain central to the community management model of rural water supply.

Funding: Targeting

Whether from taxes or transfers, the limited large-scale funding that does exist is often poorly targeted. The WASH sector overall suffers from several biases, notably towards middle-income rather than low-income countries, towards urban rather than rural people, and towards new installations rather than maintenance of existing infrastructure (WaterAid 2011, WHO 2012). There are also significant geographical inequalities in the way that funds are allocated within countries: for example, in Malawi, Sugden (2003) found that the ratio of water points per thousand people ranged from zero to nineteen.

The bias towards construction rather than maintenance is a source of especial concern to many observers. The vast majority of funding in the water sector is directed towards new installations, with much smaller amounts invested in rehabilitation, and very little in ongoing operation, maintenance and repair (OMR). In low-income countries only one-sixth of expenditure is on OMR (Ghosh Banerjee and Morella 2011: 216), despite the fact that the WHO estimates noted above suggest that fully 75% of the funding required is needed for OMR (Hutton and Bartram 2008). This overemphasis on capital investment, and underfunding of recurrent costs, has serious implications for sustainability.

2.1.2 Results: Outputs, outcomes and impacts

Distinguishing clearly between outputs (functioning water points), outcomes (people with access to safe water) and impacts (improved health, reduced drudgery, economic benefits) is analytically essential, although regrettably not always attempted or achieved.

In recent years there has been significant investment globally in data collection and management for WASH as well as in other sectors, driven by the need to assess progress towards the MDGs. The key source of outcome data is the Joint Monitoring Programme for Water and Sanitation (JMP) of the WHO and UNICEF (JMP 2011, JMP 2012a) which compiles data from a range of national statistical sources including census data, Demographic and Health Surveys (DHS), and Multiple Indicator Cluster Surveys (MICS) for over 200 countries, in order to monitor progress towards MDG 7. Data on outputs is much less comprehensive; the only source of cross-national data is based largely on guesswork (RWSN 2009). In contrast, a large number of studies have been conducted to examine the impacts of WASH programmes, and their findings have been summarised in systematic reviews (Waddington and Snilstveit 2009, Waddington, Snilstveit et al. 2009). Below, I examine each of these in turn.

Outputs and Outcomes: Water points and access to water

The most comprehensive and most reliable source of data on sustainable access to safe water is the JMP, which bases its figures on representative population surveys conducted by National Statistical Offices. However, as noted in Chapter One, there are subtle but important differences between the JMP measure of 'access to improved drinking water sources' and the MDG target of 'sustainable access to safe drinking water'. Crucially, the JMP statistics do not measure how sustainable the access is. More people are now getting access to clean water because of a surge in construction of new water points – but if many of those water points stop working within a short time, the improvement in access figures will be short-lived. Secondly, as the JMP itself points out, 'not all improved sources in actual fact provide drinking-water that is safe' (JMP 2010: 9). WHO research suggests that half of all protected wells, and one-third of boreholes and protected springs, are contaminated (JMP 2011: 34). Adjusting JMP estimates to take account of water quality results in significant decreases in estimates for access to safe water, for example by 11% in Ethiopia and 10% in Nigeria (ibid: 36). Other studies have found even higher discrepancies between reported access and adequate-quality access (Jimenez and Perez-Foguet 2008: 6).

In contrast to the JMP's outcome-based approach, some analysts (including many government water ministries) use an output-based approach, based on information - or assumptions - about water supply infrastructure, its functionality, and the number of users served. According to the only major compilation of output figures available, average water point non-functionality across 20 countries in sub-Saharan Africa is 36% (RWSN 2009).

Frustratingly, some analysts conflate the two types of measure, and discount population (outcome) figures for access to water by infrastructure (output) figures for water point functionality – an invalid calculation, since the two measures are based on different factors. For example, for Malawi, Baumann and Danert give the figure of 71% access to improved drinking water sources (they do not give a source, but presumably this figure is drawn from the 2006 MICS, as shown in JMP 2010), but then go on to claim that since 'it is estimated that 31% of the improved rural water points are not functioning, thus effective coverage is reduced to 55%' (Baumann and Danert 2008a: 10). Clearly, a person-based index should not be multiplied by a technology-based index: the MICS data represents people who say they actually draw water from an improved drinking water source, whereas the non-functionality figure relates to numbers of water points. Others, including DFID, repeat the same mistake (de Saint Méloir 2009, DFID 2012: 58).

It thus appears that the approach taken to measuring 'sustainable access to safe water' depends on who is using the statistic and what point they wish to make. Unsurprisingly, politicians and international aid officials tend to emphasise the positive story told by the JMP outcome figures, whereas NGOs and other water sector stakeholders often highlight output non-functionality in order to focus attention on sustainability. While it is important to celebrate the progress that has undoubtedly been made in recent decades towards universal access to clean water, greater objectivity and clarity are necessary in order to diagnose and address the problems that remain. In Malawi, the statistics (66% functionality, 80% access) might suggest a simple solution: fix the broken infrastructure, and 100% access might follow. However, this takes no account of the dimension of equity. Many broken water points may be located in areas where people have access to alternative improved sources. Both functionality and equity of distribution of water infrastructure must be addressed in order to approach 100% access.

Impacts: Health and time benefits

Two main benefits of access to safe water have been identified in the literature: improved health, and reduced drudgery (i.e. greater convenience and/or time savings). Some analyses also suggest that direct economic benefits can be significant, if improved access to water supports increased agricultural production; and there may also be indirect economic benefits since improved health and reduced drudgery lead to increased human productivity. However, since the primary focus of my analysis is domestic water consumption, I focus here on the direct impacts on health and time.

As noted in Chapter 1, unsafe water, sanitation and hygiene is responsible for 4.2% of the global burden of disease as measured in disability-adjusted life years (DALYs), and unsafe WASH is the fourth largest cause of death in low-income countries. It has long been claimed by proponents of clean water supply that such investments lead directly to health benefits, particularly through reduced incidence of waterborne diseases such as diarrhoeal infections (White, Bradley et al. 1972, Hunter, MacDonald et al. 2010, Elbers, Godfrey et al. 2012). However, a 1996 study of almost 17,000 people in 8 countries concluded that 'health benefits from improved water were less pronounced than those for sanitation. Benefits from improved water occurred only when sanitation was also improved' (Esrey 1996: 608). Other studies have found no positive effects on health of water infrastructure programmes (Klasen, Lechtenfeld et al. 2012).

A systematic review concluded that improving access to clean water is most effective in tandem with improvements in sanitation, especially the elimination of open defecation, and in hygiene practices, especially hand-washing with soap after defecation and before eating or preparing food, and safe disposal of childrens' faeces (Waddington, Snilstveit et al. 2009). Even if water is fetched from a safe source, it may become contaminated after collection through unsafe storage; Masangwi, Morse et al. (2009) found that households using borehole water were almost equally as likely as those using unimproved wells to suffer from diarrhoea. Thus, access to clean water is important but not sufficient for improved health, and must be coupled with improved sanitation and hygiene if health benefits are to be achieved.

A second significant and widely-noted benefit of improving access to safe water is the consequent reduction in the burden of fetching water, which is borne almost exclusively by women and children (Aladuwaka and Momsen 2010). Improved access to safe water frees their time for more productive activities, such as income generation or schooling (Rauniyar, Orbeta et al. 2011), or for leisure, social and religious activities (Gutierrez 2007). In fact, these convenience-related benefits are more immediately felt and better appreciated by users than the assumed health benefits: ‘users prioritise convenience in access to water over other possible concerns such as health’ (Haysom 2006: 40).

There are also productive and social impacts of improving access to safe water. Easier access to water can support agricultural production, both through main-crop irrigation and through hand watering of small kitchen gardens. Water availability is a very significant constraint on production in many poor countries, such as Malawi, which relies on rain-fed agriculture with a single growing season. Social benefits have also been noted: researchers found that ‘in Tanzania and Ghana, where receiving visitors with hospitality is socially important, people can now offer potable water or pleasant-tasting tea in clean cups. More people from neighbouring villages started to visit the communities with water points and this has led to increased status and self-respect’ (WaterAid 2001: 21).

Achievement of these positive impacts rests, of course, on the long-term sustainability of the water points themselves – which, as already noted, cannot be assumed. The next section examines the concept of sustainability in more depth, and assesses the record of the sector so far.

2.2 SUSTAINABILITY

Sustainability is one of a number of development ‘buzzwords’ or ‘fuzzwords’ whose overuse and lack of clarity risk making them meaningless (Cornwall 2007, Cornwall and Eade 2010). It is ‘a consummately effective ‘boundary term’’ (Scoones 2010: 153) linking the worlds of science and politics; but ‘has become one of the most overused and abused words in development vocabulary’ (Sugden 2003: 1). Nonetheless it is central to my topic, and must therefore be clearly defined.

2.2.1 Definition

Two broad spheres of meaning can be distinguished: environmental, and economic. The concept of environmental sustainability came to prominence with the Brundtland Commission’s definition of sustainable development as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Brundtland 1987: 43); it emphasises the need to steward natural resources. It has some relevance to the rural water sector, in that access to water in some areas may be threatened by the drying up of aquifers due to over-extraction and/or reduced replenishment from rainfall.

The second sphere of meaning, economic, is more commonly used in development discourse. It implies either that outcomes will continue after inputs cease, or that new resources are found to replace the initial inputs. This concept of sustainability – the idea that external agents can intervene to kick-start a project or process, which will continue indefinitely once they withdraw funding and other support - is central to much development policy and practice today, and this is the meaning of sustainability most frequently used in the literature on rural water supply. However, many authors do not specify which set of meanings they refer to, but simply emphasise 'continuation over time' as the core of the concept (Webster, Dejachew et al. 1999, Harvey and Reed 2004, Rosenberg, Hartwig et al. 2008, Baumann and Danert 2008a, Lockwood and Smits 2011). For all these authors, sustainability simply means 'continuation over time' without (significant) further inputs.

There is, however, evidence that 'the sustainability doctrine' can paradoxically lead to short-term opportunism on the part of development actors, as observed by Swidler and Watkins in Malawi, where donor focus on sustainability in HIV/AIDS programmes 'created a capricious, irrationalising environment that reinforced a contingent, opportunistic orientation among recipients' (Swidler and Watkins 2009: 1183). The insecure nature of aid funding often leads not to the development of sustainable local sources of funding (which may be a chimera in any case) but rather to a scramble to access the next short-term grant. Another critique of the 'illusion' of sustainability is offered by Kremer and Miguel (2007). Using the example of deworming in Kenya, they show that continued public subsidy is the most effective way to ensure continued provision of public goods, and suggest that 'it may be difficult for external interventions to promote sustainable voluntary local public good provision' (Kremer and Miguel 2007: 1060).

The emphasis on sustainability in the rural water supply sector, as well as in other development sectors, is reflected in the now widespread agreement that water supply needs to be implemented using a service delivery approach rather than a project approach (Lockwood and Smits 2011). The focus has thus shifted away from delivering stand-alone outputs (water points) to delivering outcomes (continued access to clean water) - a welcome shift that implicitly puts sustainability at the centre. Ensuring sustainable access to clean water depends on ensuring continued functionality of the infrastructure. Thus, I define sustainability in the context of this study as 'continued water point functionality over time'.

2.2.2 Dimensions

Since the purpose of this study is to assess the influence of various factors on the outcome of sustainability, we must first define how this outcome variable is to be measured. Measuring sustainability is challenging, since multiple aspects of quality and quantity must be considered (Whittington, Davis et al. 2008).

The quantity of water delivered depends on the yield of the water point (influenced by the size of the source, the efficiency of the technology, and the number of users), and the number of days that it is operational (which depends on seasonality, and the frequency and duration of breakdown). The quality of water has four facets, as previously discussed: microbial, chemical, radiological and acceptability. Microbial quality is generally considered the main concern by providers of water points, and is influenced by factors such as siting, construction quality, and user behaviour. However, acceptability criteria such as taste, hardness, convenience and queuing time are much more salient to users. User satisfaction is also influenced by perceived costs, in terms of money, time, or energy. The importance of user perceptions in achieving functionality (and sustainability) has also been noted in other sectors, for example in projects promoting improved cooking stoves (Chowdhury, Koike et al. 2011). The performance metrics that are important to outsiders may be very different from those that are valued by users.

There are currently no performance standards for functionality or sustainability in the sector, although the WASHCost initiative is attempting to set benchmarks for cost-effectiveness. Although the problem is widely recognised, and the WASH Sustainability Charter (SustainableWASH.org 2011) has been endorsed by almost one hundred organisations, the question of what constitutes an acceptable level of functionality and sustainability is only rarely addressed either in the literature or in practice. The sole exception is the recent work of the WASHCost initiative, which has suggested a definition of 'a basic level of service' as:

'People access a minimum of 20 litres per person per day, of acceptable quality (judged by user perception and country standards) from an improved source which functions at least 350 days a year without a serious breakdown, spending no more than 30 minutes per day per round trip (including waiting time).' (WASHCost 2012: 1).

This definition appears highly aspirational, not least because it specifies functionality on 350 days out of 365 (96%) – a rate considerably higher than current average water point functionality almost everywhere, as discussed in the next section.

To summarise, then, sustainability can be measured in several ways: as a snapshot, or through a combination of elements including breakdown frequency and breakdown length (which can be combined to give functionality as a percentage of time), water quality, and yield. Box 2.1 summarises these six metrics or outcome variables.

Box 2.1: Dimensions of water point sustainability

Metric	Variable name
Functionality at time of assessment	FUNCT
Frequency of breakdown	BREAKFREQ
Duration of breakdown	BREAKLENGTH
Days operational since installation	%DAYSFUNCT
Quality of water	WATERQUAL
Quantity of water	YIELD

The main metric used in the sector is the first, functionality, normally expressed as a binary (Yes/No) value and aggregated to give the percentage of water points that are functional in a given location.

2.2.3 Data

We have already seen that the major international data-gathering effort in the water sector, the JMP reporting process, does not collect data on functionality. The little data that exists on this topic is partial and perhaps unreliable – even more so than official development statistics, which have themselves been subject to significant critique (Jerven 2012, Jerven 2013).

National inventories of WASH infrastructure are seen as an important first step in monitoring sector performance, but they are costly and often, once completed, are underutilised (Welle, Schaefer et al. 2012). Such inventories have been completed for several countries, including Ethiopia and Malawi, but updating and data utilisation remain major challenges. Indeed, one earlier dataset, a 1993-1997 water point inventory for Zambia, was completely 'lost' during government reorganisation (Gutierrez 2007).

The best available data suggests a major sustainability challenge. Nearly ten years ago, Harvey and Reed (2004): 5-6 reported depressing estimates from several sources:

> *'In 1994 it was estimated that 40 to 50 per cent of handpumps in SSA were not working (Diwi Consult & BIDR, 1994), and according to RWSN (2004b) there are currently approximately 250,000 handpumps in Africa, less than half of which are operational. This is backed up by data from Uganda (DWD, 2002a) and South Africa (Hazelton, 2000) which indicate*

similar operational failure rates. An evaluation in Mali in 1997 found 90 per cent of pumps inoperable one year after installation (World Bank, 1997).'

More recently, the Rural Water Supply Network (RWSN 2009) collated estimates for handpump non-functionality in twenty sub-Saharan African countries. These estimates range from 10% in Madagascar and 20% in Uganda and Guinea, to 65% in Sierra Leone and Cote D'Ivoire and 67% in DRC, with the average for the 20 countries being 36% non-functionality. The figures appear to come from individual informants, and little or no information is given regarding the methods used in calculating them. Still, despite its flaws, this is probably the best data that is currently available, and these estimates are used widely in the sector, including by the JMP itself (JMP 2011, Lockwood and Smits 2011).

Their relevance is reinforced by the work of Kleemeier (2010: 5-6) who combines the RWSN estimates with World Bank data and finds considerable agreement between her four sources of data; non-functionality is very low in some countries (e.g. Senegal 5% and Madagascar 10%) but much higher on average for Africa as a whole. Indeed a figure of 30-40% for water point non-functionality in Africa in general, and Malawi in particular, appears to be well entrenched and widely used (RWSN 2005, Matamula 2008). Oddly, the RWSN (2009) estimate for Malawi is 40%, with the source listed as MICS 2006 – which is strange, since MICS is a population survey not an infrastructure survey, and in any case good infrastructure data (the

2005 Malawi WP database) was available at the time, showing non-functionality was 34%.

Some attempts have been made to generate more accurate data through surveys and mapping in a number of countries, a process that has gained momentum in recent years as technology has developed (Pearce and Howman 2013). For example, WaterAid in Tanzania commissioned a private company to survey water points; having mapped 51 districts (out of a total of 127 districts in Tanzania) they found that only 54% of all the improved public water points were working, and that 25% of new water points stop working within the first two years (Taylor 2009a: 1, Taylor 2009b). An earlier mapping effort in Tanzania (covering 3 regions plus one extra district) showed overall functionality of only 45%, with WaterAid water points having functionality of 67% in the same areas (Haysom 2006: 1). In Liberia, (Rudge and Bosc 2009) found functionality of 64%.

These high failure rates, of a third or more, have important implications for achievement of the MDG on water. First, they suggest that the achievement of positive outcomes (in terms of improved access to clean water) is unlikely to be sustainable due to poor sustainability of outputs (water points); and second, this implies a very significant level of wasted inputs (investment). The question of <u>why</u> so many water points fail – the question to which this thesis offers some answers - is thus critically important for the sector.

2.3 EXPLAINING WATER POINT SUSTAINABILITY – AND FAILURE

A range of models have been put forward in an attempt to explain water point sustainability or failure. Although this distinction is not always made in existing models, I have found it helpful to distinguish between 1) the proximate factors that directly affect water point sustainability, and 2) the underlying social, political and economic dynamics that shape their impact. As an illustration, consider the question of availability of funds for maintenance and repair, highlighted as a key factor by many studies. Low savings by a Water Point Committee is likely to severely reduce the likelihood of water point functionality, since if a breakdown occurs there will be no money for repairs. A simplistic response to identification of this determinant might be simply to recommend better collection of funds. However, we need to go beyond observing this correlation to examine in more depth <u>why</u> WPC funds are typically so low – an enquiry that touches on questions of social status and structures, the politics of how the water sector is organised, and the economics of rural livelihoods.

I therefore adopt a two-stage analytical framework. The first 'hypothesis-testing' stage identifies the key proximate explanatory variables associated with variation in water point functionality, and tests them in order to assess their relative importance. The second 'theory-generating' stage involves explaining the influence of these factors through analysis of underlying social, political and economic dynamics. Chapter Three engages with this second theoretical stage. The remainder of the current chapter outlines the first stage: reviewing the key proximate determinants highlighted in the literature, examining several overarching models proposed by previous authors, and presenting my own synthesis.

2.3.1 Key proximate determinants

A wide range of factors are noted in the practice-based literature. They can be broadly divided into two groups: design and installation factors, and post-construction factors. Brief summaries are given below.

<u>Design and installation factors</u>

<u>*Geology and siting*</u>

Geological conditions determine the difficulty of accessing groundwater and the type of water infrastructure that can be installed - e.g. shallow well, borehole or piped system (Harvey and Reed 2004). A balance has to be struck between optimal siting in technical terms (determined by geology and system design requirements), and optimal siting for users. Good siting requires good hydro-geologists, who are often in short supply in low-income countries. User participation in siting decisions has been shown to improve sustainability (Khwaja 2009) but may entail some compromise on system design.

Climate

Sustainability will be compromised if the aquifer is rapidly exhausted (either because it was insufficient in the first place, or because rainfall is too low to replenish it) or if the water table is too low to provide water year round (Harvey 2004). Climatic factors can also damage water infrastructure directly. For example, flash floods frequently wash out piped systems in Malawi (Baumann and Danert 2008a).

Type of technology

Inappropriate choice of technology and/or poor system design can threaten sustainability (Bhandari and Grant 2007). Poor choice or design may be due to ignorance (either on the part of contractors, and/or by users, if they play a major role in system choice) or sometimes incentives (e.g. if installers are offered bribes by suppliers to select a particular technical option). Proliferation of many different types of technologies makes it harder to ensure that spare parts and expertise are available for maintenance and repairs; standardisation is helpful (Lockwood and Smits 2011).

Quality of installation

It is often assumed that most borehole failures are due to problems with the handpump rather than failure of the borehole itself, but this is not always the case. If boreholes are not drilled deep enough (to cut costs, or because drillers lack sufficient expertise), or drilled during the wet season (because of time and cost pressures), they are more likely to fail (Harvey 2004). Construction quality is one of the most important factors influencing sustainability of water supply systems (Sara and Katz 1997), yet this is often hard to quantify. It is in turn affected both by the availability of resources and the quality of supervision. However, many projects rely on unskilled 'supervision' by community members, or very sporadic site visits by district government staff.

User numbers

High user numbers are associated with lower sustainability due to wear and tear (Komives, Akanbang et al. 2008, Whittington, Davis et al. 2008). High user numbers also affect consumption levels (Mathew 2004) and may drive some users to resort to unprotected sources (Bhandari and Grant 2007). Interestingly, sustainability may also be lower if there are too many water points per user; if users have easy access to a good alternative, they are less likely to invest in fixing a broken water point (Whittington, Davis et al. 2008).

System age

Intuitively, the age of a water supply system is likely to affect its functionality; common sense suggests that older water supply infrastructure is less likely to be operational than newer systems. However, recent studies have provided contradictory results: water point age was indeed associated with functionality in Peru, but not in Bolivia or Ghana (Whittington, Davis et al. 2008).

Post-construction factors

Frequency of maintenance

In theory, regular maintenance of water infrastructure should reduce or eliminate the incidence of breakdown and need for repairs. Indeed, user manuals advise water point managers to conduct regular tests in order to identify and fix potential problems (SKAT-RWSN 2007). However, the literature suggests that maintenance is rarely done (Colin 1999).

Accessibility of spare parts

Several sources (Hankin 2001, Harvey and Reed 2004, RWSN 2005, Baumann and Danert 2008a, de Saint Méloir 2009) suggest that access to spare parts is a critical factor influencing water point sustainability. For example, Whittington, Davis et al (2008: 12) found that it took much longer to fix breakdowns in Ghanaian handpumps (18 days on average) than in Latin American gravity fed systems (1-5 days), and attributed this to Ghanaians having to source spare parts from outside the country. However, other studies have found no relationship between functionality and access to spare parts (Haysom 2006, McNicholl 2011).

Availability of maintenance and repair skills

The community management (CM) model envisages that WPC members, supported in some locations by 'Area Mechanics', will have the skills to maintain and repair water points. However, many observers have argued that this is unrealistic, noting problems including poor quality training, illiteracy, and low motivation on the part of trainees (Baumann and Danert 2008; de Saint Meloir 2009; Bhandari and Grant 2007; Haysom 2006). On the other hand, Sara and Katz noted that 'one of the most conclusive findings of [our] study is that both household and water committee training plays an important role in ensuring … sustainability' of water supply systems (1997: 50).

Availability of funds for maintenance and repair

As discussed above, ability and willingness to pay for recurrent costs are critical issues in ensuring sustainability. While the community management model envisages that users bear these costs, in practice the amounts collected are often much lower than required (Carter, Harvey et al. 2010), and users often wait and hope for NGOs and other external agents to cover these costs instead (Whittington, Davis et al. 2008). Users may also be unwilling to pay if they do not trust the committee (Haysom 2006, Gorton, Sauer et al. 2009).

Availability of external support

Many sources (Carter, Tyrrel et al. 1999, Webster, Dejachew et al. 1999, WaterAid 2001, Harvey and Reed 2004, Carter and Rwamwanja 2006, Lockwood and Smits 2011, Opare 2011) acknowledge that there is a need for continued external support of some sort – a conclusion echoed in other types of development programmes, such as improved cookstoves (Bailis, Cowan et al. 2009). The critical role of local government in post-construction support (PCS) is often noted (Carter and Rwamwanja 2006), and a large study found that refresher technical training for water point caretakers, plus regular visits by district water and sanitation teams (local government officials) are the most promising types of post-construction support (Komives, Akanbang et al. 2008).

Incidence of theft

The incidence of theft and vandalism is not particularly widely acknowledged in the literature, although some references can be found (e.g. Kleemeier 2000). However, there is evidence that it may be a significant factor in some places; for example, theft explained two-thirds of non-functionality in one sub-District in Malawi (Campbell 2009).

2.3.2 Overarching models

Several authors have attempted to synthesise the individual factors listed above into an overarching model of sustainability.

For example, Harvey and Reed (2004) identified eight elements influencing sustainability, stressing the importance of viewing these factors as interlinked building blocks, rather than in isolation. Their list combines what I have called ‘proximate’ and ‘underlying’ factors:

1. Policy context
2. Institutional arrangements
3. Financial and economic issues
4. Community and social aspects
5. Technology and the natural environment

6. Spare parts supply
7. Maintenance systems
8. Monitoring.

Three of the eight (finance, spare parts supply, and maintenance skills) have frequently been used as shorthand for assessing sustainability (Sugden 2001, Sugden 2003, Rudge and Bosc 2009); and Harvey and Reed's analysis fed through into an RWSN strategy paper (RWSN 2005), which unusually and helpfully indicated the relative importance of each of the 15 factors identified.

More recently, the Triple-S programme (Sustainable Water Services at Scale - a 6-year multi-country learning programme led by IRC (the International Water and Sanitation Centre) and funded by the Gates Foundation) identified nine areas necessary to improve sustainability (Lockwood and Smits 2011: 2):

1. Professionalization of community management
2. Increased recognition and promotion of alternative service provider options
3. Sustainability indicators and targets
4. Post-construction support to service providers
5. Capacity support to decentralised government (to the service authorities)
6. Learning and sharing of experience
7. Planning for asset management
8. Financial planning frameworks to cover all life-cycle costs
9. Regulation of rural services and service providers.

While more specific than Harvey and Reed(Harvey and Reed 2004), this list still does not clearly identify the relative importance of these factors; nor is it specific about who should do what, when, and at what cost to address these challenges. Ultimately, neither Harvey and Reed's building blocks, nor the Triple-S list, provide a suitable analytical framework for this study.

Another recent report by some of the same authors provides an overview of five key studies, and highlights twelve 'critical issues affecting sustainability' (Lockwood, Bakalian et al. 2010: 13):

Pre-project issues:

1. Community participation
2. Demand-responsive approaches
3. Empowerment
4. Technical design
5. Construction quality
6. Gender and poverty focus
7. Training.

Post-project issues:

8. Finance and tariff collection
9. User satisfaction
10. Capacity of water committees
11. Definition of roles and responsibilities for system management
12. On-going training.

Reviewing these, they identify two elements as of primary importance: adequate tariff for recurrent costs (issue #8), and external follow-up support (issue #12).

This framework underpinned a large-scale (400 communities and 10,000 individual informants) study examining the impact of post-construction support on sustainability in Ghana, Peru, and Bolivia. The study's findings 'contradict the general perception that most rural water systems fail' (Whittington, Davis et al. 2008: 4) and 'found far fewer project failures in either treatment or control villages than expected' (ibid: 8).

However, the representativeness of the study is limited by its sampling; the researchers purposively selected projects 'that used a 'state of the art' demand driven, community management model' (ibid: 7) and that had been in operation for several years; the only variation between treatment and control villages was whether they had received post-construction support (PCS). Thus, their research design screened out unsuccessful projects at the first hurdle; and as they observed themselves, 'demand-driven, community managed rural water supply programs that have been in operation for several years are not all that common' (ibid: 7). Consequently, although the researchers themselves have claimed that 'the demand-driven, community-management model seems to be working'(Bakalian and Wakeman 2009: xiv), their results only help us understand whether, in successful projects, post-construction support makes them even more successful; not whether the demand-driven, community management model itself is generally successful.

Nonetheless, important lessons emerge from this study. The Ghana research (Komives, Akanbang et al. 2008) considered 18 possible sustainability factors, of which only three were found to be particularly significant: receipt of technical training by water point caretaker/operator; regular visits by district water and sanitation team members, and village receiving only one handpump. More broadly, (Bakalian and Wakeman 2009) conclude that financial sustainability is the key issue.

The list of 'critical issues' drawn up by Lockwood, Bakalian et al. (2010) also has some similarities to the list of 'proximate explanatory variables' set out in section 2.3.1, including the division into pre- and post-construction factors. However, they list complex concepts (such as 'empowerment') alongside aspects that can be much more easily assessed (such as 'construction quality'). For the purposes of this study, it seemed to make more sense to consider questions of empowerment and participation – which would be difficult to investigate through primarily quantitative research - within a wider theoretical framework, and to use this to interpret my findings regarding the influence of proximate determinants.

2.3.3 Synthesis: analytical framework for hypothesis-testing

The analytical framework for the first stage of this study therefore encompasses ten key proximate explanatory variables - factors that immediately influence the outcome of sustained water point functionality – in two groups: design and installation, and post-construction (Box 2.2). Two other proximate determinants discussed in section 2.3.1 (geology and climate) were excluded from the framework, for two reasons: the literature suggests that they are relatively less important influences on sustainability, and collection of the necessary geological or climatic data was beyond the scope of this study.

Box 2.2: Proximate explanatory variables for water point sustainability

Design and installation factors	Variable name
Type of technology	WPTYPE
Quality of installation	INSTQUAL
User numbers	USERS
System age	AGE
Post-construction factors	**Variable name**
Frequency of maintenance	MAINTFREQ
Accessibility of spare parts	SPARES
Availability of maintenance and repair skills	SKILLS
Availability of funds for maintenance and repair	FUNDS
Availability of external support	SUPPORT
Incidence of theft	THEFT

These ten variables are those that the literature suggests have an immediate effect on water point functionality, and so this study collects data to test the influence of each. However, in order to explain <u>why</u> they operate as they do, it is necessary to engage in particular with the theory of participation, which underpins the community management model on which rural water supply in Malawi is based. This is the focus of the next chapter.

Summary

This chapter began by presenting an outline of the rural water supply sector in general – both the inputs required, in terms of technology and funding, and the results achieved, especially in terms of functional infrastructure. Several key points were highlighted, including the large gap between funding needed and funding available, the reliance of the sector on transfers from donors for capital expenditure and on user fees to cover recurrent costs, and the biases in investment towards urban areas and towards new construction rather than maintenance and repair. Data on water point functionality highlighted a major problem with performance in the sector.

Having defined water point sustainability as 'continued functionality over time', section 2 of this chapter considered six ways in which this might be measured, or six dimensions of the outcome variable 'sustainability'.

The literature suggests a large number of factors that may influence water point sustainability, both individually and in combination. Paring down these lists and models, I have identified ten key proximate explanatory variables that will be tested in this study.

To summarise, then, this first stage of my analytical framework will enable me to address the question '*what* are the main factors that contribute to variation in the sustainability of improved community water points in rural Malawi?' as well as the question '*how much* of an influence does each factor have?' The next chapter extends the analytical framework further, to examine the underlying dynamics driving these factors.

Chapter 3

THE POLITICAL ECONOMY OF COMMUNITY MANAGEMENT: UNDERLYING INFLUENCES ON SUSTAINABILITY

Introduction

The previous chapter reviewed the literature on rural water supply and identified the key 'proximate explanatory variables' or determinants of water point sustainability. This chapter extends the analysis into more theoretical territory, arguing that the operation of those explanatory variables is in turn driven by underlying political economy dynamics relating both to the nature of governance in many low-income countries, and to the dominant model of service delivery in the rural water sector - community management.

Section 3.1 situates 'sustainable access to safe water' within the wider literature on public goods and services, and examines the arguments regarding the relative roles, successes and failures of the state, market and civil society in ensuring the provision of those goods and services. The influence and implications of the literature on good governance and, more recently, on 'going with the grain' of neopatrimonial politics, are debated.

Section 3.2 reviews the literature on public participation and collective action. Participatory theory is (deliberately) diffuse and diverse; nonetheless it is arguably the most important strand in development theory, policy and practice in recent decades. In this section I explore both the claims for, and critiques of, participation and collective action.

The theory of participation underpins the strategy of community management, which is the dominant delivery model in rural water supply in most low-income countries. Section 3.3 outlines the roots, the reach, and the reality of the community management approach. I examine the extent to which the claimed benefits of participation are operationalized through community management, and discuss the implications of this evidence for theories of participation.

The chapter concludes by outlining the second stage of my analytical framework, focused on the question: 'Is community management an effective way to ensure sustainable provision of public goods and services?'

3.1 THE POLITICAL ECONOMY OF RURAL WATER SUPPLY

The concept of political economy, like that of sustainability, is multi-faceted and contested. Some see it as the application of the methods of economics to the study of politics (Weingast and Wittman 2006); others propose that it is, rather, the study of how politics affects policy choices and economic outcomes, focusing on the central concept of conflict of interests (Drazen 2000). It is in this latter sense that I use the phrase here.

3.1.1 Public goods and services

The provision of public goods has long been a core concern of political economy. Public goods are most commonly defined as goods that are non-rival and non-excludable, such as clean air or a lighthouse (Figure 3.1).

Figure 3.1: Types of goods.

	Excludable	Non-excludable
Rival	Private good	Common good / Common pool resource
Non-rival	Club good	Public good

Placing rural water supply within this framework is not entirely straightforward. In some situations, water supply is a private good (e.g. private household connections); in others, depending on local management arrangements, it may be a club good (e.g. where users must pay a fee to use the supply) or a common pool resource (e.g. where use is free, but water availability is limited).

The key characteristic is that water supply, like education and healthcare, is a 'social good'; although it is individually consumed, it has some public-good characteristics. Public services – services provided by the state for the benefit of its citizens – are concerned with the provision of such social goods, for two broad reasons (World Bank 2004). First, externalities: services like healthcare, education and clean water supply have important positive spillover effects that are insufficiently taken into account in individuals' decisions about whether and how much to pay for them, so they will be under-provided by the market. Second, equity: access to healthcare, education, clean water and so on are commonly agreed to be fundamental human rights (as noted in Chapter One), with the implication that the state should ensure that they are accessible to all, regardless of wealth or income. However, although it is generally accepted that the state bears significant responsibility for ensuring provision of these services, there is considerable debate over the precise mechanisms by which this should be achieved.

3.1.2 The state and the market in public service provision

Following the Second World War a consensus emerged among wealthy nations that the state should play a major role in development, not least through direct provision of public goods and services. In Europe, the three decades following 1945 saw unprecedented expansion of the role of the state in both the social and economic sphere. The same assumptions underpinned policy elsewhere, as many countries emerged from the yoke of colonialism (Chang 2003). Consequently, rural water supply in low-income countries was seen as the responsibility of the state (Schouten and Moriarty 2003).

This consensus on the role of the state collapsed in the 1970s and 1980s. 'Neoliberal' critics argued that the state-led approach had failed, pointing to evidence of poorly functioning public services and problematic public finances. The neoliberals swept to political power in the UK in 1979 and in the US a year later, and their economic prescriptions, conveniently (though misleadingly) summarised as the 'Washington Consensus' (Williamson 1993), dominated global public policy for the next three decades. Key planks of the agenda included fiscal discipline, financial liberalisation, and privatisation (Chang 2003).

In the name of fiscal discipline, and in response to economic crisis, many low income countries were encouraged to adopt structural adjustment policies in the 1980s, which frequently involved the reduction of public services and/or the introduction of user fees. The harmful effects of such policies were strongly criticised (Cornia, Jolly et al. 1987, Jolly 1991), and in health and education there has now been a shift back to emphasising 'free at the point of delivery' services, exemplified by the global impetus behind universal free primary education encapsulated in MDG2. However, as noted in Chapter Two, the rural water sector still promotes user fees.

Alongside the new liberal economic prescriptions emerged the discourse of 'good governance', emphasising political democratisation and large-scale administrative reform. While rich nations had been happy to turn a blind eye to poor governance in poor countries during the Cold War, the fall of the Berlin Wall and the claimed 'end of history' (Fukuyama 1989) meant that Western governments discovered a new interest in promoting democracy and human rights. These became a significant focus of aid and foreign policy engagement - as well as of domestic activism within poor countries that were no longer Cold War proxies – and many new democracies flowered during the 1990s, particularly in Africa.

However, the ambitious good governance agenda faced significant implementation challenges, and critiques of its 'overwhelming' nature prompted articulation of a vision of 'good enough governance' in its place (Grindle 2002), with the emphasis on setting a few key priorities and ensuring that responsibility for delivering on them was clear. The emphasis on good governance endured in donor policy (DFID 2006), albeit with increased acknowledgement of the primacy of politics (Leftwich 2005); but with 'underwhelming' results (Kelsall 2008: 627). As a consequence, a new focus developed on 'the politics of what works' - and why - in particular polities and societies, alongside an emphasis on 'working with the grain' of African politics (Kelsall 2008, Booth 2011a).

The nature of this ‘grain’ is generally identified as clientelism, in which rulers maintain power through relations of patronage with individuals or small groups - for example, the transactional exchange of a vote or loyalty in return for payments or other preferential treatment (Lockwood 2006, Kitschelt and Wilkinson 2007, van de Walle 2012). The concept of neopatrimonialism is closely related to, and is often used interchangeably with, clientelism. A contested term (Erdmann and Engel 2009), neopatrimonialism was first proposed by Eisenstadt in 1973 to distinguish between ‘traditional patrimonialism’ (drawing on Weber’s distinction between legal-rational, traditional and charismatic legitimacy) and modern forms (Bruhns 2012), and specifically refers to the use of the resources of the modern state in sustaining clientelist relations (Bach and Gazibo 2012). Thus, ‘the characteristic feature of neopatrimonialism is the incorporation of patrimonial logic into bureaucratic institutions’ (Bratton and Van de Walle 1997: 62). For example, politicians often use control over public services as a mechanism of clientelism, e.g. through allocation of jobs, allocation of services themselves, or diverting resources from their intended purpose (World Bank 2004).

African states are hybrid states – part modern institutions, but also strongly influenced by traditions of personal rule and patronage (Lockwood 2006). It has been argued that the state itself is ‘a relatively empty shell’ and ‘the real business of politics is conducted informally’ (Chabal and Daloz 1999: 95). As a result of this ‘veranda politics’ (Harrison 2008) more attention is often paid to creating the appearance of good governance than to implementing real change - a ‘style over substance’ problem neatly captured by Pritchett et al in the phrase ‘isomorphic mimicry' (Pritchett, Woolcock et al. 2010). Of course, as van Donge, Henley et al. (2012) point out, clientelism has also been a major feature in economically successful South-East Asia. However, while it is certainly possible for neopatrimonial states to combine patronage politics with developmental effectiveness in the sense of poverty reduction or improved provision of public services – Rwanda is one recent example (Booth 2011b) – most such states have a poor record.

This, then, is the broad political context of service provision in Africa: a complex interplay between an externally-driven agenda rooted in traditions of liberal democracy and Weberian administration, and a domestic heritage of neopatrimonial authority and personalised politics. Actors wishing to influence outcomes in this context require analytical tools that pay close attention to informal norms and processes as well as formal structures (Copestake and Williams 2012). This need has prompted the emergence of political economy analysis (PEA): an approach and a set of tools that are 'concerned with the interaction of political and economic processes in a society: the distribution of power and wealth between different groups and individuals, and the processes that create, sustain, and transform these relationships over time' (Collinson 2003: 3). I employ PEA to analyse the political economy of Malawi, and of its rural water supply sector in particular, in Chapter Four; but first I discuss the most significant policy responses to the problems of state and market failure - decentralisation and participation.

3.1.3 Decentralisation and participation

Decentralisation - the process of transferring (state) power from the centre to lower/outer levels – has been a key element of the 'good governance agenda' since the 1990s. In theory, decentralisation should lead to increased accountability and responsiveness of the state to its citizens – hence improving state legitimacy (Faguet 2014). It should reduce information asymmetries between principals and agents, and improve coordination, resulting in better public service provision (World Bank 2004).

Decentralisation has thus become a key element of reform in the public sector, including rural water supply (WPP 2010). However, it is now well recognised that decentralisation of responsibilities is not necessarily accompanied by decentralisation of resources or powers (Ribot, Agrawal et al. 2006); there is often 'excessive central control over sector revenues and intergovernmental transfers' (WPP 2010: 11). Local authorities in most low-income countries are critically hampered by lack of capacity: low skills and few resources (Lockwood and Smits 2011). At the same time, citizens face many barriers (educational, informational, logistical, and financial) to organising to claim their rights.

Even when power is truly devolved, physical 'closeness to the people' by no means automatically translates into greater likelihood of acting in their interests. Local politicians are not necessarily any more responsive to citizens than national ones, and 'there is no reason to expect that decentralisation will be pro-poor' (Moore and Putzel 1999: 1). In a neopatrimonial political context where incentives are top-down rather than bottom-up – where promotion and resource flows are dependent on personal allegiance not on performance assessment – decentralisation may make very little difference to outcomes. Indeed, it may make it harder for citizens to organise to claim better services, since the centre can abdicate responsibility and blame local factors. Democratic decentralisation may also result in the transfer of powers to unelected local institutions such as traditional chiefs and NGOs – a type of 'pluralism without representation [which] is often a formula for elite capture, not democracy' (Ribot 2007: 44).

The vogue for decentralisation of public service provision has also been closely associated with an emphasis on citizen involvement or participation. Indeed, a strong case could be made that participation has been the defining theory of development over the last two or three decades. In rural water supply, it is operationalized in the form of community management, in which an elected group of villagers collectively manage, maintain and repair their own water point after installation. This model is founded on assumptions about the instrumental and intrinsic benefits of user participation – assumptions that I now examine in detail.

3.2 PARTICIPATION: THE THEORY OF COLLECTIVE ACTION

Following Martinussen's (1997) distinction between development theories, concepts and strategies I suggest that 'participation' is a development <u>theory</u> of the context-specific or middle range (rather than grand theory) type, i.e. 'a hypothesis about promoting and obstructing conditions to development' (Sumner and Tribe 2008: 84) in which 'the literature acts as proxy for theory' (Bryman 2008: 8). Collective action is a <u>concept</u> or 'development objective', and community management is a <u>strategy</u> or 'set of actions and interventions to promote development' (Sumner and Tribe 2008: 84) associated with the theory of participatory development.

The emergence of participation as a theory of development was in part a response to the collapse of credibility of 'grand theories' of development in the 1970s and 1980s (Sumner and Tribe 2008). As Mohan and Stokke (2000) point out, it has roots at both ends of the political spectrum, with the 'new right' promoting participation as a means to improve efficiency of public services, and the 'new left' focusing on participation as an empowering process. As a body of theory it is diffuse, and has long defied attempts to define it (Oakley 1991); indeed, attempts to pin it down have themselves sometimes been criticised as running counter to participatory principles. It can be seen as having roots in the deliberative philosophy of Jurgen Habermas, with its core meaning located in the idea of 'collective public deliberation' (Farrington 2011: 152). One simple and influential definition of participation proposed by World Bank authors is 'a process by which people, especially disadvantaged people, influence decisions that affect them' (Bhatnagar and Williams 1992: 177); more fully, it is 'a voluntary process by which people, including the disadvantaged (in income, gender, ethnicity, or education), influence or control the decisions that affect them' (Narayan 1995: 7). Crook and Manor, focusing on political participation, defined it as 'citizens' active engagement with public institutions' (1998: 7); although I would suggest that 'individuals' active engagement with public action' is a more inclusive formulation.

Mansuri and Rao (2013) suggest that participation can be promoted or induced in two broad ways:

- Community development: 'efforts to bring villages, urban neighbourhoods, or other household groupings into the process of managing development resources without relying on formally constituted local governments' (ibid: 1); and
- Decentralisation: 'efforts to strengthen village and municipal governments on both the demand and supply sides'(ibid: 2).

The present study focuses particularly on the former; but, as has already been discussed, and as will be demonstrated in subsequent chapters, the political context - including the extent to which power is decentralised - is a critical influence on the potential for community development through collective action.

3.2.1 Collective action and the 'community'

The term 'collective action' is used to signify actions that are undertaken collectively towards common goals (Olson 1977), of which cooperation between households to ensure rural water supply is one example. Collective action requires common interests and shared rules. While Ostrom (1990) and others have devoted considerable attention to articulating shared rules or 'design principles' for collective action, such approaches have given significantly less weight to the issue of diversity of interests.

Development interventions frequently assume a large degree of common interest on the part of 'the community', generally defined as people living within a particular geographic area; but this 'myth of community' (Guijt and Shah 1998) is misleading (Leach, Mearns et al. 1999). While the term may be a 'helpful shorthand', it must be used with care (Nunan 2006). People have diverse interests – based on gender, class, caste, age, income, wealth, livelihood, health status and many other elements of identity and forms of social stratification – and diverse groups often find it harder to organise successful collective action (Ray and Bhattacharya 2011). Addressing this is a key challenge for participatory approaches.

3.2.2 Arguments for participation

Broadly speaking, two main arguments are made for participation: efficiency and empowerment (Nelson and Wright 1995, Mohan and Stokke 2000) . Participation is claimed to have instrumental benefits, increasing the efficiency and effectiveness of development work, as well as (perhaps more importantly, for many of its proponents) intrinsic or transformational value in promoting empowerment and equity. Different degrees of participation have been distinguished, with a critical difference between strong ('partnership or ceding control') and weak ('consulting or informing') participation (Brett 2003: 5).

Efficiency and effectiveness

Proponents argue that participation increases both the efficiency of development programmes - meaning the economical conversion of inputs into results (OECD 2010), and their effectiveness - meaning the extent to which the programmes' objectives are achieved (ibid.). Participatory approaches are seen as more efficient because unpaid local labour and participants' financial and in-kind contributions can replace inputs that would otherwise have to be paid for, thus enabling donor funding to be spread more widely.

In terms of effectiveness, Narayan and colleagues (Isham, Narayan et al. 1995, Narayan 1995) have argued influentially that increased participation in the water sector leads to improved project outcomes. Drawing on statistical analysis of reports from 121 rural water projects, they found that 'beneficiary participation is the single most important factor contributing to project effectiveness' (Narayan 1995: 75). Sara and Katz (1997) also found that demand-responsive water supply services were more likely to be sustained, and other authors have made similar claims for instrumental effectiveness (Bhandari and Grant 2007, Taylor 2009a, Aladuwaka and Momsen 2010, Madrigal, Alpízar et al. 2011, Marks and Davis 2012). Kleemeier (2000) found that participation was important in keeping small-scale piped water schemes functioning in Malawi, and Prokopy (2005) concluded that participation through contributing to capital costs and through household involvement in decision-making was positively associated with outcomes in India. Gender also appears important: Komives, Akanbang et al. (2008) found that water points with a higher proportion of female committee members were more likely to be functioning.

It is argued that participation leads to improved outcomes through engendering a sense of ownership (Whittington, Davis et al. 2008), a conclusion also reached by Marks and Davis (2012) and Prokopy (2005), for whom financial participation through either up-front capital contribution or monthly user fees is the key form of participation. However, the argument that contributing to capital costs is important and positive runs counter to the findings of Babajanian (2011) and also to the wider literature on subsidies versus user charges (e.g. Banerjee and Duflo 2012) which suggests that such 'contributions' are regressive and counter-productive.

Overall, there is mixed evidence on the effect of participation on provision of public goods and services. On the one hand, community monitoring of healthcare providers in Uganda (Björkman and Svensson 2010) and of teachers in Kenya (Duflo, Dupas et al. 2012) led to marked improvements in service provision. On the other hand, Olken (2005) found that centralised audits were more effective than community monitoring at reducing corruption in road-building projects in Indonesia, and Banerjee, Banerji et al. (2010) found that a programme to encourage parent participation in monitoring teacher performance in India had no effect on learning outcomes. However, these examples all relate to participation in monitoring of public services, rather than participation in the provision of the service, as in rural water supply. The question of whether such participation is effective remains open.

Equity and empowerment

The idea of empowerment is central to much of the participation literature, not least in the writings of Robert Chambers (Chambers 1983, Chambers 1997). Participatory approaches are seen as a means of challenging and reversing power imbalances – between rich and poor, urban and rural, men and women, development workers and villagers.

Participation is also argued to be important for equity, which can be seen as both an instrumental and an intrinsic benefit. An example is given by Handa, Huang et al. (2012), who found that community-based targeting of cash transfer programmes in Malawi, Kenya and Mozambique was highly effective in reaching the poorest, and achieved better pro-poor targeting than average cash transfer programmes around the world. A more complicated picture is painted by Labonne and Chase (2009) who studied community-driven development in 66 villages in the Philippines. They found that resources did indeed flow to the poorest villages but also to the most politically active, and (controlling for poverty) the most unequal, because there the leader was more likely to override community preferences and influence inter-village competition to ensure that the resources came to his village. Thus, the evidence linking participation and equity is complex and mixed.

An interesting insight into the intrinsic value of participation from the point of view of participants themselves emerges from Cochran and Ray's (2009) study of equity considerations in rainwater-harvesting schemes in Rajasthan, India. It found that community members felt they gained 'symbolic capital' from participating in community activities, which was just as important to them as more concrete benefits from the project. Thus, although the economic benefits of this project (water for irrigation and livestock) were distributed quite unequally, virtually all villagers felt that the costs should be shared equally. The net effect of this participatory project was an increase in economic inequality in the village – but this was accepted by all including the 'losers', who felt they had asserted a degree of social equality through their participation. This example highlights both the possibility that participation may increase inequality, and the difficulty of making judgements as a non-participant.

A related aspect of the equality argument is that participation represents full citizenship (Jones 2011) – an idea that can be linked to the 'symbolic capital' gained through participation by the Rajasthani villagers. However, this argument has interesting normative implications, as it can lead to a view that participation is not just a right but also a responsibility, i.e. that people ought to participate in collective action even if they do not wish to do so.

3.2.3 Critiques of participation

It was perhaps inevitable that after the rapid flowering of participatory theory and action in the 1980s and 1990s a backlash would emerge. Participation was provocatively described as 'the new tyranny' (Cooke and Kothari 2001) due to its dominance of development discourse, and the past decade or so has seen considerable effort devoted – by sceptics and enthusiasts alike - to examining the empirical basis for participation's 'heroic claims' (Cleaver 1999: 597).

Improving performance: results, or theatre?

There is a significant body of evidence countering the claim that participatory approaches are especially effective. In their wide-ranging review of the evidence, Mansuri and Rao (2013) conclude that participation has only modest impacts on outcomes, and that inequality has an important counteracting effect. Critics have argued powerfully that participation too easily becomes a 'performance' – in the theatrical sense of players following a script for an audience - in which success is determined by the ability of a project model to establish 'the causal link between participatory processes and efficient implementation that is absent (or difficult to establish) in practice' (Mosse 2005: 162). Indeed, in the case studied in depth by Mosse, patronage rather than participation was in fact the main social organising principle.

In contrast to participatory theory, the practice of participation may in fact sometimes reduce efficiency and effectiveness. For example, the devaluation of expertise can lead to poor decision-making on technical issues; Khwaja (2009) found that community participation in technical decision-making had a negative effect on project outcomes. Participation also has significant transaction costs (Mosse 2005, Ray and Bhattacharya 2011) which may partly account for why Kleemeier (2000) found that participation worked well for the smallest schemes but not for large ones.

At the level of organisational practice, reality often does not match participatory rhetoric. Brett (2003) notes the contradiction between the espoused participatory theory and the actual organisational practice of all development organisations, which are hierarchical and expertise-based, and Burger and Owens observe that 'NGO descriptions of their efforts to involve the community in projects are frequently not aligned with the accounts of the communities' (2010: 1266).

Finally, at the level of societal change, participation has rarely been associated with rapid development - in the sense of both economic growth and rising human development standards (Brett 2003). Indeed, if anything, a case could more easily be made that low levels of citizen participation have been a hallmark in many of the countries that have been most successful at rapidly raising living standards, such as China and South Korea. This challenge has arguably received insufficient attention from theorists of participation.

Equity or elite capture?

The claim that participation supports equity and empowerment is similarly challenged by the evidence. For example, Casey, Glennerster et al. (2012) show that, in Sierra Leone, major efforts to foster participation in decision-making by marginalised groups had no long-term effect; male elders and chiefs retained just as much control as in places where there had been no such efforts. One of the key ways in which participation can fail is through 'elite capture' (Mansuri and Rao 2013). This may happen intentionally – as observed by Mosse (2005) in India, where the rich presented themselves as poor and were the main beneficiaries of the programme; or unintentionally, since the poorest are, by definition, most marginalised and hardest to reach, and least likely to participate. Indeed, surveys in 29 countries in Africa and Latin America show that the better off are more likely to participate: household income and housing status are positively correlated with community participation (Awortwi 2013), and causality is much more likely to flow from wealth to participation than in the other direction.

Demand-led programming is often problematic, since it results in the privileging of those with greatest voice, who are likely already to be relatively privileged. External actors seek interlocutors who can communicate easily with them, and almost inevitably these will be members of the educated, confident elite (Dill 2009). In Malawi, the most demand-driven social action fund resulted in the most unequal distribution of benefits (Schou and Tsoka 2010). Recent research on decentralised forest management finds that it leads to a significantly higher risk of elite capture of forest harvest benefits, and that this risk increases over time

(Persha and Andersson, in press) - so the greater the degree of local control, the greater the inequity. The same researchers found that strong links with an external organisation improved accountability and reduced inequity - echoing other findings from Benin, where a recent shift towards more centrally-directed, need-based programming has had a positive impact on improving equity, compared with previous demand-led approaches (BMZ 2011).

Donors may also inadvertently encourage elite capture through re-legitimising customary non-democratic institutions (Ribot 2007), for instance through relying on them as means of mobilising participation. Brett also notes the awkwardness of attempting to implement participatory approaches in a context where people 'may well be locked into hierarchical and deferential structures' (2003: 14-15). This tension between modern and traditional forms of social organisation, and the process of 'institutional bricolage' (Cleaver 2012) that characterises their interaction, is central to this study.

An interesting alternative interpretation is that what occurs in practice is not necessarily elite capture. Baland and Platteau (1999) highlight the ambiguous impact of inequality on the potential for collective action, showing that in some circumstances it provides incentives for elites to support collective action towards outcomes that also benefit non-elites. Vajja and White, in their study of social funds in Malawi and Zambia, concluded that 'the nature of community participation is indeed shaped by existing power and social relations' (2008: 1145) but that this does not so much represent 'elite capture' as a form of paternalism, with which community members are generally satisfied even though the outcomes are not what they would themselves have chosen. Vajja and White emphasise the critical role played by individuals or 'prime movers', rather than collectives, in initiating 'collective action' and in determining project choice, and conclude that 'social funds use social capital rather than create it' (ibid: 1163). That is to say, such institutions draw on and reinforce existing social networks and power structures rather than building new ones. This analysis also has interesting parallels in recent work – from various political perspectives - emphasising the positive aspects of paternalism (e.g. Thaler and Sunstein 2008, Duflo 2012).

Empowerment or abdication?

For individuals, in theory, participation in community decision-making should be a positive, empowering experience. But in reality participation carries heavy transaction costs – time and energy, and often money too - but also the costs of managing conflict within the community (Cleaver 1999). These go a long way to explaining the problems faced by many participatory projects in mobilising participation; villagers may well see participation as a means to an end (getting the development project) rather than of any intrinsic value (Babajanian 2011). Development workers have tended to respond by criticising the approaches used to engender participation and resolving that projects should try harder - the assumption seems to be that all individuals would (and should) want to participate, and the right not to participate is rarely promoted. In Malawi, where the concept of participation carries associations with forced labour dating back to the Banda era (Msukwa and Taylor 2011, Nkhoma 2011), such an attitude is heavily loaded.

Even when people do wish to participate, the potential for securing empowerment through participation is severely constrained by existing social structures (Cleaver 2004, Cleaver 2007, Cleaver 2012).

For groups, participation theoretically builds social capital - 'social networks and the norms of reciprocity and trustworthiness that arise from them' (Putnam 2001: 19). But in fact 'there is little evidence that induced participation builds long-lasting cohesion, even at the community level' (Mansuri and Rao 2013: 9). As Vajja and White (2008) demonstrate, participation draws on social capital, but does not strengthen it. Indeed, induced participation – which frequently takes the bureaucratic form of externally-initiated committees - can have a negative effect on social trust, as found by Vollan (2012) in South Africa. It seems that induced participation is often part of the problem, not the solution.

While the roots of the current emphasis on participation can be traced, as we have seen, in part to the hope that it might offer a way to overcome the shortcomings of the state, the balance of evidence suggests this is not the case. Indeed, for societies as a whole, 'local participation appears to increase, rather than diminish, the need for functional and strong institutions at the centre' (Mansuri and Rao 2013: 11). The role of central government and formal structures is critical, but may be neglected if excessive focus is instead placed on participation - what Botchway (2001) has called 'the paradox of empowerment'. He highlights the danger that participation may 'become a substitute for the structural reforms needed for social change' (ibid: 136) and may be 'used to justify the state's evasion of its responsibilities' (ibid: 148). Similar points are made by Mohan and Stokke (2000), highlighting the importance of the politics of the local, and by Brett (2003), who argues that participation glosses over power inequalities, leaving them intact. Certainly, a strong case can be made that community management of rural water supply is an example of this phenomenon, of participatory approaches diverting attention from the central problem of poor state performance.

3.3 COMMUNITY MANAGEMENT OF RURAL WATER SUPPLY: PARTICIPATION IN PRACTICE

The previous section outlined the arguments for and against participatory approaches in general. This section examines the literature concerning the application of these approaches in the rural water supply sector in particular – specifically through the practice of community management.

Community management is one of the key ways in which the theory of participation has been operationalised, and is particularly strongly established in the rural water supply sector, where its dominance was enshrined in both the 1990 Delhi Statement and the 1992 Dublin Principles (Nicol, Mehta et al. 2012). Harvey and Reed (2007) suggest there are three core reasons why community management has become so popular: it is a reaction to poor performance and service delivery by government; it suits the 'project approach' of NGOs and donors very well; and it is rooted in a 'Western 'cultural idealization' of communities in low-income countries' (Harvey and Reed 2007: 366).

Indeed, as already noted, the community management model has roots in two contemporaneous currents of thought: neoliberal economics, and participatory theory and practice. Although these are often thought of as politically opposed - neoliberalism seen as an agenda of the right, and participation identified with the left - in fact they share a common emphasis on the rights and responsibilities of the individual. It could thus be argued that community management suited donors and governments very well indeed since, far from challenging existing power structures, it provided a convenient 'exit clause' for donors worried about aid dependency and difficult questions of long-term sustainability. In theory, civil society – in the form of community committees - would take on the long-term responsibility for service provision that was abdicated by the state and unfulfilled by the market.

The doctrine of community management thus spread rapidly in the 1990s, and today remains the dominant model of rural water supply in many low-income countries. However, growing criticism in both academic and practitioner literature has suggested that community management does not deliver as promised, and led to calls for greater professionalisation, or 'community management plus' (Lockwood and Smits 2011).

Reflecting on this debate, I identified two key questions requiring research. These shape the remainder of this chapter, and are used as a framework for analysis of this study's findings in Chapter Seven:

1. To what extent does the operation of community management in practice reflect its potential benefits in theory?
2. What explains the differences between the theory and the practice of community management?

3.3.1 Community management in practice

Undoubtedly, 'all theory is an abstraction' (Sumner and Tribe 2008: 86). As such, it cannot be expected to exactly match reality. But if the reality of participatory development differs significantly from the theory, there is a need to re-examine the theory. This section develops many of the arguments for and against participation that were highlighted in the previous section, but with a particular focus on community management of rural water supply.

Efficiency and effectiveness?

In many cases it is difficult to assess whether community management leads to improved programme performance, due to the absence of a counterfactual. However, it is possible to examine whether community management works on its own terms – and the evidence is not inspiring. For example, an evaluation of water and sanitation programmes in Benin, based on community management models, found that poor quality construction, lack of skills and spares, low transparency in financial management of water facilities, low accountability, and lack of data were key problems (BMZ 2011).

Although a few practitioners still claim that community management works (Lane 2012), most assessments acknowledge that it has serious problems. In the words of one major sector initiative, 'the community management model has brought many benefits; however, in most countries around the world it has by and large failed to achieve the ultimate goal of reliable and sustainable water supply at scale' (Triple-

S 2009: 1). As Harvey and Reed have observed, 'despite the blanket application of community management of rural water supplies in sub-Saharan Africa, the sustainability of such interventions remains woefully inadequate' (2007: 366).

The original positive findings of Narayan (1995) have been superseded by studies showing much more mixed results, such as the findings of Heinrich and Lopez (2009) that participatory approaches had a positive effect on participants' perceptions of project effectiveness, but not on actual outcomes. Two aspects of performance are of particular interest.

Technical aspects

In terms of installation quality, there are serious concerns about community management. The participation agenda risks privileging the views (including assumptions and prejudices) of the uninformed over those of experts; indeed the discourse of participation is profoundly anti-expert, associating expertise with elitism. Thus, there is a risk that technical skills (engineering, financial management, etc.) may be underemphasised and that technical decisions may be directed by those without the necessary knowledge to make optimal choices (Khwaja 2009). Technical expertise is important: the absence of proper supervision has, in Uganda, resulted in some private contractors installing new water points using second hand parts (Golooba-Mutebi 2012). Evidence from road programmes in Indonesia also suggests that community monitoring is a poor substitute for independent quality inspection and audit (Olken 2005).

Community management rests on the existence of voluntary water point committees (WPCs), able to undertake regular maintenance and respond to breakdowns immediately. In reality, a large proportion of such committees become dormant relatively soon after installation is completed. Despite the rhetoric of voluntarism that is central to the community management model, committee members are often more motivated by the hope of getting a paid job, and by the opportunity to access small payments in the meantime (Boesten, Mdee et al. 2011). When such expectations prove unrealistic, committee members become disillusioned and disengage from their roles (O'Reilly and Dhanju 2012). Low skills and low motivation are self-reinforcing; one study in Ethiopia found that 'none of the trainees … even tried to maintain the pump. 90% of operation and maintenance trainees were not confident to maintain the systems by themselves if failure occurs in the future' (Tarekegne 2009: 42). As Carter (2009) observes, the software of community management is just as prone to fall into disrepair as the hardware of water supply. Ultimately, community management is not able to ensure the availability of skilled technicians.

Financial aspects

Central to the community management model is the assumption that financial sustainability of the water point will be ensured through regular user contributions to a Maintenance Fund. In reality, this is rarely the case. As discussed in Chapter Two, very few committees manage to collect even a small fraction of the contributions due. Problems of accountability and trust are central to people's low willingness to pay (Harvey 2007). In Uganda, refusal to pay monthly fees is widespread, and funds are only collected when the water point breaks down; a key factor is that users do not trust committee members to hold their money (Golooba-Mutebi 2012). In Tanzania, Haysom (2006) found that poor financial management was the most important factor influencing water point functionality; in the vast majority of cases, WPC funds were much lower than they should have been according to the reported scale and frequency of user charges and reported expenditures.

Equity and empowerment?

In theory, community management should be empowering both for WPC members, who learn new skills and take on new responsibilities, and for users, who elect the WPC. It should also be equitable, because everyone in the community is expected to contribute equally. In reality, however, the literature suggests that neither is the case.

Committees

Community based management requires the creation of new structures – committees - at village level. The proliferation of such committees and their interaction with pre-existing power relations - their difficult 'institutional engineering' (Jones 2011) - represents a significant political dynamic. 'Development by committee' has been widely criticised. For example, Zulu argues that community based natural resource management (CBNRM) 'created new elites (forest committees) who largely operated as corrupt, unaccountable 'village bureaucracies', alienating communities from CBNRM. Widespread forest degradation and institutional breakdown ensued. Community management became committee management, and part of the problem. Rare 'success' was associated with idiosyncratic leadership qualities of village heads' (Zulu 2008: 687). Blaikie (2006) also highlights the danger of elite capture of committees.

Access to committee positions represents not just responsibility, but also access to resources in the form of training and skills, status, power, cash and payments in kind - particularly so in the case of water point committees, which have revenue-raising powers. The method of appointment of committee members (selection or election – though in practice the distinction is not always clear-cut) is therefore very important. There is considerable opportunity for relatively powerful and high-status community members to influence membership of the committee, and once in post, there is considerable opportunity for members to mismanage funds.

While widely acknowledged as an issue, there is little comparative research in this area. One exception is an NGO study of a food distribution programme in Malawi implemented through village committees (Concern Universal 2006). It found that committees organised by village heads 'lacked accountability and transparency' and were characterised by 'numerous incidents of transfer mismanagement'; democratically elected committees 'were more efficient, transparent and accountable than the other committee structures' but 'would require payment for their services' in an expanded project; and beneficiary/carer committees were the most 'responsible and dependable' but were 'generally less capable than other types of committee and required more external support' (Concern Universal 2006:

4). The study also found that 'close monitoring gave significantly better results than the 'hands-off' approach' (ibid: 6). While not directly transferable to water point management, the findings seems to suggest that electing WP management committee members is optimal, that it may be necessary to pay individuals whose duties are significant, and that ongoing close monitoring by an external authority is highly desirable.

Context

Water point committees do not operate in a vacuum. As Cleaver has repeatedly pointed out, people's ability to use their agency is shaped by a range of structural factors including social relationships and cultural conventions, and challenging the cultural grain may be highly costly for individuals (Cleaver 2001, Cleaver 2004, Cleaver and Hamada 2010). The community management model is based on unrealistic assumptions about the desire and ability of people to participate, and what this will cost them (Brett 2003, Banerjee and Duflo 2008). Such costs may include the time required to participate, the financial costs of 'community contributions' and importantly the fact that participatory decision-making may well entail conflict.

Indeed, there is little evidence that participation in community management is important to villagers per se. On the contrary, Haysom persuasively argues that 'what villagers want is water, and the management of the requisite delivery system is to a large extent inconsequential to the users' (Haysom 2006: 41). Similarly, Cleaver (2004) has pointed out that transformation of the material conditions of the poor must be integral to any understanding of empowerment. If this is the case, and if – as DFID recently concluded – 'community management of water supplies significantly increases vulnerability and … needs to be revisited' (DFID 2012: 86), then it is clearly time to question the model.

3.3.2 Institutional bricolage

If it is obvious that there are significant differences between the theory and the practice of community management, what explains this and how can it be analysed? I suggest that two organising concepts may be particularly helpful: institutional bricolage (Cleaver 2012) and civil society failure (Mansuri and Rao 2013).

The concept of institutional bricolage helps to illuminate the interaction between introduced / exogenous bureaucratic institutions and existing / endogenous socially embedded institutions. It describes the way that actors shape structures by 'patching together' institutions, while at the same time emphasising the fact that those actors and their actions are themselves socially embedded. It thus provides a lens through which we can observe and understand the way in which both introduced and embedded institutional forms may be substantially reshaped by their interactions, through processes of articulation, aggregation, and alteration (de Koning 2011). I argue that this can help explain the failure of community management, and, more broadly, the failure of externally-induced collective action to produce the intended results.

Critical institutionalism (Cleaver 2012, Hall, Cleaver et al. 2014) critiques and expands the 'institutionalist' perspective pioneered particularly by Elinor Ostrom in her work on rules governing collective action in common property resource management (Ostrom 1990). Whereas Ostrom was interested in demonstrating that institutions could be crafted to facilitate effective collective action, critical institutionalism suggests that the scope for agency in designing new institutions is considerably constrained by existing structures or institutions. These institutions have been defined as 'sets of working rules' (Ostrom 1990: 51) that set out who can (or must) do what – or what is required, permitted, and forbidden. More broadly, they are not just the rules, but also the norms and beliefs (de Koning 2011) and roles and relationships (Cleaver, Franks et al. 2013) that influence human action.

Thus, the introduction of community management - in the form of a democratically elected, gender-balanced, trained committee with new financial and operational powers - challenges many foundational elements of existing social structures, such as inherited chiefly power and women's subordination. Proponents of community management have generally underestimated the enduring power of traditional institutional forms and the way that the new forms of community management would be adapted and shaped by them. So, for example, while the theory of community management holds that committees will raise funds through equal per-household monthly contributions to a water point fund, in practice this 'rule' is adapted to local context: sometimes in socially-progressive ways (e.g. through exemptions for the elderly, or adjusting collection timetables in line with seasonality) but sometimes in regressive ways (e.g. through exemptions for powerful individuals, or through misuse of funds by committee members or chiefs). Srivastava describes how the idealised institution of community management was distorted in practice in a flagship rural water programme in India, highlighting the multiple ways in which 'the local institutions reconstructed the core ideas… such as participation and community ownership' (2012: 41); the underlying social and political structures were evidently much stronger than the new model.

Olivier de Sardan's work on multiple 'modes of governance' is also helpful here. Defining governance as 'any organised method of delivering public or collective services and goods according to specific logics and norms, and to specific forms of authority' (2011: 22), he identifies eight modes: chiefly, associational, municipal, project-based, bureaucratic, sponsorship-based, religious and merchant. The different modes work together in 'co-delivery' of public goods or services, and as political, social and economic drivers change over time, a process of 'institutional accretion' – or bricolage - occurs in which new forms of governance do not replace old ones, but simply 'pile up' on top of the old, creating complex multi-layered structures of power and legitimacy.

Olivier de Sardan's description of the imported Western 'associational mode', which is 'appropriated' by target populations, but generally not at all in the way that its instigators hope, has considerable resonance with community management in rural water supply: 'elections are often replaced by appointments … meetings do not take place on the expected dates… funds which are accumulated in the community coffers are 'borrowed'…' (ibid: 26). The reason, he suggests, lies in the centrality of patron-client relationships, which, he claims, operate in all modes.

The enduring strength of patron-client relations means that new institutional forms may be diverted from their original purpose; there is a substantial risk of elite capture. It is therefore not at all straightforward to claim that community management will empower the marginalised; the degree to which it does must be balanced against the degree to which it provides a framework for the powerful to entrench their position and extract rents. Indeed a strong case can be made that community management is often counterproductive in practice: it drains people's time and energy, it is far too open to financial abuse, it actively discourages the development of specialist skills and services, and it makes accountability far too diffuse to be operationalized.

Designers of development interventions have tended to pay much more attention to the design of formal institutions, such as water point committees, than to informal institutional structures, such as the nature of patron-client relations. The tools of political economy analysis employed in Chapter Four are designed specifically to counter this tendency.

3.3.3 Civil society failure

The idea of 'civil society failure' – defined as 'a situation in which groups that live in geographic proximity are unable to act collectively to reach a feasible and preferable outcome' (Mansuri and Rao 2013: 4) is an important complement to the more established concepts of 'state failure' and 'market failure'. Market and state failures are typically seen as problems of information and coordination in systems characterised by principal-agent relationships (e.g. customer-company, voter-government). While civil society is more generally (though not entirely) characterised by collective action relationships (e.g. unions, churches, campaigns, self-help groups), these are also subject to problems of information and coordination.

Information asymmetries

Rural water supply provides many examples of information asymmetries in collective action, both within communities, and between communities and other actors (such as the state). Asymmetric access to financial information is of particular importance.

Within communities, most people do not know what it costs to install – or repair - a water point, and most users do not know how much they have collectively saved in their water point maintenance fund. Several studies have suggested that low willingness to pay by users is a major factor in low sustainability, and that this reflects users' lack of trust in committees (Haysom 2006, Komives, Akanbang et al.

2008). Trust is important not just in terms of whether users trust that their committee will look after their funds correctly, but also in terms of whether they trust that their water point will not be stolen. Theft and vandalism are issues that are surprisingly little-mentioned in the literature on water point sustainability, yet there is evidence suggesting that in some instances these are significant factors (Kleemeier 2000, Campbell 2009). The extent to which information asymmetries exist within communities, and the extent to which trust is affected, evidently needs further research.

Information asymmetries between different actors involved in rural water supply are also a significant constraint. For example, district water officers often do not know which water points need repair, or where the greatest need for new investment lies. Donors do not know enough about long-term sustainability or cost-effectiveness of their investments in the sector. Water users do not know how much has been spent on providing services to them. These information gaps mean that it is very hard for citizens to hold the state to account for service provision – the 'long route' to accountability (World Bank 2004), or for donors to know how cost-effective their grants have been.

In terms of accountability for inputs, there is robust evidence from other sectors that improved transparency can have a significant positive impact. Reinikka and Svensson (2003, 2011) clearly demonstrated the power of access to information in improving public services through deterring misappropriation of funds and increasing focus on outcomes in education and health; they argue that such innovations in governance of public services are an effective way of improving outcomes. There appears to be considerable scope to apply these lessons in the WASH sector.

Regarding accountability for results, there is strong awareness of the problem in the WASH sector, and considerable efforts have been invested in generating and sharing information about performance. Examples include the (failed) Danida-funded MOM programme of quarterly monitoring visits in Ghana (Komives, Akanbang et al. 2008), investment in mapping (WaterAid 2008, MacDonald 2009, Water for People 2013), and other initiatives using technology to remotely monitor water point functionality (Thomson 2012, Thomson, Hope et al. 2012). However, the failure of the Maji Matone initiative in Tanzania – which asked villagers to report water point breakdown - suggests that such programmes face wider constraints (Daraja 2011). It has been suggested that user participation in holding providers directly accountable for service provision (the 'short route' to accountability) is more promising than the 'long route' of ensuring accountability through politicians and policymakers (World Bank 2004). However, information asymmetries severely limit the extent to which this is possible.

<u>Coordination problems</u>

Community management – and collective action in general – entails significant coordination costs. As discussed already, participation requires considerable investment of time and energy, and in this sense it may not be efficient; desired outcomes might be achieved at lower cost using less participatory approaches. A common response to these coordination costs is withdrawal or non-participation (Cleaver 1999, Cleaver 2007): users may stop making contributions into the repair fund; committee members may stop doing maintenance or repairs. In the language of Hirschman (1970), people may 'exit' from participation because the costs of exercising 'voice' are too high.

For example, if the village head misuses the maintenance fund, people are likely simply to stop contributing, rather than try to hold the chief to account. If the water point breaks down and there is no money in the maintenance fund, people may prefer to wait for an external donor (e.g. the MP or an NGO) to fix it – although they may have to live for years without clean water in the meantime. Both are clear cases of coordination failure. In both cases, the 'voice' option is likely to be difficult and contentious, a prospect that runs contrary to conflict avoidance principles that are deeply ingrained in many village societies (Cleaver 1999). The requirements of maintaining social harmony are overriding; structural limits on voice imposed by gradients in social status within communities mean that exit is the path of least resistance for individuals, although it is non-optimal for the collective.

These micro examples illustrates a wider point, that demand-led approaches to improving governance are likely to fail unless the wider context is supportive. As Booth observes, 'theory and empirical studies show that client 'voice' is a weak source of results-based accountability unless accompanied by strong top-down pressures of some kind' (2011b: 3). It is notable that, in the literature, there are no examples of water users coming together to challenge their committees' record on financial management, or to challenge district decision-making on resource allocation for water supply. Rather, success reportedly derives from effective top-down leadership (Zulu 2008, Golooba-Mutebi 2012).

In summary, civil society action – collective action – is subject to the same information asymmetries and coordination problems as states and markets. In this sense, 'civil society failure' is part of the explanation for the problems of community management. However, it is by no means at the root of the issue. As I will argue in Chapter Seven, civil society failure is more of a symptom than an explanation of the problem.

Summary

This chapter set out my approach to analysing the underlying social, political and economic factors that influence the proximate variables discussed in Chapter Two. In particular, the chapter has explored the question of whether the evidence supports the hypothesis that community management is an effective way to ensure sustainable provision of public goods and services.

After tracing the roots of the community management model in the theory of participation, and in changing views of the role of the state in recent decades, two key questions were considered. These questions form the second stage of my analytical framework.

First: to what extent does the operation of community management in practice reflect its potential benefits in theory? The literature suggests that there is a considerable gap between the reality of community management and the theoretical promise of participation, in terms of efficiency and effectiveness, and equity and empowerment.

Second: what explains the differences between the theory and the practice of community management? The literature suggests that 'civil society failure' (Mansuri and Rao 2013), due to problems of coordination and information, is more widespread than is generally acknowledged; and that 'institutional bricolage'

(Cleaver 2012) explains how and why the formal structures and processes of community management are shaped by existing structures of power and authority.

With these questions in mind, I now focus on the specific case of Malawi.

Chapter 4

RURAL WATER SUPPLY IN MALAWI

Introduction

This chapter sets the scene for the particular focus of this study, Malawi, using the approach of political economy analysis (PEA). While there are numerous PEA tools, they all share a core concern with four elements: structural features, institutions, actors and incentives (Harris, Kooy et al. 2011: 17). This four-part framework is adopted here to examine the Malawian political economy as a whole in order to understand the wider context, before focusing more closely on the rural water supply sector using the ‘water governance’ analytical framework proposed by Franks and Cleaver (2007).

4.1 MALAWI: A POLITICAL ECONOMY ANALYSIS

Figure 4.1: Map of Malawi.

Source: (UN 2013).

4.1.1 Structural factors

> *'The conditions that influence the state and political system… foundational elements of the context in which analysis must be grounded' (Harris, Kooy et al. 2011: 17).*

Geographic

Malawi is a small landlocked Southern African country with a land area of 118,000km2 (GOM 2013), bordered by Tanzania, Zambia and Mozambique (Figure 4.1). The country runs broadly along a North-South axis formed by the Rift Valley, in which Lake Malawi lies. There is one annual rainy season, between December and March, during which almost 90% of the rain falls; May to October are totally dry across most of the country (Baumann and Danert 2008a). 60% of cultivated land is used for the staple food, maize (Ellis and Manda 2012); cash crops including tobacco, tea, sugar and coffee are also grown (IFAD 2013). Less than 1% of cultivated land is irrigated (IFAD 2013).

Demographic

All the data below have been drawn from the World Bank's World Development Indicators 'World Databank' website (World Bank 2013a), the most comprehensive and current source available, which incorporates data from Malawi's most recent national census (NSO 2008).

A large majority (84%) of Malawi's population of 15.4 million people are rural dwellers, and most rely on subsistence farming. Population density is relatively high at 158 people per sq. km, and agricultural land is in short supply at only 0.25 hectares per person. Population growth is high at 3.2% per annum; the population increased by 50% from 1996 to 2011. Nearly half (46%) are under 15 years of age.

Malawi has made progress in recent years on some key demographic indicators. Under-5 mortality dropped from 143/1000 in 2003 to 83/1000 in 2011. Life expectancy increased from 47 to 54 over the same period, thanks in part to action to reduce the prevalence of HIV (from 14% to 10%), and antiretroviral provision to improve survival rates for those infected.

The main ethnic group in Malawi are the Chewa (33%) with large minorities of Lomwe, Yao, Ngoni and Tumbuka along with smaller numbers from several other tribes (CIA 2013). The official language is English while the 'common language' is Chichewa (GOM 2013). Adult literacy stood at 75% in 2010, up from 64% in 1998 (World Bank 2013a). While tribal identity is important in Malawi, there is little inter-tribal conflict. 80% of Malawians are Christian, while 13% are Muslim (NSO 2008: 13).

<u>Historical and political</u>

Pre-colonial Malawi was a politically contested land, severely affected by the trade in slaves and ivory (McCracken 2012). Social and political organisation was based around extended kinship groups headed by chiefs and/or monarchs, a structure which was used instrumentally by the British colonists, and which still plays an important role in modern Malawi.

Following 73 years (1891-1964) as a British Protectorate, Malawi won independence in 1964. Its first President was Dr Hastings Banda, who as leader of the Malawi Congress Party was a key figure in the struggle for Independence. His authoritarian and highly personalised one-party regime endured for 30 years, until he was forced to accede to donor demands and citizen pressure for multiparty elections in 1994 (Cammack and Kanyongolo 2010).

Bakili Muluzi won the 1994 election and presided over a period of economic mismanagement and increased corruption. His protégé Bingu wa Mutharika then won the 2004 election, but promptly distanced himself from his former political master. Mutharika's first term brought macroeconomic stabilisation and considerable progress on delivering public goods such as healthcare and roads, as well as the popular and effective Farm Input Subsidy Programme (Cammack and Kanyongolo 2010). However, his increasingly authoritarian style, along with high inflation and fuel shortages, prompted public protests in 2011. Mutharika's death in April 2012 precipitated a brief political crisis which was ultimately resolved peacefully and constitutionally when the Vice President Joyce Banda (no relation to Hastings) took over as President (Dionne and Dulani 2013).

Political parties in Malawi are highly personalised, and defined mainly by their leaders rather than by policy differences. While there are dozens of registered parties, a select few dominate the scene:

- Malawi Congress Party (MCP) established 1960 – Hastings Banda's party, which led the country to independence in 1964 and operated a one-party state until the 1993 referendum.
- United Democratic Front (UDF) established 1993 – Bakili Muluzi's party.
- Democratic Progressive Party (DPP) established 2005 - formed by Bingu wa Mutharika as an offshoot of the UDF after his election in 2004.
- People's Party (PP) established 2011 – Joyce Banda's party, formed after she was dismissed from the DPP for opposing Mutharika's promotion of his brother.

In the most recent (2009) elections, the DPP Presidential candidate Bingu wa Mutharika won 66% of the vote while the MCP candidate John Tembo won 31% (Malawi Electoral Commission 2009). The DPP also won 114 (59%) of the 193 seats in the National Assembly; the MCP won 26 (13%) and the UDF won 17 (9%). The next elections are scheduled for 2014.

<u>Economic and social</u>

Malawi has seen rapid economic growth in recent years, with growth rates averaging 7.5% from 2006-2011, higher than the 6% target in the 2006 Malawi Growth and Development Strategy (GOM 2012b). However, growth slowed from 9.7% in 2008 to (a projected) 3% in 2012 (World Bank 2013b), and with population growth also at 3%, this equates to stagnant real incomes. Poverty rates are falling, but remain high: the 2010/11 Integrated Household Survey showed that 51% (57% in rural areas) of the population live in poverty, down from 65% in 1998, with 25% (28% rural) living in ultra-poverty[4] (World Bank 2013b).

Malawi's Human Development Index score has been rising slowly over recent decades, from 0.270 in 1980 to 0.400 in 2013 (rank: 171/187), but remains below the average for sub-Saharan Africa (UNDP 2013). Malawi scores relatively well on health, but relatively poorly on income. Annual GNI per capita is $360, or $870 in purchasing power parity terms (rank: 184/191 countries for which 2011 data is available) (World Bank 2013a). Malawi continues to be one of the most aid-dependent countries in the world, ranking 18th in 2011, with an ODA to GNI ratio of 15% (World Bank 2014), and donor activity is highly fragmented (de Renzio and Angemi 2012).

A significant part of Malawi's strong economic growth in recent years has been attributed to the government's highly successful national Farm Inputs Subsidy Programme, which has been credited with turning Malawi around from severe food insecurity and famine (Tiba 2011) to a significant food surplus (Conroy, Blackie et

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4 The Bank does not provide definitions in this source, but we can assume that they use the international poverty line of USD 1.25 per person per day as the definition of 'poverty'. 'Ultra-poverty' is less clearly defined. Lipton defined the ultra-poor as "a group of people who eat below 80 per cent of their energy requirements despite spending at least 80 per cent of income on food" (Lipton, M. (1986). "Seasonality and Ultrapoverty." IDS Bulletin 17(3): 4-8.); IFPRI defined ultra poverty as living on less than half of the international poverty line: 54 US cents per day at the time of their publication; 62 cents now (Ahmed, A. U., R. V. Hill, L. C. Smith, D. M. Wiesmann, T. Frankenberger, K. Gulati, W. Quabili and Y. Yohannes (2007). The world's most deprived: Characteristics and causes of extreme poverty and hunger International Food Policy Research Institute (IFPRI))

al. 2006, Dorward and Chirwa 2011, Vandemoortele and Bird 2011, Chinsinga 2011b). The programme was very strongly identified in the public mind with Mutharika and the DPP, who pushed the programme despite criticism of its inefficiency and inequity from international donors. Nevertheless the programme was both highly popular, and also apparently highly successful in increasing agricultural production for a number of years. However, more recently Malawi has again suffered significant food shortages, suggesting that underlying problems remain (Ellis and Manda 2012).

4.1.2 Institutions and Actors

> *Institutions: 'The rules of the game… both formal and informal… that govern behaviour' (Harris, Kooy et al. 2011: 17).*
>
> *Actors: 'The individuals or organisations that are most relevant to the issue in question' (Harris, Kooy et al. 2011: 17).*

Malawi's political economy combines formal democracy and Weberian bureaucratic forms with traditional authority and a neopatrimonial political culture.

<u>Formal institutions</u>

Upon democratisation in 1994, Malawi adopted many of the formal institutions associated with democracy, including separation of powers, five-year electoral terms, a free press and free civil society. However, Parliament is weak in relation to the Presidency, and individual MPs often appear more interested in pursuing personal advancement than in promoting policies – politicking rather than governing (Cammack and Kelsall 2011).

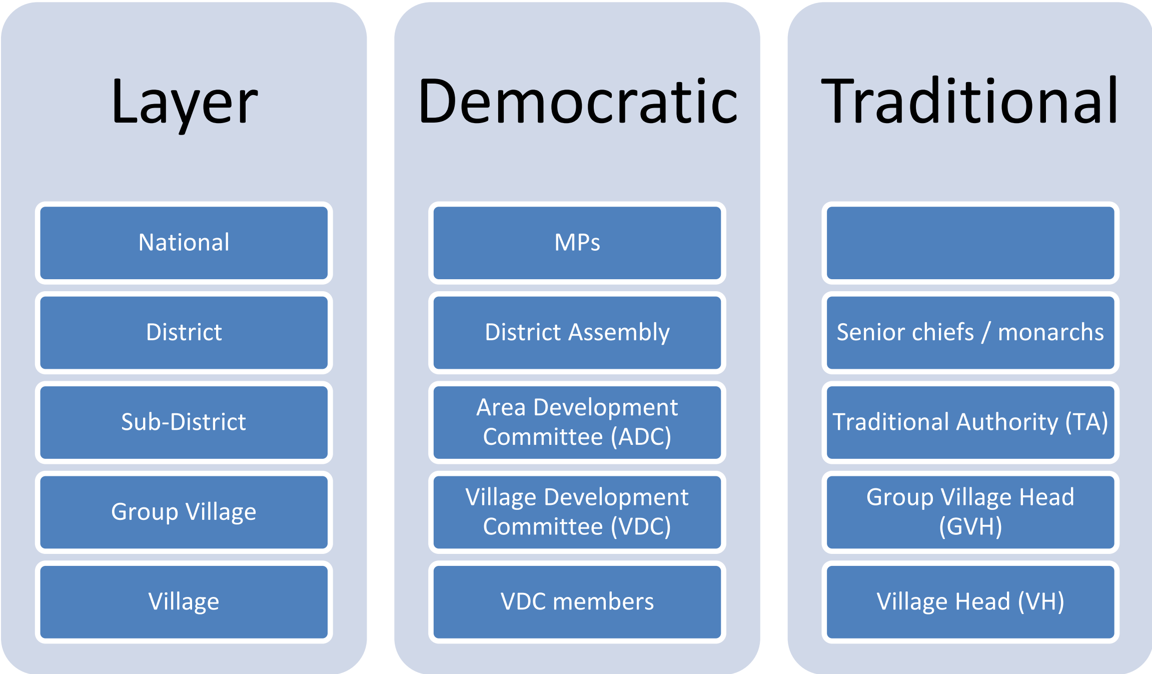
Malawi is divided into three administrative regions (Northern, Central and Southern) and 28 Districts. For the first few decades after independence, political structures were relatively centralised, but in common with many other low-income countries Malawi has attempted to engage in both political and administrative decentralisation since the late 1990s (Chiweza 2005). The justification for decentralisation was twofold: 1) to improve service delivery, and 2) to strengthen democracy at grassroots level (GOM 2005a: 2).

In 2000 the decentralisation process devolved greater autonomy and responsibility to elected District Councils (re-named Assemblies in 2010). However, since the expiry of the original Councillors' terms in 2005, new local elections have been repeatedly postponed, most recently until 2014 (Cammack and Kanyongolo 2010, Dionne and Dulani 2013). Consequently, civil servants run the districts without local political masters, instead responding to central government directives and supervision, with local MPs and traditional authorities in an advisory role. District policy is, at least in theory, guided by District Development Plans (e.g. Ntcheu District Council 2010a), which are themselves informed by a District Socio-Economic Profile (e.g. Ntcheu District Council 2008).

Under decentralisation, new institutions were also created at village and sub-district level. The Village Development Committee (VDC) is 'a representative body from a village or group of villages [which] facilitates planning and development at the community level' (GOM 2005a: 42). The committee comprises one elected member from each village covered by the VDC, the local councillor for the VDC's Ward, four women representatives nominated by the other VDC members, and an extension worker elected by his/her colleagues (GOM 2005a). The VDC is expected to identify development initiatives at village level, propose these through the ADC to the District, and implement activities using community self-help resources and (when available) external support. At sub-district level, the Area Development Committee (ADC) represents all VDCs in a Traditional Authority (TA) area. The ADC holds monthly meetings to set priorities for development in the Area and acts as a communication channel between the District and the VDCs.

Institutions of inherited traditional authority also exist alongside, and are supported by, these new institutions of democracy and administration (Figure 4.2). Districts are divided into Traditional Authorities (TAs), each under the aegis of an individual also known as a TA. Group Village Heads (GVH) and their subordinate Village Heads (VH) report to the TA. TAs, GVHs and VHs receive financial support from the state via the Districts, play an advisory role to VDCs and ADCs, and have considerable authority over issues including land allocation and local justice. The result is a complex interplay of modern democratic and traditional inherited power structures.

Figure 4.2: Layers of governance in Malawi, democratic and traditional.



Completing the formal institutional picture is a range of civil society groups, including churches and other faith groups, traditional collective institutions such as burial societies, and more recently-established civil society organisations (CSOs), many of which have been 'seeded' by the intervention of international NGOs over the last two decades. Overall, there has been substantial growth in the number of CSOs in Malawi since the end of the Banda regime in 1994 (Makuwira 2011). Non-state providers have played a major role in provision of some services, particularly health (Batley 2006).

Informal 'rules of the game'

In practice, both the 'modern' and 'traditional' institutional structures outlined above are 'enveloped by the neopatrimonial practices of political 'big men'' (Bratton and Van de Walle 1997: xiii). Personalised patron-client relations are dominant, characterised by a deferential culture and weak downward accountability.

At national level, formal democratic trappings have sometimes been simply a charade: 'the budget as theatre', in the memorable phrase of Rakner, Mukubvu et al. (2004). In the first decade of democracy under Muluzi, delivery of public services became highly politicised (Cammack and Kanyongolo 2010). While the Mutharika regime placed much greater emphasis on improved economic performance, this was nonetheless achieved using neopatrimonial means (Cammack and Kelsall 2011). The resolution of the April 2012 Presidential succession crisis in favour of Joyce Banda signals the growing importance of the formal rules of the constitution – although some analysts suggest that the informal roles played behind the scenes by 'big men' in the army and judiciary were crucial in resolving the crisis (Dionne and Dulani 2013).

At district level, the local government system is characterised by a high degree of 'institutional fragility' (Bratton 2012) due to its short history and very low degree of institutionalisation. Major problems with the implementation of decentralisation in practice – slow pace, confusion, unevenness, resistance by the centre – meant that when local elections were finally held they were highly party-politicised and the calibre of local councillors was generally low (Cammack and Kanyongolo 2010). The resulting institutions are 'toothless' and their plans are 'hardly implemented': elected bodies are made up of appointees, and committees are dormant, not meeting unless in response to external stimulus (Chiweza 2010: 5,6). Poor record-keeping and non-existent data banks further undermine accountability, and resource flows are highly politicised (ibid.)

Structural institutional complexity has led to what Cammack and Kanyongolo refer to as an 'overlapping jigsaw-puzzle of government agencies' (2010: 12). The resultant confusion leads to weak accountability, since each agency can claim that responsibility for service delivery lies elsewhere. Relatedly, there is low 'policy capacity' – a multiplicity of policy documents, but few actual implemented policies (Booth, Cammack et al. 2006). The durability of traditional institutions alongside modern ones adds another layer of complexity.

Although modern democratic structures are nominally dominant, in fact, at village level, traditional authority often enjoys a higher degree of legitimacy than elected authorities. Indeed, while such respect for and deference to traditional authority is common in many African countries, it is particularly strong in Malawi (Logan 2013). In many areas, nominally democratic structures such as VDCs are in reality appointed by traditional leaders (Chiweza 2010). Traditional authorities dominate village activity in practical terms, for example in initiating community participation in social fund projects (Vajja and White 2008). Less positively, they also dominate decision-making in key areas such as allocation of fertiliser subsidy (Chinsinga

2011b) and land reform (Chinsinga 2011a), resulting in elite capture of programme benefits. Despite this, traditional leaders are much more widely trusted than elected leaders (Ellis, Kutengule et al. 2003, Zulu 2012); in general, Malawians rate their elected representatives much lower for responsiveness than citizens in most other African countries (Bratton 2012: 518).

In effect, in Malawi, the formal modern institutions of democracy and bureaucracy have been recently grafted onto a much more embedded heritage of traditional socio-political institutions based on inherited authority and personalised rule. The complex interplay of these two systems is well captured by the concept of 'neopatrimonialism' (Bratton and Van de Walle 1997); what happens in Malawi is still very much determined by the informal rules of personalised power. One clear example is the Farm Input Subsidy Programme, designed to assist the poorest households throughout the country. Despite the universalist intent of this programme (Collin 2011), researchers found that 'households in areas where the ruling party won the last presidential election acquire significantly more subsidized inputs than other households' (Mason and Ricker-Gilbert 2013: 75).

4.1.3 Incentives

> *'The rewards and punishments that are perceived by individuals to be related to their actions and those of others' (Ostrom et al. 2002), quoted in (Harris, Kooy et al. 2011: 17).*

Democratic theory suggests that citizen power in the form of the vote provides the key incentive for the state to perform; citizens hold political representatives accountable via the ballot box for the performance of the institutions of the state, including the bureaucratic provision of public goods and services. Bureaucrats are accountable upwards to political masters, who are themselves accountable downwards to citizens. The theory implies that the politician is judged by the voter, and the bureaucrat is in turn judged by the politician, on the basis of their performance in delivering public goods and services. However, this simple model fails to explain the complex reality of the Malawian political economy.

Exogenous bureaucracy

In reality, much of the modern bureaucratic superstructure is driven by the economic logic of external financing, which provides the sole incentive for its existence. When the funding ends, the institution withers (Chiweza 2010). External funding provides perverse incentives for local initiatives, paradoxically undermining the very sustainability that it purports to engender through diverting energies into jumping through administrative hoops (Swidler and Watkins 2009) or through seeding a plethora of competing mini-bureaucracies such as village committees.

Endogenous patronage

At the same time, socially-rooted relationships of patronage and hierarchy form an enduring and pervasive context for all development action, and mean that attempts to impose democratic egalitarian institutional forms - such as elected gender-balanced village committees – rarely have the intended results. As Zulu observes with regard to community based natural resource management (CBNRM), 'local actors selectively adopt, ignore, or alter institutional choices imposed by governments and donors, creating institutional hybrids' with unintended outcomes (2012: 194) – a classic example of bricolage. Exogenous institutional forms display little resilience to elite capture, and are held in low regard by ordinary people. Zulu's research showed that large majorities had little or no trust in CBNRM committees and believed they did not represent community interests (Zulu 2012). In some cases, external institutions are little more than unwitting pawns in local political dynamics; Cammack (2012) documents one such case of a water NGO working in peri-urban Blantyre.

The enduring strength of the endogenous political economy poses an interesting analytical challenge. If, as public choice theory claims, people act rationally in their own interests, why do the marginalised majority not act to limit the power of the elites? Cammack suggests that 'the dominance of clientelist politics will end only when there is predictable delivery by the state of sufficient public goods for everyone' (Cammack 2012: 46) – but this is a vicious circle, because it is precisely those clientelist political structures that prevent the delivery of sufficient public goods for everyone, instead ensuring that resources are unequally distributed. At the same time, the clientelist political culture means that any individual's best chance of securing a better share of resources is to promote a particular patron, still within the clientelist structure. Thus, clientelism is an extremely strong and stable system.

Upwards and downwards accountability

At the risk of oversimplification, the situation can be summarised in terms of two powerful dynamics of upwards accountability: traditional/autocratic and modern/bureaucratic. In both, 'lowers' are accountable to 'uppers', to use Chambers' (1994) terms; incentives for downwards accountability on the part of elites (respect in the traditional model, the vote in the modern model) are weak and subject to manipulation, and information asymmetries are pervasive.

Citizens have low expectations of government, so they do not express or exert themselves regarding its failures (Cammack 2012). Using Hirschman's (1970) typology of responses to decline, they choose 'loyalty' to one individual patron, or 'exit' if they can (e.g. if they are wealthy enough to turn to the market instead) rather than using 'voice' to secure change. The concept of downward accountability is unfamiliar to both elites and citizens - although a recent pilot project using community scorecards to improve public services across eight districts in Malawi showed some promise (Wild and Harris 2012).

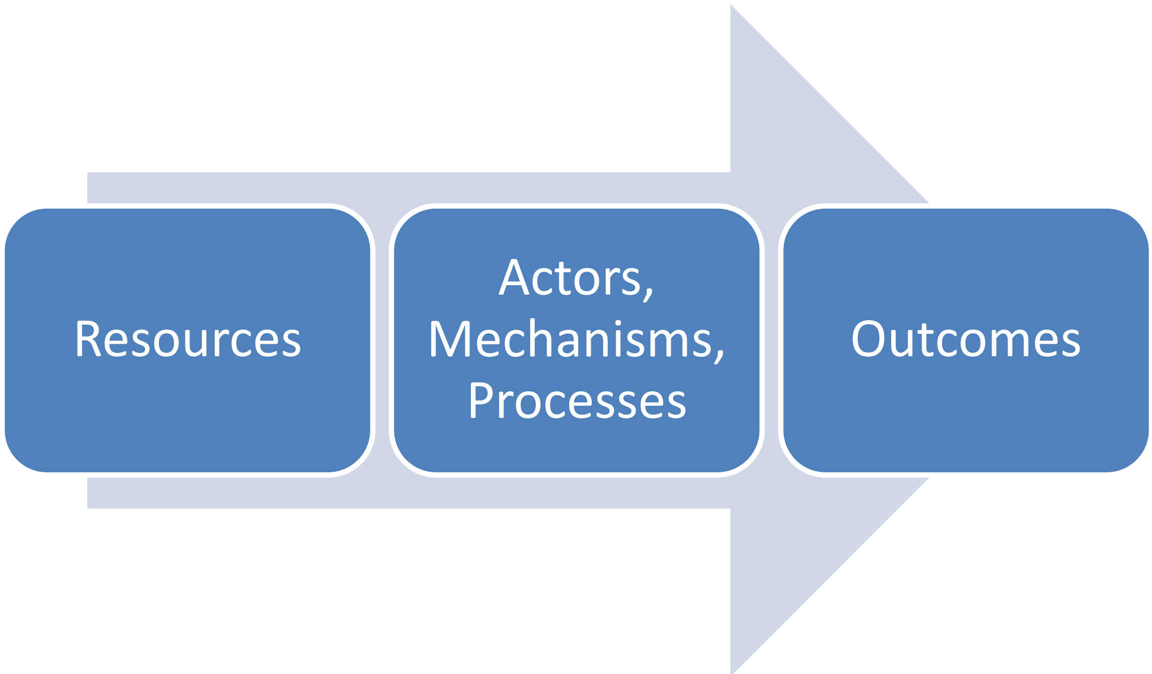
At the same time, upwards accountability fails. Whereas a tight system of rules and sanctions underpinned relative state effectiveness during the Banda period, under Muluzi and Mutharika performance discipline has weakened substantially (Cammack and Kanyongolo 2010). Civil servants win promotion not on the basis of their achievements in terms of service delivery and citizen satisfaction, but on the basis of their cultivation of powerful patrons. Lack of performance discipline extends also to the activities funded by external donors: for example, DFID concluded that there was little to show for the large sums they had channelled through government systems in the early 2000s (Barnett, Chisvo et al. 2006).

These pervasive features of the Malawian political economy play out in all public service sectors. The rural water supply sector is no exception, and it is to this that I now turn.

4.2 THE RURAL WATER SUPPLY SECTOR

The structure of this section is based on a framework for water governance – meaning 'the system of actors, resources, mechanisms and processes which mediate society's access to water' proposed by Franks and Cleaver (2007: 303, 294). I contend that the actors are more central than is suggested in the original model, in that they (attempt to) design and (ultimately) shape the mechanisms that translate resources into outcomes. Figure 4.3 sets this out in diagram form; the similarities between this 'water governance' framework and the PEA structure used in the previous section are clear.

Figure 4.3: A framework for water governance.



Source: adapted from (Franks and Cleaver 2007).

I first consider the resources (policy, infrastructure, investment) available in the sector. Two key mechanisms of access are then discussed: technology ('hardware'), and the dominant model of community management ('software'). The main actors/agents involved in the sector are surveyed, and outcome data is summarised. Finally, I examine the processes and incentives that drive these outcomes.

4.2.1 Resources

'The material and non-material properties of social systems from which human governance of water is constructed… both authoritative and allocative' (Franks and Cleaver 2007: 293, 295).

This section focuses on sector policy as the key authoritative resource, and investment as the key allocative resource.

<u>Policy</u>

Within the Malawi government, water supply is addressed together with irrigation under the aegis of the Ministry of Irrigation and Water Development (MOIWD). Key documents guiding practice in the sector include the Malawi Growth and Development Strategy II (MGDS II) (GOM 2012b) and its predecessor, MGDS (GOM 2007); and the National Water Policy 2005 (GOM 2005b).

Water supply is included together with irrigation as one of the nine priority areas in the current MGDS II (GOM 2012b). However, the document provides little in the way of practical guidance to the sector; the goal ('to improve access to water through an integrated water management system') and expected medium-term outcomes ('well developed and managed water resources' and 'increased access to safe water points within 500m distance') are vague, and the strategies are equally non-specific (GOM 2012b: 72). The document also neatly illustrates a pervasive feature of water policy in Malawi, the mismatch between problem identification and solution specification. Thus, despite identifying the main challenges as including 'aging infrastructure, inadequate maintenance capacity, theft and vandalism resulting in more than 30 percent nonfunctionality of the infrastructure' (GOM 2012b: 73), the MGDS states that the government's focus will be on 'construction of dams, establishment of piped water systems and drilling of boreholes where gravity fed systems cannot work' (ibid.). There is a clear disjunction between the identification of maintenance of existing infrastructure as a major problem on the one hand, and articulation of a strategy focusing on building new infrastructure on the other. The emphasis on gravity fed systems is also surprising, given the poor performance record of such schemes.

The National Water Policy sets out the following 'specific policy goal':

> *'3.2.4 Rural Water Services: To achieve sustainable provision of community owned and managed water supply and sanitation services that are equitably accessible to and used by individuals and*

entrepreneurs in rural communities for socio-economic development at affordable cost' (GOM 2005b: 4).

Thus, sustainability, equity of access and use, and affordability are three key concepts underpinning national policy on rural water supply. Two other points are worth noting. One is the focus on anticipated economic benefits of water supply, implied by the references to 'entrepreneurs' and 'socio-economic development'. This stands in interesting contrast to the literature reviewed, which tends to emphasise health and/or time impacts, rather than economic benefits of rural water supply. The other point, of particular relevance to this study, is the emphasis on 'community ownership and management' as the single model of rural water supply. This, of course, reflects development discourse at the time the policy was written, although some criticism of community management was already being voiced by 2005 (Schouten and Moriarty 2003).

Indeed, the National Water Policy (NWP) is arguably trying to be all things to all people. For example, the eighteen 'guiding principles' include '3.4.6 Water resources shall be optimally, equitably and rationally allocated …' and '3.4.8 Water development programmes shall be based on demand responsive and demand driven approaches, beneficiary participation and empowerment' (GOM 2005b: 6); but, as discussed in Chapter Three, there is often a trade-off between the two: demand-driven approaches often increase inequality, since the more privileged are more able to exercise voice. Such complexities are nowhere acknowledged in the NWP. Moreover, the (fifteen) strategies set out in the policy for achievement of the (eight) specific objectives are too numerous, non-specific, and not rooted in problem identification. Overall, the NWP has significant shortcomings.

Indeed, a careful reading of the NWP reveals that responsibility for operation and maintenance is allocated to no-one. In the NWP's outline of the respective roles of the various stakeholders in the water sector, local governments have only four responsibilities while NGOs have ten; management and maintenance of existing infrastructure is not mentioned at all in the lists of responsibilities of national or local government, and is only briefly mentioned elsewhere, where NGOs are exhorted to support 'communities' to do this. In the five pages of the NWP that list the responsibilities of eleven different stakeholders, there is no section for 'communities' – so, although the entire policy rests on the assumption of community management, the (very significant) responsibilities that are to be shouldered by these centrally important stakeholders are never articulated.

The MOIWD's main vehicle for implementation of the NWP in recent years has been the second National Water Development Programme (NWDP), running from 2007 to 2015 with a budget of USD $250 million (Lockwood and Kang 2012, World Bank 2013c) mainly funded through a concessional loan from the World Bank. Under the NWDP initial steps have been taken towards the establishment of a Sector Wide Approach (SWAP) (GOM 2008), including the initiation of annual joint sector review processes, and the production of annual sector performance reports of progressively increasing quality (GOM 2009, GOM 2011b, GOM 2012a). However, development of the SWAP has been severely hampered by capacity limitations within MOIWD, resulting in a dysfunctional 'dialogue' characterised by politicking by different agendas (Lockwood and Kang 2012); to date, the SWAP remains on the drawing board.

At District level, WASH policy is theoretically guided by District Sector Investment Plans (DSIPs). However, close analyses of a sample of such plans (Kasungu District Assembly 2007, Ntcheu District Council 2010b) reveal major flaws in design and budgeting; it seems likely that DSIPs are exercises in wishful thinking rather than practical guides to action.

Investment

It is extremely difficult to obtain information about the scale of activity and investment of the many different players involved in the water sector. The problem is compounded by the fact that water is the responsibility of MOIWD, while sanitation and hygiene are under the Ministry of Health. Some important sources of data (e.g. MEJN 2010) are clearly unreliable in places, and all are compiled by institutions with particular interests to promote (GOM 2012a, Washwatch 2013). The figures presented in Table 4.1 appear to be the most recent and reliable available.

Table 4.1: Size of the water supply sector in Malawi.

	2006	**2007**	**2008**	**2009**	**2010**
Government WASH budget (current $US, millions)	4.7	13.7	18.6	32.9	20.0
as % of total Government budget	0.4	1.0	1.1	1.7	1.0
as % of GDP	0.2	0.4	0.5	0.7	0.4

Source: (Washwatch 2013). Data is for expenditure, apart from 2008 and 2010 which are budgeted data, since expenditure data is not available.

Table 4.2 below places investment in WASH in the wider context of government expenditure on health and education[5].

Table 4.2: Malawi Government budget allocations to selected sectors, 2004/05 to 2010/2011.

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Water %	0.8	0.8	0.9	1.7	2.0	3.1
Education %	10.2	11.3	10.1	8.4	9.2	16.1
Agriculture %	12.7	13.25	12.08	14.04	13.06	8.1
Health %	7.28	7.82	10.54	10.1	8.92	15.5

Source: (GOM 2012a) Table 3.2, page 13.

Although the 'Water' budget has been increasing significantly in recent years, only a tiny proportion is devoted to rural water supply. More than half of the 2010/11 water budget (MWK 4.9bn) was allocated to the NWDP and a further MWK 4.1bn was allocated to irrigation, leaving only MWK 0.1bn, or about 1% of the budget, for borehole construction (GOM 2012a: 14). To put this in context, Ghosh Banerjee and Morella estimated the 'water infrastructure financing gap' for Malawi to be 5.1% of GDP or $144 million per year – seven times larger than the 2010 budget (2011: 228-229).

<u>Trends over time:</u> While the share of WASH in Malawi's government expenditure declined significantly in the early part of the last decade (Gutierrez 2007), the data above suggest that this was reversed after 2007, although a decline can again be

[5] It is immediately clear that there are differences between the WASH figures in Table 4.1 and the Water figures in Table 4.2. Part of the discrepancy may be due to Water being a sub-sector of WASH, and to one dataset using calendar years while the other uses financial years. Although it is not possible to triangulate the data directly, both datasets do confirm broadly similar trends.

seen in 2010. WASH expenditure averages about 1% of the overall government budget.

WASH expenditure compared with other sectors: allocations to WASH are much lower than allocations to education, health or agriculture. On the other hand, MEJN data suggests that the proportion of government expenditure going to WASH more than doubled from 2004/5 to 2009/10, while shares in the budget for education and health declined (MEJN 2010: 19).

Relative contributions of different sources of funds: The vast majority (86%) of MOIWD's expenditure is funded by donors, significantly higher than the average ratio in other government departments (MEJN 2010: 4). Donor funding to WASH and irrigation totalled 6% of all donor funding to Malawi between 2006-2009, compared with 42% for health, which is by far the largest recipient sector (MEJN 2010: 13). No information at all is available on the scale of NGO investment in WASH in Malawi (GOM 2012a). The MEJN study only received responses from two of the twenty-five NGOs identified and targeted; even WaterAid, which funded the study, did not provide data (MEJN 2010: 14). This is a major lacuna, since according to Gutierrez (2007) such funding could account for up to 75% of sector spending.

A key factor influencing the level of investment in the sector is donor confidence in the MOIWD, which has historically been very low due to its low capacity and frequent change of personnel (ODI 2004, Welle 2005, Gutierrez 2007). Furthermore, other development sectors have been prioritised by key players, overshadowing WASH: the government has prioritised agriculture, and donors and NGOs have prioritised health, especially HIV/AIDS (Morfit 2011).

There are major imbalances in the allocation of WASH funding overall. Virtually all government WASH funding (97%) is centrally controlled by the MOIWD (Lockwood and Kang 2012: 23). There is a very significant urban bias: in 2008, WASH spending per capita was about twenty times higher in urban areas, at USD $22.00 versus USD $1.16 in rural areas (Lockwood and Kang 2012: 23). Allocations to Districts are minimal: using MOIWD figures, Scott calculated that the average annual budget for a District Water Development Office is approximately USD $4900 (Scott 2012: 277), barely sufficient to drill a single borehole.

Until recently, allocation of funds from the MOIWD to Districts was simply based on historical allocation. In 2011 the National Local Government Finance Committee consulted on a proposed change to the allocation mechanism that would bring practice in the water sector in line with health and education, through use of a single national formula to calculate allocations. Calculations showed that the proposed new allocation formula – 50% based on the number of water points in the district, and 50% based on the percentage of the population unserved – would result in very significant changes in many districts (GOM 2011a).

The 2010/11 district budget provisions envisaged a 4% reduction on the previous year's budget for water, within the context of an overall 7% increase in district budgets. While the budget allocation to Districts for water stood at MWK 33.5

million, this was dwarfed by the allocations for health (274 times larger), education (45 times larger), and agriculture (16 times larger); indeed, almost all other sectors of the local government budget were larger than water, including gender, fisheries, immigration, forestry, housing and trade (GOM 2010a: iii). More recent budget projections forecast significant increases in several sectors, especially education, but a relative stagnation in the water budget (GOM 2011c: 383). And yet, as the Afrobarometer survey showed, water is the second-highest priority for rural dwellers, and the third-highest for Malawians overall (Tsoka and Chunga 2013). It thus seems clear that the Malawian budgeting process is far from demand-driven.

In addition to the standard District funding allocation, known as ORT (Other Recurrent Transfer), Districts can also access the Local Development Fund (LDF), established in 2008 as a successor to the Malawi Social Action Fund (MASAF). Both were World Bank funded programmes with twin objectives: 'providing financing for locally prioritised development projects and increasing local government capacity' (Lockwood and Kang 2012: 11). However, there have been reports of political influence in allocation of LDF funds, meaning that the supposed need-based allocation criteria are actually not met; and, as with MASAF, projects are no doubt chosen by 'prime movers' rather than collectively (Vajja and White 2008). Although MASAF funded significant numbers of water projects, use of LDF funds for WASH has so far been very low (Lockwood and Kang 2012).

Finally, deployment of the limited resources available at District level is poor. Examination of Output Based Budgets for the four Districts that are the focus of this study suggest very limited capacity in planning, budgeting, and performance management. For example, in Chikhwawa, the MWK 1.3 million allocation for water is split as follows: one-third (MWK 439,968) for 'construction / rehabilitation of 20 boreholes or shallow wells'; and two-thirds (MWK 877,010) to 'provide adequately for office services' – with the performance metric being 'number of monthly reports produced' (GOM 2010b: 9).

4.2.2 Mechanisms of access

> *'Particular context-specific arrangements for organising access to water' (Franks and Cleaver 2007: 295).*

This section focuses first on physical infrastructure, then on the social infrastructure of community management.

Hardware: technology and infrastructure

Table 4.3 summarises the latest available national data on access to improved water infrastructure[6].

6 This data is from the JMP, as no data is available directly from the Malawi government. As at 24 October 2013, the Malawi government homepage (http://www.malawi.gov.mw) hyperlink for the MOIWD led to the website for the WASH SWAP (http://waterswap.org/) which contained only an error message saying 'This site has been suspended'.

Table 4.3: Use of drinking-water sources in Malawi.

Year	Use of drinking-water sources in Malawi (percentage of population)														
	Urban					Rural					National				
	Improved			Unimproved		Improved			Unimproved		Improved			Unimproved	
	Total improved	Piped on premises	Other improved	Unimproved	Surface water	Total improved	Piped on premises	Other improved	Unimproved	Surface water	Total improved	Piped on premises	Other improved	Unimproved	Surface water
1990	91	40	51	5	4	35	2	33	46	19	42	6	36	41	17
2000	93	35	58	5	2	57	2	55	31	12	63	7	56	27	10
2011	95	30	65	5	0	82	2	80	14	4	84	7	77	13	3

Source: (JMP 2013: 25).

Although the data above is not broken down by hardware type, the most recent census indicates that approximately half of all Malawians (48%) obtain their water from boreholes with handpumps, a much larger proportion than those who use a standpipe (12%), private piped source (7%) or protected well (6%) (NSO 2008: 19). In rural areas, 55% use boreholes while only 16% use any other type of protected source (ibid). However, borehole technology is virtually ignored in national policy and practice, with only minimal budget allocations. At the same time, very large sums of money are invested in piped schemes which have an extremely poor functionality record (GOM 2012a). This paradox surely requires explanation.

One factor that is commonly acknowledged to be a positive influence on functionality is Malawi's handpump standardisation policy (Baumann and Danert 2008a). The Afridev, a public domain pump originally developed in Malawi (Hankin 2001) and specifically designed for village level operation and maintenance (VLOM), is used for deep mechanically-drilled boreholes, while the Malda is used for hand-dug wells. This successful handpump standardisation has been a significant factor in keeping functionality rates as high as they are, as it means there is greater effective demand for the spares for these pump types, and greater opportunity for mechanics to develop the specialist O&M skills required.

Software: the community management model

As enshrined (or assumed) in the National Water Policy, the community management model is a central element of the water sector in Malawi. Virtually all water point installations follow the same basic approach of establishing and training a village water point committee, and handing over management responsibility after installation is complete. As an MOIWD employee explained to a sector conference, CBM is believed by the Ministry to work very well and to be the key to tackling sustainability (Matamula 2008) – despite the fact that the model has been in place since the 1990s, and non-functionality remains high.

As noted above, the dominance of the community management is so strongly based on assumptions that the responsibilities of communities are not even articulated in the National Water Policy, and there are no national guidelines on the topic. Community management is simply assumed to be the way to deal with the challenge of long-term management of water supply services; a mechanism to ensure that all costs post-construction are borne by the users. Even so, community management does not in fact come cheap. Although data is scarce, UNICEF figures indicate that community management costs (essentially, the costs of mobilising users and training committee members) comprise 16% of the total costs of borehole construction (GOM 2012a).

4.2.3 Actors

This section provides an overview of the main organisations involved in the rural water supply sector in Malawi.

National government

Recent years have seen frequent changes in the national Ministerial structure, with Irrigation moved from Agriculture to Water, then all three merged, then split again. In 2013, responsibility for rural water supply is held by the Ministry for Irrigation and Water Development (MOIWD). The MOIWD's main water programme is the World Bank-financed second National Water Development Project (NWDP) already discussed (World Bank 2013c), which focuses on urban water supply, and piped schemes in towns and rural areas. Five Water Boards (Lilongwe, Blantyre, Northern Region, Central Region and Southern Region) are responsible for water supply in towns and cities.

Local government

In line with Malawi's Decentralisation Policy, rural water supply was decentralised to District level in 2006 (MLGRD 2013). However, as noted above, the reality of devolution is patchwork and 'projectised' (Lockwood and Kang 2012: 26); decentralisation of responsibility has not been accompanied by decentralisation of resources, and District Water Offices are notoriously understaffed and underfunded (Baumann and Danert 2008a, MEJN 2010, WPP 2010, Lockwood and Kang 2012, GOM 2012a). The slow pace of devolution is generally attributed to 'lack of capacity' at District level and/or the stalling of political decentralisation (postponement of local elections). However, there is an instructive contrast between the level of funds devolved to Districts in the WASH sector (roughly 3%) and in the Health sector (roughly 30%) (Lockwood and Kang 2012: 9), which suggests that sector-specific factors – such as, perhaps, the relative capacity and commitment of staff in the respective Ministries - are significant.

<u>International donors</u>

The key donors to the water sector include the World Bank (WB), the European Commission (EC), the UK Department for International Development (DFID), the Japanese International Cooperation Agency (JICA), the African Development Bank (AfDB), and the United Nations Children's Fund (UNICEF). Most of them channel the majority of their funding through the national government, although DFID and the EC fund several large international NGOs, and UNICEF engages in direct partnerships with thirteen District Water Offices. The donors established a Water and Sanitation Development Partners Group in 2008 to coordinate their support for the sector (JICA 2012).

<u>NGOs</u>

Malawi is well supplied with NGOs in general, and the water sector is no exception.

Baumann and Danert (2008a) found 31 NGOs involved in rural water supply and suggested that this was not a comprehensive list, while MEJN (2010) listed 25; WES Network, the coordinating group for NGOs working on WASH in Malawi, has over 50 members. Key international NGOs (INGOs) working on rural water supply include WaterAid, Concern Universal (CU), World Vision, Emmanuel International, Engineers Without Borders (EWB), InterAide, and Water For People. There are relatively few Malawian NGOs specialising in WASH, and those that exist work in partnership with INGOs.

While some large NGOs (e.g. CU) focus mainly on water point installation and rehabilitation, others (e.g. EWB) focus on strengthening local government capacity to deliver sustainable water supply; some (e.g. WaterAid) do both. WaterAid played a significant role in initiating water point mapping in Malawi (Welle 2005), while EWB has been focusing on helping districts to implement Excel-based monitoring systems in recent years (Scott 2012). Meanwhile, Water for People has been piloting its own mobile mapping approach, FLOW (Water for People 2013). InterAide has specialised in establishing networks of Area Mechanics (de Saint Méloir 2009).

<u>Communities</u>

The key actors in the community management model are of course the communities themselves, represented by the Water Point Committee, as discussed earlier. Within communities, however, there may be a number of other important individuals or institutions with significant influence on access to water, including:

traditional leaders (VH, GVH, TA); religious leaders and entities (churches, mosques); modern governance structures (VDC, ADC); and other committees, either nested (such as VDC sub-committees) or stand-alone (such as committees established by other types of development projects focused on child care, AIDS orphans, forest management, and so on.)

4.2.4 Outcomes

This section first presents data on outcomes (i.e. people having access to clean water), then on outputs (i.e. numbers and functionality of water points). Various challenges relating to data are then examined, including problems of indicator confusion, updating, and coordination.

<u>Outcomes: access to clean water</u>

Malawi has made great strides in improving access to clean water over the past 15 years, with 83% of the population now enjoying such access (JMP 2012a: 47). It is 'on track' to meet the MDG target, and in fact is the highest-performing country in sub-Saharan Africa, with 48% of the 2010 population having gained access to improved drinking water sources since 1995 (JMP 2012a: 11). The proportion of the rural population with access to clean water has increased from just 35% in 1990 to 80% in 2010 (JMP 2012b). As shown in Table 4.4, access to clean water is now significantly higher in Malawi than in neighbouring countries, or in other parts of sub-Saharan Africa (SSA) as a whole.

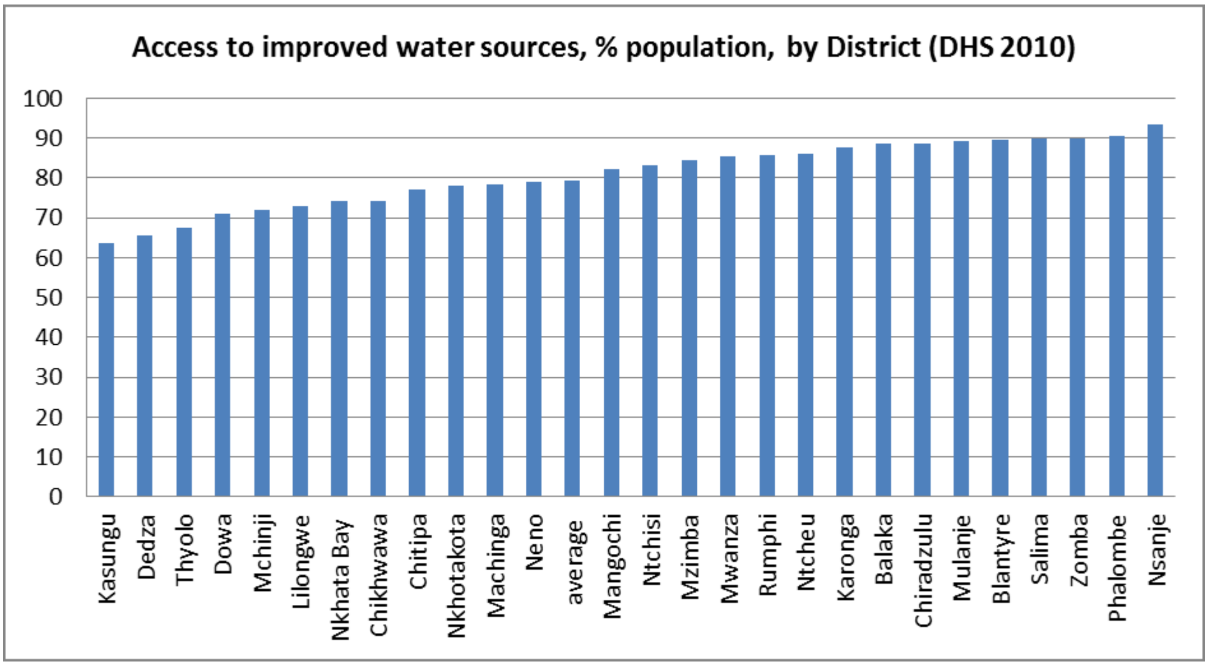
Table 4.4: Access to improved drinking-water sources, 2010.

% of population	World	Developing Regions	Sub-Saharan Africa	Malawi	Tanzania	Zambia	Mozambique
Urban	96%	95%	83%	95%	79%	87%	77%
Rural	81%	79%	49%	80%	44%	46%	29%
Total	89%	86%	61%	83%	53%	61%	47%
% gaining access since 1995	23%	26%	26%	48%	16%	26%	21%

Source: (JMP 2012a), statistical tables on pp38-55.

However, this progress is unevenly spread, and access is not always constant: 24% of rural dwellers (and 16% in cities and 8% in towns) report that they have gone without enough clean water 'many times' or 'always' over the past year (Tsoka and Chunga 2013: 9). Performance also varies significantly between districts, as shown in Figure 4.4. Sector stakeholders are concerned that 'access in rural communities is not improving' but instead has stagnated since 2007 (GOM 2012a: iii); and the limited data available suggests that a significant proportion of improved sources do not provide water of adequate quality, and/or that poor household hygiene leads to water contamination before consumption (GOM 2012a: 37).

Figure 4.4: Percentage of population with access to improved water sources, by District.



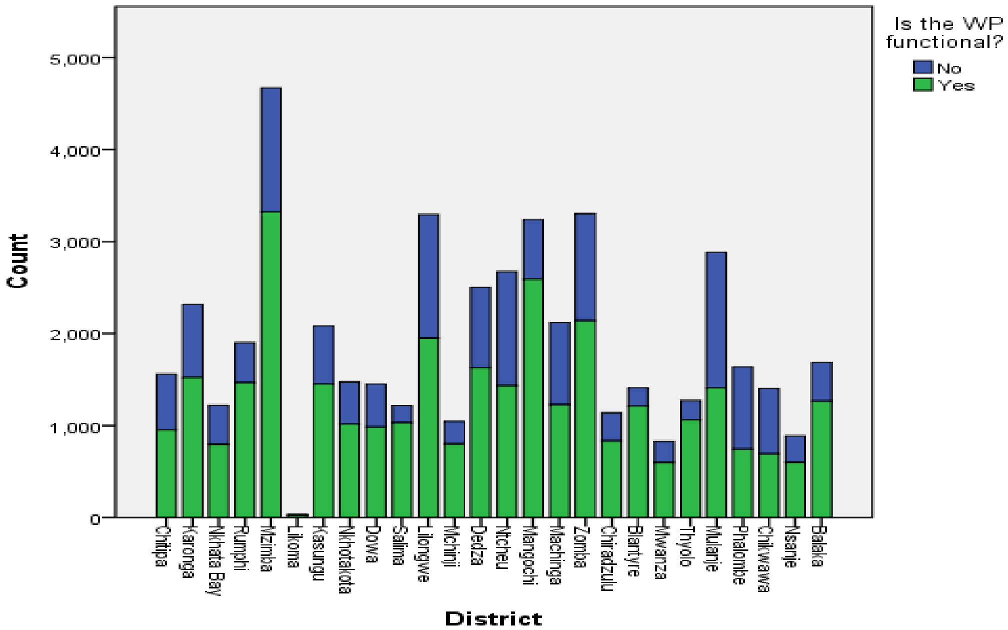
Source: GOM (2012a), Figure 8.2 on page 61, using data from DHS 2010.

So, despite the impressive increases in access since 1990, water supply was rated as the third most important problem facing the country overall by Afrobarometer respondents, and rated second most important by those living in rural areas (Tsoka and Chunga 2013: 48). Respondents also felt that government performance in providing water and sanitation services had declined between 2002 and 2012 (Asunka 2013). In summary, Malawi has made good progress, but more needs to be done to ensure access to clean water for all.

Outputs: water point numbers and functionality

The increase in Malawians' access to clean water can be attributed in large part to the significant increase in investment in WASH in recent years outlined earlier – although comprehensive data regarding the number of new water points constructed is simply not available, and there is cause for concern about the long-term sustained functionality of new infrastructure (MEJN 2010). Indeed, the best (only) national data available is from the 2005 Malawi WP Database (WaterAid 2005), which covers 25 districts and shows average functionality of 66.1%. However, there is wide variation between districts (Figure 4.5), between TAs within districts (Figure 4.6), and between different technology types (Figure 4.7). For example, Figure 4.5 shows that functionality is much higher in Mangochi than in Lilongwe, although both districts have roughly the same number of water points.

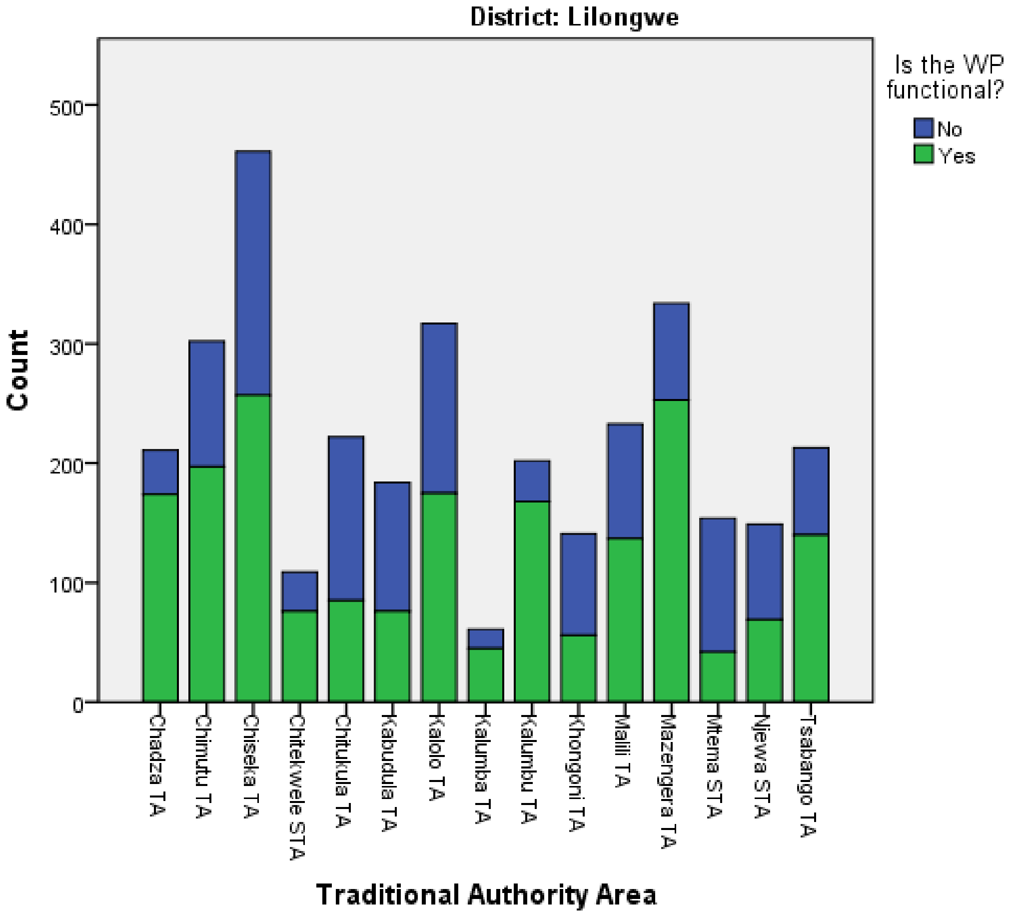
Figure 4.5: Water point functionality by District.



Source: author's calculations from WaterAid (2005).

Figure 4.6 highlights variation within a single district, showing that some TAs (e.g. Chadza) have very high functionality while in others (e.g. Chitukula) more than half the water points are non-functional.

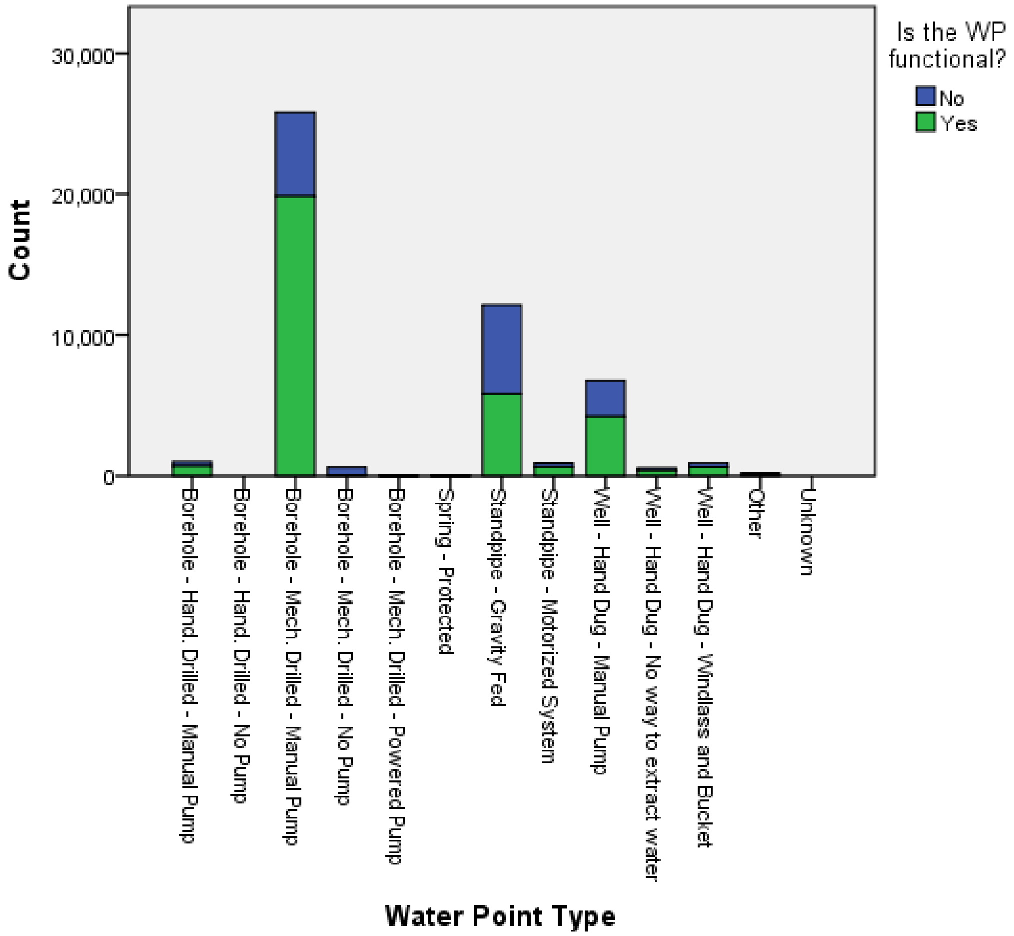
Figure 4.6: Water point functionality by TA, Lilongwe District.



Source: author's calculations from WaterAid (2005).

Figure 4.7 shows that the large majority of water points are boreholes, and that a good majority of these are functional, whereas about half of all standpipes are not.

Figure 4.7: Numbers of water points and their functionality, by technology type.



Source: author's calculations from WaterAid (2005).

Mechanically drilled boreholes with a manual pump are the best-performing technology type, with 76.7% of such water points being functional at the time of the survey. Functionality is even higher for those boreholes fitted with Afridev pumps, at 78.7%, better than all other pump types (author's calculation). At the other end of the spectrum, protected springs perform very badly with only 25.4%

functional - but there are (reportedly) only 67 of them in the country in total. Gravity fed standpipes, of which there are many (12,121), also perform poorly, with less than half being functional. Although there are very few boreholes with powered pumps, only half are functioning, implying that use of a powered pump rather than a handpump decreases the likelihood of system sustainability.

Some anomalies in the data are apparent. For example, more than two-thirds of hand-dug wells with 'no way to extract water' are classified as functional, and nearly 10% of boreholes with no pump are similarly classified as functional. Rather than being mistakes, however, it seems likely that the problem lies rather in the classifications on offer in the survey. Many hand-dug wells in Malawi are shallow hollows in the ground, from which water is scooped directly into a bucket. Such wells have 'no [technical] way to extract water' but they still supply water and as such are 'functional'.

This comprehensive database is unfortunately now quite out of date. At the time of compilation it was intended to be regularly updated, but this has not happened; and while plans are in place to establish a national water point monitoring system (AfDB 2012), this is not yet available. Few Districts have comprehensive datasets for their own infrastructure, and even fewer implementing agencies monitor functionality long term. However, a handful of ad hoc and small-scale studies have yielded more recent functionality data.

For gravity fed / piped systems (GFS), a 2011 survey showed only 26% of GFS taps in Northern Malawi were functional, with somewhat better performance (45% functionality) in Central and Southern Malawi (GOM 2012a: 65-66). Strangely, the 2011 Sector Performance Report from which this data was taken has nothing whatsoever to say about functionality of other types of water points, which make up the bulk of Malawi's water access infrastructure. However, Campbell (2009) found 70% functionality for boreholes installed by Concern Universal in Thyolo District, and 82% functionality for water points installed by other agencies.

In summary, the best available data show that, although one-third of improved water points in Malawi are non-functional, nonetheless four-fifths of the rural population report that they get drinking water from an improved source. By implication, maintaining and repairing existing non-functional water points might be just as effective as (or more so than) constructing new water points in bringing Malawi closer to 100% access to clean water.

Data challenges

Overall, poor data availability is a significant problem in the RWS sector in Malawi, noted by many commentators. There is no comprehensive current overview of sector investment or outputs either at national or district level. The 2005 Malawi WP Database has been only minimally updated since compilation, meaning that it is now of very limited analytical use. In Districts, DWOs complain that most NGOs and some projects financed by the MOIWD or the Constituency Development Fund do not report to them on WASH activities; most DWOs do not have any accurate information on the WASH infrastructure for which they are nominally responsible. Although the African Development Bank recently made a grant of nearly 2 million Euros to the MOIWD to strengthen water sector monitoring and evaluation (AfDB 2012), this project has not yet been completed.

Confusion between output and outcome data is also common; as noted in Chapter Two, Baumann and Danert (2008a) multiply a person-based index by a technology-based index to argue that access to safe water in Malawi is considerably worse than it actually is; and the same mistake is repeated by others. This confusion reflects a lack of clarity in the sector overall regarding which metric is most important.

Ultimately, of course, the outcome – people accessing clean water - is of most interest. But output data is critically important. Each non-functional water point represents a waste of resources; at approximately £5000 each in today's prices, the roughly 10,000 non-functional boreholes in Malawi represent approximately £50 million of failed investment. If outcomes are improved through massive investment in new infrastructure but a large proportion of these new water points cease to function within a few years, policymakers, practitioners and donors need to review their strategy.

4.2.5 Processes and Incentives

Having outlined the broad contours of the RWS sector in Malawi, this section now considers the processes and incentives that operate to translate the resources, via the mechanisms and actors, into the outputs and outcomes described above. Linking back to Section 4.1, three key areas are highlighted: exogenous and endogenous incentives, and accountability challenges.

Exogenous incentives

Two key processes can be identified, both driven by external incentives.

First: over-investment in concrete short-term outputs. The rural water supply sector is pervaded with 'project logic' and subject to donor timetables. Action is driven almost entirely by funding, in line with the pattern identified by Chiweza (2010) in other sectors. For example, efforts to develop monitoring systems at District level only function so long as there is external funding (Scott 2010), and the ubiquitous 'sitting allowances' reflect a work culture where activity is driven very largely by financial incentives. Donors are all individually subject to requirements to disburse funding rapidly and demonstrate concrete, specific achievements, and consequently all stakeholders focus primarily on construction of new water points. Despite strong advocacy in the sector more widely for a move away from projects towards treating rural water supply as an ongoing service delivery challenge, the sector in Malawi remains rooted in a 'build a water point and hand it over to the community' model.

The second process is 'isomorphic mimicry' (Pritchett, Woolcock et al. 2010) – the pretence of substance through the adoption of form only - also driven by funding logics. The National Water Policy is a case in point: a policy exists on paper, but it is of such low quality that it is of little use as a practical guide for action. Similarly, decentralised governance structures are supposed to give citizens greater control over expenditure - but so few resources trickle down through the chain to the districts that, even if they have capable committed staff, they are unable to deliver. From the perspective of donors and NGOs, the building blocks of participatory governance are in place, allowing them to believe that, by handing over control of the newly-built water point to the Water Point Committee, they are contributing to the strengthening of democracy and the empowerment of citizens. From another perspective, however, this behaviour could be seen as a form of abdication of responsibility, forcing village structures into premature load-bearing.

Endogenous incentives

At national level, the reality of the sector is more political than is generally acknowledged. The poor performance of the water sector relative to other sectors such as health and education – reflected in the failure to develop a SWAP, the failure to decentralise resources, the multiple reincarnations of the Ministry and the 'pass-the-parcel' of the Ministerial water portfolio – is clearly a political product. Technocratic attempts to secure improvements – such as an international consultancy's attempts to propose a new framework to strengthen O&M (Baumann and Danert 2008a, Baumann and Danert 2008b), or efforts to ensure that the 2005 water point database is kept up to date – have foundered in the face of ministerial opposition or indifference. The massive skewing of investment towards large-scale, centralised gravity-fed schemes – despite their poor functionality record – is politically driven rather than evidence driven. Politics also has a strong influence on investment and on functionality at local level: ‘political’ water points, i.e. boreholes drilled by MPs or using Constituency Development Funds, are particularly prone to poor construction quality (Baumann and Danert 2008a: 25). As Gutierrez (2007) observed, the challenges in the sector are mainly political, rather than technical.

At village level, the theory of community management stands in contrast to deep-rooted clientelist logics. The situation is further confused by the way that project implementation varies between stakeholders. For example, while some water point installers insist on in-kind contributions, others do not – and in any case, practice may differ from policy: as one NGO worker commented, ‘you will be lenient when the community has killed a goat for you’ (quoted in Baumann and Danert 2008a: 27). And although communities are supposed to pay for repairs themselves, in practice they may rely on ‘patrons’ – the local MP, other politicians seeking election, other local ‘big men’, a religious institution, or an NGO – to provide assistance.

Accountability challenges

One key result of the combination of these two sets of processes and incentives is the devolution – or abdication - of a very large degree of responsibility to communities themselves, much more so than in other sectors such as health or education. The stakeholders with access to economic or political resources focus their efforts on delivering short-term outputs in line with exogenous funding incentives, and/or on securing personal benefits in line with neopatrimonial political incentives. In both cases, accountability is upwards, but is not necessarily based on performance as measured by any metric that is meaningful to the intended beneficiaries.

Two further specific challenges are worth highlighting. One is the worryingly high incidence of theft and vandalism, which, although little-mentioned in the wider literature on water point sustainability, emerges surprisingly strongly from the Malawi literature, including government policy documents (GOM 2012b). Both Baumann and Danert (2008a) and Kleemeier (2000) highlight the problem, and Campbell (2009) found that it explained two-thirds of non-functionality. High incidence of theft and vandalism may suggest two things: low sense of ownership, and weak rule of law.

The second challenge relates to information management. The 2005 water point database represented a major investment by multiple NGOs in establishing a national system for monitoring water points, intended to inform future investment in both new construction and in repairs; but like a previous effort in Zambia, the initiative has failed (Gutierrez 2007). Scott (2012) notes two key barriers to effective monitoring systems: first, that district staff are not held accountable for having data; and second, that even if they do have the data, the scope for using it is relatively limited, since the vast bulk of resources in the sector are centrally controlled, and districts have no direct control over NGO siting decisions. These structural constraints have a major influence on the viability of institutionalised monitoring systems. Similarly, there exists no analysis of the relationship between the investment put into the sector and the results achieved - no analysis of cost-effectiveness. Clearly the incentives for evidence-based decision-making are much weaker than those for politics-based decision-making.

Summary

This chapter has reviewed the structure and performance of the rural water supply sector in Malawi, drawing on many of the themes and concepts discussed in Chapters Two and Three. Using a 'political economy analysis' approach, I have examined both the formal and informal institutions and incentives that shape 'how things work' in Malawi in general, and in the rural water supply sector in particular.

The chapter has shown that there are significant tensions between some of the key actors in the sector (national government, district government, and non-governmental organisations) as well as major challenges of coordination, weak accountability and poor data. Lack of rigorous data on water point sustainability and its causes is also a serious problem.

The analysis presented in this chapter demonstrates clearly that rural water supply is not primarily a technical challenge, but rather a political one, shaped by economic incentives. This reinforces the value of the two-part analytical framework developed in previous chapters, and informs the research design and methods outlined in the next chapter.

Chapter 5

RESEARCH DESIGN AND METHODS

Introduction

This chapter sets out the research strategy, design and methods selected. The particular value of a mixed methods approach to the research question is highlighted, and the sampling frame is set out in detail. Research instruments for collection of both quantitative and qualitative data are presented, and careful consideration is given to research ethics. The chapter concludes with a discussion of the sources, and quality, of the data on which the subsequent analysis is based.

Chapter Two highlighted a range of proximate factors that, individually or in combination, may directly influence water point sustainability. Chapter Three argued that the operation of these factors is determined by underlying social, political and economic dynamics. Hence, this study adopts a two-stage analytical framework.

In stage one I seek to answer the question: *what* are the main factors that contribute to variation in the sustainability of improved community water points in rural Malawi, and *how much* of an influence does each factor have? I do this through examining the influence on water point sustainability of ten proximate explanatory variables. In stage two I address the question: *how and why* do these factors influence sustainability? I do this through analysing the underlying social, political and economic dynamics that influence these results. In particular, I assess whether the community management model delivers on its theoretical intrinsic and instrumental benefits.

5.1 RESEARCH PARADIGM, DESIGN AND SAMPLING

5.1.1 Research philosophy and paradigm

This section outlines the background to my research approach, beginning with the research philosophy or paradigm – the worldview, or organising framework (Bergman 2010) from which it derives. The research question addressed by this study is at one level concerned with physical realities – the functioning of technology and the provision of a public good, access to clean water. As such it is concerned with a phenomenon that can be objectively seen and understood empirically, an approach conventionally called positivist. At a second level, however, beyond the question of whether a given water point functions or not, this study also seeks to understand why. It is therefore concerned with human behaviours and motivations – aspects that need to be understood from within as well as assessed from without. The constructivist research tradition offers a helpful model here, with its emphasis on multiple interpretations of reality.

Like Gorard (2010), I find the dichotomy between positivism and constructivism artificial and unhelpful. Along with positivists, I believe that social phenomena have an existence independent of their perception by social actors; but I also agree with constructivists that social phenomena and their meanings are continually being created by social actors, and therefore that knowledge is always subject to revision. I believe that it is useful and valid to apply the methods of the natural sciences, including observation and measurement, to the study of social phenomena; but I also realise that the same phenomenon can be interpreted very differently by different actors, that these interpretations influence actions, and those actions in turn shape the phenomenon. However, although meanings do guide actions at individual levels, this is not always conscious, logical or optimal; and patterns at a wider level can be discerned using natural scientific methods. Thus, in philosophical terms, my position is perhaps closest to pragmatism or critical realism, a position that is frequently associated with a commitment to mixed methods (Johnson, Onwuegbuzie et al. 2007, Mertens 2010, Tashakkori and Teddlie 2010).

Indeed, this philosophy drives my commitment to a dual approach to this study, which is both deductive (theory-guided, typically associated with quantitative research) and inductive (theory-generating, typically associated with qualitative research). The deductive aspect is represented by the first part of my analytical framework, which draws on previous studies to identify and then test ten proximate determinants of sustainability. The inductive aspect is represented by the second element of my framework, which begins with a broad question about the effectiveness of community management, and seeks to explore this in the specific context of rural water supply. Ultimately, I argue that combining these two approaches yields new insights in two dimensions: it offers not only much greater clarity about the relative importance of the ten posited determinants, but also a revised and considered critique of community management, deeply rooted in empirical findings.

Thus, my choice of a mixed methods approach is rooted in my belief that both can offer helpful and complementary insights, and that combining multiple methods and types of data is 'quite normal for anyone who genuinely want[s] to find out the answer to their research questions' (Gorard 2010: 2). I agree with Bergman (2011) that, despite the differences in ontology, epistemology, design and methods typically associated with the two main types of research, it is indeed possible and valuable to bridge these divides with careful mixed methods research. There are two key strengths of such an approach: 1) the dialectic between them strengthens both, because the insights of one approach lead to a more critical application of the other; and 2) they provide different perspectives which can triangulate each other and build a richer and more robust analysis (Ivankova, Creswell et al. 2006). These strengths underpin the growing popularity of mixed methods studies, which now comprise approximately 15% of research in applied disciplines (Alise and Teddlie 2010). As Bryman observes, 'bringing quantitative and qualitative findings together has the potential to offer insights that could not otherwise be gleaned' (2007: 9). One clear example is the work of Davis and Baulch (2011) on poverty assessments in Bangladesh, and Shaffer (2013) provides a number of others.

It has been claimed that mixed methods research has historically favoured quantitative over qualitative insights, and that a new emphasis on the qualitative is required (Hesse-Biber 2010), but this study aims to achieve an even balance between the two. The quantitative analysis focuses particularly on description of the phenomenon, and the qualitative analysis more on explanation; but both types of data contribute to both types of analysis, and I argue that both are essential and neither could stand alone. I have endeavoured, through the detailed description of research design and methods that follows, to give an accurate account of how the research has been conducted and the way in which the two elements have been integrated (Alise and Teddlie 2010).

5.1.2 Research design

Following De Vaus (2001) and Gorard (2010) I consider that research design must come before commitment to any specific methods. I carefully weighed up the advantages of each of the four classic research designs - experimental, cross-sectional, longitudinal, and case study (De Vaus 2001) - before settling on the design for this study.

Experimental design has enjoyed growing prominence in international development in recent years, for good reason (Banerjee and Duflo 2012). It has, however, also been strongly critiqued on grounds of reductionism, limited applicability to many important questions, and limited explanatory power (Deaton 2010, Lilja, Kristjanson et al. 2010, Picciotto 2012). Although there is certainly scope, indeed need, for more experimental research in the WASH field, a randomised controlled trial is beyond the capacity of an individual doctoral researcher and was accordingly deemed inappropriate for this study.

Cross-sectional design offers a snapshot at a given point in time, comparing two or more objects of study – such as water points in two or more villages. Such an approach is limited in its capacity to assess change over time, which is a critical component of assessing sustainability. Although the time element can be addressed through participant recall, respondents may forget past events or remember them inaccurately. Nevertheless, if recorded historical data is accessible to the cross-sectional researcher, this limitation may be overcome. For example, most water points in Malawi are inscribed (by writing with a stick in the wet concrete when they are first built) with the date of construction, the name of the installer, and frequently other details.

Longitudinal design compares differences 'over time' as well as 'between groups', and thus can provide a richer research picture, particularly well-suited to a study of sustainability. It requires more than one round of data collection – baseline, and at least one subsequent follow-up. Researchers can sometimes use existing secondary data as the baseline, and this was the approach initially intended for this research. However, owing to limitations in the available data (discussed in Chapter Eight) it was not possible in practice.

Case study design examines a particular phenomenon through in-depth analysis of one or more cases. A case is often at a relatively small scale, such as a single village. At a larger scale, the present study could be seen as using the 'case' of RWS in Malawi to explore wider questions concerning the political economy of community management of public goods and services.

In practice, studies of sustainability of rural water supply often adopt a case study format; frequently, the researcher already knows the project and seeks to understand it in more detail, e.g. (Mathew 2004, Carter and Rwamwanja 2006). A meta-analysis of collective action literature found that small-N studies (fewer than 30 observations) predominate, making up 69% of all studies found; and half of these were single case studies (Poteete and Ostrom 2008). However, a limited number of large cross-sectional studies have been undertaken. For example, Whittington, Davis et al. (2008) conducted an unusually large study (400 villages, 10,000 respondents) in which the research team spent on average one day in each participating village, where they conducted group and individual interviews and 25 randomly sampled household surveys. In Ghana, the most used borehole in each village was observed for a whole day; in all sites, engineering staff completed a technical assessment.

Somewhat surprisingly, the literature appears to contain no examples of experimental approaches directly focused on my research question. However, important lessons can be learned from experimental studies in related fields, such as Concern Universal (2006) on institutional arrangements, Björkman and Svensson (2010) and Reinikka and Svensson (2011) on information flows, and J-PAL (2012) on willingness to pay.

I considered several possible research designs for this study, including a purely longitudinal design following up on secondary data, and an action research case study design based on a 6-12 month placement within a District Water Office. I rejected the first as too limiting: considerable investment has been made in the water sector since the baseline data was collected, and a focus exclusively on 'old' water points might entail loss of significant insights from more recent developments in RWS. The second potential design was impractical for pragmatic reasons, being incompatible with the needs of my children and partner. Instead, I adapted the idea by including in my analysis secondary narrative data (blog posts) from individuals who had done such placements, under the auspices of the Canadian NGO Engineers Without Borders, in a range of District Water Offices.

The final design adopted for this study is essentially cross-sectional with longitudinal elements: cross-sectional because it compares outcomes across a wide range of cases in order to test the influence of a number of explanatory variables, and longitudinal because it assesses change over time using both primary and secondary data. The selection of Malawi as the focus country was driven by the availability of nationwide secondary data, in the form of the 2005 WP database. This data provided a basis for the sampling frame, and a baseline for longitudinal analysis.

5.1.3 Sampling

Sampling is critically important because it determines the degree to which a study has wider relevance (De Vaus 2001). In this study, my principal aim was to generate findings of relevance to practitioners and policymakers (local and national government officials, donors, and NGOs) in the WASH sector in Malawi as a whole.

I also hoped that my findings would cast new light on community management more generally.

The quantitative and qualitative research traditions are typically associated with two different approaches to sampling, respectively 'probability' and 'purposive' sampling. Sampling is often required at several levels, and a different approach may be required at each level; this may especially be the case in mixed methods research (Teddlie and Yu 2007: 85) and is certainly true for this study. Where possible, I used probability sampling, in order to reduce the likelihood of non-random variation (bias) in the sample. At some levels, however, use of random sampling risked limiting the wider relevance of the study, so purposive sampling was used instead. This mixed approach to sampling is somewhat unusual, and little discussed in the literature. In an important sense, mixing probability and purposive sampling at different levels may undermine the justification for both. Nevertheless, there are good reasons for using mixed sampling in certain circumstances, provided that there is a strong justification for each type of sampling and the implications for validity are clearly articulated, as below.

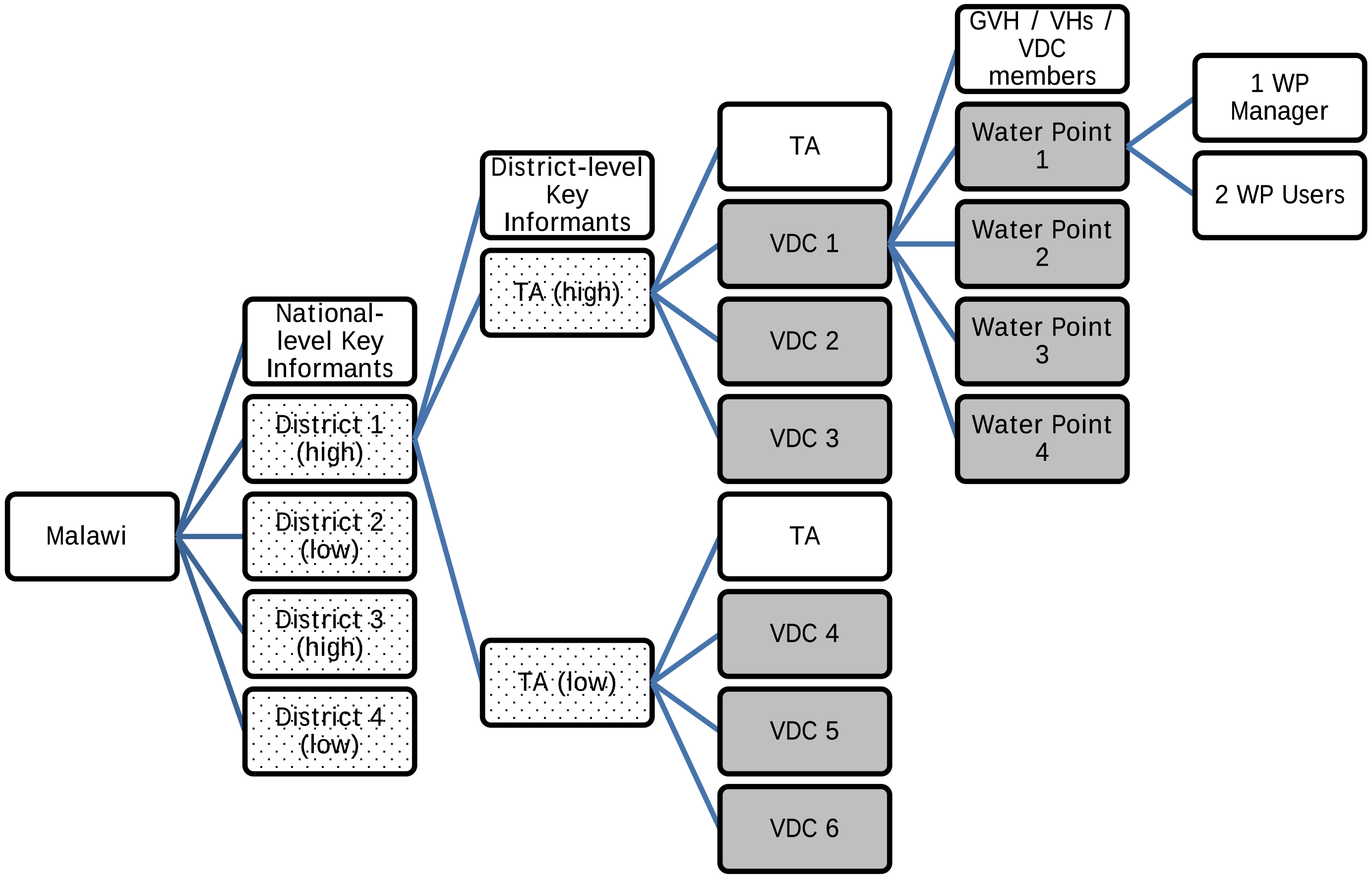
The mixed sampling frame adopted for this study is summarised in Figure 5.1. Probability sampling was considered preferable for the large-N, quantitative element of the study (surveys of water points, and their users and managers) in order to achieve maximum representativeness of the sample and therefore to maximise external validity. However, it would be necessary to randomly sample 381 of the ~50,000 water points in Malawi in order to have 95% confidence that the results were representative[7]. Logistically, this was beyond the scope of this study. But even more importantly, it would have been inappropriate, since the object of interest in this study is not a single water point in isolation but the system of rural water supply within which it is embedded, including the relationships between village, installer, and local and national government. It therefore made more sense to use cluster / stratified sampling to select sample districts (since districts are non-overlapping structures of oversight for all waterpoints) and then randomly sample water points within those districts.

Sampling was therefore stratified at five levels: district, TA, VDC, water point, and respondent. Random sampling was used wherever possible, i.e. at VDC and water point levels. However, at some levels random sampling was either not feasible or not optimal, and purposive sampling was therefore used to select Districts, TAs, and respondents. The rationale for each sampling decision is set out in more detail below. In summary, the intended research sample involved:

- 4 Districts (2 high-functionality and 2 low-functionality)
- 8 TAs (1 high-functionality and 1 low-functionality per district)
- 24 VDCs (3 per TA, randomly sampled)
- 96 water points (4 per VDC, randomly sampled)
- 288 survey respondents (2 Users and 1 Manager per water point)
- 20 key informants at national and district level.

7 Using http://www.raosoft.com/samplesize.html

Figure 5.1: Sampling diagram.



Key: White boxes: purposive sampling; dotted boxes: stratified purposive sampling; grey boxes: random sampling.
NB: although the full sampling framework is only shown for District 1 / VDC 1 / Water point 1, the same framework is applied to all other Districts, VDCs and water points.

Districts (stratified purposively sampled)

Since the focus of the study is on variation in performance, I sought 'exemplar cases' of high and low performance. Using the 2005 WP Database, I stratified the districts to identify the five highest-functionality and five lowest-functionality (Table 5.1).

Table 5.1: Water point functionality in selected Districts in Malawi, 2005

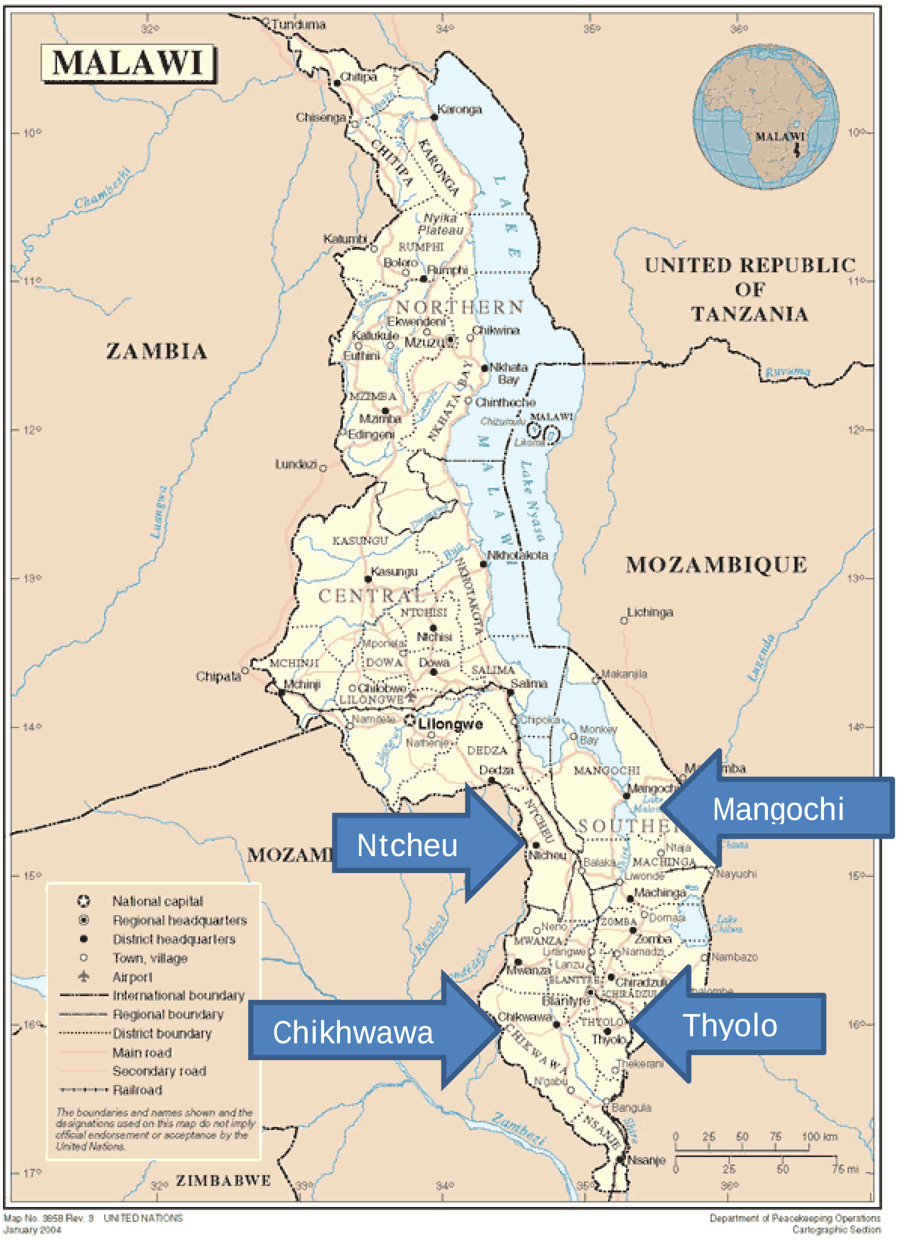
	District	% of WPs functional
Highest	Blantyre	85.8%
	Thyolo	83.6%
	Mangochi	80.0%
	Salima	78.9%
	Rumphi	77.0%
Lowest	Machinga	57.9%
	Ntcheu	53.4%
	Chikwawa	49.1%
	Mulanje	48.9%
	Phalombe	45.6%

Source: 2005 WP Database.

I excluded urban districts (Blantyre) and those with a high proportion of gravity-fed systems (Phalombe and Mulanje) as they were obviously not representative of most districts in Malawi, then mapped the remainder. Since neighbouring districts might be expected to share geological, topographical, climatic, social and political features to some extent, I identified two pairs of neighbouring districts with contrasting functionality levels: Mangochi (high functionality) and Ntcheu (low); and Thyolo (high) and Chikwawa (low). Ntcheu is in Central Region; the other three districts are in Southern Region (Figure 5.2).

It is worth noting that this selection was based on the somewhat optimistic assumption that water point functionality levels in each district had not changed significantly since the 2005 WP Database was compiled. In fact, common sense suggests that there may well have been significant changes in functionality in some districts in the intervening six or so years; but without more recent data there was no better way to identify sample districts.

Figure 5.2: Map showing sampled Districts.



Source: adapted from (UN 2013).

TAs (stratified purposively sampled)

Within each sampled district, I identified the highest- and lowest-functionality TAs, using either the 2005 WP Database or (where available) more recent district-wide secondary data. Unless there were compelling reasons to the contrary, I selected these TAs as the next layer of the sampling frame. Exceptions occurred in Ntcheu, where I selected Kwataine and Masitimale (both low-functionality) rather than Mpando since a new NGO project had recently started in the latter; and in Mangochi, where I selected Mbwana Nyambi instead of Makanjira, because the functionality data from the latter was reportedly highly inaccurate. It was only after completing fieldwork in the first District, Ntcheu, that I decided to change the sampling frame to include one low-functionality and one high-functionality TA in each district in order to get a broader picture of each location, hence the asymmetrical sample of TAs.

Table 5.2: Sampled TAs, by District.

District (%Functionality; #WPs)	Selected TAs (%Functionality)		TA Data Source
	High Functionality	Low Functionality	
Ntcheu (53.4%; 2691)	-	Chakhumbira (43.2%) and Kwataine (48.4%)	2005 WP Database plus DWO advice, July 2011
Mangochi (80.0%; 3240)	Mbwana Nyambi (93.4%)	Nankumba (73.2%)	2010 UNICEF WP Atlas plus DWO advice, October 2011
Thyolo (83.6%; 1270)	Chimaliro (85.0%)	Nsabwe (49.6%)	DWO advice, July 2012
Chikwawa (49.1%; 1408)	Masache (96.1%)	Lundu (44.5%)	District WP database, July 2012

Note: District level data is from the 2005 WP database, which is the basis on which the Districts were sampled; but at the time of fieldwork this data was out of date.

VDCs (randomly sampled)

Clustering the sample by VDC was both logistically and analytically helpful. It minimised travel time, which was by public means (between VDCs) and by foot or bicycle (within VDCs). Spending a whole day in one VDC, rather than a short visit to an individual water point, facilitated the use of more than one research instrument in one place, enabling triangulation of findings.

I sampled three VDCs in each TA, on the basis that this would provide sufficient data while still being logistically manageable. Experience suggested that it would be important to use random sampling at this level, in order to avoid the likelihood that gatekeepers (specifically, District Water Officers) might direct me towards unrepresentative VDCs. I therefore used a random number table to select three VDCs per TA from a full list of VDCs sourced from the district. The sampled VDCs are listed in Table 5.3.

Table 5.3: Sampled VDCs, by TA and District.

District	TA	VDC	Fieldwork
Ntcheu	Chakhumbira	Zidana Tchayatchaya Namale	July 2011
	Kwataine	Masitimale Chimphamba Nachiye	
Mangochi	Mbwana Nyambi	Mkumba Mzinda Kumbalama	October 2011
	Nankumba	Chamba Kasankha Chiwalo	
Thyolo	Nsabwe	Ndaona Chalonda Mzundu	June 2012
	Chimaliro	Chidothe January Boyidi	
Chikwawa	Lundu	Tomali Sekeni Nkhwazi	June / July 2012
	Masache	Jackson Mphonde Masache	

Water points (randomly sampled)

Once again, experience indicated that random selection of water points would be essential to avoid the possibility of village informants directing me towards unrepresentative sites. Since accurate lists of water points in each VDC are non-existent, it was necessary to compile such a list at the introductory meeting in each VDC, with the help of the Village Head(s) and VDC members. This listing process generally involved 6-10 informants and took approximately one hour. Once the list was complete, I used a random number table to select four improved water points (regardless of functionality) at which surveys of Users and Managers would be conducted in Chichewa by my research assistant, Yanjanani (Yanja) Chimpokosera. I surveyed as many as possible of the other water points on the list myself, using a shorter survey format and working through an interpreter from the VDC.

Survey respondents (purposively sampled)

At each sampled water point, Yanja surveyed two types of respondent: Managers (i.e. individuals with responsibility for managing or maintaining the water point, such as Water Point Committee members), and Users (i.e. people who collect and/or consume water from the water point). Generally, two Users and one Manager were surveyed to enable triangulation of responses; precise respondent numbers are shown in Appendix 8. Convenience sampling was used to select Managers; often, only one was available. Convenience sampling was also used to select Users, either on the basis that the respondent was using the water point at the time of the survey (which is in itself a fairly random circumstance), or because their home was close to it.

Key informants (purposively sampled)

Complementing the village-level fieldwork, a purposive sample of key informants was drawn up at national and district level, as shown in Table 5.4. I aimed to recruit 5 informants from each of the 4 categories. Although this was lower than the 6-12 interviews per category of informant suggested as sufficient to achieve saturation by Guest, Bunce et al. (2006), it provided a large and varied enough sample to be relatively representative. These informants were asked to participate in semi-structured interviews and a ranking exercise.

Table 5.4: Sampling frame for key informants.

Category	Examples
National Government	Ministry of Irrigation and Water Development
Local Government	District Water Officers Director of Planning and Development Area Mechanics
Donor	UNICEF DFID JICA
Non-Governmental Organisation	WaterAid Engineers Without Borders Concern Universal Water for People WES Network

Additionally, a courtesy call was paid to the Traditional Authority in each research site, and meetings were held with the Group Village Head and VDC members in each location. Although not formal interviews, these meetings also yielded data in the form of field notes. Appendix 9 list the key informants.

5.2 METHODS

This section outlines the approach taken to data collection and fieldwork, the research instruments used, and questions of research ethics.

5.2.1 Data collection

This study set out to make use of both numerical and narrative data, from both primary and secondary sources (Table 5.5).

Table 5.5: Data types used in this study.

	Primary	Secondary
Quantitative	User, Manager and Water Point surveys	2005 WP Database
Qualitative	Interviews with key informants, including factor ranking exercise. Field/survey notes.	Blog posts by EWB Fellows.

Secondary quantitative data - the 2005 Malawi WP Database, sourced from UNICEF Malawi - was used as a basis for some initial sampling decisions. It was also used for the first level of analysis, to explore the influence of three of the ten proximate explanatory variables. Primary quantitative and qualitative data were then collected in the field. After fieldwork was completed and the primary data analysed, secondary qualitative data (sourced from the internet) was used to triangulate the findings. The data sources are discussed in more detail in section 5.3.

Initially, visual research methods, and water point mapping in particular, were of particular interest to me. The data collected for the Malawi 2005 WP database was originally intended to be used in map format, and several initiatives in recent years have explored the potential of mapping for monitoring water point performance (Pearce and Howman 2013). However, the same practicalities which have limited the uptake of mapping in the sector (access to software, sufficiently powerful computers, and the skills to use them) also affected me. It soon became clear that developing the capacity to use maps effectively as part of this study would require time and resources that I did not possess. Instead, like many Malawian District Water Officers, I relied on working with data in Excel and SPSS rather than in ArcGIS.

<u>Fieldwork</u>

Owing to family circumstances, I was unable to spend long periods of time conducting fieldwork in Malawi. However, it was possible to overcome this constraint with a combination of thoughtful research design, an excellent local research assistant (Yanja), and several shorter field visits. Three such trips totalling eight weeks were undertaken: three weeks in July 2011 (Ntcheu), two weeks in October 2011 (Mangochi), and three weeks in June/July 2012 (Thyolo and Chikhwawa). Fieldwork was timed to coincide with the dry season, when rural roads are most easily passable, and when water points are most likely to run dry.

Each trip followed the same pattern. After a day in the district capital, interviewing the District Water Officer and other key informants, and scheduling visits, one full day was spent conducting research in each sampled VDC. Travel was in public minibuses and pickups, by bicycle taxi and on foot; in some cases it took many hours to travel from one VDC to the next. Accommodation was generally in villagers' homes (often with the TA or GVH) and occasionally in guesthouses.

A typical day's fieldwork saw myself and Yanja arriving in a village at around 8am. The GVH was notified in advance (by phone and/or letter) of our visit and its purpose, and asked to assemble a group of 6-8 key informants (generally Village Heads and VDC members) and compile a list of water points. It frequently took an hour for the meeting to assemble, and another hour to compile the list. Yanja would then leave to conduct User and Manager surveys at the four randomly-sampled water points, while I would accompany a local translator (often a VDC member) to visit as many of the other water points on the list as possible: this involved walking or cycling 10-20 km through the VDC, visiting 20-30 water points for 10-15 minutes each. At the end of the day we would pay the GVH a courtesy call, offer thanks, and leave. We made small thank-you gifts of money to the translators and guides who accompanied us throughout the day, and occasionally gave spare parts to WPC members when we felt confident that they were needed and would be used well.

The official languages of Malawi are Chichewa (spoken by the majority) and English (spoken by those who have had some years of formal schooling). Other languages are widely spoken in particular areas; in TA Mbwana Nyambi, Mangochi District, the mother tongue was Yao. Since the constraints on fieldwork duration meant I could only learn some basic Chichewa phrases, the support of my research assistant, Yanja, was invaluable. Her role centred on conducting surveys of water point Users and Managers at village level, but she also played a crucial role in facilitating the research, particularly in terms of interactions with Traditional Authorities and local chiefs.

Wherever possible, key stakeholders in the research were notified in advance. The purpose of notification was threefold: a) to show courtesy, b) to request their advice and input, and c) to offer them the opportunity to ask questions or raise objections if they wished. Before commencing any fieldwork in Districts I consulted key Ministry officials; in each District my first port of call was the District Water Officer, and in each TA, the Traditional Authority him/herself. DWOs and TAs were very helpful in facilitating communication with sampled VDCs by phone or hand-delivered letter, although messages occasionally became scrambled. Nevertheless, we were welcomed in all TAs and villages, even when they were not expecting us. Likewise, all key informants contacted happily agreed to be interviewed, and only one was unavailable.

5.2.2 Research instruments

Structured surveys: Users, Managers, and Water Points

Quantitative data was generated using a structured survey format (Appendices 3-6). The 8-page Manager survey (Appendix 6) was based on the 5-page User survey (Appendix 5), with the addition of extra sections on breakdown history and management arrangements, on the assumption that Managers were more likely to have such information. The one-page Water Point survey (Appendix 4), designed in response to need following data collection in the first District, focused on a few key questions, and the List survey (Appendix 3) captured the list of all water points in the area according to the VDC. The survey formats were primarily designed to generate data for testing the ten proximate explanatory variables. Appendix 11 sets out the relationship between the variables and the survey questions. The data was entered into, and analysed using, SPSS.

Careful consideration was given to the possibility of collecting survey data using smartphones - a rapidly-growing area of action research in WASH and other sectors (Christensen, Mikkelsen et al. 2011, Jones, Drury et al. 2011, Dillon 2012). Advantages include the elimination of time-consuming data entry at a later date, the ability to ensure that inconsistencies are identified in the field and that there are no missing responses, and the ability to integrate audio and visual data collection into the survey. Accordingly I identified suitable software (Open Data Kit), used it to build the survey, and fully intended to use it to conduct the research. However, during the first week of fieldwork and before data collection commenced, it became apparent that this would not work for technical and logistical reasons - once I arrived in Malawi that I discovered that bright sunshine on the screen made it very difficult to record data outdoors using the phone, and I also had serious concerns about battery life. Instead, we used paper and pen. In fact, this turned out to our advantage, as the much more flexible paper format allowed far greater latitude for recording qualitative information alongside survey responses – data which subsequently proved analytically important. Had we used smartphones, we would probably have failed to record a significant amount of useful and nuanced contextual information.

Survey notes and observations

Quantitative surveys are often criticised for rigidity. As Robert Chambers observed in 1983, they 'embody the concepts and categories of outsiders rather than those of rural people' (Chambers 2008: 6), and analysis based on them is often simply the product of 'fallible programming of fallible punching of fallible coding' (ibid., 8). For Chambers' reasons and others, surveys form only one part of my data. I was also mindful of the experience of other water researchers; for example Haysom (2006) who quickly found that her structured questionnaire was too rigid and not a suitable instrument for her research in Tanzania, and that informal conversations were a more effective way to collect data. On the one hand, I was wary of the possibility that such an approach might simply generate many non-comparable anecdotes; on the other hand, I was convinced that such informal conversations could be vitally important sources of nuanced insight that might not be accessed or recorded through the survey process. Accordingly, I requested Yanja to make notes in the margins of the survey forms whenever the respondent added contextual information. These notes were then typed up and coded in NVivo.

Semi-structured interviews and factor ranking exercise

A semi-structured interview schedule (Appendix 7) was used to structure data collection from key informants, although in practice interviews often took a more fluid form. Interviewees were also asked to complete a 'factor ranking exercise' in which they were asked to identify in their own words the key factors influencing water point sustainability, and to allocate percentage weightings to each factor to indicate their relative importance.

5.2.3 Research ethics

Overseas research poses special ethical challenges (ESRC 2012), including:

- Misunderstandings arising from different languages and cultures, on the part of the researcher, the respondent(s), or both. This was a moderate risk in this case, since I did not speak Chichewa or any other local Malawian language. However, it was mitigated by the fact that English is one of the national languages of Malawi, by my prior experience in Malawi, and by my excellent local research assistant, Yanja.
- Power inequalities between myself as the researcher and the respondents. This was a moderate risk due to the colonial and post-colonial history of Malawi, and also to the simple economic inequality between the research respondents and myself: my plane ticket alone cost far more than an average rural household's annual income.

Such ethical concerns were arguably somewhat heightened by conducting fieldwork in short bursts, thus reducing the length of time in the field and hence the opportunity to develop cultural and linguistic understanding, as well as increasing the cost of fieldwork. However, all research is constrained by pragmatic issues, and I gave careful thought to overcoming these challenges. The remainder of this section demonstrates how this study meets the standards set in the ESRC's Framework for Research Ethics (ESRC 2012).

Integrity, quality and transparency

The purpose and methods of this research were made transparent to research subjects from the start, through an information sheet (Appendix 1) and/or verbal introduction. The research design and methods were reviewed in accordance with University of Birmingham and ESRC Ethical Review procedures.

Informed consent

All participants were informed of the purpose, methods and intended possible uses of the research, and what their participation entailed. Interviewees were given a one-page written consent form (Appendix 2) while survey respondents were informed orally, due to low literacy levels in rural villages. Respondents were informed of their right to withdraw at any point, and interviewees were re-contacted at the end of the writing-up process to secure consent for the use of specific quotes.

Confidentiality and anonymity

I understand 'anonymity' to mean that research participants should not be identifiable by readers of the research, and should be protected, for example, through the use of pseudonyms; and 'confidentiality' to mean that research data should only be seen by a limited number of people who have a legitimate need to access it. Anonymity is a means of ensuring confidentiality (Wiles, Crow et al. 2008).

Although respondents at village level were always more than happy to give their names, even if they were making critical comments, I have anonymised all responses, whether surveys or interviews. Where I refer to a particular survey, I identify the source by its type (U=User, M=Manager, W=Water point) and number in my SPSS dataset. For interviews, I indicate only the category of interviewee (local or national government official, donor, or NGO).

Confidentiality was ensured through secure data collection and storage, with only myself and Yanja having access to the paper data. Electronic data was held on password-protected computers and a password-protected online backup site.

<u>Voluntary participation</u>

All respondents participated entirely voluntarily. No payment was made to survey respondents or interviewees, although as noted above we made small payments to guides and translators. In the overwhelming majority of cases, people were very keen to speak to us. At village level, I was well aware that this might be due to false expectations regarding access to resources, and I was careful to emphasise my status as a research student, not a donor. When pressed for resources on one or two occasions, my response was to highlight existing local support mechanisms (especially the District Water Office) and encourage their use.

Harm avoidance

For the respondents, participation was low risk as the research was on a relatively uncontroversial topic. I had wondered whether respondents might be exposed to some risk if they revealed evidence of wrong-doing (for example, embezzlement of funds), but a large proportion of respondents did indeed discuss such matters openly. Anonymisation provided further protection for all respondents.

For the researchers, the main risk associated with the project was involvement in a road traffic accident. Death rates from traffic accidents are far higher in Malawi than in the UK (26 per 100,000 population per year in Malawi, compared with 3.59 in the UK[8]) despite much lower vehicle access in Malawi. As far as possible the risk was minimised through careful choice of means of transport. The minor risk of ill health from contaminated food or water was minimised through careful choice of food and drink; as anticipated, drinking village borehole water did not cause any health problems.

Independence

The research was independently designed and conducted, without affiliation to any particular organisation (aside from University of Birmingham) or viewpoint. ESRC studentship funding gave me complete independence, and all those who assisted the research in Malawi did so without any expectation of unduly influencing its findings.

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[8] http://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate

Participant voice

The ultimate purpose of this research was to contribute to improvements in access to clean water in rural Malawi by improving understanding of the factors underlying water point sustainability - or failure. I was conscious that my presence might lead villagers to hope for external support, and I tried to address this both through managing their expectations (i.e. emphasising my status as an independent researcher with no NGO/donor connections) and minimising my demands on people's time (e.g. specifying that only a few VDC members should meet us, specifying only one translator to accompany me). I also attempted to ensure that the study would provide a channel for the voices of water point users and managers to be heard clearly without distortion relating to institutional agendas or fundraising priorities.

5.3 DATA SOURCES, QUALITY, AND ANALYSIS

5.3.1 Data sources

Table 5.6 summarises the data sources on which this study's analysis is based. The sample differed slightly in practice from the sampling framework set out in section 5.1. Table 5.7 outlines the (minor) differences.

Table 5.6: Summary of data sources for this study.

	Primary	Secondary
Quantitative	Surveys: 177 users, 99 managers, 338 surveyed water points, 341 listed water points. Dataset has 955 cases, 266 variables.	2005 WP Database: 49,517 cases, 20 variables.
Qualitative	Survey notes: 177 users, 99 managers, 338 water points. <u>Interviews</u> with 26 respondents: 6 local government, 5 national government, 6 donors, 9 NGOs, 1 area mechanic. <u>Factor ranking exercise</u>: 19 respondents among the 26 interviewees.	Blogs: 28 bloggers, 739 posts, spanning Sept 2008 – Feb 2013.

Table 5.7: Sample: Intended and actual.

	Intended	Actual	Notes
Districts	4	4	2 high-functionality and 2 low-functionality
TAs	8	8	1 high-functionality and 1 low-functionality per district, except in Ntcheu (both low-functionality), because I changed the TA sampling frame after the first fieldwork trip in order to get a broader picture of water point performance in each District.
VDCs	24	25	Only W data was collected in two of the VDCs.
WPs	96	92	One of the Ntcheu VDCs had no improved WPs.
Users	192	177	
Managers	96	99	

Primary quantitative: Surveys

Within the 25 VDCs, a total of 679 improved water points were listed by community leaders[9]. We conducted a Water Point (W) survey at 338 of the 679 water points (49.8%) using convenience sampling, and in-depth User (U) and/or Manager (M) surveys at 92 randomly-sampled water points (13.5%) (Table 5.8).

Table 5.8: Water points sampled for User and Manager surveys, by District.

District	# WPs
Ntcheu	21
Mangochi	24
Thyolo	23
Chikhwawa	24
Total	92

At the majority of these 92 randomly-sampled water points (n=61, 66%), two User surveys and one Manager survey were carried out. At the others, either 0, 1 or 2 Users and/or Managers were surveyed, depending on whether respondents could be found. For each sampled water point, between 1 and 4 Users and/or Manager surveys were completed. The total number of surveys conducted is shown in Table 5.9. 97% of Users surveyed were female; for Managers, gender is not known for 16% of respondents, but 57% of the remainder were female and 43% were male.

[9] Data was also collected on unimproved sources, but these have been excluded from the analysis.

Table 5.9: Number of surveys conducted in each District.

	Survey Type	Intended Sample per District	Actual Sample Size				Total
			Ntcheu *	Mangochi	Thyolo	Chikhwawa **	
L	WPs listed but not surveyed	-	81	105	132	23	341
W	Water points	-	90	115	79	54	338
	Total # WPs in sampled VDCs	-	171	220	211	77	679
	Total # WPs sampled for U and M surveys	24	21	24	23	24	92
U	Users	48	38	48	46	45*	177*
M	Managers***	24	32	26	21	20	99
	Total # Respondents	72	70	74	67	65	276

Notes:

* In Tchayatchaya VDC in Ntcheu, no User or Manager surveys were conducted because there were no improved water points. Comprehensive field notes were taken instead.

** Considerably fewer water points were surveyed in Chikhwawa than in the other districts because several of the Chikhwawa VDCs had very few water points. Additionally, for 3 of the User surveys in Chikhwawa, only narrative notes were taken and the survey proper was not conducted; these were essentially interviews rather than surveys.

*** Some Manager surveys were conducted with several committee members together, with their collective responses recorded on one survey.

While there are some slight differences in sample size between districts, I contend that the sample is sufficiently well balanced to obviate any need to apply weighting procedures to the data.

Data was collected using four separate, though related, instruments: surveys for Users, Managers, and Water points, plus a form for listing all water points in the VDC. Appendix 11 shows the relationships between the survey questions and the variables (outcome variables and proximate explanatory variables) that are the focus of this study. Data was entered into SPSS for analysis, and the resulting dataset comprises 955 cases and 266 variables.

Primary qualitative: Interviews, survey notes, factor rankings

I conducted 20 formal semi-structured interviews with a total of 26 respondents; 5 were joint interviews. Fourteen of the interviews were voice-recorded then transcribed in full; comprehensive notes were taken at the other six. Nineteen of the 26 individuals also provided responses to the factor ranking exercise.

The second major source of primary qualitative data (in fact the most significant in terms of volume, running to 283kb in contrast with the 162kb of interview material) was survey notes. These notes derived from three sources: 1) notes taken by Yanja in the margins of the User and Manager surveys, reporting information from her conversations with respondents; 2) my own equivalent notes on the Water Point surveys; and 3) other fieldwork notes. All were transcribed into NVivo for coding and analysis, as described in Section 5.3.3.

Secondary quantitative: 2005 Malawi WP database

The 2005 Malawi WP Database provided a starting point both for sampling and for quantitative analysis. The data, covering 49,517 water points in 26 of the 28 districts in Malawi[10], was collected over a period of 3 years (May 2002 to June 2005) by ten different NGOs in a process initiated by WaterAid (Welle 2005). A very small minority of water points had more recent entries from subsequent data collection exercises. The database was published by UNICEF in 2006 and is officially

[10] At the time that the survey was conducted, Neno district (created in 2003) was still part of Mwanza district. It appears that no data was collected for Ntchisi district in Central region.

‘owned’ by the MOIWD, although the master copy of the database is still housed by UNICEF.

Although the survey format included questions on maintenance and whether a committee was in place (Kampala 2007), the version of the database to which I had access did not include data on these questions, and consequently the analytical value of the database was more limited than I had at first hoped. In fact, I was only able to use it for analysis of one outcome variable (FUNCT) and three proximate explanatory variables (WPTYPE, INSTQUAL, and AGE), and additionally for exploration of geographical variation in functionality (by region, district, or TA).

As described in Section 5.1.3, I also used the 2005 WP database as a sampling frame, except in Mangochi and Chikhwawa districts, where more recent water point databases had been compiled.

Secondary qualitative: Blogs

Secondary qualitative data was sourced from the blog posts of 28 Fellows of the NGO Engineers Without Borders (EWB), spanning the period 2008-2013. The EWB Fellows are Canadian professionals or students with a background or interest in WASH, who undertake voluntary placements in Malawi, generally in District Water Offices. Since I was unable to undertake such a placement myself, their blogs provided an alternative window on life in a District Water Office. In a sense, these represented ‘field notes’ by individuals undertaking the type of fieldwork that I would myself have done, if not for other commitments.

Placement duration varied widely (from 3 to 35 months), as did the analytical value of the blogs. Longer-term Fellows generally worked in more than one location. The data comprised 739 blog posts totalling 1377 KB of data, i.e. nearly five times as much data as in the survey notes. Inevitably, the data had limitations: many of the posts were irrelevant; the authors had a very particular perspective (expatriate, young, inexperienced); and the public, permanent nature of blogging undoubtedly influenced what people wrote. Nevertheless, analysis of this material represents an innovative approach to accessing fresh insights on the research questions.

I coded the blogs last, largely using emergent coding; and I used this secondary qualitative data to triangulate my primary findings rather than as a major source of analytical conclusions.

Mixed methods: combining data sources

In summary, this study draws on four main types of data, from several sources. The purpose of combining data types and sources in this way is to arrive at a richer, more nuanced understanding of the subject of study than can be achieved using a single approach. The data were collected and analysed in an iterative pattern, with insights from one feeding into another to build up a nuanced, multifaceted picture of the study topic, from which conclusions were drawn only if they were supported by evidence from multiple data sources.

5.3.2 Data quality

The conclusions of any research are only as sound as the data on which they rest; hence, consideration of data quality is essential both when designing a study, and when analysing the results. Good research design is key to minimising bias that may otherwise arise from unrepresentative sampling or from human cognitive biases (Kahneman 2012). However, other forms of bias may also affect the data collected, notably 'courtesy bias' on the part of respondents (White and Phillips 2012). The impact of this phenomenon on this study is discussed below, following a broader consideration of data quality issues overall, as they relate to quantitative, qualitative, and mixed methods data and approaches. Codes in brackets refer to specific example of the phenomena under discussion; e.g. W367 means Water Point Survey #367, and U219 means User Survey #219.

<u>Quality of quantitative data</u>

Typically, quantitative analysis is concerned with two aspects of data quality: reliability and validity (Bryman 2008: 149-150).

Reliability refers to whether a measure is consistent. It has three aspects:

- Stability, i.e. that one respondent's answers to the same question put repeatedly are consistent ('test-retest reliability');
- Internal reliability, i.e. that one respondent's answers to related questions are consistent;

- Inter-observer consistency, i.e. that multiple respondents' answers to the same question are not contradictory.

Validity refers to whether a variable actually measures what it sets out to measure. It has two key aspects:

- Criterion validity, i.e. that the instrument is an accurate reflection of the phenomenon being measured. For example, a measure of quantity of water consumed would not be a valid measure of water quality.
- Content validity, i.e. that the instrument measures the whole item being measured. For example, a measure of water point functionality should assess both whether the water point produces water, and whether people actually use it.

Primary quantitative data

In general, I consider that both **criterion validity** and **content validity** of my data are robust: the survey questions were designed to encapsulate the phenomenon being studied both accurately and comprehensively. In designing the survey, I erred on the side of completeness rather than brevity in order to maximise validity. For example, instead of simply asking 'do people contribute to a water point maintenance fund', my surveys included 31 questions with bearing on water point finances, of which 20 were included in both U and M surveys: detailed questions about whether people were supposed to contribute, how much, whether they did in practice, whether anyone was exempt, whether there was a penalty for non-payment, when and how much the respondent last contributed, how much had been saved for water point maintenance and repairs, whether the committee reported back to all villagers on what was done with the contributions, and so on. The advantage of such an approach is that it enables the researcher to 'dig down' beyond initial responses to get closer to an objective assessment; indeed, Yanja herself observed that these surveys generated much more accurate data than other, more 'shallow' surveys that she had previously conducted. However, the disadvantage is that it may generate a set of responses that are internally contradictory; hence, efforts to increase validity highlight problems in reliability, illustrating the fact that the problem is not so much with the data collection methods as with human inconsistency.

Stability implies that another researcher going back to the same individuals and asking the same questions would get the same answers. However, there are several reasons to doubt this, the main one being respondent bias. Certainly for the water points I surveyed myself, my identity as an affluent white outsider inevitably influenced people's responses. On numerous occasions, it appeared that respondents were telling me what they thought I wanted to hear, rather than what was actually true. Initial answers often represented the theory of water point management (active gender-balanced committee meeting regularly, frequent financial contributions by all villagers), rather than the reality of what was actually happening in practice, which only became clear after further questioning. On one or two occasions, major distortion was apparent: for example, my translator in one VDC told a patently false story about having used extraordinarily large sums of his own money to fix a water point, apparently in hope of accessing resources from me

(W141). Overall, it seems probable that a different researcher asking the same people the same questions might well obtain somewhat different answers, depending on the respondents' perception of the researcher. Nonetheless, I suggest that the broad correlation between the findings from Yanja's surveys and my own, and our success in 'digging deeper' as surveys and interviews progressed, mean that although individually unstable, taken together the responses are still collectively reliable.

Recollection problems might also affect stability of the data; a large proportion of responses recorded on the surveys were 'don't knows'. In the field, it was noticeable that people quite often responded to the question 'why did the water point break down' by listing a large number of things that may or may not have gone wrong with it ('rod, U-seal, rod connectors, hanger pin…') (M068/W562; W674; W763; W768; W773) – but which were unlikely all to have broken simultaneously. It seemed plausible that respondents were offering a range of responses to 'test' whether I would be satisfied with one of them, and it frequently took 5-10 minutes of close questioning to get clearer answers.

The problem of **internal reliability,** or inconsistency, has already been touched upon above: respondents quite frequently contradicted themselves. Sometimes this was clear from the survey responses alone: for example: U2 said financial arrangements were 'very poor' (Q63) but still said she was 'quite satisfied' with financial arrangements (Q70); M20 said the water point had been out of order for 30 days in the past year, but zero days in the past 5 years; M29 said the WPC met once a month (Q84) but then said the last meeting was in November, 8 months previously (Q85); M37 said that the committee was active (despite the borehole being broken down for a long time) and last met in May; but that 'none' attended the meeting; M39 said the WPC was not active (Q80) but then said it met every month, including the previous Tuesday (Q81). Overall, inconsistent responses were especially common regarding the existence and activity of WPCs, and regarding financial management.

In other cases, responses to survey questions were consistent, but then contradicted by the qualitative data in the survey notes. One example is U123, a user of W630, whose survey responses on water point finances (pay occasionally, MWK50/hh/month, elderly are exempt, everyone else contributes, last collection was 3 months ago, the committee always report back on expenditure, financial management is good) were flatly contradicted by Yanja's notes from her conversation with U123: 'This is the third committee and is not trained. All that were trained are no longer WPC members. For this borehole the community don't contribute and the WPC is not active because the community speaks a lot on funds management so the WPC stopped asking for anything. The community thinks that the WPC are eating their money'. In such cases I was often more inclined to believe the detailed, nuanced notes rather than the survey responses. Triangulation with other respondents also increased certainty; in this case, both of the other respondents for this water point (U124 and M74) indicated problems with the committee, suggesting that the U123 notes rather than the survey were more accurate.

Inter-observer inconsistency was also noted; there are numerous examples in the data of two respondents giving contradictory answers to the same question (e.g. between M19 and M20 on financial management; between M42 and M43 on financial contributions; between user and translator regarding rod numbers at W567; between M66 and M67 on access to spares). Sometimes this could be put down to differences in knowledge (e.g. between Users and Managers), or differing perspectives or interpretations of what happened; but more frequently it seemed to be either a product of ignorance or a deliberate strategy. Where there was no third source with which to triangulate, I found myself in a difficult position: which version should I choose to believe? And if I chose the most 'plausible', would I simply be distorting the data with my own preconceptions?

A simple, easily-resolvable example of contradictory data relates to water point age. Yanja and I frequently found that the information provided by the VDC at the listing meeting was inaccurate; true dates were generally inscribed in the water point's concrete civil works. This was particularly noticeable in VDC 3A3, where the listed installation dates were often several years out (e.g. W576 listed as 2010 but actually 2006; W577 listed as '2008 CU' but actually '2005 COMWASH') and was also a problem in VDC 3B1 (e.g. W595 was listed as '2002 PROSCAP functioning borehole'; but in fact was found to be '1998 MASAF non-functioning borehole').

An extreme form of unreliable data is data that is obviously unbelievable. In a number of places I annotated my survey notes with 'don't believe', recording my sense that I was being told a story with little relation to reality. In some cases this was prompted by glaring inconsistencies or contradictions; in others, by my sense that the report was such an outlier, when placed in the wider context, that it was unlikely to be true. For example, at W655 I was told that the WPC was trained for 'one month'; at W672 I was told at first that the water point had 1000 users (the estimate was later revised to a more plausible 26 households); M25 said they had dismantled the borehole 2-3 times each week in the last year; and M82 reported that it took a 6 hour return journey and K1000 to get spares – although this village was only a few kilometres from a major trading centre.

Secondary quantitative data

It is harder to judge reliability and validity of the 2005 Malawi WP Database and other secondary data sources simply because there is far less information available regarding the data collection process. The data appear to be reliable and valid, and have been used by others (international donors, and the Malawi government) as though they are. However, the examples below suggest that this secondary data may be subject to the same flaws as the primary data.

- An EWB Fellow who spent some time exploring the 2005 Database found significant clustering of GPS coordinates, strongly suggesting that surveyors had entered data for some water points without actually visiting them (B25); similar problems have been noted by other researchers in the WASH sector in Malawi (Delaplace 2011).
- The mapping process was conducted at different times by different agencies in different districts. As a result, there is some variability in the type and

quality of data collected (for example, some categories are only used for some districts), and there are likely to have been other systematic differences in the way that responses were coded in different districts.

- In Mangochi District, I was reliably informed that the most recent data for Makanjira (which appeared to have the highest functionality rate of all TAs in the District) was highly unlikely to be accurate. Makanjira is the most remote TA, and my informants stated that fuel shortages had prevented accurate mapping of its water points; instead, they implied, the data might have been (partly) invented. If so, this would be an extreme example of content invalidity, where the measure (functionality rate) bears no relation at all to what it is supposed to represent.
- Also in Mangochi District, problems with analysing data had resulted in obviously inaccurate statistics (such as a claim of 124% functionality) being published in the most recent District Water Point Atlas (Mangochi District Council 2010).

In summary, despite careful attention to research design and methods, there are some significant concerns relating to reliability and validity of the quantitative data in this study – although, in some cases, triangulation with qualitative data helps strengthen the reliability of quantitative data. Two important conclusions emerge: 1) specifically regarding this study, that these caveats regarding reliability and validity must be borne in mind when interpreting the data; and 2) more generally, that the 'neatness' of quantitative data may easily conceal considerable ‘fuzziness’ due to the way in which the researcher or the respondent has decided to simplify complex information about reality.

Quality of qualitative data

I now consider qualitative data. To a considerable extent, the criteria of reliability and validity can be applied to qualitative research with only minor adjustments (Bryman 2008). However, some authors have proposed alternative criteria: Lincoln and Guba (1985) suggest credibility, transferability, dependability and confirmability; Tracy (2010) proposes eight criteria; and Spencer and Britain (2003) list eighteen. While the alternative approaches all have some merit, in practice three key issues were most prominent in this study: reliability was sometimes compromised by translation problems, and validity was called into question by respondent bias and researcher bias.

Primary qualitative data

Translation problems mainly affected the W surveys and associated survey notes, i.e. the village-level data I collected independently, separately from Yanja. These problems took two forms, ‘incomprehension’ (where the translator had insufficient skills in English to actually translate in either direction), and ‘insertion’ (where the translator inserted his or her own views rather than translating, a problem that occurred in both directions). ‘Incomprehension’ rendered my research particularly difficult in two VDCs, Mkumba and Chamba. ‘Insertion’ was a problem in another five VDCs, and particularly in Mzundu; of course, it may have been more widespread, but would have gone undetected precisely because of my lack of knowledge of Chichewa.

Respondent bias was frequently apparent during fieldwork. While I take a broadly realist or pragmatic approach in this study, rooted in a belief that it is possible to make objective statements about many aspects of the 'what' and the 'why' of water point sustainability, I also acknowledge that multiple competing versions of the truth can seem equally plausible, depending on one's perspective. Respondents may produce different versions of 'the truth' depending on (their beliefs about) who is asking and why. For the researcher, this can be problematic[11].

My survey notes frequently highlight the difficulties I encountered in reaching one clear version of events, even with regard to relatively simple closed questions such as 'when was the last time this water point broke down?' As noted earlier, I often felt that respondents' main concern was to tell me what they thought I wanted to hear, rather than what actually was the case. A classic example was a TA's assurance that the walk to the next day's VDC was less than 3km, when in fact it was at least 10km. Attempting to overcome this 'courtesy bias' (White and Phillips 2012) frequently took five or ten minutes of careful questioning (and gentle highlighting of inconsistencies in responses) in order to arrive at a reasonable degree of clarity on issues such as water point breakdown history or financial

[11] I am, of course, well aware of the awkwardness of discussing such problems based largely on my gut feelings regarding the 'truthiness' (Colbert 2005) of my respondents and my data.

management. This seemed partly to do with many respondents' limited knowledge of the matter in question, e.g. not knowing what caused a particular breakdown. However, it also seemed to suggest that, by telling me different stories, respondents were trying to work out which one I might be more interested in or more likely to believe.

My identity or 'positionality',that is, who my respondents perceived me to be (Jakobsen 2012), as an affluent white outsider, was of course a significant factor in this. Respondents associated such people with donors and NGOs - sources of resources, and people with definite ideas about how community management of water points should be organised. Despite my efforts to emphasise my student status, many respondents obviously still hoped that my research might be a precursor to funding. I had anticipated this at the design stage, when considering research ethics; accordingly, I endeavoured to communicate as clearly as possible both the limitations to what my research might achieve, and my desire to hear about the reality of community management, not the theory.

My main approach to addressing respondent bias was triangulation, both at the time (questioning inconsistent responses) and retrospectively (comparing responses from different sources, including comparison of qualitative and quantitative data). Nevertheless, it was frequently difficult to get to a clear, single version of 'the truth', and the variability in the data often required considerable interpretation on my part.

The other side of this phenomenon, **researcher bias**, must also be acknowledged. The scope for researcher bias is higher when discussions are not audio-recorded, as was the case for all village-level fieldwork. Much of the qualitative data is therefore in the form of written notes, and it is likely that researcher bias shaped what we were most predisposed to hear and record in writing. Additionally, we cannot be certain whether the notes are verbatim transcripts of a respondent's answer, or the rephrasing of a researcher or translator. When reporting findings in subsequent chapters, I use quotation marks to indicate quotes from the written notes; these should be taken as endeavouring to convey the respondent's meaning as accurately as possible, but may not be exactly what the person in question said themselves, word for word.

These three issues, and especially the second, must to some extent call into question the robustness of the data, and consequently of my conclusions. The difficulty of ensuring reliability and eliminating bias is a challenge faced in all research, but especially research such as this, in which the researcher represents potential access to resources and so the respondents have strong incentives to try to give the most advantageous, rather than the most accurate, response. It is also inevitable that on a short visit one will only obtain a limited insight into the interplay of local political, economic, social and cultural interests that may shape responses. The best that can be done is to openly acknowledge issues regarding data quality, to deal transparently with questionable data, and to be careful only to draw conclusions that the data can support. The use of Nvivo to code the qualitative data helps ensure transparency, since coding decisions can be audited.

Secondary qualitative data

Blog posts are subject to a very particular type of respondent bias due to their public, personal and permanent nature. Bloggers write for a purpose; in the case of the EWB fellows, this was often mainly to communicate with friends and family back in Canada, although some appeared to use their blog as a forum for more philosophical reflections and as a means of communication with the wider global community of ‘people interested in development who read blogs’. Additionally, the bloggers analysed here are a self-selecting non-random sample of a very particular population group; as such, the external validity of their observations is arguably limited.

Specific biases likely to affect the reliability and internal validity of the data include self-promotion (the likelihood that the blogger will mainly cast themselves in a positive light) and self-censorship (the likelihood that the blogger will hold back when writing about controversial issues and/or about individual colleagues). Examples of the latter include B24, although in other examples (B11, B13) EWB fellows wrote openly about corruption and programme failure. Thus, as with the primary qualitative data, the researcher must exercise a considerable degree of judgement in analysing this data – which in itself can introduce further bias.

Mixed methods: ensuring inference quality

As outlined above, both the quantitative and qualitative data collected and analysed for this study are subject to various biases that affect data quality. However, use of mixed methods approaches helps in addressing challenges of reliability and validity through triangulation (Bryman 1988). Mixed methods approaches also help in distinguishing between data quality and inference quality (Tashakkori and Teddlie 2003). Having acknowledged the limitations in the data, we can still ensure that our inferences are sound, i.e. that the conclusions drawn are only those that can be supported by the data as a whole. This is the approach taken in the chapters that follow.

5.3.3 Data analysis

In analysing all four types of data I made use of computer programmes: SPSS and Excel for quantitative data, and NVivo for qualitative data. Here I set out briefly how I analysed the data, and my rationale for adopting particular approaches, as well as explaining how I combined both types of data to illuminate the research questions.

Analysis of quantitative data

In analysing this data using SPSS and Excel Pivot Tables, I relied on the guidance of Field (2009) and UCLA (2013). Analysis was a multi-stage iterative process, as the primary dataset was complex, with multiple survey questions relating to each variable, and the dataset stratified at multiple levels. In some cases data was recoded into new variables to facilitate analysis. I began by using descriptive statistics to get a sense of the data, then used either Pearson's chi square (for categorical explanatory variables) or logistic regression (for continuous explanatory variables) to analyse the factor's relationship with functionality.

Most of the explanatory variables in the 2005 WP database, and many in my primary dataset, were categorical-nominal (e.g. District, WP Type, Funder) rather than continuous (e.g. WP Age, # Users, Months since last breakdown). Since nominal data can only be used to consider frequencies (Field 2009: 9), this limited the type of statistical analysis that was possible.

In some cases, in order to overcome this limitation, new datasets were computed from the originals. For example for the 2005 Malawi WP Database, a new dataset was computed in which the cases are Districts, TAs, and WP Types (rather than individual water points). This enabled the calculation of continuous variables for these cases (such as % of functional water points in each TA), which in turn enabled the use of a wider range of analytical tools and statistical tests to interrogate the data.

<u>Analysis of qualitative data</u>

I found NVivo to be a valuable tool to help me process and analyse the substantial amounts of qualitative data collected (Bazeley 2007). I took two approaches to coding the interviews, survey notes and blogs: structured (deductive) and emergent (inductive). I used a range of techniques to identify themes, especially repetitions and indigenous typologies (Ryan and Bernard 2003). First, I coded the interviews and surveys according to the structure set out in the first part of my analytical framework, i.e. using the proximate explanatory variables and outcome variables. In some places I created new sub-variables, for example 'Mismanagement of funds' under the variable 'FUNDS'. Second, I identified new (sets of) codes that emerged from the data, including sets for 'Data Quality', 'Individuals and Institutions' (or 'Actors'), and other 'Emergent Codes'. With hindsight, I could also have coded the material using the 'water governance framework' categories outlined in Chapter Four, or the Efficiency and Empowerment categories discussed in Chapter Three. Although I did not do this explicitly, these themes are drawn out in the analysis in Chapter Seven. The final coding structure is reproduced in Appendix 12. I used the coded data both to prioritise or weight factors and themes on the basis of frequency of appearance in the data, and to identify illustrative examples for a factor or theme.

Mixed methods: integrating data analysis

Conscious of the challenges to integration of quantitative and qualitative research findings (Bryman 2007, Mertens and Hesse-Biber 2012), I explored various approaches to combining my findings, before selecting the approach taken in the two chapters that follow. During analysis, I moved frequently between the two types of data, enabling insights from one to inform my approach to the other – an 'iterative, cyclical approach' (Tashakkori and Teddlie 2010: 275) that arose naturally from the simultaneous collection and processing of the data. Three examples illustrate this:

- Use of the proximate explanatory variables that were tested using the quantitative data as the first element of a two-stage approach to coding, to enable direct comparison between the findings from the survey notes, and the quantitative survey data.

- Use of the ‘theft’ coding of the survey notes to help retrospectively construct the ‘theft’ variable in the primary quantitative data.
- Use of quantitative summaries of qualitative data (e.g. counting the number of times that different themes appeared in the data) to inform the degree of emphasis accorded to those themes in my analysis.

Ultimately, the analysis aims to give equal attention to both datasets. In Chapter Six, quantitative analysis of each variable is presented first, followed by qualitative analysis; this is not intended to suggest any primacy for statistics, but is simply the logical order given the deductive nature of that part of the study’s analytical framework. Chapter Seven draws more heavily on the qualitative data, exploring themes highlighted by the analysis in the previous chapter.

Summary

This chapter has set out my research strategy, design and methods in detail. Beginning with an explanation of my philosophical position, I have outlined my associated commitment to using mixed methods to answer my research questions. In setting out the careful sampling framework for this study, I have explained how this maximises the validity of the research. By providing a detailed explanation of the methods used, and the way in which quantitative and qualitative data have been integrated in the study, I have emphasised both the scope and the rigour of the work, and the way that they support inference quality.

This chapter has also carefully considered some of the key difficulties encountered regarding data quality – problems that are perhaps not always made explicit in reporting research, particularly where quantitative data are concerned. I have explained the measures taken to overcome these challenges, including persistence and triangulation. In summary, through a clear exposition of my research strategy, design and methods, I have demonstrated that this study is able to answer the research questions with accuracy, depth and confidence.

Chapter 6

ANALYSIS OF PROXIMATE EXPLANATORY VARIABLES

Introduction

The next two chapters present the results of my research. The two-part presentation of the findings mirrors the two-part structure of the analytical framework. First, in this chapter, I analyse the proximate determinants of sustainability identified in Chapter Two. The bulk of the quantitative analysis is presented here, together with illustrative qualitative material. Then, in Chapter Seven, I examine the underlying dynamics that shape these results, with reference to the framework and questions developed in Chapter Three.

This chapter begins with a recap in Section 6.1 of the six outcome variables that are proxies for water point sustainability (Box 6.1). The advantages and disadvantages of each are discussed, and FUNCT is identified as the key outcome variable.

Box 6.1: Components of water point sustainability

Component	Variable name
Functionality at time of survey	FUNCT
Frequency of breakdown	BREAKFREQ
Duration of breakdown	BREAKLENGTH
Days operational since installation	DAYSFUNCT
Quality of water	WATERQUAL
Quantity of water	YIELD

Next, Section 6.2 examines the influence on FUNCT of the ten proximate explanatory variables identified in Chapter 2 (Box 6.2). The relative significance of each variable is assessed, based on analysis of both quantitative and qualitative data; and the most important factors are highlighted.

Box 6.2: Proximate explanatory variables for water point sustainability

Design and installation factors	**Variable name**
Type of technology	WPTYPE
Quality of installation	INSTQUAL
User numbers	USERS
System age	AGE
Post-construction factors	**Variable name**
Frequency of maintenance	MAINTFREQ
Accessibility of spare parts	SPARES
Availability of maintenance and repair skills	SKILLS
Availability of funds for maintenance and repair	FUNDS
Availability of external support	SUPPORT
Incidence of theft	THEFT

Finally, Section 6.3 reports findings from the 'factor ranking exercise' conducted during the key informant interviews. Chapter Seven then further interrogates the data, in order to explain these results.

6.1 OUTCOME VARIABLES

In Chapter Two I defined the outcome of interest, water point sustainability, as 'continued functionality over time'. I also identified several components or proxies: functionality at the time of assessment (FUNCT), frequency of breakdown (BREAKFREQ), duration of breakdown (BREAKLENGTH), percentage of days functional in a given time period (%DAYSFUNCT), quality of water (WATERQUAL) and quantity of water (YIELD). Three are continuous variables (BREAKFREQ, BREAKLENGTH, and DAYSFUNCT) while the others (FUNCT, WATERQUAL, and YIELD) are, in my dataset, categorical-nominal. Table 6.1 summarises the data I collected on each of the six outcome variables, showing which survey type includes data on which variables.

Table 6.1: Data availability for outcome variables by survey type.

			Survey type* and # of surveys			
			W	**L**	**M**	**U**
Outcome Variable		**Variable Type**	**338**	**341**	**99**	**177**
FUNCT	Functionality	Categorical	Yes	Yes	Yes	
BREAKFREQ	Frequency of breakdown	Continuous	Yes		Yes	
BREAKLENGTH	Duration of breakdown	Continuous	Yes		Yes	
%DAYSFUNCT	% days functional in last year / 5 years	Continuous			Yes	
WATERQUAL	Quality of water	Categorical			Yes	Yes
YIELD	Quantity of water	Categorical			Yes	Yes

*: W= Water point, L= List (compiled by VDC members); M=Manager, U=User.

6.1.1 FUNCT: Functionality

Functionality (FUNCT) is recorded in all four data sets: W, L, M and U[12]. However, functionality rates differ slightly between the data sets, as shown in Table 6.2.

Table 6.2: Discrepancy in FUNCT by survey type.

Data source		FUNCT?			Total
		No	Partly	Yes	
W	Water point surveys	30%	7%	63%	100%
L	Listed by VDC	28%	6%	66%	100%
U	User surveys	19%	8%	73%	100%
M	Manager survey	20%	11%	69%	100%
ALL		26%	7%	66%	100%
W + U + M		25%	8%	67%	100%

The largest difference is between the W and U data set (the W surveys reported 30% non-functional against 19% in the User surveys; and 63% functional against 73% in the User surveys) – a difference that reflects the imperfect nature of the sampling. In some cases, VDCs were mistaken, i.e. they listed a water point as functional when it was not (or vice versa). Thus the W, U and M data are more reliable. I base the remainder of this section's analysis on the W data, as it is the most comprehensive.

[12] Although a specific question on FUNCT was not included in the U survey, a value for FUNCT has been recorded based on the researchers' notes and/or data from M, W or L surveys for the same water point.

Table 6.3: FUNCT by District and TA.

District			% of WPs functional	
			W and L data	W data only
Ntcheu	TA	Chakhumbira	34%	36%
		Kwataine	26%	35%
	Total		30%	36%
Mangochi	TA	Mbwana Nyambi	87%	85%
		Nankumba	85%	82%
	Total		85%	83%
Thyolo	TA	Nsabwe	70%	70%
		Chimaliro	75%	64%
	Total		73%	67%
Chikhwawa	TA	Lundu	49%	50%
		Masache	68%	75%
	Total		58%	61%

The W data shows considerable variation in FUNCT by District and TA (Table 6.3). Only a third (36%) of water points in Ntcheu are fully functional[13]; whereas functionality is much higher in Chikwawa (61%), Thyolo (67%) and Mangochi (83%). Direct comparison with functionality for those districts from the 2005 Malawi WP dataset (Ntcheu 53%, Chikwawa 49%, Thyolo 84%, and Mangochi 80%) cannot be made, since my W data are not randomly sampled at District level. However, the figures do suggest that functionality has significantly decreased in Thyolo and in Ntcheu in the past few years (although the Ntcheu data is skewed downwards, since both TAs sampled in the district were selected to be low-performance), while increasing slightly in Chikhwawa and Mangochi.

[13] Although not shown in the Table, a significant proportion of water points in three TAs (20% in Chakhumbira, and 8% in both Nsabwe and Masache) are only partly functional. Many of the part-functional points are taps that only operate intermittently. For analytical purposes I classify part-functional water points along with non-functional ones, since the health and time benefits of improved water points require consistency in functionality.

Although the sampled TAs were purposively chosen to represent both high and low functionality, in fact it is only in Chikhwawa district that there is significant variation in FUNCT between the two TAs (Lundu 50% vs Masache 75%). Curiously, the Masache figure differs significantly from the 96% functionality for that TA shown in the District Water Officer's own database (Chikhwawa District Water Office 2010).

In Thyolo, the reportedly 'low-functionality' TA Nsabwe in fact had higher FUNCT (70%) than the supposedly high-functionality TA Chimaliro (64%) - surprising, since these two TAs were selected on the basis of secondary data provided by the DWO showing opposing levels of functionality (Chimaliro 85% vs Nsabwe 50%). It is possible that my Nsabwe sample may have been somewhat skewed, since logistical challenges excluded the most remote VDCs from the sample, but it seems unlikely that this would explain all of the difference.

In Mangochi, the supposedly 'low-functionality' TA Nankumba in fact had 82% functionality - also surprising, since the Mangochi District Rural Water Atlas shows TA Nankumba to have the lowest functionality rate of all TAs in the district, at 73% (Mangochi District Council 2010: 26).

In summary, there is significant variation in FUNCT both between and within Districts. This suggests that sub-District factors – the explanatory variables explored in Section 6.2 – are significant determinants of functionality. The discrepancies between data from different sources also highlight the fact that analysis may be more complex than initially anticipated.

6.1.2 BREAKFREQ: Frequency of breakdown

Data on breakdown frequency is available from 92 of the 99 Manager surveys, but from only 144 of the Water point surveys (less than half) covering only 3 districts[14]. The partial nature of the data means that particular care must be taken in drawing wider conclusions, and this variable cannot be used as the main outcome variable. However, analysis highlights some interesting patterns. Clear differences in BREAKFREQ are apparent both between and within districts (Table 6.4). The high performance of boreholes in Mangochi, especially in Mbwana Nyambi where 42% have never broken down, suggests that installation quality (INSTQUAL) may be a particularly important factor.

Table 6.4: BREAKFREQ: Number of breakdowns since installation.

District	TA	# BH	# Breakdowns since installation				
			0	1 or 2	3 to 5	6 or more	Don't know
Mangochi	Mbwana Nyambi	53	42%	40%	15%	4%	
	Nankumba	15	33%	53%	7%	7%	
Thyolo	Nsabwe	19	21%	26%	16%	32%	5%
	Chimaliro	26	8%	27%	27%	35%	4%
Chikhwawa	Lundu	5	0%	80%	0%	20%	
	Masache	14	21%	7%	14%	57%	

(Source: W data)

[14] BREAKFREQ data was not collected for Ntcheu because the Water point survey format was not developed until after Ntcheu data collection was completed.

Since older boreholes are more likely to have broken down, a better basis for comparison is the number of breakdowns during the past 12 months. Again the data highlights the particularly strong performance of water points in Mangochi district (Table 6.5).

Table 6.5: BREAKFREQ: Number of breakdowns in the last 12 months.

District	TA	# WPs	# Breakdowns in last 12 months				
			0	1 or 2	3 to 5	6 or more	NA or DK
Ntcheu	Chakhumbira	14	14%	36%	7%	7%	36%
	Kwataine	18	33%	17%	6%	11%	33%
Mangochi	Mbwana Nyambi	15	40%	53%			7%
	Nankumba	9	56%	22%		11%	11%
Thyolo	Nsabwe	7	14%	86%			
	Chimaliro	11	27%	55%	18%		
Chikhwawa	Lundu	7	29%	71%			
	Masache	11	27%	45%	18%		9%
TOTAL		92					

(Source: M data)

6.1.3 BREAKLENGTH: Duration of breakdown

Again, data here is limited: I have data on breakdown duration (first and last breakdown) from only one-tenth of the Water point surveys and half of the Manager surveys, relating only to 5 out of 8 TAs. Mean reported breakdown duration is 136 days, but the range is very large (0 – 1800 days) and there is high variability between locations and between first and last breakdowns. The limitations of this data mean that little meaningful analysis is possible, and BREAKLENGTH cannot be used as an outcome variable in statistical analysis.

6.1.4 %DAYSFUNCT: % of days functional in the last 1 year / last 5 years

While the variable FUNCT represents a snapshot, showing whether a water point was working on the day of the survey, an alternative metric is the percentage of time that each water point functions. I attempted to compute this using data from Managers on the number of days that their water point was non-functional in the past year and the past five years. However, I only had data from 91 Managers, and much of it was unsatisfactory - the numbers were contradictory, or the answer 'many' was given instead of a number. It was therefore not possible to calculate meaningful values for this variable.

6.1.5 WATERQUAL: quality of water

Although I did not have the technical capacity to collect and analyse data on microbial, chemical, or radiological aspects of water quality, I nevertheless collected perception / satisfaction data from Users and Managers regarding two 'acceptability' aspects of water quality: taste and hardness. The data show that out of 276 Users and Managers, only 14 complained of hardness and 15 complained of taste (Table 6.6). However, this data may not fully reflect perceptions; certainly, I am surprised that so few complaints about taste were recorded in TA Lundu, where many of the water points produce very salty water.

Table 6.6: WATERQUAL: Complaints about water quality.

District	TA	Complaint	
		Hardness	Taste
Ntcheu	Chakhumbira	-	-
	Kwataine	1	-
Mangochi	Mbwana Nyambi	3	-
	Nankumba	-	5
Thyolo	Nsabwe	3	4
	Chimaliro	2	2
Chikhwawa	Lundu	1	4
	Masache	4	-
TOTAL		14	15

Thus, while this data offers some limited insight into user perception of water quality, it is not sufficiently robust to use as an outcome variable in statistical analysis.

6.1.6 YIELD: quantity of water

Again, while physical tests for yield were not practical, I was able to collect perception / satisfaction data from Users and Managers on yield, and on time spent queuing. The data (Table 6.7) indicates that there is a particular problem with low yield in Thyolo and Chikhwawa districts. The very large number of complaints about queuing time in TA Kwataine is unexpected, since observations did not suggest that queues were generally much longer in that area than in others.

Table 6.7: YIELD: Complaints about water point yield.

District	TA	Number of complaints	
		Low yield	Time queuing
Ntcheu	Chakhumbira	1	8
	Kwataine	4	25
Mangochi	Mbwana Nyambi	3	-
	Nankumba	-	-
Thyolo	Nsabwe	11	5
	Chimaliro	5	4
Chikhwawa	Lundu	9	-
	Masache	5	3
TOTAL		38	45

A further question asked Users and Managers whether there was enough water for the number of users (Table 6.8). In Ntcheu, more than half the respondents said there was 'never enough' water; and in Thyolo more than half said there was 'often not enough'. In contrast, in Mangochi district, a large majority said there was 'always enough' water. Overall, this perception data highlights important spatial variability in YIELD.

Table 6.8: YIELD: Is there enough water?

District	TA	Is there enough water for the number of users?				TOTAL
		Yes, always	Normally enough	Often not enough	Never enough	
Ntcheu	Chakhumbira	14%	18%	11%	57%	100%
	Kwataine	0%	2%	2%	95%	100%
	TOTAL	6%	9%	6%	80%	100%
Mangochi	Mbwana Nyambi	78%	5%	15%	3%	100%
	Nankumba	68%	0%	3%	29%	100%
	TOTAL	73%	3%	9%	15%	100%
Thyolo	Nsabwe	24%	3%	73%	0%	100%
	Chimaliro	39%	3%	58%	0%	100%
	TOTAL	32%	3%	65%	0%	100%
Chikhwawa	Lundu	38%	0%	35%	27%	100%
	Masache	31%	0%	19%	50%	100%
	TOTAL	34%	0%	26%	40%	100%

This section has summarised the data on six outcome variables that are proxies for sustainability. Each offers useful insights; but as we have seen, data limitations render most of them unsuitable for use in statistical analysis. Only one, FUNCT, is suitable for use in this way. In order to simplify analysis, I recoded FUNCT into a binary (yes/no) variable in which partly-functional water points were classified as not functional, since I have defined sustainability as continued (not intermittent) functioning over time.

Having examined the outcome variable data, I now turn to the explanatory variable data.

6.2 INDIVIDUAL PROXIMATE EXPLANATORY VARIABLES

In this section I examine each of the ten key proximate explanatory variables in turn, using both quantitative and qualitative data. The analysis is presented as follows:

- Quantitative data analysis (2005 Malawi WP database if available, then my own survey data): descriptive statistics, statistical analysis.
- Qualitative data analysis: coding frequency, main emergent themes, illustrative quotes.
- Summary: my overall assessment of the significance of the variable in explaining water point sustainability.

This section draws on a very large quantity of data from a range of sources. Appendix 11 provides an overview of the relationship between the quantitative data and the variables (summarised in Table 6.9), and sets out in detail how the questions in the List (L), Water point (W), Manager (M) and User (U) surveys relate to the outcome variables, proximate explanatory variables and associated hypotheses that are explored in this chapter.

Table 6.9: Quantitative data availability for explanatory variables by survey type.

Explanatory variable	Survey type			
	W	L	M	U
WPTYPE	Yes	Yes	Yes	
INSTQUAL	Yes	Yes	Yes	Yes
USERS			Yes	Yes
AGE	Yes	Yes	Yes	
MAINTFREQ			Yes	
SPARES	Yes		Yes	
SKILLS			Yes	Yes
FUNDS	(Yes)		Yes	Yes
SUPPORT			Yes	
THEFT	*		*	*

*: see section 6.2.10

An overview of the coding structure employed to analyse the qualitative data is provided in Appendix 12, and Appendix 13 summarises coding frequencies. In the extracts reproduced in this chapter, the sources are identified as shown in Table 6.10.

Table 6.10: Qualitative data source identifiers.

Identifier	Respondent type
A	Area Mechanic
D	Donor
G	National government
L	Local government
M	Manager
N	NGO
U	User
W	Water point survey*

In a few cases, the text does not relate to a particular water point or respondent, but rather to a location. These are coded 'number-letter-number' – so 3B2 indicates District '3', TA 'B', VDC '2'. For the water point surveys, the source is my own notes from translated conversations, often with multiple respondents. For most other sources, extracts are from individual interviews.

6.2.1 WPTYPE: Type of water point technology

Chapter Four demonstrated that functionality varies by type of technology in Malawi, as elsewhere; in general, boreholes are more likely to be operational than gravity fed standpipes. I therefore tested the relative impact of different water point types on FUNCT.

Quantitative analysis

The headline figure in the 2005 WP database is that, nationally, 75% of boreholes are functional while only 48% of gravity fed standpipes are working. Analysis of this database using Pearson's chi-square (Field 2009: 698) confirms the very strong association between WPTYPE and FUNCT: X2 (6) = 4053.5 ($p<0.001$), and Cramer's V = .317 ($p<0.001$). The standardised residuals show that the result is mainly driven by boreholes performing much better than expected, and by taps (gravity fed standpipes) performing much worse than expected.

My own survey data shows the same clear pattern: functionality is strongly influenced by WPTYPE (Table 6.11). Using all 952 observations (from Water point, User and Manager surveys plus the VDC Lists), functionality is highest for boreholes (n=752, 74% functional). Only just over a quarter of taps are functioning properly (n=117, 27% functional), although another 17% function partially.

Table 6.11: FUNCT by WPTYPE (all survey data).

WPTYPE		**FUNCT?** No	**FUNCT?** Partly	**FUNCT?** Yes	**Total**
Borehole	#	156	40	556	752
	%	21%	5%	74%	100%
Malda Pump	#	26	1	32	59
	%	44%	2%	54%	100%
Tap	#	65	20	32	117
	%	56%	17%	27%	100%
Protected Spring	#	2	1	1	4
	%	50%	25%	25%	100%
Other Protected	#	2	6	12	20
	%	10%	30%	60%	100%
Total	#	251	68	633	952
	%	26%	7%	67%	100%

However, as noted in Section 6.1.1, the List data is less reliable. If it is excluded (Table 6.12), the results remain fairly similar for boreholes (71% functional) and Malda pumps (53% functional), but Tap functionality is a third higher, at 36% (plus 20% partially functional).

Table 6.12: FUNCT by WPTYPE (W, M and U survey data only).

WPTYPE		**FUNCT?** No	**FUNCT?** Partly	**FUNCT?** Yes	**Total**
BH	#	112	34	364	510
	%	22%	7%	71%	100%
Malda	#	16	1	19	36
	%	44%	3%	53%	100%
Tap	#	25	11	20	56
	%	45%	20%	36%	100%
Protected Spring	#	1	1	1	3
	%	33%	33%	33%	100%
Other Protected	#	1	0	5	6
	%	17%	0%	83%	100%
Total	#	155	47	409	611
	%	25%	8%	67%	100%

Analysis by District and TA reveals considerable diversity in functionality, as well as highlighting geographical variation in the dominant WPTYPE (Table 6.13). In Mangochi district, all water points surveyed were boreholes; but in Thyolo district a significant proportion were Malda pumps (25/80 in TA Nsabwe, 5/66 in TA Chimaliro), and taps were relatively common in Ntcheu district (10/78 in TA Chakhumbira, 22/88 in TA Kwataine)[15], as well as in TA Lundu in Chikhwawa district (15/56).

[15] Although the majority of improved water points in TA Kwataine (53/92 in the sampled VDCs) are standpipes, not one of them is working. In contrast, 62% of the 39 boreholes are functional. Since the W surveys used convenience sampling, the functional boreholes are overrepresented in the W data.

Table 6.13: FUNCT by WPTYPE, by District and TA (W M and U data).

District	TA	FUNCT?	WPTYPE					
			BH	Malda	Tap	PS	Other	All
Ntcheu	Chakhumbira	No	55%		0%	33%	100%	47%
		Partly	2%		100%	33%	0%	15%
		Yes	44%		0%	33%	0%	37%
	Total #		64		10	3	1	78
	Kwataine	No	35%		100%			52%
		Yes	65%		0%			48%
	Total #		60		22			82
Mangochi	Mbwana Nyambi	No	10%					10%
		Partly	14%					14%
		Yes	76%					76%
	Total #		99					99
	Nankumba	No	13%					13%
		Partly	8%					8%
		Yes	79%					79%
	Total #		90					90
Thyolo	Nsabwe	No	7%	44%	20%		0%	19%
		Partly	4%	4%	20%		0%	5%
		Yes	89%	52%	60%		100%	76%
	Total #		45	25	5		5	80
	Chimaliro	No	21%	80%				26%
		Partly	2%	0%				2%
		Yes	77%	20%				73%
	Total #		61	5				66
Chikhwawa	Lundu	No	44%	0%	7%			30%
		Partly	11%	0%	0%			7%
		Yes	44%	100%	93%			63%
	Total #		36	5	15			56
	Masache	No	4%	100%	25%			7%
		Partly	9%	0%	0%			8%
		Yes	87%	0%	75%			85%
	Total #		55	1	4			60
ALL		No						25%
		Partly						8%
		Yes						67%
Total #			510	36	56	3	6	611

Among boreholes only (Table 6.14), the worst performance by far is in TA Chakhumbira, where many of the boreholes are very old; and in TA Lundu in Chikhwawa, where corrosion due to salinity is a major problem.

Table 6.14: Borehole FUNCT by District and TA

District	TA	% Functional
Ntcheu	Chakhumbira	44%
	Kwataine	65%
Mangochi	Mbwana Nyambi	76%
	Nankumba	79%
Thyolo	Nsabwe	89%
	Chimaliro	77%
Chikhwawa	Lundu	44%
	Masache	87%

Using Pearson's chi-square test (Table 6.15), I find (as expected) a significant relationship between WPTYPE and FUNCT: X2 (2) = 31.836, (p<.001); Cramer's V = .228 (p<.001). The standardised residuals indicate that this result is mainly driven by the poor performance of taps.

Table 6.15: Effect of WPTYPE on FUNCT: Chi-square test results.

WPTYPE		FUNCT? No	FUNCT? Yes	Total
Other	Count	20	25	45
	Expected Count	14.9	30.1	45.0
	% within WPTYPE	44%	56%	100%
	% within FUNCT	10%	6%	7%
	% of Total	3%	4%	7%
	Std. Residual	1.3	-.9	
BH	Count	146	364	510
	Expected Count	168.6	341.4	510.0
	% within WPTYPE	29%	71%	100%
	% within FUNCT	72%	89%	83%
	% of Total	24%	60%	83%
	Std. Residual	-1.7	1.2	
Tap	Count	36	20	56
	Expected Count	18.5	37.5	56.0
	% within WPTYPE	64%	36%	100%
	% within FUNCT	18%	5%	9%
	% of Total	6%	3%	9%
	Std. Residual	4.1	-2.9	
Total	Count	202	409	611
	Expected Count	202.0	409.0	611.0
	% within WPTYPE	33%	67%	100%
	% within FUNCT	100%	100%	100%
	% of Total	33%	67%	100%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.836[a]	2	0
Likelihood Ratio	29.908	2	0
Linear-by-Linear Association	15.362	1	0
N of Valid Cases	611		

Thus, in conclusion, although analysis of my own survey data does not yield such a marked correlation between WPTYPE and FUNCT as for the 2005 Malawi WP database, both are very clear about the relative importance of WPTYPE as an explanatory factor.

Qualitative analysis

Turning now to the qualitative data, I coded WPTYPE in 36% of the interviews and surveys, with 33 references in total (ranking 9th). Two key themes emerged.

Gravity fed systems are especially prone to failure

Gravity fed standpipes suffer significantly from problems of both accidental damage and deliberate vandalism. The plastic pipes carrying the water are buried only a few inches below ground, and often run alongside roads or paths. People hunting mice sometimes cut the pipes accidentally, and farmers digging their fields can easily break a pipe, as a respondent in VDC 3A1 explained: "Sometimes people cut the pipe accidentally while cultivating – it happens on a monthly basis." Farmers may also break the pipe deliberately for irrigation purposes, as suggested by a respondent in VDC 1A1: "The tap stand doesn't always give water, due to vandalism at Chilobwe. Sometimes people disconnect the pipes in order to water their gardens. Then they might reconnect the pipes, or they might not." Poor management (e.g. slow repair response times) is also a particular problem in gravity fed systems, because of the problems of coordinating a system with multiple water points.

Afridev handpumps are the most effective and popular technology

One the one hand, "people always prefer taps" (N5) because they are less labour-intensive than a pump. However, "it's easier to manage a borehole than a GFS" (D5) because a single point source requires much less coordination than a multiple outlet system.

In terms of pump technology, Afridev pumps are much preferred to other types by users and almost all other stakeholders. 'Upgrading' Afridev handpumps to solar pumps or Playpumps is almost always counterproductive. For example, W597, originally an Afridev handpump, was converted to solar power in 2011 by the local MP (with assistance from WaterAid and USAID). The new solar pump has never broken down, whereas the old handpump broke several times – but nonetheless the users say they preferred it as a handpump because it was much faster. The flow now is very slow, so collecting water takes much longer.

Similar problems were reported with Playpumps. These are handpumps designed in the form of roundabouts, with the intention that children will play on them, turning the wheel to drive the pump. However, women dislike them because they are much less efficient than Afridevs at converting motion into pumping action, and children quickly get bored of the novelty. One District Water Officer explained: "another problem is the Playpump project. This is another negative project for the districts. We are most enemies of schools now. We removed Afridev and put Playpump. But there are no spares, so the school want us to remove Playpump and put Afridev […] It has not worked. Because there is no backup. They promised to train us, give us vehicles but they are not anywhere to be seen and when you try to phone them they don't respond" (L3). An example from a different District is W619, where an Afridev was replaced with a Playpump in 2005 by the Co-operative (the UK supermarket chain). Users complained that "it is causing a lot of problems because the water coming out is too little… When the Afridev was replaced by the

Playpump, the Afridev was still working at that time and working better than the Playpump does now". EWB fellows (B25, B7) reported similar problems in other locations.

Conclusion

Both the statistical and qualitative analysis indicate that WPTYPE is **highly significant** in explaining water point sustainability, but it certainly does not tell the whole story.

6.2.2 INSTQUAL: Quality of installation

I hypothesised that INSTQUAL would be strongly and positively associated with high functionality. Since quality of installation is difficult to measure without expert assessment at the time of installation, I used the identity of the installer as a proxy.

Quantitative analysis

The 2005 WP database lists 161 different Installers (after cleaning for duplicates). Very few achieved 100% functionality, and those that did had only a handful of water points. However, some major installers with relatively large numbers of water points succeeded in ensuring high levels of continued functionality. Most notable among these are GITEC, with an impressive 97% functionality (n=799); and MASAF with 82% functionality (n=4022).

In contrast, only 54% of Government water points are functional (n=11016); and functionality is even worse for UNHCR (31%) and USAID (23%). However, this highlights the importance of considering several factors together: 97% of USAID water points are relatively old GFS, and most of the listed UNHCR water points are in now-abandoned refugee camps built in the early 1990s when Malawi was hosting large numbers of Mozambican refugees. Indeed GITEC, which has the highest functionality rate of all large installers at 97.1%, also has the most concentrated portfolio type, with 99.9% of its water points being mechanically drilled boreholes fitted with Afridev pumps. However, several other installers are almost equally focused on boreholes, yet have lower functionality: examples include JICA with 79% functionality, and Plan with 76% functionality. GITEC is obviously an outlier, even among borehole-only installers.

Conducting a chi-square test with 161 possible values for one variable would have been far too unwieldy, so I grouped the installers into several types, as shown in Table 6.16[16]. There is indeed a significant association between installer type (my proxy for INSTQUAL) and FUNCT: X2 (8) = 1355.3 (p<.001). The standardised residuals show that this result is particularly driven by the poor performance of water points installed by the Malawi Government.

[16] However, the 'international NGO' category contains a far lower number of cases than would be expected based on experience, suggesting some inaccuracy in this categorisation of INSTQUAL, and casting some doubt on the validity of these results.

Table 6.16: Effect of INSTQUAL on FUNCT: Chi-square test results (2005 WP database).

INSTQUAL (Installer)		FUNCT		Total
		No	Yes	
Malawi Government	Count	4970	5786	10756
	Expected Count	3605	7151	10756
	% within INSTQUAL	46%	54%	100%
	% within FUNCT	30%	18%	22%
	% of Total	10%	12%	22%
	Std. Residual	22.7	-16.1	
Local Government	Count	9	109	118
	Expected Count	40	78	118
	% within INSTQUAL	8%	92%	100%
	% within FUNCT	0%	0%	0%
	% of Total	0%	0%	0%
	Std. Residual	-4.9	3.4	
Intl Bilateral Donor	Count	136	513	649
	Expected Count	218	431	649
	% within INSTQUAL	21%	79%	100%
	% within FUNCT	1%	2%	1%
	% of Total	0%	1%	1%
	Std. Residual	-5.5	3.9	
Intl Multilateral Donor	Count	19	63	82
	Expected Count	27	55	82
	% within INSTQUAL	23%	77%	100%
	% within FUNCT	0%	0%	0%
	% of Total	0%	0%	0%
	Std. Residual	-1.6	1.1	
International NGO	Count	373	777	1150
	Expected Count	385	765	1150
	% within INSTQUAL	32%	68%	100%
	% within FUNCT	2%	2%	2%
	% of Total	1%	2%	2%
	Std. Residual	-.6	.5	
Private Company	Count	29	172	201
	Expected Count	67	134	201
	% within INSTQUAL	14%	86%	100%
	% within FUNCT	0%	1%	0%
	% of Total	0%	0%	0%
	Std. Residual	-4.7	3.3	
Other	Count	4581	12889	17470
	Expected Count	5856	11614	17470

	% within INSTQUAL	26%	74%	100%
	% within FUNCT	28%	39%	35%
	% of Total	9%	26%	35%
	Std. Residual	-16.7	11.8	
Unknown	Count	4057	8464	12521
	Expected Count	4197	8324	12521
	% within INSTQUAL	32%	68%	100%
	% within FUNCT	25%	26%	25%
	% of Total	8%	17%	25%
	Std. Residual	-2.2	1.5	
Blank	Count	2336	3972	6308
	Expected Count	2114	4194	6308
	% within INSTQUAL	37%	63%	100%
	% within FUNCT	14%	12%	13%
	% of Total	5%	8%	13%
	Std. Residual	4.8	-3.4	
Total	Count	16510	32745	49255
	Expected Count	16510	32745	49255
	% within INSTQUAL	34%	66%	100%
	% within FUNCT	100%	100%	100%
	% of Total	34%	66%	100%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1355.292	8	.000
Likelihood Ratio	1354.615	8	.000
Linear-by-Linear Association	620.346	1	.000
N of Valid Cases	49255		

In summary, therefore, the 2005 WP database shows a significant association between INSTQUAL and FUNCT. I now turn to the survey data collected specifically for this thesis. Respondents named dozens of different institutions and individuals as installers, which were in turn classified into 16 categories. To simplify analysis, these were further grouped into NGO, Government/MP, and Other (Table 6.17).

Table 6.17: INSTQUAL: Installer by category.

Survey Type	Installer				Total #
	NGO	Govt / MP	Other	Don't know	
L	69%	15%	13%	3%	257
W	59%	26%	12%	3%	242
U	27%	21%	14%	37%	174
M	40%	28%	8%	23%	99
All	53%	22%	12%	13%	772

Since a significant proportion of Users and Managers did not know the Installer's identity, and since the L data is less reliable, I used the W data alone for my main analysis of INSTQUAL.

The chi-square test shows a significant association between INSTQUAL and FUNCT: X2 (2) = 7.808, (p<.05); Cramer's V = .183 (p<.05). The standardised residuals suggest that this result is fairly equally driven by all categories. To examine this relationship in more detail I created dummy variables for Government (n=63), NGO (n=143), and three specific NGOs: GITEC (n=40), CU (n=40), and ICEIDA (n=25). The results are shown in Table 6.18.

Table 6.18: Effect of INSTQUAL on FUNCT: Chi-square test results.

Version	Chi-square	df	p	Cramer's V	p	Odds ratio	SSRs*
INSTQUAL	7.808	2	.020	.183	.020		
NGO	6.167	1	.013	.162	.013	2.069	none
Government	1.120	1	.290	.069	.290	.714	none
GITEC	12.830	1	.000	.234	.000	9.354	minus 2.8 for GITEC, NF
CU	2.058	1	.151	.094	.151	.594	none
ICEIDA	8.098	1	.004	.186	.004	10.833	minus 2.3 for ICEIDA, NF

*Significant standardised residuals (more than plus or minus 1.96)

Calculation of the odds ratio suggests that water points installed by an NGO are more than twice as likely to be functional than water points installed by others.

Even more stark patterns emerge when we look at particular NGOs: both GITEC and ICEIDA water points are approximately ten times more likely to be functional than other installers' water points. For the ICEIDA water points, AGE may be a significant confounding factor, since 68% of the ICEIDA water points analysed are 2 years old or less. However, all of the GITEC water points are much older, between 5 and 9 years old.

In conclusion, the data shows very wide variation in functionality according to the identity of the installer. However, it is clear that 'installer name' by no means fully captures the concept of 'installer quality'; and other variables such as age are likely to be significant. Insights from the qualitative data, presented below, help to interrogate INSTQUAL in more detail.

<u>Qualitative analysis</u>

INSTQUAL was coded in 53% of the interviews and surveys, with 74 references in total (ranking 4th). Two key themes emerged.

<u>*High construction standards = high functionality*</u>

The GITEC boreholes were outstanding among those surveyed in terms of both performance and appearance; the quality of their civil works was immediately obvious. Interviewees attributed the success of the GITEC water points to their high engineering standards: "There is high functionality in Mangochi East because the technical part is just very good, the contractor is very good… they were introducing the Revision 4 pumping rod, these are very strong… Up to now no pump rod has broken in the GITEC boreholes" (L3). This reportedly reflected both the level of funding available and the degree of control that the project management exercised: "[It was a] very high quality project, GITEC… They had a lot of funding so they could do very good drilling, they could drill 4, 5 times to find a good source. They did very good training to the WPC and AMs… [They had] GITEC experts from Germany basically stationed there and doing all the work" (D5). Another respondent, who had worked on the GITEC project before joining another NGO, highlighted the difference between them: "GITEC used 40 bags of cement per borehole; [we] use 20 bags per borehole" (N1). So, while GITEC boreholes may have been more expensive at the construction stage (although comparative costs are not known), it seems these investments have paid off in terms of sustainability.

Absence of quality control

Several interviewees observed that lack of quality control is a major problem in the sector: "The private sector has no quality control … There is real need for quality control in terms of enforcement… at national level it is not being done" (N9). A government interviewee suggested that the problem was particularly significant in civil society projects: "There are some contractors which are not as professional… when the CSOs are drilling boreholes it is not their fault but maybe the contractors which they hire. Maybe the contractors once they find the water they will put up the pump and the like. Two days, maybe three months, you will find if they put up the borehole in the rainy season – after, it will run dry" (G3).

However, government-led projects are equally prone to problems, as observed by one local NGO staff member: “The moment you identify a wrong contractor you are in trouble. And most of these contractors are indeed crooked contractors, they don't do a good job … in fact let me underline the example of MASAF. MASAF was a government run project and you know what happens in government procurement. There are a lot of shortcuts. Corruption is there and procurement procedures are not followed. So it is inevitable that the MASAF contract had such problems. Because they would identify wrong contractors for purposes of bribes and other kickbacks” (N3). One EWB Fellow, attached to a major borehole installation project, observed that neither the contractor nor the government saw the actual paper contract as meaningful. The contractor insisted on doing things ‘as they’ve always done’, cutting multiple corners including not doing a proper hydrogeological survey, drilling with inappropriate equipment, failing to clean or fill the bore properly, and not testing water quality (B11). Supervision was completely inadequate.

Quality problems are often identified too late. “Right now there is a query from [District X], we have people who have gone out to look at some contractors who were given boreholes by government or UNICEF and they recorded the wrong depth... they are so crafty they say they have drilled above 40 metres but have done only 20 metres ... so many boreholes which were previously drilled have dried up” (D4). Even NGOs doing direct implementation (drilling using their own staff and rig) face quality problems: “World Vision finished in I think 2002 and then… we had [a project funded by DANIDA]. They ended up doing protected wells using a

Vonder rig. None of them are functional… If you go there, the ones that are functioning are maybe 10% of what they did" (L3).

Users themselves also commented critically on poor workmanship. At several water points, users attributed functionality problems to shallow drilling (W149, U153, 3A1). In several VDCs (2B2, 2B3, 3A3), the civil works surrounding many water points were in very poor condition, and in some cases (e.g. W240) this was despite the water point having only recently been constructed. An explanation was suggested by users at W770: "The civil works cement was shallow – the installer and repairers took advantage". Cement is a valuable commodity in short supply in Malawi.

Users generally have no power to hold installers to account; their only option is to hope that the installer will return to check on the work. An illustrative case is W754, a borehole installed by a church just a few weeks before our visit; but already showing problems, including low water yield. Users did not know the name of the contractor, and there was no inscription; they said "We are just waiting for the church to come and see the problem". Occasionally, installers simply never finish the job (e.g. W258). In one such case in VDC 2B1, the community eventually clubbed together to complete the installation by buying a footvalve, 2 years after the rest of the installation was completed; but others (e.g. two in VDC 1A2) remain unfinished several years later.

Conclusion

The data shows that technical quality of installation is **highly significant** in explaining water point sustainability. Different installers have very different functionality records, despite using more or less the same technology and approaches. The outstanding success of GITEC, in particular, calls for further investigation.

6.2.3 USERS: User numbers

The higher the number of users, the greater the wear and tear on the water point. For this reason, I hypothesised that higher USERS would be associated with lower FUNCT.

Quantitative analysis

The 2005 WP database does not contain data on user numbers, so I examined this question by combining the database with district population data from the 2008 census (NSO 2008). I found essentially no relationship between user density (proxied by the district population divided by the number of water points) and water point functionality.

My own User and Manager surveys included two questions about user numbers. Unfortunately, the question "*How many households use this water point?*" rarely elicited a specific number. By far the most frequent responses were 'many' (22%), 'the whole village (20%), 'don't know' (13%), and 'several villages' (7%), while numerical responses ranged from ‘5’ to ‘500’. Because these responses do not fit neatly on to a scale (how many is ‘many’?) it is difficult to analyse the relationship between USERS and FUNCT. The best that can be done is to examine the percentage of water points that are functional for each category of user numbers, as shown in Table 6.19.

Table 6.19: Relationship between USERS and FUNCT.

USERS	# of responses	% of responses	% FUNCT
Several villages	18	7%	78%
Whole village	53	20%	68%
Half the village	3	1%	100%
Many	59	22%	80%
Few	7	3%	71%
100-500	14	5%	71%
51-99	21	8%	71%
21-50	33	12%	61%
<20	23	9%	65%
Don't know	34	13%	68%
Total	265		71%

The lowest functionality rate is found in the group of water points with the lowest user numbers – a somewhat intriguing result, since it is frequently assumed that high user numbers lead to more frequent breakdowns and lower functionality. A partial explanation may be that the increased wear and tear associated with high numbers of users is offset by the increased availability of skills and funds for repairs.

Since most water points are boreholes, the average borehole is intended to serve 250 people, and the average household size is 5 people, I created a binary variable with 50 households as the cut-off point for the purpose of analysing the impact of

USERS on FUNCT. However, the chi-square test shows that the relationship is not significant: X2 (1) = 2.888 (p=0.89).

I also asked Users '*how long do you normally have to queue at the water point?*' Queuing time is reportedly a significant problem (Table 6.20): almost half of all Users said that they have to queue for more than half an hour to get water, and another third have to wait for between 10 and 30 minutes.

Table 6.20: USERS: Queuing time.

How long do you normally have to queue at the water point?	
No time	4%
Less than 10 minutes	16%
Between 10-30 minutes	34%
Over 30 minutes	45%
Not applicable	1%
Total (174 Users)	100%

In summary, the relationship between USERS and FUNCT is complex. However, the qualitative data illuminated these findings further.

Qualitative analysis

USERS was coded in 38% of the interviews and surveys, with 38 references in total (ranking 7th). Two key themes emerged.

'Congestion' drives people to use unsafe sources

Water points are frequently overused or 'congested': "there is always congestion even at 10pm" (W619) and "the water is never enough – the people from this village go to the next village [to get water]" (U70). This competition for water sometimes drives people to use unsafe water sources instead: U152 reported that the whole village use the borehole, but "others prefer going to the river because there is too much congestion". At W631, respondents reported that people from several surrounding villages with broken boreholes all come to this one, which is very congested; but "most are taking water from unprotected wells".

Many users may lead to more frequent breakdowns?

In one or two cases, respondents suggested a link between high user numbers and excessive wear and tear: "The only problem faced is that the spare parts don't last long because it is overused" (M30, manager of a water point used by four villages). At W434, respondents said there were frequent breakdowns "because they have [only] one borehole". However, while this observation makes intuitive sense, it was not highlighted by many respondents.

Conclusion

The data suggest that, while USERS is **highly significant** in determining a household's access to clean water, it is only **marginally significant** in explaining water point sustainability.

6.2.4 AGE: System age

Intuitively, AGE appears likely to be a very significant influence on sustainability, since most forms of technology are more likely to break down as they get older. I therefore hypothesised that increased AGE would be associated with lower FUNCT.

Quantitative analysis

Commencing with the 2005 Malawi WP database, and focusing only on boreholes, taps and protected springs (82% of the total 49,517 water points listed in the 2005 database), I was able to calculate AGE for 31,546 (78%) of the 40,636, by subtracting the date of installation from the date of survey.

Using Pearson's R to examine the degree to which the two variables co-vary, I find that increased AGE is indeed correlated with reduced FUNCT (Table 6.21): r is -.353, so R^2 is 0.124, indicating that approximately 12% of the variability in FUNCT is shared by variability in AGE.

Table 6.21: Co-variation of AGE and FUNCT (2005 WP database).

		AGE	FUNCT
AGE	Pearson Correlation	1	-.353
	Sig. (1-tailed)		.000
	N	31546	31544
FUNCT	Pearson Correlation	-.353	1
	Sig. (1-tailed)	.000	
	N	31544	40459

However, using regression to test the impact of AGE on FUNCT, I find that AGE has only a small effect (Table 6.22).

Table 6.22: Effect of AGE on FUNCT: regression results (2005 WP database).

	B	S.E.	Wald	df	Sig.	Exp(B)
AGE	-.081	.001	3343.412	1	.000	.922
Constant	1.652	.021	6398.811	1	.000	5.216

Together these results suggest that AGE has less influence on FUNCT than is commonly supposed, and that other factors play a much greater role in explaining functionality – or the lack of it. Using the same statistical procedures to examine my own survey data, I find much smaller effects – perhaps due to the considerably smaller sample. Increased AGE is only very slightly correlated with reduced FUNCT: r is -.087 ($p<0.05$), so R^2 is 0.007, indicating that less than 1% of the variability in FUNCT is shared by variability in AGE (Table 6.23). Regression (Table 6.24) confirms that AGE has almost no effect on FUNCT.

Table 6.23: Co-variability between AGE and FUNCT: Pearson's R results.

		AGE	FUNCT
AGE	Pearson Correlation	1	-.087
	Sig. (1-tailed)		.022
	N	540	540
FUNCT	Pearson Correlation	-.087	1
	Sig. (1-tailed)	.022	
	N	540	955

Table 6.24: Effect of AGE on FUNCT (binary logistic regression).

	B	S.E.	Wald	df	Sig.	Exp(B)
AGE	-.020	.010	3.906	1	.048	.980
Constant	1.462	.148	98.109	1	.000	4.314

Taken together, these results suggest that AGE plays only a minor role in explaining variation in FUNCT. Although somewhat counterintuitive, this finding emerges strongly from the data. The fact that my own survey data (540 cases) provides much less support for the effect of AGE on FUNCT than the 2005 WP database (over 30,000 cases) may well merely reflect the more limited sample.

Qualitative analysis

AGE was, in fact, coded in only one of the interviews and surveys, with one reference in total (ranking 10th). However, as discussed in the introduction to this section, this may reflect more about the coding process than about the data itself.

The coded text in fact suggests that the problem is not AGE as such, but rather the manager's inability to maintain or repair the water point, which s/he blames in turn on lack of funds: "The problem is with rods, they just break, they are the old rods they have never changed since installation… The centralisers are also worn out, also the plunger is worn out, the bush bearing… It breaks down almost daily. If I have spare parts I can maintain the borehole and repair everything but we don't have enough funds to buy all the rods" (M25). Indeed, this leads us neatly into the next section, on frequency of maintenance.

Conclusion

Overall, and perhaps counterintuitively, AGE emerges as only **marginally significant** in explaining water point sustainability.

6.2.5 MAINTFREQ: Frequency of maintenance

Water points are supposed to be regularly tested and maintained to ensure that they work effectively (SKAT-RWSN 2007). I therefore hypothesised that higher MAINTFREQ would be positively associated with higher FUNCT.

<u>Quantitative analysis</u>

MAINTFREQ is, in theory, a continuous variable, and was assessed through six separate questions in the Manager surveys. However, in practice, incidence of maintenance is so low that I have treated it as a dichotomous (yes/no) variable (Table 6.25).

Table 6.25: MAINTFREQ: Frequency of maintenance.

Type of maintenance	Never done	Done at least once
Leakage test	82%	18%
Discharge test	82%	18%
Dismantling and checking of wearing parts	39%	61%
Tightening of nuts on fulcrum pin	54%	46%
Dismantled in last 12 months	49%	51%
Dismantled since installation	53%	47%

Although 51% of Managers (n=49) reported dismantling the water point in the last 12 months, in only 14 cases was this done without being prompted by a breakdown. Similarly, although 61% (n=60) reported dismantling the water point to check the wearing parts, in only 9 cases was this done for a water point that had never experienced breakdown. Clearly, true preventive maintenance is relatively rare.

Indeed, it may well be that MAINTFREQ is over-reported, as a surprisingly large number of Managers claimed to have undertaken maintenance just 'last month'.

With hindsight, my research instruments failed to give me full insight into the occurrence of preventive maintenance. I wished to avoid simply asking 'do you do preventive maintenance', as such a question would be highly vulnerable to biased self-reporting. The rationale for asking specifically about leakage tests and discharge tests was that these are simple, quick, basic tests that should in theory, according to the Afridev manual (SKAT-RWSN 2007) be performed every month. The fact that they are not suggests the dominance of an 'as and when' rather than 'just in case' approach to maintenance and repair.

Since so few water points appear to have experienced preventive maintenance, the value of quantitative analysis is limited. Still, the chi-squared test suggests that there is a statistically significant relationship between MAINTFREQ and FUNCT ($X2 = 4.175$ (1), $p<.05$) - although this is not as strong as for some of the other variables tested. Additionally, concerns about the reliability of self-reported preventive maintenance mean that care must be taken not to over-interpret the data.

Qualitative analysis

The qualitative data is somewhat more helpful in yielding insights into maintenance and repair practices. MAINTFREQ was coded in 33% of the interviews and surveys, with 38 references in total (ranking 7th). Three key themes emerge.

Preventive maintenance is very rare

Preventive maintenance is almost never done at the recommended frequency, and in fact is probably almost never done at all. The distinction between preventive maintenance and reactive repair was not clearly made by respondents; indeed, it might be that this distinction is somewhat lost in translation. Certainly, in the vast majority of cases, respondents talked about repairs when asked about maintenance. When they did report preventive maintenance, it was hard to tell whether this report was accurate. For example, M48 reported that "they were told to maintain every 3 months, and they did it in September [last month]". That was apparently the first time since the borehole was installed eight years earlier in 2003. It seems unlikely that the community spontaneously decided to maintain it then, immediately prior to my unannounced visit; it seems much more likely that this type of response represents 'courtesy bias'. This in turn calls into question the validity of even the few reports of preventive maintenance that were recorded in the surveys.

Preventive maintenance frequently appears unnecessary

Many well-built water points – especially boreholes - function for many years with no problems. For example, W096, a borehole installed in 2003, has never broken down; consequently the Managers have never checked or maintained it. W051 is another example: installed in 1998, its first breakdown was 11 years later in 2009. For those 11 years, the community did no maintenance. They reported that they never do preventative maintenance, but only work on the borehole if it is broken. The same thing was reported at several other boreholes that have never broken down, and never been maintained (W092, W259, W260, W266). Cases such as these suggest that the 'standard model' of dismantling and checking the pump every three months may often be unnecessary, especially when water points are well-constructed in the first place. Rapid reactive repair capacity is more important.

Low maintenance frequency is both an effect and a cause of lack of skills.

Because Managers generally only put their skills into practice in reaction to breakdowns, rather than according to a regular maintenance schedule, those skills wither quickly through lack of practice. Unlike Area Mechanics, who may be called to assist with any one of a large number of water points and thus have more frequent opportunities to put their skills into practice, WPC members are responsible for only one water point. If they do no preventive maintenance for several years, they may well struggle to repair it if or when it breaks down.

Conclusion

Overall, MAINTFREQ is **moderately significant** in explaining water point sustainability. However, it is difficult to analyse this variable in isolation as it is particularly tightly linked to several others, especially INSTQUAL, SKILLS, FUNDS and SPARES.

6.2.6 SPARES: Accessibility of spare parts

Problems with access to spares are often highlighted in the rural water supply sector, although as discussed in Chapter Two, opinion is sharply split on the topic.

The hypothesis tested here is that increased SPARES is associated with higher FUNCT.

Quantitative analysis

SPARES data was primarily collected through the 99 Manager surveys. Some data was also collected through the W surveys, but it is excluded from this analysis as too few responses were recorded.

Regarding stocks of spares, 68% of Managers (n=67) reported having no spares in stock at all. Only a small minority of WPCs kept good stocks of spare parts – just 11 Managers reported having three or more different spares, and 7 of them were in Mangochi district.

In response to the question "*If you don't have a spare part in stock, how far do you have to travel to get it?",* only 55 responses were recorded, ranging from 30 minutes to 12 hours, with the mode being 1 hour, the median 2 hours, and the mean 3.1 hours. These findings suggest that travel distance is not a major barrier to accessing spares in most cases.

Nonetheless, 56% of Managers feel they have problems accessing most or all spare parts – although 30% feel they have no problems at all (Table 6.26). Outliers are TA Nsabwe in Thyolo District, where 89% report problems (probably due to the difficult hilly terrain of this isolated area) and TA Nankumba in Mangochi, where 60% report no difficulty getting parts (probably due to the fact that there was an ongoing water point construction project in the area at the time of my survey).

Table 6.26: SPARES: Access to spare parts.

Do you feel that you have problems accessing spare parts?	% of Managers
No, not at all	30%
Sometimes, for some parts	4%
Yes, problems getting most / all parts	56%
Not applicable	2%
Don't know	7%

In terms of impact on functionality, however, the chi-square test demonstrates that there is no relationship at all between SPARES (perceived difficulty in accessing spares) and FUNCT (X2 = .027 (1), p=.868). Thus, the data shows that access to spares is not a significant factor influencing functionality.

<u>Qualitative analysis</u>

SPARES was coded in 64% of the interviews and surveys, with 69 references in total (ranking 5th). Three key themes emerged.

<u>*Few WPCs keep spares in stock, and none keep records*</u>

Although many WPCs are reportedly provided with a 'full set' of spare parts after installation, it is rare that they remain. It is arguably very inefficient for each WPC to hold stocks of multiple spares that many of them will not need for several years. Spares may be lost, or 'lost' and converted into cash, or simply given away to a neighbouring WPC in need. None of the WPCs appeared to keep any record of stocks of spares, nor any log of maintenance or repairs. Some WPCs said they had spares in stock but did not know what they were (e.g. W284). At a few water points respondents complained that they had never been given any spare parts at installation (e.g. U160).

Several respondents reported that WPCs prefer to use the community's contributions to buy spares, rather than keeping the money as cash. At W664 a man said "it's easy to keep spares, but money…" – implying that cash gets 'eaten' (misused). An Area Mechanic reported the same thing, and also highlighted the fact that inflation can reduce the value of a cash fund, so it is more sensible to hold stocks of spares. Despite this, and despite the fact that some WPCs explained their low cash savings by saying they had spent the money on spares, the large majority of WPCs had few or no spares in stock, and instead bought parts as and when needed. Only a handful of exceptions were found, such as W288, a GITEC borehole whose two breakdowns had both been repaired within 2 days using parts that the WPC had in stock.

Spares can be bought in most trading centres

A weak supply chain for spare parts is still seen by some as a key barrier to sustainability. But this study supports the view of one interviewee from an NGO, who explained: "In Malawi and the sector there's a big thing 'oh there's this huge problem with access to spares, we can't get spares' - but [we] didn't go to a single village where they couldn't get spares" (N5). Although some survey respondents did report problems accessing spares, this was often hard to reconcile with my own experience. For example, in the first VDC I visited (1A1), there was a borehole that had been broken for 'one month' due to lack of a U-seal, which reportedly the Managers could not find in either Ntcheu or Dedza. However, I had easily found and bought U-seals in Ntcheu two days earlier, for K150 each (less than 50p) from a market stall – one of several selling multiple borehole parts.

In other places, different Managers had very different perspectives. At W559, a borehole with no spares in stock, one Manager (M67) reported that spares could be bought within a 2-hour return journey walking; but the other (M66) said it was a 12 hour journey. The first claim was much more in line with my own experience of the geography.

One issue highlighted by several respondents is the provenance of some spare parts. One NGO worker said "sometimes we can find some spare parts in the local market. But they are not often original spare parts. In Malawi there is a big problem of vandalising the pump so sometimes you can find parts in the market that are second-hand" (N7). Some Managers reported surprisingly low prices for parts, such as the new rod for W360 which cost only MWK 2000. This is only half the price of a new one, suggesting that it was probably second-hand. Another example comes from W773, where users reported buying spares – possibly stolen parts – from "passers-by".

Transport costs are sometimes seen as a problem

The cost of transport is seen as a problem in some areas. One DWO suggested "most of the parts are very cheap but transport is very expensive so they will be failing to buy the spare parts" (L3); while an NGO worker said: "In TA [x], transport costs three times the cost of the spare part itself… people wait until someone is travelling to the town anyway" (N9). However, people are constantly travelling back and forth to trading centres, even from remote villages, so it seems unlikely that this is really a major constraint.

<u>Conclusion</u>

Access to spares is obviously essential if repairs are required. However, the evidence suggests that it is not only distance to a shop, or whether that shop has spares in stock, that determines access to spares; rather, the management of resources within the WPC (both spares, and cash) is critically important – a theme explored further when we consider the variable FUNDS. In itself, SPARES is only **marginally significant** in explaining water point sustainability.

6.2.7 SKILLS: Availability of repair and maintenance skills

Water point functionality depends on the availability of human capacity for maintenance and repairs, whether in the form of Water Point Committee (WPC) members, Area Mechanics (AMs), or other skilled personnel. The hypothesis tested here is therefore that an increase in SKILLS is associated with increased FUNCT.

<u>Quantitative analysis</u>

SKILLS was assessed through two sets of questions. Users and Managers were asked who is responsible for both minor and major maintenance & repairs (M&R); and data was also collected - primarily through the Manager surveys - regarding the workings of water point committees (WPCs). Table 6.27 shows that about 60% of respondents (Users and Managers) feel that the WPC is solely responsible for minor M&R, with a further 8% holding the WPC responsible jointly with others (e.g. the VDC, VH or DWO). The WPC are also held to be responsible for major repairs by 36% of respondents. However, Managers are more likely to feel that major repairs are the responsibility of Area Mechanics alone. Very few respondents suggested that other individuals or institutions bear any responsibility for M&R. Evidently the community management model is very well embedded, at least in theory. However, there is some dissonance (highlighted in the qualitative data discussed in the next section) between these responses and what is evident in practice, such as considerable reliance on politicians as a source of funds for repairs.

Table 6.27: SKILLS: Who is responsible for maintenance and repairs?

	Minor M&R			**Major M&R**		
	U	**M**	**Total**	**U**	**M**	**Total**
WPC	59%	62%	60%	36%	35%	36%
Area Mechanic	10%	15%	12%	20%	38%	26%
WPC and other	9%	8%	8%	3%	4%	3%
Other	7%	2%	5%	9%	3%	7%
Don't know	7%	2%	5%	20%	5%	14%
Not applicable	3%	4%	4%	3%	7%	5%
VH	2%	2%	2%	1%	1%	1%
Other combination	1%	3%	1%	0%	3%	1%
Community	2%	1%	1%	1%	0%	1%
VDC	1%	0%	1%	1%	0%	1%
District government / DWO	0%	1%	0%	0%	3%	1%
NGO	1%	0%	0%	1%	0%	0%
WPC and AM				6%	0%	4%
Total	100%	100%	100%	100%	100%	100%

Disaggregating responses by District highlights wide variation in the degree of reliance on WPCs or AMs (Table 6.28). Reliance on WPCs is especially high in Thyolo and Chikhwawa districts, whereas Area Mechanics are more important in Mangochi district and TA Chakhumbira. In Mangochi, the DWO and NGO partners have invested significantly in developing a network of AMs. But in Chakhumbira there is no such network; the high level of reliance on AMs instead reflects low capacity on the part of the WPCs, and reliance on one or two local mechanics who are not part of any formal AM network.

Table 6.28: SKILLS: Reliance on WPCs or AMs, by District and TA.

			Minor M&R			**Major M&R**		
			U	**M**	**Total**	**U**	**M**	**Total**
Ntcheu	Chakhumbira	WPC	36%	21%	29%	36%	7%	21%
		AM	29%	43%	36%	36%	57%	46%
	Kwataine	WPC	38%	56%	45%	29%	28%	29%
		AM	0%	6%	2%	17%	28%	21%
Mangochi	Mbwana Nyambi	WPC	46%	44%	45%	25%	19%	23%
		AM	29%	25%	28%	38%	63%	48%
	Nankumba	WPC	50%	80%	59%	29%	30%	29%
		AM	17%	10%	15%	17%	40%	24%
Thyolo	Nsabwe	WPC	63%	80%	68%	29%	44%	33%
		AM	4%	0%	3%	29%	11%	24%
	Chimaliro	WPC	91%	64%	82%	50%	36%	45%
		AM	0%	18%	6%	18%	45%	27%
Chikhwawa	Lundu	WPC	61%	88%	69%	50%	88%	62%
		AM						
	Masache	WPC	79%	92%	83%	46%	64%	51%
		AM	4%	8%	6%	4%	36%	14%

However, the relative importance of WPCs or AMs appears to make little difference to functionality (Table 6.29). Chi-square tests show that there is no significant relationship between FUNCT and SKILLS (in the form of reliance on WPCs or AMs for minor or major repairs).

Table 6.29: Effect of SKILLS on FUNCT: Chi-square test results.

Version of variable SKILLS	Chi-square	df	p	Cramer's V	p
WPCminor	.491	1	.484	.042	.484
WPCmajor	1.829	1	.176	.082	.176
AMminor	3.273	1	.070	.109	.070
AMmajor	3.773	1	.052	.117	.052

The community management model rests on the assumption that after a WPC is established its members will remain active and continue to meet regularly, conduct maintenance, and collect funds for repairs, thus ensuring the continued functioning of the water point. My data challenges these assumptions.

77% of Managers reported that a new committee was established when the water point was installed, while in a further 10% of cases an existing committee took on the role of WPC. In 6% of cases no committee was created; and, somewhat worryingly, 7% of Managers did not know whether a committee existed or not. In only 52% of cases was the WPC reported to be active at the time of the survey, although 58% reportedly met at some time in the previous year, with approximately half of those reporting 1-3 meetings. One-fifth of managers reported that the WPC met every month or more frequently; indeed, very improbably, 2% reported that the WPC met every week – casting doubt on the reliability of self-reported meeting frequency.

The community management model envisages that a WPC should normally have 10 members, with equal numbers of men and women. However, in my dataset, most WPCs had only 4 active members (median 4, mode 5, mean 4.3). WPC Chairs were more likely to be male (60%), while Treasurers were more likely to be female (71%). A large majority (91%) of Managers reported that more than half of the WPC members were women, and 23% reported that all WPC members were female. However, this data also appears unreliable, since almost 40% of Managers reported a larger number of female active members than of active members altogether.

More than a third of WPCs (38%) had no members who had received training in water point maintenance and repair, and a further 8% had only 1 or 2 trained members. On the other hand, 25% of WPCs reported that all 10 members had received training – although whether those members remained active is a different matter.

Overall, the main lesson to be drawn here may simply be that the data was often contradictory. Asking a range of questions about WPC operations often served to highlight inconsistencies in respondents' answers. Consequently it is difficult to identify reliable variables whose relationship with functionality can be analysed.

The key variable, of course, is existence of an active WPC – since the community management model suggests that there should be a strong positive association between existence of an active WPC, and water point functionality. However, my data does not support this hypothesis: chi-square is 0.753 (p=.385), indicating no significant association between SKILLS (in the form of an active WPC) and FUNCT. This suggests that WPCs are broadly irrelevant to water point functionality – a challenge to the dominant community management model.

Qualitative analysis

SKILLS was coded in 67% of the interviews and surveys, with 80 references in total (ranking 3rd). Two key themes emerged.

Water Point Committees tend to collapse quickly

WPCs, which are intended to be self-sustaining institutions, in reality tend to collapse quickly. There appear to be three contributory factors:

1) WPCs often do not see the need to meet, or do maintenance, or collect money – especially if the water point functions well for months or years, and/or if there are other people who seem likely to take responsibility if things go wrong, such as an MP or NGO. As one NGO observed, "The community thinks the NGO or the district will come and do it. And they have in the past" (N2). A local government worker agreed: "There is a lack of maintenance committees … those with an MP there, they think 'why should we [take responsibility] when the MP is there'" (L6).

2) No external agent is monitoring them. One respondent said: "They are pretty much ineffective, WPCs in general. There is a lack of accountability. The DWO can't do enough monitoring" (N2). Another agreed: "…without

support from district councils... the WPC will not function. Soon after the project there are no committees" (D1). And so the cycle is repeated: "When the project has been implemented there are these committees set, but after the project is finished these committees are disintegrating and not much is going on, and when another project comes in, you know they set up the same committees and these things seem to have not been going very well." (D1).

3) Membership naturally declines, through people moving away or dying. "Mobility of WPCs is a problem… you find you erect a WPC today - tomorrow, it's not there. So you find if that WP facility breaks down then there is nobody who can maintain it until the district water people have to be consulted to assist the communities… Marriage is one factor, business is another. People go to Blantyre, Lilongwe for business and they don't come back" (L5). Although in theory new members should be elected to replace those that leave, in practice this seems very rare. The experience of M29 seems more representative: "the committee meets every month, but since the chairman had gone to Blantyre in November [i.e. 8 months earlier] they have never met".

In general, WPCs are not 'live' institutions. Often only a shell remains, in the form of one or two individuals with specific roles (Treasurer, Chair).

Managers lack technical skills

Although the community management model entails training large numbers of people at village level, lack of skills is a real problem. Some respondents believe the problem is due to insufficient training, reported in a few locations (W224, U175). One NGO worker stated that only 20-30% of WP committees have been trained, so “even for minor problems they don't know where to start from. So because of that you see that a lot of water points are just lying not functioning” (N9). However, even among those who have been trained, there is a lack of skills and confidence (M25, W536). Examples of trained Managers who still have a very low level of technical understanding include M35, who is Chair of her WPC, but cannot identify the spare parts that they have in stock; M52, another Chair who said “we don't maintain it because we don't know how the borehole works”; and the committee at W495, who said “we were trained but we have no skills”.

The quality of training is one factor. One EWB Fellow (B6), accompanying a 5-day community management training, noted a number of problems: “We covered all the topics, but the time spent for most of the topics was cut short. A lot of things contributed to this: people showing up late … people not showing up [at all], breaks taking a long time, spending too much time on irrelevant tasks” and concluded “based on this one, I have quite a few reservations on how effective these trainings are in the long term”. And even if the training itself were of high quality, many WPC members may lack the basic skills (literacy, numeracy, technical understanding) to absorb and act on it, or such skills as they have quickly wither once the training is over, since preventive maintenance is never done.

The role of Area Mechanics is perceived as critically important by several respondents: "For point water sources, the key challenge is the need for Area Mechanics" (G4). Where AMs exist, District Water Officers see them as the frontline service providers: "Here we have also Area Mechanics… So whenever there is minor breakdown the people are going to them instead of to us" (L3). There was an active network of official Area Mechanics in only one of the four districts studied; but in other districts I came across several 'unofficial' AMs, providing an important intermediate level of technical support to village-level Managers. Boxes 6.3 and 6.4 provide brief examples.

Box 6.3: The official Area Mechanic

Ms X. is an official Area Mechanic in Mangochi District, trained several years ago as part of an NGO programme. She works with two other AMs in the VDC; they are called individually by WPCs, but can call the other AMs to help if the problem is big. According to her records, between the three of them they were called to make repairs four times in 2010, and twice in 2011. The AMs are unpaid; instead, WPCs are supposed to pay MWK 500 per year (roughly £1.20) as 'borehole insurance'. Only she receives the money, as she obtained the official forms during her training; the other two AMs in this VDC did not. Her records show that only a handful of WPCs have paid this 'borehole insurance' in the last few years, and none were repeat customers. It thus appears that there is a relatively low level of demand for her services.

Box 6.4: The unofficial Area Mechanic

Mr Y. is an unofficial Area Mechanic in Ntcheu district. His only training was in 1973, but he has learned how to fix modern pumps like Afridevs simply by watching and doing. He is called to help by all villages in his VDC, and even up to 15km away. He says he makes no charge, but just asks villagers to 'give him something so he can buy soap'. He has trained many others informally through demonstration. He goes often to Ntcheu Town because people send him there to get spare parts, but he doesn't keep parts in stock. He is only ever called when a borehole is broken, never for preventative maintenance. He doesn't have his own tools, but he uses those that were left with each WPC by the installers – two spanners and a fishing tool. He usually replaces worn U-seals with a ring cut from an old flip-flop; and when a rod breaks he takes it to be welded at the main road or in Ntcheu, at one-tenth of the price of a new rod.

Conclusion

On the one hand, availability of maintenance and repair skills is undoubtedly important. On the other hand, the existence of WPCs is evidently not an effective mechanism for ensuring availability of those skills. Overall, SKILLS is **moderately significant** in explaining water point sustainability, but an alternative model of skills provision is urgently needed.

6.2.8 FUNDS: Availability of funds for repairs and maintenance

Finance is needed to pay for spare parts and/or skilled people to keep water points functioning. The community management model is based on the assumption that users will pay regular contributions into a 'water point maintenance fund', so that money will be available in case of breakdown. My working hypothesis was therefore that higher FUNDS would be associated with higher FUNCT.

<u>Quantitative analysis</u>

A large number of questions regarding this variable were included in the surveys. This was for three reasons: 1) to get accurate detail, 2) to provide opportunities to triangulate responses, and 3) because this area had been highlighted by previous authors (e.g. Haysom 2006) as especially important. Altogether the surveys included 31 questions with bearing on water point finances, of which 20 were included in both U and M surveys (273 data points), 1 was included in M and W surveys (437 data points), and 3 were included in W, U and M surveys (611 data points). This large quantity of data served to particularly highlight problems of data quality. Contradictory and/or inconsistent responses were frequently encountered – problems that might not have been so apparent if the surveys had simply asked one or two questions about finances and taken the responses at face value. The implications are highlighted in the analysis below.

First, very few people understand how much a water point costs. Only two Users (1%) and nine Managers (9%) thought they knew the cost of a water point, but almost all substantially underestimated the amount; only three guessed anywhere close to the real figure (approximately 1 million Malawi Kwacha). This lack of understanding of the economic value of a water point in turn has implications for people's understanding of likely cost of repairs or replacement.

Communities are often encouraged to open a bank account when a new water point is installed, as a place to keep the money in the Maintenance Fund. However there is considerable geographical variation: in Mangochi, none of the communities had to set up a bank account, and in Ntcheu fewer than 5% reported doing this. In contrast, in Nsabwe (53%), Chimaliro (76%), Lundu (65%) and Masache (42%) a large proportion of respondents indicated that a bank account had been opened before installation - although in most (72%) of these cases the respondent did not know how much money was put into the account. In the other 22 cases, the amount reported ranged from MWK50 to MWK18,000 (median 4000, mean 5407, mode 2500). For reference, £1 = approximately MWK 400 at the time of the surveys. Reportedly, 82% (64/78) of these bank accounts still exist. In 44 cases, the amount held is not known; in the remaining 20 cases, the amount held ranges from zero (6 cases) to MWK11,700 (median 2000, mean 2888, mode 0). However, in only 5 cases were we able to verify any of this information using written records.

The core of the community management financial model is regular contributions from users into a Maintenance Fund. A typical model in theory involves monthly payments of, say, MWK 50 (a little over 10 pence). It is important to establish whether this happens in practice.

Looking at all User and Manager responses together, 36% say they pay monthly, 9% pay yearly, 27% pay occasionally, and 25% never pay at all (Table 6.30). Managers are somewhat more likely to indicate annual or occasional payment. Along with other discrepancies in the data, I suggest that this indicates 'confirmation bias'; Users know that they are expected to contribute monthly, so they say that they do.

Table 6.30: FUNDS: frequency of community contributions.

Does the community contribute financially?	Users	Managers	Both
No	24%	27%	25%
Yes, pay per bucket	1%	0%	1%
Yes, pay monthly per household	39%	29%	36%
Yes, pay monthly per person	1%	0%	0%
Yes, pay yearly per household	9%	10%	9%
Occasionally, when repairs are needed	21%	22%	21%
Occasionally, various reasons / not sure why	5%	8%	6%
Other	1%	2%	2%
Not applicable	0%	1%	0%
TOTAL	100%	100%	100%

However, among those who say they pay monthly, only 77% report the last actual contribution as being within the last month (Table 6.31).

Table 6.31: FUNDS: Date of last contribution

When was the last time your household paid for water?	Users	Managers	Both
0-1 month	75%	82%	77%
2-6 months	11%	7%	10%
7-12 months	3%	4%	3%
A long time ago	2%	0%	1%
Don't know	9%	7%	9%
Total	100%	100%	100%

A quarter (25%) of U and M respondents indicated that some households are exempt from payment. Reported exemption is particularly high in Mbwana Nyambi (35%) and Chimaliro (37%), both high-functionality TAs; and particularly low in Kwataine (10%), a low-functionality TA. It's plausible that high incidence of exemption may be related to equity guidelines set by recent major water point construction projects in those TAs. In most (58%) cases, exemption was in place only for the elderly, while in another 33% both the elderly and some other group/s (disabled, poor, sick) were exempt. Overall this suggests that communities see the elderly as the main group 'deserving' of collective subsidy.

Among those respondents who indicate that the community does pay into a water point maintenance fund, 51% say that 'all or almost all' of those who are supposed to pay do indeed pay, while 31% say that 'about three-quarters' do. 26% of respondents say that there is no penalty for non-payment, while 48% indicate that non-payers are banned from using the water point. The qualitative data considered in the next section contains examples both of people stopping using a water point due to non-payment, and reports of dominant characters continuing to use a water point regardless of non-payment.

There is data in 50 of the 99 Manager surveys regarding the total amount of the previous collection: the median is MWK 2000 (mean 2700, range 200 to 11,700). More than a fifth of Managers (22/99) did not know how much had been collected - somewhat disconcerting, since almost all Managers were members of the WPC. Where money is collected, a large majority of respondents report that this is done by a WPC member (94%) and that the fund is looked after by a WPC member (88%) – normally the Treasurer, but sometimes the Chair. In a small minority of cases the money is collected and/or looked after by the VH or a member of the VDC.

Since most respondents report making regular or occasional payments, in theory most WPCs should have significant amounts saved for maintenance and repairs. There is data on this question from 86/99 Manager surveys (Table 6.32). Of those 86, 24 (28%) did not know how much was in the Maintenance Fund, 19 (22%) said there was nothing, and 8 (9%) said the question was not applicable (presumably because there is no such Fund). Among the 54 Managers who knew how much was held in the Maintenance Fund, the median amount saved was MWK 1150 (mean 2169, mode 0, range 0 – 11,700). MWK 1150 was worth about £2.75 in July 2012. To put this another way, only eleven of the 86 Managers reported that enough had been saved to buy a single replacement rod costing MWK 4000.

Table 6.32: FUNDS: Amount held in Maintenance Fund.

District	TA	% of Managers who know how much is in Fund	Total currently held in WP Maintenance Fund				
			Mean	Median	Mode	Min.	Max.
Ntcheu	Chakhumbira	36%	825	400	0	0	2500
	Kwataine	39%	1864		0	0	5000
Mangochi	Mbwana Nyambi	60%	3650	3200	3000	0	9450
	Nankumba	86%	2100	2100	1500	0	3600
Thyolo	Nsabwe	43%	500		0	0	1500
	Chimaliro	80%	4460	5240	0	0	11700
Chikhwawa	Lundu	83%	1044		0	0	4420
	Masache	100%	1075	150	0	0	6255
All		63%	2169	1150	0	0	11700

Clearly, the ideal of the 'just-in-case' water point Maintenance Fund is rarely, if ever, realised in practice. Even where some money has been saved, in not one case is the amount saved consistent either with likely need, or with the level of contributions reportedly made by community members.

A simple calculation highlights the scale of the discrepancy. Let *Fa* be the amount that is actually in the Maintenance Fund, and *Ft* be the amount that should theoretically be in there - based on the number of households using the water point (*h*), the frequency of payments (*f*), the size of payments (*p*), the age of the water point (*y*), and the amount expended so far on maintenance and repairs (*m*)). Thus: Ft = (p*f*h*y)-m. It is possible to calculate *Ft* for 43 cases in my dataset, and to compare this with *Fa* for 30 of them (in the other 13 cases, the Manager did not know how much was currently held in the Maintenance Fund). Table 6.3 presents the findings.

In virtually every case the discrepancy is enormous; in only three of the cases does the Maintenance Fund hold more than one-fifth of the amount it ought to, and in the majority of cases it holds only 1% or less. On average, the amount saved is just 2% of what it should be. While it would be unrealistic to expect a 100% savings rate, the sheer scale of this discrepancy strongly suggests that the financial assumptions underpinning the community management model are in serious need of revision.

Table 6.33: FUNDS: Actual versus theoretical amounts in Maintenance Fund.

WP	District	TA	Theoretical (*Ft*)	Actual (*Fa*)	*Fa* as % of *Ft*
W701	Chikhwawa	Lundu	32,901	-	0%
W771	Chikhwawa	Masache	47,750	-	0%
W279	Mangochi	Mbwana Nyambi	50,301	-	0%
W747	Chikhwawa	Masache	52,101	-	0%
W630	Thyolo	Chimaliro	61,501	-	0%
W710	Chikhwawa	Lundu	130,200	-	0%
W737	Chikhwawa	Masache	239,901	-	0%
W738	Chikhwawa	Masache	344,301	-	0%
W092	Ntcheu	Chakhumbira	470,349	300	0%
W434	Mangochi	Nankumba	758,301	2,700	0%
W765	Chikhwawa	Masache	21,500	100	0%
W530	Thyolo	Nsabwe	179,901	1,500	1%
W686	Thyolo	Chimaliro	84,600	1,000	1%
W332	Mangochi	Mbwana Nyambi	107,901	1,300	1%
W739	Chikhwawa	Masache	53,000	650	1%
W745	Chikhwawa	Masache	153,901	2,000	1%
W298	Mangochi	Mbwana Nyambi	149,661	3,000	2%
W278	Mangochi	Mbwana Nyambi	194,781	4,000	2%
W278	Mangochi	Mbwana Nyambi	201,741	4,900	2%
W621	Thyolo	Chimaliro	179,901	5,500	3%
W769	Chikhwawa	Masache	5,300	200	4%
W741	Chikhwawa	Masache	8,690	500	6%
W280	Mangochi	Mbwana Nyambi	109,101	9,450	9%
W374	Mangochi	Nankumba	13,800	1,500	11%
W459	Mangochi	Nankumba	12,000	1,500	13%
W431	Mangochi	Nankumba	23,500	3,300	14%
W420	Mangochi	Nankumba	19,100	3,600	19%
W316	Mangochi	Mbwana Nyambi	10,701	3,000	28%
W727	Chikhwawa	Lundu	14,600	4,420	30%
W749	Chikhwawa	Masache	14,901	6,255	42%
All			3,746,186	60,675	2%

There are several possible explanations for this discrepancy, as discussed in earlier chapters. Broadly, they fall into two categories: 1) money is not collected in the first place, either because people are too poor to pay or for other reasons; or 2) money is collected, but is badly managed or misused. In reality, 2) often leads to

1): if people suspect that the Fund is misused, they stop contributing. This is one of the themes that emerges clearly from the qualitative data.

My survey looked at the quality of financial management from several angles. One aspect is recordkeeping; there is data on this from 89/99 Manager surveys. In 17 cases (19%), they admitted that no records were kept at all, while in another 41 cases (46%), records were reportedly kept, but were not available. In only 22 cases (25%) were records available for inspection, and in only 3 of these cases (all of them relating to functional water points) were the records of good quality.

Another aspect of accountability relates to whether Managers report back to Users on financial matters (Table 6.34). More than two-thirds of Managers state that they 'always' report back to communities; but less than 40% of Users agree; almost half the Users say that WPCs 'never' report back, but only 15% of Managers agree. Since Managers have an incentive to overstate the degree to which they are accountable to the community, Users' responses are more likely to reflect reality.

Table 6.34: FUNDS: WPC accountability.

Do the WPC report back to the community on how the money is spent?	Users	Managers	Total
Yes, always	39%	68%	50%
Yes, sometimes	5%	7%	6%
No, never	43%	15%	33%
Not applicable	6%	9%	7%
Don't know	6%	1%	4%
Total	100%	100%	100%

Users are also twice as likely as Managers to rate financial management as poor or very poor (37% vs 19%) (Table 6.35). Conversely, 67% of Managers rate it good or excellent, against only 42% of Users. Even so, User opinion is fairly evenly split, which is perhaps surprising given that objective measures (e.g. amounts saved) and qualitative data (considered shortly) both suggest that financial management is poor in a large majority of WPCs.

Table 6.35: FUNDS: Quality of financial management.

How good do you think the financial management of this water point is?	Users	Managers	Both
Very poor	20%	10%	16%
Quite poor	18%	9%	14%
OK	6%	5%	6%
Good	42%	62%	49%
Excellent	1%	6%	3%
Not applicable	6%	7%	6%
Don't know	8%	2%	6%
	100%	100%	100%

There is, as expected, a relatively strong relationship between financial transparency and positive User perception: 70% of WPCs that ‘never’ report back are rated poorly by Users, while 76% of WPCs that ‘always’ report back are rated positively.

Having thoroughly examined the data on FUNDS, we now come to the core question: what is the relationship between FUNDS and FUNCT? Two variables are of particular interest: whether water point users contribute regularly, and the amount of money saved in the Maintenance Fund.

I classified responses into 3 groups; those who said they contributed regularly (every month or year), occasionally, or never. Table 6.36 summarises the cross-tabulation. There is a moderately large and significant relationship between (self-reported) regularity of payment and functionality: X2 (2) = 11.728, P<.005. The standardised residuals show that this result is largely driven by the high levels of non-functionality among the water points where people do not contribute. The direction of the relationship between FUNDS and FUNCT is complex: on the one hand people are less likely to contribute towards a broken water point, especially if it has been broken for some time; on the other hand, in some cases the only time that people do contribute is after the water point has broken down, when the need for funds is obvious and urgent. Care is needed in interpreting the data, and again the qualitative data serves to illuminate the issue.

Table 6.36: Relationship between FUNDS and FUNCT.

Contribute regularly?		**Functional?**		**Total**
		No	**Yes**	
No	#	30	38	68
	%	44%	56%	100%
Occasionally	#	21	54	75
	%	28%	72%	100%
Regularly	#	27	102	129
	%	21%	79%	100%
Total	#	78	194	272
	%	29%	71%	100%

Next I consider whether high levels of savings in the Maintenance Fund influences functionality. In theory, high levels of savings would indicate strong capacity on the part of the Water Point Committee, and would mean that any breakdowns would be rapidly fixed. However, as has already become evident, savings levels are universally much lower than they should be, so it is likely that the data will be too limited to draw many conclusions. I use logistic regression to examine the influence of the continuous variable 'Amount currently held in Maintenance Fund'. The results, summarised in Table 6.37, show that the size of the Fund has no influence on functionality.

Table 6.37: Effect of FUNDS on FUNCT: binary logistic regression results.

	B	S.E.	Wald	df	Sig.	Exp(B)
FUNDS (amount currently in Maintenance Fund)	.000	.000	.164	1	.685	1.000
Constant	.950	.351	7.313	1	.007	2.585

However, savings data is only available for 65 water points, and for most of these, savings levels are extremely low. Statistical analysis is therefore of limited value, but the qualitative data sheds further light on to what is really happening with raising and managing funds for water supply at community level.

Qualitative analysis

FUNDS was the variable that was highlighted by far the most frequently by respondents. It was coded in 84% of the interviews and surveys, with 276 references in total (ranking 1st). Three key themes emerged.

Major inconsistencies between financial theory and practice

As shown in the previous section, there was frequently a very large discrepancy between what should have been saved, according to respondents' description of financial arrangements, and what had actually been saved. Two main mechanisms could explain this: 1) contributions are lower than Users claim, and/or 2) funds are misappropriated by Managers. In fact, the evidence suggests that these two mechanisms are mutually reinforcing.

In a large number of cases, WPC users and managers reported that most users made regular monthly contributions, but further probing revealed a more complex picture. It is likely that 'courtesy bias' goes some way to explaining this tendency to exaggerate contributions. For example, at W763 respondents admitted they had not contributed for ten years, but, aware that this was not how it was 'supposed' to be, insisted that they planned to start collecting again "next month".

There are several reasons why contributions decline. One obvious point is that most users have little disposable income, and many priorities other than water. If the money is not required to fix the water point immediately, the incentive to contribute is weak. For example, respondents at W294 reported that they stopped contributing in the "hunger months". On the other hand, a group of men at W093 claimed that "shortage of money" is the reason why they don't repair their borehole with a proper U-seal; but when asked how they had enough money to buy alcohol (several were obviously drunk) but not enough for water, they replied that it was due to "ignorance" – while the women who were listening laughed.

Another factor is the absence of penalties for non-payment. Some community members are feared, and payment is not enforced: "People shout a lot so they don't do anything" (M79; also W18, and VDC 1A1). If some users can avoid paying, others soon question why they themselves should contribute.

Villagers also hope that, if something serious does go expensively wrong, a "well-wisher" or wealthy outsider - such as a politician or an NGO - will fix it for them. This happens frequently enough that it is not an unreasonable hope. For example, W221 broke down shortly after installation and remained non-functional for 3 years until the 2009 political campaign, when the MP paid for repairs. Similarly, W348 was repaired free of charge by the installing NGO two years after it broke down, and very shortly before the end of the project - perhaps the NGO wanted to ensure maximum functionality levels before the end-of-project evaluation?

As one local government worker explained "What has been happening.... The MPs are taking advantage, the MP has repaired it, maybe a small thing has broken down and the community waits for the MP to repair it" (L6). A DWO in another district complained: "There are some [water points] where the people didn't accept to have the rehabilitation because they had to pay a commitment fee. Because we were used to having everything free from government. They said ah the government will pay, maybe our MP will support us..." (L3). Another respondent argued, "there is no incentive right now for communities to collect up to the bar, no clarity that that they have to … every couple of years when the district gets lots of funding they come along and do all the repairs that area mechanics could do..." (N5). EWB Fellows also noted the counterproductive effect of donors providing 'free stuff' (B13, B26). Although this could be seen as a case of 'moral hazard', whereby communities do not bear full responsibility for the consequences of their inaction, I would suggest that the term is in fact more applicable to the actions of the installers, who evade responsibility for the long-term consequences of their installations thanks to the community management model.

Finally, many Users simply do not trust Managers. Misuse of funds is widely reported, so Users have little faith that their contributions will be saved until needed. This finding emerged particularly strongly, as outlined in the next section.

Misuse of WPC funds by WPC members.

Misuse of funds is the single most important reason why people do not contribute. One DWO observed, "the people can raise some funds but the ones that have received the funds don't declare them, don't use them properly... so that scares the people to contribute more funds" (L3). A local NGO worker echoed this, observing: "Most of the time if you ask why they do not contribute people will say they are poor. But … if you probe deeper … it has come to my common knowledge that indeed the factor that communities suspect their funds are being embezzled … has actually arisen. It is very true people don't actually believe that … the people who are entrusted to keep that money will do a fair job. They think they will actually spend the money. But it's difficult to prove that…" (N3).

Indeed, numerous examples were given by respondents of WPC members misusing funds intended for maintenance and repair of the water point (including U19, U26, U27, M20, M23, U43, U47, M37, M38, M48, W318, W495, W499, M62, W527, M63, W536, W553, U108, U117, U123, M84, U144, and U162). Typical comments included: "Some people don't contribute because people in the past contributed and the WPC misused the cash" (U19); "People refuse to contribute because they don't believe the WPC, they think that they use the cash for their families" (M23); "the WPC eats the money … they misuse the funds and buy their own needs" (U47); "The old committee took the money for the borehole and made their business with it" (W553). In one case, the respondent was more forgiving: "The funds are used differently. If one WPC member is sick they use the money to take him to hospital. The community is aware of this" (W736); but a much more frequent comment was "People used to borrow and do business with the money" (U101).

A typical example is W527. At first, the people at this water point said that they trusted the committee. But in response to further questions they said "the fund was there but due to some quarrels the fund is nowhere to be seen". They reported that the Treasurer collected money in the past, but that money disappeared over 2 years ago. Now there is nothing saved, and they don't contribute.

At another water point, U117 reported: "The WPC has been active but in June other WPC members realised that the money that the treasurer was keeping was not according to records, and when the WPC wanted to check in the book the treasurer said that she lost the notebook [as a way of hiding information]." Another user at the same water point (U118) added: "One of the WPC members was pregnant and had to buy baby clothes out of that [Maintenance Fund]. The GVH was told the story and that person had to pay back. This happened twice with the WPC members."

Financial mismanagement is a major reason for the dissolution and replacement of committees. One user explained: “This is the third committee … the community don’t contribute and the WPC is not active because the community speaks a lot on funds management … The community thinks that WPC are eating their money” (U123). Another, U144, reported that they were on to their fourth committee; the previous three had been replaced due to mismanagement of funds.

People often seemed afraid to question the WPC about financial management. At W665, respondents reported that about MWK 22,000 had been collected the previous year for borehole repairs, but had disappeared. A member of the WPC disclaimed responsibility, saying “I don’t know anything about the money … the treasurer is the only one who knows”. The people appeared afraid to ask the treasurer directly.

At W713, a standpipe in a small town, the tap was closed in 2007 due to an “alarming bill”; the committee misused the money, but they were not punished. It was reopened later that year; but the committee is still the same two women who ‘ate’ the money in 2007. These two women insist no one can take water unless one of them is present, so water was not flowing at the time of my visit. The users want to change the committee but they fear these two women: “These two women say other women are too junior and cannot pull them down”. The users believe that the water board is also aware of the committee situation, but “even though you go to complain to the VH or VDC or water board, they will not pass with their decision”. At W709, another standpipe, users explained that they were afraid to ask the committee members about financial management, for fear of being prevented from taking water: “The committee use their position power. It is very impossible [to hold them to account] … We are afraid”.

Abuse of power by chiefs

Similar concerns were voiced about the role of village heads. One DWO observed that “what happens normally, these WPCs, they are influenced by village headmen... to misuse or to mismanage the WP funds… The village headmen are the ones who cause problems. Because they go there and they command the WPC to give them what they have collected, and because it is the headman the WPC just give out the money…” (L5). Another DWO agreed: “In fact the challenge comes when we are setting off those WPCs. It seems there is no proper way we can elect the people to be on the committee. You find most of the people are related to the chief... they are more powerful, they can abuse” (L2).

In a few places, the VH treats the water point as his personal domain. For example, at W150, my research assistant Yanja reported: “There is no committee; the VH does everything alone, these members are like rubber stamps… People have doubts because they don’t know how their money is spent. The VH is very tough, everybody fears him. He says that the borehole is at his compound so he is the only one to control it”. Similar situations were reported by U17 and U128.

More frequently, the WPC operates under the control of the VH. At W052, the VH was a member of the WPC, took the funds that were collected, and has never accounted for them. Further examples were reported by U142, and U101: "the VH used powers to get the cash"; and by M19: "The VH … sometimes he gets the funds and misuses it. He has the powers and controls the WPC". A WPC member at W550 complained that the VH had sent someone else in her place for the training, in order to get the training allowance.

Users find it very hard to hold chiefs or their relatives to account. For example, at W633, users reported that a WPC member (now passed away) had misused all the money, but they had been unable to stop him because "he was very troublesome. He was a senior man so they were fearing him as a big man in the committee". In fact, he was a nephew of the VH, and they believe the VH also 'ate' (i.e. misused funds) with him. Similar problems are illustrated in Boxes 6.5 and 6.6.

Box 6.5: Public resource, personal profit

When I visited borehole W135, it was only 3 months old. It had been donated to K*** village by American evangelists, and was located next to the compound of an obviously wealthy family, who had a large house and a truck. The father of the family was district governor for the Malawi Congress Party, and the son was the Village Head. The villagers reported that the borehole was being operated for personal profit by this very well-connected family, who charged other community members 150K per month (three times the 'normal' rate) to use it. Most villagers were forced to use a 'spring' - a muddy trickle - 300m away down a steep hill. The district governor, alerted to my visit, was clearly alarmed that I "might have been given wrong information". Attempting to explain his control of the borehole, he said "My people are primitive, they don't want development". How he thought this justified this example of elite capture was unclear.

Box 6.6: Plus ca change…

At W598, visited in July 2012, there was a handwritten notice: 'Special announcement: from July 2012 we will start collecting money at this borehole. K50/hh, K100/hh for those with cows.' The notice was posted by the new committee who were elected in January 2012 when the borehole parts were stolen; the repair had cost MWK 31,080. The people I met at the borehole – about a dozen users - reported that some refuse to pay, but still take water – "they are powerful people and can't be challenged". The respondents reported that the old committee were collecting money but "they just ate it", and the VH wouldn't punish the corrupt WPC because "they were eating together". I asked about the new committee – would they also eat the money? The answer was surprisingly open: "Yes! So far they have used the money to buy parts but in future they will eat it". My translator explained: "The problem is money. They collect it for the borehole but then if they have personal problems they use it". But the people don't report misuse of funds, because "They are afraid. These people are powerful. They know how to shout."

These numerous examples add up to an overwhelming weight of evidence that the financial aspect of the community management model simply does not work.

Abuse of power, misuse of funds, and absence of trust are all themes that emerge vividly from respondents. These findings pose a major challenge to the theory of community management - one that I explore in more depth in Chapter Seven.

Conclusion

The key finding here is that, in terms of financial management, people default to 'as and when' (collecting funds only when repairs are required) rather than 'just in case' (saving up in advance). As one DWO put it, "You find a lot [of WPCs] they don't have these water point funds… at that time when the borehole is already broken down, they start collecting money" (L1). All the evidence suggests that this is eminently logical when resources are short, and there is little trust. Overall, FUNDS is **highly significant** in explaining water point sustainability.

6.2.9 SUPPORT: Availability of external support

Availability of external post-construction support is thought to be an important factor in sustainability (Whittington, Davis et al. 2008). Thus, I tested the hypothesis that increased SUPPORT is associated with increased FUNCT.

Quantitative analysis

Managers reported generally very low levels of post construction support (PCS): 71% received none from the installer, and 57% received none from any source. However, Mangochi district is an exception (Table 6.38): 46% reported receiving PCS from the installer and/or from the District Water Office, with a higher proportion receiving support in TA Nankumba, where there was an ongoing WASH project at the time of my survey. In Chikhwawa, installers provided little PCS, but the DWO made multiple visits to a number of sites, especially in TA Masache.

Table 6.38: SUPPORT: Frequency and source, by District and TA.

District	TA	Post-construction support				
		Frequency	Source			
			Installer	DWO	MOIWD	Other
Ntcheu	Chakhumbira	None	69%	69%	77%	85%
		Single monitoring visit	15%	15%	8%	
		Don't know	15%	15%	15%	15%
	Kwataine	None	72%	67%	100%	100%
		Single monitoring visit	11%	6%		
		Multiple monitoring visits	17%	17%		
		Maintenance (free)		11%		
Mangochi	Mbwana Nyambi	None	69%	63%	100%	100%
		Single monitoring visit	6%	19%		
		Multiple monitoring visits	25%	19%		
	Nankumba	None	30%	40%	100%	80%
		Single monitoring visit	20%	30%		10%
		Multiple monitoring visits	50%	30%		
		Other				10%
Thyolo	Nsabwe	None	70%	80%	100%	80%
		Single monitoring visit		20%		
		Multiple monitoring visits	30%			20%
	Chimaliro	None	82%	64%	100%	91%
		Single monitoring visit	9%			9%
		Multiple monitoring visits	9%	36%		
Chikhwawa	Lundu	None	88%	88%	100%	100%
		Multiple monitoring visits	13%	13%		
	Masache	None	92%	58%	100%	100%
		Multiple monitoring visits	8%	42%		

There was a strong correlation between receiving no PCS and being dissatisfied with availability of PCS (50/54). On the other hand, of those that received PCS more than once, less than half (8/17) were satisfied. Cross tabulation suggests there is little relationship between SUPPORT and FUNCT: 77% of water points that had received ‘good’ PCS (two or more visits) were functional, but so were 72% of those where no PCS was received at all (Table 6.39).

Table 6.39: Relationship between SUPPORT and FUNCT.

SUPPORT			FUNCT? No	FUNCT? Yes	Total
Any PCS at all?	No	#	16	41	57
		%	28%	72%	100%
	Yes	#	14	27	41
		%	34%	66%	100%
Good PCS?	No	#	26	55	81
		%	32%	68%	100%
	Yes	#	4	13	17
		%	24%	76%	100%
Total		#	30	68	98
		%	31%	69%	100%

The chi-square test confirms that this relationship between SUPPORT and FUNCT is small and not statistically significant (Table 6.40) - a finding that conflicts with that of Whittington, Davis et al. (2008). Again, the qualitative data illuminates the findings further.

Table 6.40: Effect of SUPPORT on FUNCT: Chi-square test results.

Variable	Chi-square	df	p	Cramer's V	p
GoodPCS?	.486	1	.486	.070	.486
MinimalPCS?	.442	1	.506	.067	.506
NoPCS?	.414	1	.520	.065	.520

<u>Qualitative analysis</u>

SUPPORT was coded in 47% of the interviews and surveys, with 53 references in total (ranking 6th). Two key themes emerged.

Support is not usually requested; and even if it is, it is usually not forthcoming.

There appears to be a self-fulfilling pattern of low expectations and low provision of PCS. Most communities with a broken-down water point had not reported it to anyone outside the village, even though this is supposed to be one of the roles of local government structures (VDCs reporting to ADCs, ADCs reporting to Districts). Even when communities do report breakdowns and request assistance, support is usually not forthcoming (e.g. W568; W570). Politicians were in fact mentioned more frequently than any other source of external support in the qualitative data; but as already discussed, their input tends to be concentrated at the time of election campaigns – with one or two honourable exceptions (e.g. in VDC 4A3).

DWOs lack both human and financial capacity

One of the key limitations on provision of PCS is the shortage of Water Monitoring Assistants at District level. One DWO observed: "In fact whenever the communities have a problem they are supposed to contact the WMA located in their respective TA. But we have that problem of shortage of WMAs… We need to provide backup service… We don't have enough resources... we need to have enough WMAs to monitor those WPCs" (L2). A donor echoed this, saying: "it's still very much a low capacity issue with not having enough WMAs" (D2).

Some locate the root of the problem at national level: "The Ministry is weak and can't play that role at national level, that oversight, that planning, that coordination.... and the ministry is weak at a district level… most DWOs have [just] a water officer" (N5). Another NGO observed that "MOIWD is one of the biggest ministries in Lilongwe [but] when you go to the district it is only one or two people who are qualified. The rest they are just picked straight from school" (N9). While DWOs struggle with extremely low monthly financial transfers from central government (as detailed in Chapter Four), donors suggest that this is not due to their lack of generosity, but rather to MOIWD policy: "The districts are … not empowered in terms of resources… us development partners would want to put more resources, so they have to find a mechanism…to get more funding to the districts for water supply" (D1).

One Malawian working for a major donor contrasted community management with the previous centralised support system: "The way that rural water supply has been managed, it's more or less the policy that government has. There has to be a WPC and that WPC has to be trained. It's a policy, not imposed by donors… The bottom line is what people need is continuous support, which I believe was there… in the time of Kamuzu Banda. WPCs were all functioning and there was a group of people from central government going to repair boreholes all over Malawi. But it's not sustainable. That is why the government came with policy to say they will provide funding to build, but O&M that has been pushed to communities and I know communities, without support from the district council… the WPC will not function. Soon after the project there are no committees" (D1). This comment suggests that community management was introduced because centralised support, while effective, was (financially) 'not sustainable'. However, since community management is also unsustainable (both financially and institutionally), perhaps it may be time to reconsider more centralised approaches to providing support.

Conclusion

Overall, SUPPORT is **moderately significant** in explaining water point sustainability. Although the statistical analysis suggested a weak association, the qualitative analysis highlighted the urgent need for more resources to strengthen capacity in District Water Offices, which are expected by all stakeholders to play the main role in providing post-construction support. Interestingly, none of the respondents suggested that PCS should be (in part at least) the responsibility of the donors or NGOs who fund most of the installations.

6.2.10 THEFT: Incidence of theft

I now turn to the tenth and last variable tested. Theft and vandalism are highlighted as significant issues in some parts of the literature (Kleemeier 2000, Campbell 2009). It is worth noting here that Malawians tend to use the word 'vandalism' interchangeably with 'theft', rather than with the conventional English meaning of 'purposeless damage'. I hypothesised that higher THEFT (of water point parts, rather than funds) would be associated with lower FUNCT.

Quantitative analysis

The lack of a specific question on theft in my surveys was a significant omission, given that I had identified it as a potentially significant explanatory variable. However, theft or vandalism was spontaneously mentioned by a significant number of respondents when discussing reasons for breakdown, non-functionality, and dissatisfaction, so I was able to construct a THEFT variable using this data.

Table 6.41 shows the percentage of surveyed water points in each VDC (those at which a User, Manager or Water point survey was conducted - that is, not including Listed water points) at which theft was reported. Some water points had experienced theft several times, but each WP is only counted once in the table. Red shading highlights VDCs where a higher-than-average percentage of water points have experienced theft.

Table 6.41: Reported THEFT by District and TA and VDC.

District	TA	VDC	# WPs	# Theft*	% Theft*
Ntcheu	Chakhumbira	Lihako 1	6	0	0%
		Zidana	18	5	28%
		Tchayatchaya	7	1	14%
		Namale	19	3	16%
	Kwataine	Masitimale	18	4	22%
		Chimphamba	14	3	21%
		Nachiye	8	1	13%
Mangochi	Mbwana Nyambi	Mkumba	16	0	0%
		Mzinda	25	5	20%
		Kumbalama	18	2	11%
	Nankumba	Chamba	17	1	6%
		Kasankha	20	0	0%
		Chiwalo	19	0	0%
Thyolo	Nsabwe	Ndaona	18	4	22%
		Chalonda	13	0	0%
		Mzundu	15	0	0%
	Chimaliro	Chidothe	7	4	57%
		January	12	7	58%
		Boyidi	14	8	57%
Chikhwawa	Lundu	Tomali	5	1	20%
		Sekeni	15	1	7%
		Nkhwazi	10	0	0%
	Masache	Jackson	7	1	14%
		Mphonde	8	0	0%
		Masache	9	1	11%
Total			338	52	15%

*# Thefts and % Theft = # and % of WPs at which theft was reported (each WP is only counted once).

Overall, theft was reported at 15% of all surveyed water points; but the problem is concentrated in particular areas. Most noticeable is the very high incidence of theft in TA Chimaliro – over 50%. Above-average incidence was also reported in several other VDCs. In 7 of the 52 cases (6 of them in low-functionality Ntcheu District) the theft occurred after the water point had already broken down; but in the other 45 cases, parts were stolen from a functioning water point, often causing permanent breakdown. This raises the question of whether theft is a significant determinant of functionality. The chi-square test indicates that, indeed, THEFT is significantly associated with FUNCT ($X2$ (1) = 9.635, $p<.005$; Cramer's V = .169, $p<.005$). Put another way, water points that have experienced theft are more than 2.5 times more likely to be non-functional than the rest.

Qualitative analysis

The survey notes and interview transcripts provide more details. THEFT was coded in 71% of the interviews and surveys, with 114 references in total (ranking 2nd).

Theft is a major cause of breakdown

As noted above, many cases of theft or 'vandalism' happen while a water point is still functioning. An NGO worker explained: "A key [problem] is vandalism. People take the rods and then they sell in black market. For fixing other boreholes. A new rod is 3500 Kwacha, a black market one 1500. People steal and they sell to other areas" (N4). A DWO concurred: "[People steal] pump rods and spare parts and sell them to other people… Sometimes [it is] people from the boma [town], sometimes people from the same village" (L1).

As described in section 6.2.6 on spare parts, there appears to be a strong demand for cut-price (second hand, perhaps often stolen) spare parts. One NGO observed: "We had some problems with MPs in some areas during the campaign, because they provide a lot of water points but sometimes they provide second hand - we don't know where they got them from" (N7). A DWO (L5) blamed the growth in private traders – itself a direct result of efforts to strengthen the spare parts supply chain - for the problem.

Examples of boreholes that stopped working due to theft include W264 (installed in 2005; one year later all the rods were stolen); 3A1 (a solar pump installed at a hospital in 2007; the solar panel was stolen in 2010); W595 (parts stolen 3 times in 2012); W634 (parts all stolen in 2002 after 4 years functioning); and W656 (pump stolen in 2002, in the same month that it was installed). In some cases the theft occurred even before construction was complete. W637 is an unfinished borehole, part-drilled as part of the 2004 presidential campaign. The drilling company reportedly bought the pipes but 'ate' them instead of installing them. Several other unfinished installations, mainly MASAF projects, were observed in Ntcheu district.

Villagers were often unwilling to speculate openly about the thieves' identity. Respondents at W638 explained "we don't want to hang people". But some respondents expressed views. At W595, the VH thought people within the village were communicating with thieves from outside; at W634 my translator suspected that the surrounding households were the thieves; and at W656 the people thought the WPC Chair and Vice-chair (both now dead) stole the pump. At W669 everyone knew the Village Head had sold the rods to a nearby WPC and "ate" the money. They had complained to the Police, and the VH "ran away". But he still comes back to visit sometimes, and now his sister has become the chief.

Some NGOs have tried to tackle the theft problem by providing locks, and in some places, especially in Thyolo district, the WPCs have welded pumps closed. But this means that when the water point breaks down, the repair job is much more complicated and expensive.

The problem of vandalism also affects gravity fed systems, where one incident can stop the water supply for thousands of people. The problem was illustrated graphically by one DWO: "Like for example, the [xx] scheme has got 107 taps. Out of the 107, all are not functioning because at the source it was vandalised… You know at the intake we normally use the 110mm diameter galvanised pipe. So these ones are vandalised just to make hoes. They make hoes from this pipe. Some make axes... Now we tried again to use the PVC pipes. The PVC pipes are also vandalised to make teapots… So it's difficult" (L5).

Area Mechanics are often implicated in theft.

Several telling comments were made linking theft with Area Mechanics. One DWO despaired: "There is a lot of vandalism. We have trained so many people and now they are able to [remove] these small bolts and move these parts and take them to other parts and sell them. So we are training even robbers" (L3). One specific example is W166. In 2006 this borehole broke down, and the villagers consulted the MP who found someone to repair it. Three weeks after the repair was done, the parts were all stolen, and the people are sure that the mechanic is to blame. They complained to the MP, but he did nothing.

One DWO has tried to learn from experience elsewhere: "Theft, that's not a big issue [here]… In Thyolo the problem of theft came about because the district and NGOs trained area mechanics and then at the same time they gave them materials which would enable them to dismantle an entire borehole. Learning from that same experience … we have trained [Area Mechanics] but we have not given them any equipment. We have left the materials with the WPC" (L2).

In the same way as the loss of trust in WPCs' financial management skills creates a vicious circle of low savings, the lack of trust in AMs undermines their capacity to provide a good service. One illustration of this comes from a District where an NGO proposed that Area Mechanics should travel around with spare parts so that they could perform repairs immediately. However, the proposal was opposed by the Area Mechanics themselves, who said that it would feed the perception of them stealing spares from one pump to fix another one (N5).

<u>Conclusion</u>

These findings show that the variable THEFT is **moderately significant** in explaining water point sustainability. While some damage is accidental (such as farmers cutting through GFS pipes by mistake while cultivating), most 'vandalism' is deliberate theft; and the WPCs and AMs, who are expected to be the guardians of water point functionality, are often implicated.

6.2.11 Other proximate explanatory variables

The sections above have considered in turn the ten key explanatory variables identified in Chapter 2. Before drawing them all together to examine their relative importance and interactions, I briefly consider the other three 'design and installation' explanatory variables – geology, climate and siting. Although I was unable to collect data specifically on these variables, some useful insights nonetheless emerged.

Geology

Geology and topography certainly do affect functionality. As one interviewee pointed out, "the coverage is affected by the topography because in some other areas people have settled in areas where we can't provide them with potable water, and in some other areas we also have problem of salinity. So even if we drill boreholes in those areas, with the salinity you cannot use the water points, so they end up using other unprotected sources" (L2). This problem of salinity particularly affects parts of Chikhwawa district, and lakeshore parts of Mangochi district. Salty water has a doubly negative impact: in addition to leading to corrosion of the water point hardware, it is often undrinkable. More generally, geography and topography influence the choice of WPTYPE. Gravity fed systems are particularly suited to hilly terrain, and are particularly prone to breakdown; hence the lower functionality of water points in mountainous districts like Phalombe and Mulanje.

Climate

Interestingly, there were no references at all to climate in the interviews or surveys. Although some international NGOs claim that climate change is leading to the drying up of water points, no suggestion of this emerged during my research. A number of water points indeed only functioned seasonally – particularly many of the Malda pumps in hilly TA Nsabwe, Thyolo district – but no respondent suggested any longer-term variation or decline, or any link to a change in climate.

Siting

The phenomenon of broken water points being abandoned if there was another functioning one close by was noted by several interviewees (D2, A1) and observed in several locations. For example, W724 broke down in 2011 after 5 years with no problems, but no-one has bothered to repair it because they now have a standpipe. Other problems with siting were also noted. W395 reportedly functioned perfectly from installation in 2001 up until 2009, when a nearby homeowner built a toilet right next to the water point. It was therefore abandoned, and a new borehole (W396) was subsequently installed a hundred metres away.

The problem of political influence on siting was also noted. For example, W740, a Climax wheel pump installed in the 1970s, worked for less than a year. The Village Head had insisted that it should be installed near his house, overriding the installer's topographical objections. There was only water in the wet season, so the pump was abandoned after one season. A much more recent example is W726, a brand new Afridev borehole installed just 2 weeks before my survey, at the site of a big new agricultural market hall located in the middle of nowhere in Chikhwawa district. The borehole functions, but the water is completely undrinkable, with an extraordinarily high concentration of salt. Reportedly, the water was tested during construction, and yet installation continued. The waste of time, money and an expensive new pump set is hard to understand.

So, while siting has some influence, and geology is a key determinant of WPTYPE, climate is not a major factor. My focus on the other ten explanatory variables thus appears justified. In the next section, I summarise and consolidate my findings on those ten variables.

6.2.12 Combined analysis

Tables 6.42 and 6.43 summarise the results of statistical analyses of each variable. Green highlighting denotes statistically significant results. Based on the secondary data, the most significant variable is WPTYPE, with a chi-square test statistic three times that of INSTQUAL. Based on the primary data, the most significant variable is again WPTYPE. Large and significant effects are also clear for (in descending order of influence) FUNDS, THEFT, INSTALLER, SKILLS (one element only), and MAINTFREQ; while USERS, AGE, SPARES and SUPPORT are not significant.

Table 6.42: Determinants of FUNCT: categorical explanatory variables.

Variable	Note	Chi-square	df	p	Odds ratio
WPTYPE	2005 database: WPTYPE	4053.528	6	.000	
	WPTYPE = Borehole, Tap, or Other	31.836	2	.000	
INSTQUAL	2005 database: Installer	1355.292	8	.000	
	Installer = NGO, Govt, or Other	7.808	2	.020	
	Installer = NGO	6.167	1	.013	2.07
	Installer = Government	1.120	1	.290	0.71
	Installer = GITEC	12.830	1	.000	9.35
	Installer = CU	2.058	1	.151	0.59
	Installer = ICEIDA	8.098	1	.004	10.83
USERS	# HH users = >50	2.888	1	.089	
MAINTFREQ	Leakage test ever done?	4.175	1	.041	4.46
SPARES	Problems accessing spares?	.027	1	.868	
SKILLS	Major repairs = WPC / AM / other	7.709	2	.021	
	Minor repairs = WPC	.491	1	.484	
	Major repairs = WPC	1.829	1	.176	
	Minor repairs = AM	3.273	1	.070	
	Major repairs = AM	3.773	1	.052	
	Is WPC active?	.753	1	.385	
FUNDS	Do HH contribute regularly?	11.728	2	.003	
SUPPORT	Good PCS?	.486	1	.486	
	Minimal PCS?	.442	1	.506	
	No PCS?	.414	1	.520	
THEFT	Theft reported?	9.635	1	.002	2.54

Table 6.43: Determinants of FUNCT: continuous explanatory variables.

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
AGE (2005 WP database)	-.081	.001	3343.412	1	.000	.922
Constant	1.652	.021	6398.811	1	.000	5.216
Variable	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
AGE (my primary data)	-.020	.010	3.906	1	.048	.980
Constant	1.462	.148	98.109	1	.000	4.314
Variable	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
FUNDS (my primary data) (amount currently in Maintenance Fund)	0	0	0.164	1	0.685	1
Constant	0.95	0.351	7.313	1	0.007	2.585

My original intention in this research was to combine all ten variables in one statistical model using loglinear analysis. However, due to the diversity of variable types (continuous and categorical) and of data sources (W, L, M and U), and the limited number of data sources for some variables, this is not possible. In any case, as this section has demonstrated, the quantitative data frequently does not offer a full – or coherent - picture. It is only through triangulating findings from both quantitative and qualitative analysis that it becomes possible to contextualise both, and arrive at a clearer understanding of the phenomenon being studied. So, to conclude this section, Table 6.44 summarises the results of my quantitative and qualitative analyses combined.

Table 6.44: Determinants of FUNCT: Summary of findings.

Variable	**Influence**		
	Quantitative analysis	**Qualitative analysis**	**Combined analysis**
WPTYPE	Very high	High	Very high
INSTQUAL	High	High	High
USERS	Low	Low	Low
AGE	Low	Low	Low
MAINTFREQ	Medium	Medium	Medium
SPARES	Low	Medium	Low
SKILLS	Medium	High	High
FUNDS	High	Very high	Very high
SUPPORT	Low	Medium	Medium
THEFT	High	High	High

In Chapter Seven, I offer my interpretation of these results in light of the literature reviewed in Chapters Two, Three and Four. However, before moving on to this, I present the results of one more element of my mixed methods analysis.

6.3 FACTOR RANKING EXERCISE

As set out in Chapter Four, a 'factor ranking exercise' was carried out with interviewees at national and district level. In total, 19 people participated. They were asked to identify in their own words the key factors influencing water point sustainability, and to allocate percentages (weightings) to each factor to indicate relative importance.

Between them, the 19 respondents identified 74 factors, with percentages attributed to each ranging from 5% to 100%. To analyse these factors, I began by using the proximate explanatory variable framework, and attempted to see whether the factors freely identified by interviewees corresponded to the variables identified in Chapter Two. The answer was 'only in part'. It soon became clear that four more categories were required in the classification: 'community ownership', 'sector coordination', 'sector funding', and 'other'. More than half of the factors identified fell within these categories, and more than a quarter within just one, 'community ownership'.

Inevitably, there is a subjective element to classifying responses in this way. There is also some degree of overlap; for example, the issues referred to by one respondent as relating to external support may have been phrased by another as problems of coordination. Nonetheless, Table 6.45 summarises the common themes emerging.

Table 6.45: Factors influencing sustainability: frequency and weighting (by rank) of interviewees' responses.

	Factor	# mentions	Weighting
1	Community Ownership	14	20.1%
2	Sector Coordination	8	16.1%
3	FUNDS**	5	11.3%
4	Sector Funding	6	10.3%
5	SPARES	6	9.5%
6	SKILLS	5	8.0%
7	SUPPORT	6	7.1%
8	Other	8	6.3%
9	THEFT	6	4.9%
10	INSTQUAL	2	2.9%
11	AGE	2	1.8%
12	WPTYPE	1	0.6%
13	USERS	1	0.5%
14	Geology	1	0.3%
15	Siting	1	0.3%

** i.e. 'availability of funds for repair and maintenance' at community level

Evidently, 'Community Ownership' is seen as the most important factor overall. However, it has many dimensions. Examples of comments classified under this heading include the following (percentages in brackets show the weighting given by the individual respondents):

- (60%) "Lack of community ownership - because of the way facilities are provided to communities (not in dire need, not informed or trained on management). Very common with some NGOs."
- (50%) "Lack of ownership - the borehole may have been 'donated' so there is limited ownership towards fixing it."
- (35%) "[Problems with] management arrangements."
- (35%) "Lack of accountability of WPC and / or poor community leadership."
- (25%) "[Lack of] community ownership."

Some other responses, classified elsewhere, are also related to community ownership. For example, the following comments were classified under ‘Funds’ (i.e. ‘Availability of funds for repairs and maintenance’ at community level) but could also be seen as reflecting aspects of low community ownership. In fact, they highlight one of the specific ways in which community ownership may fail, i.e. through breakdown of the financial mechanisms that both reflect, and enable, ownership.

- (70%) “Lack of operation and maintenance funds or unwillingness of communities to contribute towards O&M funds.”
- (30%) “Lack of trust of WPC members or other leaders (who are collecting money) so WPCs have no funds.”
- (25%) “Communities not willing to pay (don't understand up front investment, don't prioritise water, alternative sources nearby etc.) so have no funds in savings.”
- (40%) “Lack of willingness by the communities to contribute funds towards VLOM due to poverty.”

Overall, a consistent message emerges, that this concept of ‘community ownership’ needs to be more closely interrogated. This is a theme that I take up in Chapter Seven.

The next factor, ‘Sector Coordination’ is mentioned by 8 respondents. Example comments include:

- (100%) “Inadequate capacity at District level.”

- (60%) "[Lack of] O&M framework for the community to regulate and guide implementation and no coordination in approaches."
- (40%) "Coordination and collaboration."
- (40%) "Conflict of choices of technology. Multiple suppliers (government, NGOs). Communities prefer taps over boreholes."

It is worth noting that the first response listed above accounts for one-third of the overall weighting of this factor in this analysis, even though the respondent does not mention the word 'coordination'. However I considered this was the most appropriate category for this comment, although it also reflects a wider concern with lack of skills, funding, and perhaps motivation at district level.

The problem of inadequate funding for the sector overall (as distinct from repair and maintenance funds at community level) was mentioned by 6 respondents. Example comments include:

- (50%) "Lack of funding to district."
- (40%) "Inadequate resources to equally distribute new water points."
- (30%) "Lack of operational resources at district level - for district officers to do their monitoring."
- (30%) "Low funding in the sector."

Analysis by respondent type is summarised in Table 6.46. It is evident that donors and national government staff place relatively more emphasis on issues of community ownership than do NGOs or local government staff. No local government respondent highlighted sector coordination as a problem (although they did emphasise lack of external support). Instead, they suggested that problems with accessing spare parts are the most important influence on sustainability - a conclusion that is not borne out by the analysis in section 6.2.6.

Table 6.46: Factors influencing sustainability: top three factors by respondent type.

Respondent Type (#)	# of Factors	1st	2nd	3rd
Donor (4)	8	Community Ownership (28%)	Sector Coordination (26%)	Sector Funding (15%)
Local Government (5)	9	Spares (21%)	Sector Funding (20%)	Community Ownership (18%)
National Government (5)	12	Community Ownership (28%)	Sector Coordination (16%)	Theft (13%)
NGO (5)	10	Sector Coordination (24%)	Funds (19%)	Skills (18%)

Overall, the factor ranking exercise provided a useful alternative perspective on the research question, drawing out the key themes of community ownership, sector coordination and sector funding. These are all examined further in Chapter 7.

Summary

This chapter has presented a clear and comprehensive analysis of the factors influencing water point sustainability in Malawi, using qualitative and quantitative data to interpret and interrogate each other. Important findings and new insights - including some that challenge received wisdom - have emerged from the analysis. Table 6.47 summarises the key points.

Table 6.47: Proximate explanatory variables: Key findings.

Variable	Influence	Key findings
WPTYPE	Very high	Boreholes have significantly higher functionality than piped systems. Afridev pumps are much better than solar pumps or Playpumps.
INSTQUAL	High	Government water points have lower functionality than NGO water points. Excellent functionality among some NGOs is due to investment in technical quality of both hardware and software.
USERS	Low	Queuing time is a significant influence on whether people use safe water points; but user numbers per se are not a major influence on functionality.
AGE	Low	Age is not a major influence on functionality; other factors are much more significant.
MAINTFREQ	Medium	Preventative maintenance is almost never done. For high-quality water points, maintenance is rarely required. Low MAINTFREQ is both a cause and a consequence of low SKILLS.
SPARES	Low	Few spares are held in stock by WPCs. But physical barriers to access are not very significant; questions of finance are more important.
SKILLS	High	Most WPCs are essentially defunct. Few WPC members are capable of repairing a water point. There are insufficient numbers of Area Mechanics. WPCs tend to wait for outsiders (MPs, NGOs) to fix their water points.
FUNDS	Very high	Very low levels of savings by WPCs. Frequent reports of poor financial management. Low transparency and accountability, low trust. Frequent reports of conflict within communities over finance.
SUPPORT	Medium	Little external support, follow up or monitoring is provided. When provided, it is associated with a small increase in the likelihood of functionality.
THEFT	High	Theft of parts is relatively common, and frequent in certain locations.

Building on this empirical understanding, the next chapter analyses the underlying dynamics that influence the operation of the factors discussed above. I examine the differences between the theory and the reality of community management, and offer an explanation for the findings outlined in this chapter.

Chapter 7

ANALYSIS OF UNDERLYING INFLUENCES

Introduction

The empirical findings presented in Chapter Six throw new light on the question posed in Chapter Three: Does the evidence support the hypothesis that 'community management is an effective way to ensure sustainable provision of public goods and services'?

This chapter addresses this question directly, considering two specific aspects in turn:

- To what extent does the operation of community management in practice reflect its potential benefits in theory?
- What explains the differences between the theory and the practice of community management?

The implications for rural water supply in Malawi in particular, and for public service provision in poor countries in general, are then outlined in Chapter Eight.

7.1 COMMUNITY MANAGEMENT IN THEORY AND IN PRACTICE

I first assess the extent to which the results of community management in practice reflect its potential benefits in theory. The literature reviewed in Chapter Three suggested two sets of benefits: efficiency & effectiveness ('instrumental' benefits, in shorthand), and equity & empowerment ('intrinsic' benefits). I consider these in turn.

7.1.1 Efficiency and effectiveness

In theory, community management is both efficient and effective, because it locates the responsibility for, and the skills to undertake, maintenance and repair as close as possible to where they are needed. This localisation should minimise 'friction' and delays by ensuring that the individuals with the skills to make repairs are also those (the community members) who are most motivated to do so, because they depend on the water point. The key mechanism is 'ownership', through which people feel that they have the responsibility, authority and power to act. Thus, community managers – water point committee members - should be best placed to ensure sustainable rural water supply, through:

- conducting regular preventive maintenance;
- making rapid, high-quality repairs in case of breakdown;
- collecting and saving funds to pay for repairs as needed.

In practice, this study found that these assumptions are erroneous. Consistent patterns emerged across multiple locations, strongly supporting generalised findings that contradict the theory.

Preventive maintenance is almost never done

As shown in Chapter Six, preventive maintenance is very rare. Most water points are like W051: "they never do preventative maintenance; they only do things to it if it is broken". As one District Water Officer observed: "we train the people but … most of them after training they have not touched the borehole" (L3). The philosophy of 'if it ain't broke, don't fix it' applies almost universally, and understandably: boreholes that have never broken down have generally never been maintained (e.g. W092, W259, W266 and many others). Managers are nonetheless aware that they are supposed to do regular preventive maintenance; thus, many - like M48, noted in Chapter Six - claimed that they had done so "just last month".

The only really plausible example of regular preventive maintenance recorded among the hundreds of water points visited was at W741, where the WPC chair explained that he greased the pump twice a month using grease given to him free by a bicycle mechanic. This water point was indeed in good condition.

Repairs are often slow and sub-standard

Although WPCs are expected to be able to ensure rapid repairs when a water point breaks down, in reality repairs are often both slow, and sub-standard – if they are done at all. One example is the use of an improvised U-seal made out of an old ‘slipper’ (a plastic flipflop), reported at several water points (e.g. W100) – even though a new U-seal costs only K200 (about 50p), and is widely available in trading centres. A second example is the practice of fixing broken rods by ‘tying them with string’, reported several times in VDC 2B3, and observed at the very first water point visited for this study. These practices, and the (rather more effective) use of welding to fix broken rod connections, are not due to inaccessibility of spares; in VDC 2B3, the district capital is only 30 minutes away down a major tarmac road with frequent vehicles. Instead, they reflect unwillingness or inability to pay.

Despite training, many WPC members struggled with the most basic technical aspects of their role. For example, at W211, the ten committee members were trained in 2009 by the installer for 6 days. Yet, when the borehole needed a replacement bobbin (a simple job) they could not fix it: “When they tried themselves, it was not sweet”. They were unsure what a U-seal looks like, and unable to identify a bush bearing. A similar situation was found at W768, where the committee believed that the borehole breakdown was due to ‘rubbers’ (i.e. the U-seal, a very simple problem to fix) – but had not actually attempted to open the borehole to find out. Even at W316, a GITEC borehole, a User reported: “though the WPC was trained but they fail to maintain the borehole. It took the area mechanic to maintain it and since then it has not been dismantled because they are afraid that they may fail again” (U55).

Some Managers are startlingly uninformed: M32 is Chair of her WPC, which she reports as "active" – but she doesn't know when they last met or who came to the meeting, nor who the treasurer is; while M74, another Chair, "cannot mention anything on the parts of the borehole" (i.e. she knows nothing about it). A respondent at W495 spoke for many when he observed that "we were trained but we have no skills". Even where skills are available, it often takes weeks or months to repair a water point, because it take time to collect funds to pay for spare parts.

In a large number of other cases (e.g. W497, W501, W513) committees were reported to be "trained, but not active". Other explanations for loss of WPC capacity include migration (for marriage, for work) and death: for example, M52 reported that "the first WPC is no longer functioning because most of them died and the new ones are not trained". One EWB fellow working on a borehole rehabilitation project noted that many of them "only had a few broken parts that could easily have been replaced if the Water Point Committee responsible for the well had taken action" (B16).

<u>Committees are unable to collect and save funds</u>

The evidence presented in Chapter Six showed that most WPCs were characterised by limited and/or inactive membership, infrequent or non-existent meetings, weak technical skills, and financial management problems. In no case was the amount saved by the WPC in the maintenance fund consistent with reported contributions. Misuse of funds is very frequently reported. The vicious circle of low trust, low contributions and low motivation causes long delays in making repairs when breakdowns do occur.

One example is W357, a broken borehole next to a school. The committee members were trained “but they have not opened it to maintain it” because, the Headmaster said, “they were not organised”. Committee members said that they reported the problem to the VH, but it needed money to fix it and no-one was contributing. The school felt that the village should repair the borehole, and the villagers believed the school should do it. In consequence no one took responsibility, and the borehole remained broken down.

WPC members often struggle to keep WPC money separate from their personal funds. A telling example (M48) was reported by Yanja: “it shows that in the past the treasurer used the money for business, because when I asked for satisfaction with financial arrangements she said that no any because she stopped doing business because people only contribute 3 months a year” - i.e. the Treasurer admits using WPC funds as capital for her personal business.

Because users do not trust committees to save funds, the ‘just in case’ model of financial management does not work. Instead, funds are collected on an ad hoc basis when needed - and it can take weeks or months to collect the money required to make a repair.

Summary

The evidence does not support the instrumental ‘efficiency’ and ‘effectiveness’ claims of the community management model. In reality, community management is usually characterised by neglect of maintenance, slow and substandard repairs, and failure of committees to save sufficient funds.

However, it could be argued that community management might still be worth supporting on the basis of empowerment and equitability – even if it is inefficient and ineffective. I therefore now examine whether the model delivers these other compensating intrinsic benefits.

7.1.2 Equity and empowerment

In theory, community management is both equitable and empowering. It should provide a model of democratic, egalitarian social organisation that will liberate and include people who are otherwise marginalised, and it should empower community members by equipping them with the skills and authority needed to ensure that their water needs are met. Thus, community management should:

- Challenge inequality;
- Build social capital;
- Empower individuals.

In practice, this study again found that these assumptions are erroneous; consistent patterns emerged of negative, counter-theoretical effects.

Existing unequal village power relations are reinforced

Far from being an arena in which 'lowers' can hold 'uppers' to account (Chambers 1994), community management often provides a new arena for the reproduction of existing inequalities. As detailed in section 6.2.9 in the previous chapter, water point committees are frequently used by their members and by village heads as a means of projecting personal power, especially through misuse of funds. For example, M19 reports that "the VH… sometimes he gets the funds and misuses it. He has the powers and controls the WPC". Community members explain that they cannot hold their committees to account because "the committee is higher than the community" (W108) – committee members have more status and power than ordinary community members.

GITEC boreholes, too, despite their high functionality overall, suffer from the same problems. For example, at W316, U56 reported: "The VH is very tough requesting money now and then so I decided to stop [using the borehole]". Yanja explained: "everybody complained about the VH that he uses community money so some people just stop going to the borehole and drink at the river… Some people were banned because the VH wants money and others haven't found the money [so] they are chased from the [borehole]". Overall, users feel there is "no benefit [from the borehole] because most of the time we don't use it due to VH behaviour" (U56). Interestingly, this interview was interrupted by the VH: Yanja noted that "the lady was interviewed in private and the VH came while the interview was in process so she was unable to answer some of the questions but at first she said that the VH misused the funds".

There is very little that villagers can do to change their VH, since it is an inherited position. In contrast, WPC members are elected, and can in theory be democratically replaced. However, in practice, WPC membership often remains unchanged for years (W219), even when the members are no longer active (M40). In other cases the committee is re-elected, often in response to the previous committee's inaction (M18) or discovery of financial mismanagement (M19, M20) - but even so, users seem to have little hope that the new committee will be any better than the old one (W598).

Community management breeds conflict, instead of building social capital

Numerous managers reported dissatisfaction with their role due to conflict among WPC members, or between them and the wider community – often linked to money. For example, U49 used to be a WPC member but stopped "due to how the chair's daughter talked to her - she talks and shouts a lot"; and as a consequence, "It is difficult to maintain [the borehole] since there are only 2 people remaining in the committee". M48 reported that "We don't meet as a WPC but only when problems arise. Some members stopped because there are always quarrels at the borehole so they can't manage". Many Users and Managers alike made the same observation as M23: "people refuse to contribute because they don't believe the WPC, they think that they use the cash for their families". Consequently many WPC members "just stopped – they were discouraged because of how the community talk" (M40), or "because the community don't listen to them" (M67).

In some cases, WPCs are encouraged by installers to raise money for water point repairs through collective work - building on traditions of self-help - rather than through household contributions. One such case was found by this study; but it is a tale of conflict rather than successful collective action: “There are about 10 households who are not using the borehole next to them because they disagreed. They had a garden for the water point and everybody worked in the tomato gardens, but after selling the tomatoes the WPC did not want to tell people what they got (total cash) and they assigned the community another work (garden) to do, so the community insisted that they should hear what they got from the first garden. And because of this they were told not to drink at that borehole any more. The VH has done nothing to resolve the issue. Even the health worker has done nothing so all these people draw their water from the unprotected well” (Yanja, interview with U86).

Another example of conflict came from W676. As noted by Yanja, “This lady (U127) interviewed went for training. She was previously one of the WPC and when she tried to implement what she was trained on the procedures of buying parts and borehole management people hated her. For instance: they were taught that when they want to buy spares, two should be sent not one, and several times other WPC members had sent one, so on trying to ask reasons for this she was removed from the WPC.” Another User of the same water point (U128) explained further: “the community wanted to know what they contributed for quite a long time and the WPC answered that they bought parts so people were surprised because the borehole has never broken down since installation and [they] were not informed [about] anything. So everybody was angry and stopped contributing … the community did not trust the WPC and people talks a lot so this committee was discouraged and worse the VH had to take control of everything when the WPC stopped. So a new WPC was elected though not respected and active". In this case, the borehole itself has never broken down, but the conflict caused within the community by the establishment of the WPC has been very significant.

Unsurprisingly, no Managers admitted that they themselves had diverted funds, but many Managers as well as Users referred to problems with previous committee members abusing their position. For example, M75 explained that her WPC was active "but it's a new WPC"; there was a committee before but it "mismanaged funds" so a new one was elected. In fact, as Yanja noted, "this is the third WPC. As to what happened with the first one she [M75] don't know but the second one did not manage the finances properly and also took the VH as a WPC member. This did not please community so it was dissolved and this third WPC was elected. So this WPC was not trained. All that were trained are no longer active". From a positive perspective, this quote suggests that the community was able to override an attempt by the Village Head to 'capture' the WPC – which, if true, suggests that the democratic principles underpinning WPCs in theory are being practised in at least some locations.

<u>Individuals feel disempowered</u>

Far from finding community management an empowering experience, both users and WPC members tended to find the opposite. Users reported frequent conflict or arguments over money (W265, W064, W295, W539, W348), and voiced their frustration at their inability to hold WPC members or village heads to account (e.g. U101). For their part, WPC members reported frustration that users did not trust them or "spoke badly of them" (M23, M40, W596), as well as frustration with the failure of higher authorities to respond when called on. For example, M26 explained that they had "done a lot of contributions and there is no change on the functioning of the borehole. There is really need that the DWO should assist otherwise they have spent a lot and the borehole is not functioning."

Many cases were reported of WPC members refusing to continue serving on the WPC (e.g. W295). At W537, "the committee is there but it is not active because people don't listen to these committee members and they are not respected or recognised as a WPC. So they just stopped doing anything at this water point" (U100). At W559, M67 explained that the WPC is inactive "because the community don't listen to them". At W530, "the installer has some relations that are giving problems at this borehole. Those people can collect money though they are not WPC members and use the monies for their own benefit. So the WPC that is there is not active because these people are giving them problems" (M63).

While there were some examples of villagers displaying initiative in management of their water point (e.g. the greasing done at W741) there were many more examples of villagers expressing resignation and disempowerment and just waiting for someone else - such as politicians, churches, and NGOs - to resolve problems (W096, M59, W727).

A sobering example of disempowerment comes from VDC 3B2, where two community members, Mr X and Mrs Y, were trained as Area Mechanics by an NGO in 2004. At first they fixed boreholes together, but then, as Mr X explained, they "stopped working together because people were talking a lot thinking that these two are in love. And the husband to Mrs Y was also angry". Since then Mrs Y has not worked as a mechanic, and Mr X is the only AM in the VDC. This case highlights the difficulty of overcoming deeply embedded attitudes to gender.

Summary

The evidence does not support the intrinsic 'equity' and 'empowerment' claims of the community management model. In reality, community management is usually characterised by reproduction of existing power imbalances, misuse of funds, increased conflict within communities, and disempowerment both of users and, in some respects, WPC members. Users and Managers alike appear resigned to WPC dysfunctionality; unable to use 'voice' to shape the institution, Users 'exit' by refusing to contribute financially, and Managers 'exit' by ceasing to be active.

Overall, this study has found that community management has largely failed to deliver the intended benefits, and has in many cases given rise to new problems. There are two key dimensions of this failure – hardware (the water point itself), and software (the management arrangements).

7.1.3 Two key dimensions of failure: hardware and software

Hardware: the technology

On the technical side, many installations are of poor quality. Professional audit and inspection are rare; supervision is left to overstretched District Water Officers who pay occasional visits to sites - but often only when transported by, and paid a daily allowance by, the installer themselves (N9). Communities are left to provide unskilled 'supervision' – and then to manage, maintain and repair the installations, in line with national policy on community management (L1). There are not enough highly skilled technicians, and there are far too many poorly trained amateur WPC 'managers'. This is inefficient, because it is time-consuming and expensive to train large numbers of amateurs, very few of whom will ever make use of the training; and ineffective, because it does not lead to the desired result of functioning water points.

In fact, the findings of this study strongly suggest that some of the key determinants of sustainability – the factors that positively impacted on efficiency and effectiveness of rural water supply - were non-participatory, technical factors: water point type, and installation quality. High-quality installations, such as the GITEC installations in parts of Mangochi District, often remain functional for many years with no maintenance. They key factor here is technical expertise: careful siting, high quality components, and professional construction, as noted by interviewee D5, quoted earlier.

There is of course some overlap between the quality of the hardware and the quality of the software component. GITEC water points are of notably higher construction quality than others; and community management seemed to work somewhat better at many of them than elsewhere. An example is W288, a GITEC borehole constructed in 2006 which had only broken down twice in 5 years. The first time (in 2009) it needed a new footvalve; the repair was done in 2 days. The second time (in 2011) it needed a new U-seal – this was replaced on the same day by a WPC member, using a U-seal that they had in stock. They have recently bought more spares, and they have about K4000 saved. Overall, this is perhaps the best exemplar of a model water point.

However, many GITEC water points still suffered from the same non-technical problems as others. There were several examples in VDC 2A3. At W298 there were many quarrels over financial management; at W316, the VH controlled the borehole and misused the funds; and again at W318 the WPC had misused the funds. In all three cases the borehole was still functioning, although the first two had ongoing minor problems (broken handle, difficult pump action) that were not being fixed because of conflict. It is fair to conclude that the high technical quality of GITEC boreholes helps to reduce the incidence and seriousness of such conflict, and is the key determinant of their functionality.

The corollary is that poor technical quality is a key determinant of non-functionality, with numerous examples among those installed by MPs (e.g. W149), government (W726), UNICEF (W258), NGOs (W701), and churches (W754). In all these cases, technical failures in construction meant that the water point worked for only a short time, if at all. Hardware and software are mutually-reinforcing to some extent, in that a water point that breaks down frequently is likely to place more stresses on the committee. In these cases, community management was unable to prevent poor construction, and unable to overcome its impact. Clearly, an alternative approach is necessary to ensure technical quality, and thus high functionality.

Software: the management arrangements

Community management fails in two key respects in 'software' terms: it does not ensure availability of technical skills, and it generates conflict over money. Regarding the first problem, as one of the EWB Fellows observed, "the knowledge on how to repair the system usually deteriorates faster than the system itself, thus when it finally does break down, there's no one left who knows how to fix it" (B25). As noted above, WPC members frequently do not have the technical skills to fulfil their responsibilities for maintenance and repair – either because they were inadequately trained, because they have forgotten, or because those that were trained are no longer WPC members. Wider support systems – Area Mechanics and District Water Offices – are themselves weak, and need long term support (B4).

Regarding the second problem, the findings of this study provide strong evidence that community management generally undermines, rather than strengthens, social capital - because it places financial management responsibilities on individuals and groups who are ill-equipped to cope with them, and as a result it erodes trust and increases conflict. WPCs are too embedded in their villages to be able to consistently and accountably collect, save and spend funds. Instead, they can all too easily become vehicles for the consolidation of existing power structures – particularly those rooted in traditional authority - and the extraction of rents. Far from promoting empowerment and equity at community level, in too many cases community management has the opposite effect.

This study has highlighted the complete breakdown of the 'just-in-case' financial model on which community management is predicated. Communities do not make regular collections and save the money safely so that they can make immediate repairs when required; instead, they wait until the need is urgent before collecting money. This practice is entirely unsurprising, for two reasons. First, in rural Malawi - where many people live at subsistence level, incomes are highly seasonal, and inflation and devaluation have major impacts on the purchasing power of savings - it makes little sense to set aside significant cash sums for long periods. Secondly, in a social environment where access to banking is almost unknown, record-keeping is very rare, deference is strong, and the dividing line between public and private finances is frequently blurred, people tend to assume (generally correctly, as this study has shown) that those with access to such cash sums may find it hard to keep them set aside untouched. The clarity with which these findings emerge provides an interesting contrast with much of the practitioner literature (e.g. Harvey and Reed 2004) where misuse of funds is only mentioned tangentially, via an emphasis on the importance of trust and transparency.

There is some debate as to whether villagers are unable to meet the costs of water supply, or whether they are simply unwilling to pay. This is a complex issue, but the findings of this study suggest the latter. While several respondents in this study noted that the poorest villagers (the elderly or very sick) were exempt from contributing, the financial limitations faced by the large majority of WPCs were primarily attributable to unwillingness rather than inability to pay – and this unwillingness was directly linked to the breakdown of trust between community members and the WPC. In theory, most households could afford K50 per month, and in theory these contributions would have added up to more than enough to keep the water points functional in virtually every case. But in practice, these funds were not available. Community management is thus demonstrably unable to ensure the financial viability of rural water supply. It is evident that a different approach is required to ensure the availability of adequate finance for maintenance and repairs, and thus ensure water point sustainability.

Summary

The findings of this study strongly support the conclusion that community management is neither efficient and effective, nor equitable and empowering. Indeed, more often than not, it is the opposite. The evidence for these failures of community management forms a consistent pattern across multiple locations, numerous installers, and several technology types. These findings not only confirm, but also substantially extend, previous critiques of community management (Schouten and Moriarty 2003, Lockwood and Smits 2011), and highlight the fact that the institution of the water point committee, central to community management, is unable to sustain itself. I now offer an explanation for the findings described above.

7.2 EXPLAINING THE GAP BETWEEN THEORY AND PRACTICE IN COMMUNITY MANAGEMENT

The literature analysed in Chapter Three suggested that two concepts might be particularly helpful in explaining the differences between the theory and the practice of community management: ‘institutional bricolage’ (Cleaver 2012) and ‘civil society failure’ (Mansuri and Rao 2013). Together with the analytical approaches outlined in Chapter Four, these enable us to explore the political economy of community management.

7.2.1 Institutional bricolage

As discussed in Chapter Three, the concept of institutional bricolage illuminates the way in which new institutions interact with existing structures. In some cases the interaction between old and new may result in the wholesale replacement or absorption of one by the other, but more usually it produces a hybrid that may have unintended consequences (Cleaver 2012, Cleaver, Franks et al. 2013).

<u>The limits of institutional design</u>

Proponents of community management, motivated by the failure of previous institutional arrangements to deliver public services, envisaged that water point committees would constitute a real improvement on what went before – even if not perfect in practice. Water Point Committees were designed to be the main mechanism to deliver this, both in form (democratically-elected and gender-balanced) and in function (specific technical and financial responsibilities and powers).

Of course, the WPC is not the only such institution that has been created at village level in recent decades. Similar committees - forest committees, natural resource management committees, community based child care committees, home based care committees – have been established widely in the name of development by both government and non-governmental organisations (Chiweza 2010). However, water point committees are perhaps one of the clearest examples of the phenomenon, since a) water supply concerns every person in the village, and b) WPCs are almost always considered to have revenue-raising powers.

This new institutional form, the WPC, was inserted into a context already contested by two dominant types of power and authority: the chief and the state[17]. The assumptions underlying this process of institutional insertion were rarely articulated, but can be discerned with hindsight. Essentially, the design of the WPC was predicated on the assumption that it was possible to carve out an independent sphere of influence for the WPC, and that the design principles (democracy, gender equality) would trump context. But, as Poteete and Ribot (2011) have pointed out, efforts towards democratisation and decentralisation are always contested by those whose power is threatened, using 'repertoires of domination'.

[17] Other types of authority (e.g. religious authority) are also significant, but they are not central to the argument here.

As described in Chapter Four, the 'traditional chiefly' and 'modern state' forms of authority already compete for political space and influence – and frequently overlap to a significant degree at village level. For example, although VDCs are intended to be separate from traditional authority, in practice the GVH is often 'elected' as the VDC Chair. So, whereas the community management model envisages the water point as an isolated sphere of influence in which the WPC is dominant, in reality – as this study's fieldwork has so clearly demonstrated - the WPC is by far the junior partner in relation to traditional authority (represented by the chief) and the modern state (represented by the DWO; although the DWO is itself very much dominated by the central Ministry).

In practice, this study has found that the unintended consequences of the community management model are significant, and seriously under-recognised. In immediate practical terms, community management creates a substantial direct burden of new obligations, including time to be spent in meetings, and conflict over access to new resources – participation requirements that can be seen as a 'regressive tax' (Casey, Glennerster et al. 2012). But more importantly, community management interacts with traditional authority and the modern state to produce counter-intuitive and undesirable results - the consolidation of clientelism, and erosion of the social contract.

The consolidation of clientelism

In effect, the WPC represents a challenge to traditional authority; the WPC's values of democracy, meritocracy and equality stand in direct contrast to the values of heredity and gender bias embodied in the institution of the chief. This conflict is made explicit only rarely; none of the interviewees in this study commented on it directly. However, the study's findings provide many examples of where traditional authority has responded to this implied challenge either through direct takeover of the WPC, or through a more gradual process of co-option and capture.

One example of takeover is W150, where Yanja found that "there is no committee but the VH just appointed this lady to take part at borehole management, the VH's daughter is the secretary. He does everything alone, these members are like rubber stamps… it is the VH who does everything. People have doubts because they don't know how their money is spent… The VH is very tough, everybody fears him. He says that the borehole is at his compound so he is the only one to control the BH" (Yanja's notes, W150). More widespread, though, is co-option: the chief appoints his relatives and friends to the WPC (W633); WPC members are prevented from participating in training so that a chief's relative may claim the 'sitting allowance' (W550); the chief controls the WPC (M19); the chief 'eats' the maintenance funds (W052, U101, W598). Thus, through bricolage, the new institution (the WPC) is shaped by the existing institutional context (neopatrimonial authority) in such a way that it becomes an instrument of that authority, rather than an alternative to it. These findings echo those of several researchers (Zulu 2008, Msukwa and Taylor 2011, Zulu 2012), who warn against romanticising traditional authority and report high levels of community distrust of chiefs. They also chime with the findings of Rigon (2014) who highlights the way that the introduction of a new participatory institution – a residents' committee – in a Nairobi slum actually institutionalised pre-existing power imbalances between landlords and tenants.

Bricolage goes deeper than political capture, however; existing social inequalities are reproduced through the new participatory institutions. Even if not actually members of the chief's family, WPC members are not seen as 'public servants', but rather as holders of high-status positions whom it is not possible to hold to account: in the words of one respondent, "the committee is higher than the community" (W108). Community management thus becomes an arena in which inequality between 'uppers' and 'lowers' is reproduced rather than challenged. In a social context in which the 'grain' (Kelsall 2008) is hierarchical and deferential, an institutional form that rests on assumptions of democracy, equality and downward accountability is bound to struggle without ongoing support.

<u>Erosion of the social contract</u>

This problem of downward accountability is also visible in the way that the WPC interacts with the DWO and other agents of the modern state. Communities – or citizens - have very low expectations of the state. This means that users and managers rarely trouble to report the breakdown of their water point to the next level up in the democratic structure (e.g. the Area Development Committee) or to the DWO. Instead, they invest their hopes in individual patrons such as politicians or foreign donors. In this way, community management contributes to the erosion of the ‘social contract’, the idea that the citizen’s consent to be governed rests on provision of public goods by the state.

Instead, the state is personalised, through individual politicians. Communities often rely on the assistance of outsiders to resolve problems and undertake repairs: “We are waiting for some organisation to come and give us funds to fix it” (W536); “We are just waiting for the church to come and see the problem” (W754). The role of MPs and prospective MPs is important here, especially at election time. For example, W221, a borehole installed by MASAF in 2005, broke down shortly after installation and remained broken for 3 years; it was eventually repaired in 2009 “during the political campaign time” by the local MP. This role of politicians in supporting rural water supply appears to be seen by both parties within the frame of clientelism rather than of citizenship; people hope that the ‘Big Man’ will dispense largesse in their direction, but they know they may have to wait some considerable time, and they claim it as a gift rather than as a right.

Such repairs may also be at the cost of breakdowns elsewhere. One TA reported that during the political campaign period, people steal parts from one area to fix boreholes in another area. A DWO also noted that ‘mechanics’ associated with an MP caused more problems than they solved: “instead of increasing numbers functioning it was decreasing. But because they were political we were unable to control them… Instead of repairing they make boreholes even worse. They were not adequately trained” (L5).

Clientelist logics shape relationships at district and national level too. Resource allocation is politically driven rather than being based on need; available funds at District level are divided up equally between MPs, rather than being allocated to the areas with lowest access to water (L6). Politically, there is no mechanism for local accountability, since there have been no local elections since 2000. At national level, one government official acknowledged, "If one district is so vocal and … is good at negotiation, definitely they will get more money regardless that it is low [need]" (G3).

Summary

Community management does not always fail. But only rarely does it succeed in anything close to its theoretical form. Instead it is shaped by local circumstances, and many communities 'muddle through' with a variant that pays lip service to participation and collective action, but actually relies on key individuals (like the mechanics profiled in Chapter 6) and clientelist relationships in the attempt to sustain water point functionality. In this bricolage process, context is dominant; existing arrangements form an 'institutional corridor' (Cleaver 2012: 205) constraining the transformational potential of new, designed institutions. To use the language of political economy analysis, the informal neopatrimonial rules of the game are the primary factor shaping institutional outcomes, at community level as well as at district and national level. This fact has been seriously (and, for some, conveniently) underappreciated by many actors in the sector. It is at the root of what could be seen as 'civil society failure' – but which I will argue is, rather, a product of state and donor failure.

7.2.2 Civil society failure?

As discussed in Chapter Three, Mansuri and Rao have coined the term 'civil society failure', to mean 'a situation in which groups that live in geographic proximity are unable to act collectively to reach a feasible and preferable outcome' (2013: 4).

Approached from the 'village angle', the problems of community management do indeed appear to be a clear illustration of this very situation. Certainly, the findings of this thesis provide ample evidence in support of Olson's (1977) original observations on collective action: it is inherently difficult, large groups face large costs, and a minority with strong private interests can dominate the majority. This study demonstrates that collective action by civil society has proved vulnerable to many of the elements of state and market failure, including information asymmetries and co-ordination problems:

- Users do not know how much repairs cost or how much money has been collected or spent (W340);
- DWOs do not know which water points are non-functional (L1);
- Committees struggle to work together (U49);
- DWOs are unable to coordinate the work of installers (L2).

Thus, from one perspective, the failure of community management could be seen as an example of civil society failure. However, I suggest that this is an inadequate label or explanation, because the problems described in the previous section are rooted in the wider political economy of community management. Examination of the 'mechanisms of failure' illustrates this point.

<u>Mechanisms of failure</u>

The failure of community management in rural water supply in Malawi highlights two mechanisms of failure originally identified by Pritchett et al with reference to the failure of some countries to achieve progress in state capability: isomorphic mimicry, and premature load-bearing (Pritchett, Woolcock et al. 2010). While these concepts were originally developed with reference to what the authors call 'big development', they are also highly relevant to 'small development', at project and community level.

Isomorphic mimicry – the theory that high capability can be achieved by adopting the outward structures and procedures that characterise high-capability institutions – underpins the design of water point committee. The committee – an institutional form associated with collective action and the delivery of public functions in mature democracies – is intended to be both the delivery mechanism for a public good (clean water) as well as a model of democracy in action. Because such committees are assumed to be a 'Good Thing' both practically and normatively, their existence and effectiveness remain largely unquestioned.

Premature load-bearing – the early abdication of responsibilities to institutions and individuals that do not have the capacity to shoulder them – is, likewise, a key characteristic of community management. The role of management, maintenance and repair of public water supply infrastructure, which in most countries requires state-wide coordination and expert management, is delegated to armies of low-skilled WPC members. Not only do many of them lack the technical skill to fix a borehole or the financial understanding to keep accounts – problems that are generally not resolved by a one-week training course – but, as argued above, the strain of community management often undermines the limited social capital that exists.

Simultaneously, the fashion for decentralisation has led to premature load-bearing by DWOs, who obviously lack financial capacity – and often technical capacity (N9, B20) – to fulfil their functions. DWOs receive very limited funds from central government – barely enough to cover office expenses, let alone provide support to communities. As one DWO explained "This month we got 59,000 and we spent 35,000 on annual rental for our postal box. Then we pay water bills, electricity bills, we buy reams of paper, then the money is finished" (L5). This has a seriously detrimental effect on their ability to fulfil their responsibilities, as observed by an EWB Fellow: "More times than I can count, I have come in to the office just to see the whole staff sitting outside under a tree playing checkers or bawo (an African version of mankala) all day — not because of laziness, but instead because there is no funding for fuel, motorcycle maintenance, or some other necessary item to do their work. Village meetings should be attended by our staff but are not, borehole drillings should be overseen by our staff but they aren't, and so on and so forth — all due to lack of funding" (B20). Similar problems of inactivity in DWOs were reported by other EWB Fellows (B15, B17, B13), but not always attributed simply to lack of funding. Other factors noted included an unwillingness to engage with 'capacity-building' (B15, B24) and the 'allowance culture' whereby staff appeared willing to undertake activity (such as field visits) only if they received additional financial incentives beyond their salaries (B17, B6, B11, B27). These observers suggest that Districts do not just lack funding, but also (in some cases) motivation.

Thus it is evident that 'civil society failure' is an inadequate label or explanation for the problems of community management. Communities themselves cannot be blamed for the problems they have faced implementing the approach, and the solution is not to exhort them (or train them) to do better. Rather, community management is flawed at its root, because it is a product of the abdication of responsibility by the state, and by donors.

State failure

Community management provides an excuse for state failure. It enables the state to place responsibility for provision of one of the most basic public services, water supply, into the hands of the users themselves, and to disclaim any responsibility for performance. This is decentralisation taken to an extreme. In no other public service sector (health, education, roads) is the assumption made that all recurrent costs should be borne by the users, nor that maintenance of the service should be done by amateurs.

As discussed in Chapter Three, decentralisation was supposed to ensure that government would be more accountable to the people. But the absence of top-down accountability mechanisms means that the theory of decentralisation leading to empowerment is meaningless. Because the central state has decentralised responsibility but not resources, both the capacity and the credibility of the local state are undermined; district staff are disempowered. Because a government job is a job for life, and performance review is not done, there are few incentives for district or national staff to improve performance (B15); rather, they are motivated by allowances (as noted earlier) and by career progression (G3). The result is a vacuum that is filled by ad hoc and clientelist mechanisms. Arguably, decentralisation has resulted in a shift away from citizen-state relations to client-patron relations.

Donor failure

Community management also acts as a figleaf for donor failure. Donors – major bilaterals and multilaterals, as well as NGOs – have played a key role in promoting community management, not least through making it a core component of the water projects they fund. Their motives are arguably twofold: ideology and convenience. Ideologically, many people working in development are indeed 'true believers', philosophically committed to community management as a way of operationalizing participation, caught up in 'romantic ideas about groups and institutions' (Cleaver 2004: 271); and even those that are not may find it hard to articulate their concerns for fear of appearing reactionary. But convenience is an even more powerful incentive: community management means that responsibility for the most complex part of ensuring rural water supply – long term sustainability – is removed at a stroke from the hands of the donors. The model enables large organisations with well-paid staff to transfer all the responsibility (but no resources) for management of WASH infrastructure to voluntary WPCs.

Cleaver (2012: 38) highlights ‘the non-project nature of people’s lives’ - the fundamental difference between the world of development, with its projects and contracts, and the realities of the people enrolled in and affected by them. Meshing the two often results in what – to adapt a telling image from Rakner, Mukubvu et al. (2004) - we might call ‘the project as theatre’. Communities and donors alike collaborate to build a fiction of collective action that enables both to meet their short-term needs (communities to access resources, and donors to spend them.) Essentially, ‘development’ is seen as an exogenous process by community members (Msukwa and Taylor 2011); the idea of ownership of development is an oxymoron which may be adopted in order to access resources, but is not internalised. While the project is ‘live’, both parties have an incentive to perform their role according to script. But when the curtains are drawn and the donor audience leaves, it is unclear what incentives for performance remain.

In the case of community management, I argue that those incentives cannot be provided, as theorised, by the pressures of downwards accountability. The contrast between results in Rwanda on the one hand, and Uganda on the other (Golooba-Mutebi 2012), highlights the importance of upwards accountability in determining performance in the rural water sector. Since donors continue to hold the purse-strings in the rural water sector in Malawi, and have been the key advocates for community management in the past, I argue that they have a large responsibility to acknowledge their own role in its failure, and consider amendments and alternatives.

Summary

In this section I have argued that the problems of community management cannot be blamed on the failures of communities, but should rather be seen as a symptom of the abdication of responsibility by the state, supported by donors. In the next and final section I link this analysis back to the wider literature by considering recent debates on the potential (or limitations) of collective action, and the role of aid.

7.3 WIDER LESSONS

7.3.1 The limits of collective action

One recent and influential theme in the policy literature suggests that many of the failures in public service provision in sub-Saharan Africa can be traced to problems with the principal-agent model underpinning many development interventions, and that solutions are more likely to lie in collective action (Booth 2012). However, my findings offer a different narrative.

At village level, this study has shown that the potential of collective action, in the form of community management, is very limited. As Cleaver has pointed out, 'for poor communities there are crippling limits to what can be achieved through collective action in the absence of productive connections to authoritative and resourceful agencies' (Cleaver 2012: 190) – authority and resources which are intimately tied to principal-agent dynamics. The same conclusion was reached by Kleemeier (2000) in her study of rural water systems in Malawi; she identified the core of the sustainability problem as being the fact that community management institutions have only ineffective local government institutions above them to which they can link. Essentially, collective action cannot compensate for failure or abdication of responsibility on the part of the next layer up. Indeed, it could be suggested that the discourse of participation has been distorted, in the form of community management, to serve as an 'anti-politics machine' (Ferguson 1990), obscuring the need to engage with the way that the state functions.

Interestingly, one of the components of the Africa Power and Politics research programme summarised by Booth (2012) was a study by Cammack and Kanyongolo (2010) which sought to identify factors that positively influence the provision of essential public goods at the local level. They identified three core issues: 'the strength of the 'sanctions regime'; the presence or absence of cohesive communities capable of sustaining collective action; and the extent to which the relevant actors and agencies coordinate their activities' (2010: 3; 8). The first of these, in particular, is clearly a classic principal-agent issue, concerned with performance management and accountability. A similar point is made by Golooba-Mutebi (2012) who contrasts rural water supply in Rwanda and Uganda and finds that it is not participation that makes the difference, but rather the factors relating to hierarchy and structure: inspection and supervision, coordination capacity, and top-down enforcement of accountability mechanisms. Key to success in Rwanda has been a move away from user committees based on voluntarism.

Despite the fact that many of the sector characteristics of rural water supply – such as the nature of the good, its visibility and political salience – could be argued to provide strong incentives in theory for (downward) accountability in service delivery (Mcloughlin and Batley 2012), this study shows that this does not happen. Users have such low expectations of the state, and have so internalised the discourse of community management, that they do not hold the state responsible for delivery of safe water. Thus – for the moment at least - upward accountability mechanisms appears to offer the best hope of improving sector performance.

Kelsall (2011) pursues a related line of enquiry in asking: does the absence of the state facilitate the development of community activity? The evidence suggests otherwise; a capable state is a precondition for capable civil society, which cannot flourish when the state is either too weak or too strong. Thus the core issue is making the state work better; civil society cannot compensate for a weak state. Booth (2011b) also makes the point that failure in service provision is due to the absence of top-down management disciplines, and Crook and Booth (2011) suggest that 'a developmental form of neo-patrimonialism' is the most probable way of creating 'the necessary vertical discipline' in terms of governance arrangements to deliver public goods. Cammack and Kelsall (2011) highlight the importance of technocratic integrity to developmental patrimonialism, and Cammack and Kanyongolo (2010) note the significance of rules and sanctions in increasing trust (as in Malawi under the Banda regime). As Cammack (2012) points out, trust is critically important as a basis for self-help and collective action; but my findings show that the community management model undermines rather than builds community trust, precisely because of the absence of rules and sanctions.

7.3.2 The role of aid

What then should be the role of aid? In this study I have problematised the role of donors in supporting community management, and argued that the solution to sustainability lies in strengthening the state.

My argument is two-fold. First, donors need to acknowledge the counterproductive effects of overemphasising community management. Much greater realism about the capacities of communities to collectively manage resources is required; and discussion in the sector about the need for greater professionalization (Smits 2013) needs to be reflected in resource allocation decisions. Secondly, donors must take more responsibility for ensuring sustainability themselves. In practical terms this means committing funds for recurrent as well as capital costs, and integrating long-term monitoring and support into development projects. Donors can, do and should use their power and position as the source of funds to require certain standards of performance on the part of recipients – and this has been shown to increase the quality and impact of aid (Selaya and Thiele 2012).

There is growing interest in the water sector, mirroring the aid world more widely, in a variety of innovative financing models such as output-based aid (OBA), results-based aid, and cash on delivery aid (e.g. Savedoff and Martel 2011). Lucas (2011), summarising research on OBA in the WASH sector, finds that only a small proportion (3-4%) is in WASH. Donors may withhold part of the payment (typically 20-25%) for 3-6 months to check that installed systems are robust, but payments are not dependent on long-term sustainability and the assumption is still that user fees will cover long-term maintenance and repairs; in this respect, OBA may be a solution to failures at the installation stage, but not to failure in ongoing operation and maintenance. Another approach focused on ensuring performance over the longer term is now being piloted by the Dutch - a 'Sustainability Clause' in its water project contracts, under which recipients of funds are contractually obliged to ensure a certain level of functionality after ten years (Lockwood 2013). Such approaches may offer a means by which donors can contribute to encouraging the ‘rules and sanctions’ necessary for sustainability, and provide incentives for professionalization and improved performance in the sector. This will not be possible, however, unless donors commit to funding the most cost-effective approaches on an ongoing basis.

Summary

This chapter has demonstrated that community management in practice rarely lives up to the theory. Rather than being a means of ensuring efficiency and effectiveness in the water sector, community management is usually characterised by neglect of maintenance, slow and substandard repairs, and failure of committees to save sufficient funds. And, far from being a mechanism of equity and empowerment, in reality community management is frequently characterised by reproduction of existing power imbalances, misuse of funds, increased conflict within communities, and disempowerment of users and, often, managers. Community management generally undermines, rather than strengthens, social capital. It places technical and financial management responsibilities on individuals and groups who are ill-equipped to cope with them, and as a result it erodes trust and increases conflict.

Insufficient attention has been paid to the way in which community management is shaped through a process of institutional bricolage, and the way that this results in the strengthening of clientelism and erosion of the social contract. While the problems of community management could be conceptualised as 'civil society failure' or a collective action problem, I argue that it results from the abdication of responsibility by the state and by donors. Ultimately, community management cannot substitute for a functioning, effective state.

Chapter 8

CONCLUSION

Introduction

This chapter draws conclusions and discusses the implications of this study – both for the rural water supply sector in Malawi, and for sustainable public service provision in general. Reflections are offered on the evolution of the research questions, analytical framework, and research design; and on the limitations of the study. I outline the original contribution made by this research, and suggest potential extensions and directions for future research.

8.1 CONCLUSIONS AND IMPLICATIONS

8.1.1 Results and conclusions

This thesis has answered the question of 'which factors influence water point sustainability, and why' at two levels.

At the immediate presenting level I have tested the ten main determinants of sustainability discussed in the literature, and demonstrated that several of them (USERS, AGE, SPARES) have very little effect on performance, whereas others (WPTYPE, FUNDS, INSTQUAL) are highly significant.

Beyond these presenting factors, at a deeper level, this thesis has also analysed the political economy of the community management model by which sustainability is supposed to be ensured. The findings demonstrate that community management is not an effective way to ensure sustainable provision of public goods and services. Community management, on balance, is <u>in</u>efficient and <u>in</u>effective, <u>in</u>equitable and <u>dis</u>empowering. It provides an excuse for duty-bearers – donors, politicians, and officials – to abdicate responsibility; and it strengthens neopatrimonialism and undermines accountability.

The process of institutional bricolage results in the erosion of the capacity of water point committees to fulfil their intended functions; isomorphic mimicry is insufficient to create genuinely equitable and empowering institutions. Donors and central government abdicate responsibility, forcing premature load-bearing on structures at district and village level, leading to their collapse. As a result, participatory and democratic structures are co-opted into a wider pattern of clientelism – a system of power relations that has far deeper roots and greater strength than the new committees.

On the one hand, these observations are not new. Critiques of community management have been common in the WASH literature for ten years at least (Schouten and Moriarty 2003) as well as in the wider literature on CBNRM (Nunan 2006). On the other hand, community management is indubitably the dominant – indeed only – model in use in Malawi and in many other countries. Key stakeholders remain entirely committed to it in theory and in policy, and appear to believe that it merely requires a few minor adjustments in practice – a little more training for WPCs, a few more WMAs conducting follow-up in the Districts. Few if any critiques make the deeper point articulated by this study: that the model of community management itself is flawed and counterproductive, and is a distraction from efforts to build a more effective state.

This conclusion rests on two levels of analysis. First, the quantitative analysis presented in Chapter Six showed that the key determinants of water point sustainability were (in descending order of influence):

- water point type,
- availability of funds,
- incidence of theft,

- installation quality,
- availability of skills, and
- frequency of maintenance.

Integrating these findings with qualitative data analysis confirmed these conclusions and demonstrated that communities faced significant problems with poor financial management and consequent conflict, suggesting that the key problems related to the 'software' or management arrangements, as much as to 'hardware' or technical issues.

A second level of analysis, presented in Chapter Seven, explained these findings with reference to underlying factors including the interaction between old and new institutional forms, and the operation of political and economic incentives at multiple levels. The enduring dominance of the community management model is thus seen to derive primarily from the way in which it fulfils the needs of donors, politicians and officials to abdicate long-term responsibility for service provision, rather than from fulfilling citizens' needs for sustainable access to clean water. Thus, 'failure of community ownership' masks the reality of serious failures within the water supply sector overall, including severe imbalances in the allocation of resources and responsibilities.

In summary, this study concludes that community management has failed the people it was designed to empower; in rural water supply, participation and collective action are burdensome rather than liberating. The solution to the failure of community management lies not in trying harder, but rather in structural changes to the way rural water supply is delivered and managed, with renewed emphasis on, and attention to, the role and responsibilities of the state – a process that also requires reorientation on the part of donors.

8.1.2 Implications for rural water supply in Malawi

The findings of this study suggest three key practical measures by which sustainability of rural water supply in Malawi might be substantially improved. In line with the argument that the key failure lies less with civil society and more with donors and the state, these propositions are directed at the latter. They are offered not as blueprints, but rather as constructive ideas that deserve to be tested empirically.

Payment for performance, rather than installations

Ultimately, as Kremer and Miguel pointed out, if donors wish to ensure long term sustainable provision of public goods and services, they need to 'endow funds earmarked for this purpose rather than counting on potentially illusory voluntary local contributions' (2007: 1060-1). Donor rhetoric on sustainability needs to be matched with action to ensure:

- Allocation of a much greater proportion of WASH funds to management, maintenance and repair;
- Equitable allocation of funds for capital investment, including prioritisation of underserved areas;

- Use of financial incentives such as performance-linked management contracts and sustainability clauses (Lockwood 2012) to reward good, and penalise poor, performance.

The current financial model in the rural water supply sector requires a major overhaul. Donors pay almost exclusively for installations alone: they focus overwhelmingly on investment in new infrastructure. Users effectively pay for poor performance: the more frequently their water point breaks down, the more they have to pay. Inevitably, they quickly become demotivated.

This financial model creates numerous perverse incentives – for donors to prioritise quantity over quality, for installers to cut corners, for Districts to focus all their efforts on courting new donors, for Managers to divert funds, for Users to avoid contributing. An improved financial model would instead reward positives (such as continuous water point functionality) and penalise negatives (such as poor accountability). While there are no silver bullets - experiments in Indonesia have shown significant improvements in health system performance resulting from changing financial incentives, but no equivalent effect in education (Olken, Onishi et al. 2012) – it is nevertheless evident that the current financial model in rural water supply is unsustainable. The clear implication of this research is that instead of paying for installations, donors should pay for performance.

The same applies to user fees. Although there are strong arguments in favour of abolishing user contributions altogether and funding water supply through taxes or transfers, a shift in financial model might also make it easier to collect contributions from users if required. Users' main concerns are predictable service provision and non-exploitation; they may well be willing to pay a regular fee if they believe that everyone else is paying the same (no free-riding) and that no one is exploiting them (no rent-seeking). Ensuring this, however, may be challenging.

Professionalisation of water point management

This study has effectively identified the problems of volunteer-based public service provision: dysfunctional water point committees, maintenance not done, repairs often delayed and difficult to organise, expertise in short supply, and conflict endemic. These findings lend weight to the increasingly insistent calls for greater professionalisation of rural water supply (Carter 2011, Lockwood and Kang 2012). Instead of an army of poorly trained and demotivated committee members, the sector needs to create professional roles and incentive structures capable of delivering a steadily improving level of service. In no other public service sector is responsibility placed so heavily on amateurs.

Professionalisation might take many forms, and would best be articulated by those already working in the sector themselves. But this study suggests several amendments to the community management model - at village, VDC, and district level – that could together result in a much more effective system for managing rural water supply.

- At village level, multiple WPCs could be replaced with a single 'water point manager' for each village. These individuals, appointed on merit and paid a stipend by the DWO, would be responsible for conducting routine maintenance, calling in the AM when repairs are needed, and reporting on functionality to the District.

- At group village level, each VDC should have at least one Area Mechanic, a post open only to people living in that VDC, with appointment on merit based on competitive application. AMs would be responsible for repairing all water points in their VDC and would be paid by the DWO according to how many water points they care for, the type and age of each water point, and the percentage of time that the water point functions. They would be required to undergo regular refresher training and testing to ensure skill levels.
- At District level, every TA should have a Water Monitoring Assistant, with responsibility for managing the AMs and collecting data on WP functionality from Managers. District Water Officers would be responsible for approving all new installations, ensuring that investment is allocated in line with equity principles. Districts would be allocated funding – considerably more than at present – based on the formulas discussed in the previous section.
- At national level, professionalisation will require the establishment of a culture of performance management, for staff as well as for water points. The wide variation in calibre of RWS staff interviewed for this study suggests that such a culture is currently lacking. National information management systems – notably, a functional and 'live' water point database, will also be needed.

Professionalization of water point management would create many new jobs within a national career hierarchy. Opinion surveys throughout Africa consistently show that unemployment tops the list of respondents' concerns (Afrobarometer 2014), and it is a major reason why people migrate to cities - but employment is too often a neglected area of development effort. Creating a professional hierarchy of posts with increasing levels of technical skill could potentially provide an important route for capable and committed individuals to obtain employment in the sector.

Professionalisation will inevitably entail costs. But amateurism is also costly. Under the community management model, ten people must be trained for each water point – but a large majority of them make little or no use of that training. The alternative approach of training and employing one Manager per village and one Area Mechanic per VDC might well be no more expensive. It would also make it much easier for DWOs to monitor the frequency and quality of their work.

Transparency and accountability

There are multiple opportunities to apply the lessons identified by Reinikka and Svensson (2003), Olken (2005) and Reinikka and Svensson (2011) regarding transparency in public services to the rural water supply sector. Two in particular stand out.

First, construction standards. This study has shown that installation quality is a major influence on functionality - and yet there is no mechanism in place to ensure consistent application of minimum standards in construction. Independent expert inspection and audit of installations, coupled with financial penalties for sub-standard construction, could be a highly cost-effective way to improve installation quality with consequent long-term savings to donors, the state, and users. Establishing such an inspectorate is an action that any donor could initiate immediately, beginning with their own funded installations.

Secondly, transparency. It is currently extremely difficult to access information in the sector. Record-keeping at village level is virtually non-existent. Information systems at District level are often piecemeal and of poor quality: for example, Mangochi's water point mapping data was rendered unusable by an individual's inability to use Excel, and Ntcheu's monthly DWO reports are only sporadically compiled and rarely filed. If this researcher struggles to access information, it seems unlikely that citizens will be able to access and use it to hold their public servants to account. In the immediate future, the best hope lies not in bottom-up demand for transparency and accountability – which has been found in Tanzania to be a very inadequate mechanism for improving water point performance (Daraja 2011) but in top-down performance disciplines, such as in the Rwandan water sector (Golooba-Mutebi 2012). Again, this is an area in which donors have the ability to lead, through incorporating these principles in programme design, and then holding their grantees and loanholders to them. The growing emphasis in recent years on 'value for money' in development (DFID 2011), and the need to establish, repair or strengthen feedback loops in aid (Barder 2009), both require increased transparency and accountability. Payment for performance means that funding needs to be conditional on good information, on both expenditure and results.

8.1.3 Implications for public service provision in general

The three propositions outlined above are specific to the rural water supply sector in Malawi. But they highlight some key themes that are of relevance to the provision of other public goods and services in resource-poor countries.

While community management is rooted in the participatory paradigm, the three propositions outlined above can be seen to be rooted in a different, more 'universalist' paradigm. Box 8.1 summarises, in a highly simplified format, the broad contours of each paradigm.

Box 8.1: Two development paradigms

Participatory	Universalist
Demand-led	Supply-led
Flexible	Standardised
Localised	Centralised
Amateur / voluntary	Professional
Collective action	Principal-agent
Downward accountability	Upward accountability

Whereas the participatory paradigm rests on the assumption that things are best done by people for themselves, and that most people prefer to do things themselves, the universalist paradigm rests on the assumptions that benefits of scale are significant, that the provision of many public goods and services requires significant expert involvement, and that in most cases people would rather not take responsibility for doing things themselves if other people can do so with as much, or greater, ease and efficiency – a point highlighted many years ago by Eyben and Ladbury (1995). While a case can perhaps be made that management of fisheries or forests requires participation in order to take full account of the nuances of local context, something like water supply is primarily a technical function and therefore amenable to more of a 'blueprint' approach.

While the problems of community management could be seen as a collective action problem requiring a collective action solution – in line, perhaps, with the conclusions of Booth (2012) – this thesis suggests otherwise. In fact, I argue that the failures of community management are largely attributable to insufficient attention to principal-agent dynamics, including donor-recipient, funder-installer, and manager-user relationships.

This lack of attention to principal-agent dynamics results in too much scope for variability in the participatory paradigm. Whether or not people receive a consistent level of public service depends not on their needs or rights as citizens, but to a very large extent on the capacities and commitment of the individuals involved – the WPC members, the chief, the TA, and the DWO. Although technically the WPC is the agent of the users, in practice users have little authority over the WPC; and the other agents are all accountable upwards on the basis of clientelist, rather than performance-based, logics. These conclusions echo the findings of Baird, McIntosh et al. (2013), who show that the demand-driven elements of community development programmes were regressive, but the centrally determined features (e.g. specific allocation of funding to specific districts) were progressive.

The importance of principal-agent approaches is illustrated by experience with police reforms in Rajasthan (Banerjee, Chattopadhyay et al. 2012): the two successful reforms did not require sustained local input and were 'robustly implemented', whereas the unsuccessful reforms were reliant on local participation and as a result were not successfully implemented. Ultimately, community management – and participatory or 'small development' approaches more broadly – are not a solution for big development problems, or a substitute for investment in developing a functioning system by which the state ensures provision of public services.

In some respects this argument chimes with the proposal made by Kelsall (2008) that development needs to 'go with the grain' of existing social and political arrangements, since 'institutions work best when they build on local understandings of power, authority, ways of behaviour and modes of organisation, and less well when external behaviours are imposed' (Kelsall 2008: 640). As my research has demonstrated, community management does not enable users to hold managers to account, or enable villagers to effectively demand support from districts or NGOs. Accordingly, delivery of rural water supply through a more top-down, centralised framework would be more in line with 'local understandings' than a community management model that does not take account of traditions of clientelism and deference.

And yet, if 'the grain' is patriarchal, hierarchical, authoritarian and unaccountable, 'going with it' is surely not a solution to that part of underdevelopment attributable to these characteristics. Positive social change very often requires going <u>against</u> the grain: in Britain, the abolition of slavery, the extension of suffrage to women, and the decriminalisation of homosexuality all 'went against the grain'. In practice, 'going with the grain' risks being deeply regressive, and some associated suggestions – such as organising public services along kin lines – could be extremely dangerous. But the core of the idea, relating closely to bricolage, makes sense: development interventions need to explicitly acknowledge, analyse, and organise themselves with reference to existing social and political structures.

This thesis, then, makes the case that donors should reconsider their longstanding support for community management of rural water supply - and perhaps, by extension, other participatory approaches that are vulnerable to co-option. As Moore (2001) highlighted, aid relationships can themselves sustain 'political underdevelopment'; my research suggests that community management has contributed to this through inadvertently strengthening clientelist relationships, and undermining the development of the social contract between citizen and state. Even if aid can do little to influence outcomes positively in neopatrimonial states (Cammack 2007), donors nevertheless have an obligation to try: first, to do no harm – and therefore to avoid promoting approaches that have been shown to undermine social capital; and secondly, to strengthen the capacity of the state to equitably and effectively deliver public services.

Thus development actors 'need to focus on mechanisms for reducing government failures rather than increasing the burden on citizens to help themselves in ways that leave state failures largely intact' (Devarajan, Khemani et al. 2014: 21). Undoubtedly, greater donor use of carrots and sticks cannot fix all the problems of public service provision, nor is such influence a substitute for citizen (or client) power. However, this study has demonstrated that users themselves simply do not have the power – as citizens and voters, or as clients and consumers – to do the institutional heavy lifting of initiating improvement in public services. Rather, it is those that direct financial resources into the sector who are in a position to shift the incentives for improved service provision, to monitor performance effectively, and to generate the information that citizens need in order to exercise voice.

8.2 REFLECTIONS AND LIMITATIONS

This next section steps back from the content of the study itself to reflect critically and reflexively on the research process. Reflexivity - 'the researcher being aware of his *[sic]* effect on the process and outcomes of research' (Anderson in Thorpe and Holt 2008: 183) - is an important requisite in research of all types, although it is particularly emphasised in qualitative research (Finlay 2002, Finlay and Gough 2008). Given the subjective nature of this discussion, I adopt a personal tone in this section.

8.2.1 Research questions and analytical framework

This study began life as a nagging question that repeatedly confronted me in my work for an international NGO – 'how much difference will this [activity x] make in the long term?' I was conscious of a growing frustration, concern, and indeed scepticism about the value of much of the development work we did, rooted in my increasing awareness of failed water points, non-existent latrines, abandoned half-constructed buildings, and dead livestock. The decision to focus on water came very naturally, prompted by personal experience, by the availability of data, and by the clarity of the 'theory of change' associated with rural water supply. Thus my initial research questions – 'How long do the benefits of investment in improved rural community water points endure? What factors contribute towards sustainability?' - emerged from my curiosity about what I had observed (White 2009).

My topic appeared, on the surface, very simple, perhaps too basic; colleagues queried whether there was already substantial research on these questions. I felt somewhat embarrassed that I was unable to find very much; searching back issues of key development studies journals, I was puzzled by the apparent dearth of academic research on the subject. On the other hand, I found a copious and at times overwhelming grey literature: reports from NGOs and other international organisations; data from the JMP; books and articles and conference papers written by practitioners, often with a very practical focus. While much of this material was useful, a significant proportion was biased in some way, and almost none made use of anything that could be called an 'analytical framework'. However, in its totality this literature pointed to a range of factors influencing sustainability, which I consolidated into the list presented in Chapter 2. Identification of these factors enabled me to design research instruments and begin fieldwork, while keeping an open mind on how to address the deeper themes of empowerment and ownership that were clearly central.

My initial intention was to examine sustainability at three levels - outputs (water points), outcomes (access to clean water), and impacts (improved health and other benefits) - and also to analyse both the scale and distribution of costs and benefits associated with rural water supply. To achieve this I planned to use GPS mapping, video, direct testing of water quality, and cost-benefit analysis. However, like most (perhaps all) doctoral researchers, I found that a core part of the research process involved scaling back my initial over-ambitious plans. Even so, the resulting pared-down research design and methodology still generated substantial amounts of data, to which I could not do full justice within the parameters of a PhD.

At the same time, my research aim evolved. I started with a very practical, positivist approach, frustrated with the sector's apparent vagueness about causality. I was intrigued by the opportunity that quantitative methods seemed to offer to distil the messy reality into clear constituent parts – 'factors' – and draw clear, definitive statistical conclusions about their relative influence. However, as I engaged with that messy reality in increasing depth, I gained a new appreciation of the limitations of a quantitative approach. It seemed evident that the data could not simply speak for itself, and that I would need to pay just as much attention to interpretation and explanation as I did to quantitative description. Hence, my research questions evolved into a two-part format: 1) *what* are the main factors contributing to variation in the sustainability of improved public water points in rural Malawi, and *how much* of an influence does each factor have?; and 2) *how and why* do these factors influence sustainability?

It was particularly challenging to clarify the first part of my analytical framework because I found it hard to see where the big concepts of empowerment, ownership and participation fitted alongside variables such as siting and post-construction support. I knew that I very much wanted to retain the practical focus of the study, but that at the same time I needed to situate it in a wider body of theory. For a long time I struggled to reconcile the two – frustrated at the lack of theoretical depth in the sector-specific literature, and unsure how to conceptualise my topic in a theoretical way. Indeed, it was only through immersion in the data and the iterative process of reflection on both data and literature that I was able to crystallise my framework into its final format. Once I had articulated my second-stage research questions – regarding the differences between community management in theory and in practice – I then realised that I could productively draw on political economy analysis and the concepts of institutional bricolage and civil society failure to frame my work.

However, I remain conscious of the flaws in the resulting framework - somehow it seems both too complex and artificially neat. Perhaps, to some extent, I am still coming to terms with having been unable to fulfil my initial hopes of generating a very clear, definitive, quantified answer to my questions, and the fact that my research developed in directions I did not fully anticipate. Certainly, I am conscious that the process of fitting messy reality into any analytical framework is rather like stuffing jelly into a string bag: it bulges out of the sides, and sections are liable to fall off.

Nevertheless I am confident that I have both addressed a question of real practical relevance, and engaged with it at a deeper-than-practical level. I had not expected at the start of this research that my focus would shift in this way, and that my main conclusion would be a trenchant critique of community management and its interaction with clientelism; but both the literature and the data have led me steadily to this point.

8.2.2 Research design and methods

I began this study with a clear opinion on the research design required: any study of sustainability had to be longitudinal, in order to capture the time dimension. I also had definite views on sampling (probability-based) and on methods (emphasising the quantitative). In all these aspects I was seeking the objectivity that I considered was so lacking in NGOs' own assessments of the value and long-term impact of their work. I wished to differentiate my study as far as possible from the small-*n*, purposively-sampled, qualitative studies that seemed to predominate in the NGO world and in the practice-based literature more generally. Although I did not realise it at the time, my concerns in many ways mirrored those articulated by Agrawal (2001) regarding research on the determinants of sustainable institutions for managing common property resources.

As I engaged with the practicalities of research design, however, I had to adapt these views somewhat. For example, once I had gained access to the 2005 WP database, it became clear that it contained almost no baseline data regarding determinants of sustainability. Furthermore, pure probability sampling with 5% margin of error and 95% confidence level would require visiting 382 water points randomly distributed throughout the country – a logistical challenge beyond my capacity as a lone postgraduate student. My eventual research design, as described in Chapter 5, evolved in response to these issues. While this may lay my work open to criticisms relating to rigour, I believe that this design and approach to sampling has retained the best of both worlds, combining objectivity and representativeness with nuance and depth.

Methodologically my ideas also evolved considerably in the first year or so of my research. I was clear from the beginning that I wanted to conduct surveys and analyse data statistically, but – despite taking advantage of all the available statistical training – I did not fully understand what type of data I needed to collect in order to conduct certain statistical tests. As a result, my research instruments collected a great deal of data (multiple questions on each variable) and when it came to analysis it took quite some time to work out what data should be used for which test. With hindsight, a pre-analysis plan would have helped avoid any risk that I might end up cherry-picking data or 'data mining', which can lead to erroneous conclusions (Casey, Glennerster et al. 2012).

The process has both strengthened my respect for those who have the skills to do high-quality quantitative research, and also strengthened my appreciation of the risks and potential flaws inherent in such research. I frequently found that the objectivity of my quantitative data was compromised by inconsistency in respondents' answers, or that considerable detail and nuance had to be sacrificed to squeeze the answers into pre-determined categories. The process reinforced the value of using mixed methods, and I was happy to find that the failure of my plan to collect data on smartphones meant that Yanja was able to record much more qualitative data (observations and interviews) than I had initially envisaged – data that was very valuable in interpreting the more quantitative findings.

In summary, working with very large amounts of data from multiple sources required me to think hard about how to sift, categorise, and select the most important elements. At the same time I aimed to be open to letting insights emerge and crystallise in the iterative process of moving back and forward between datasets, and between the data and the literature.

8.2.3 Researcher identity

As a relatively privileged white researcher from the former colonial power, my identity could not fail to influence this study. My own assumptions and approach were undoubtedly shaped by my past experience: of growing up in Kenya, of volunteering in Uganda, and of working for development NGOs for many years. While I could not escape this (nor did I wish to), I endeavoured to read as widely as possible, and to design the research to be as objective as possible, in order to minimise the impact of my personal biases. In company with Lashaw (2012), I have struggled at times with the problem of critiquing a progressive sector with whose aims I agree, and in which I have worked for over a decade, but about whose actions and results I am ultimately quite sceptical.

My white, British, female identity undoubtedly also influenced the way in which Malawians responded to me during data collection. I made efforts to mitigate this through working with an extremely able local research assistant (Yanja), through modifying my own style of dress and behaviour to demonstrate respect for local culture, and through emphasising my status as an independent research student, not associated with any donors or projects. However, various incidents during the research process demonstrated the influence of these barriers of language, culture and ethnicity, and of local expectations – including the translation problems described in Chapter Five, and the requests for assistance received in several locations. These barriers inevitably limited the extent to which I was able to gain deep insight into Malawi and my topic. The most important factor in overcoming these barriers was the skilled support of Yanja. I was fortunate to have worked with her before beginning this study, and knew that she was hardworking, conscientious and precise. However, most important of all was her consummate skill in adapting her own approach to her respondents, so that she was equally comfortable talking to a village householder, a government official, or a local politician. Her guidance and insight were invaluable.

My identity and positionality have undoubtedly also influenced the data analysis and thus the findings of this study. In acknowledgement of the potential for bias in analysis, I have endeavoured to ensure that the warrant for my conclusions is clear and robust through combining insights from multiple sources and types of data. My discussion of the role of donors in these last two chapters reflects my own position as a citizen of a donor country, and as a development worker within the aid system.

No research is without flaws, and no research is entirely objective (Gorard 2010); what is crucial is to acknowledge the limitations of the work, and this has been my purpose above. The next section emphasises the strengths of this research, its original contribution, and the ways in which it could be further extended.

8.3 CONTRIBUTION OF THIS THESIS, AND FUTURE DIRECTIONS

8.3.1 Original contribution of this study

This study has offered new insights on a longstanding set of questions regarding sustainability and participation. There are two dimensions to the originality of my thesis.

First, the research design. This is a large-*n* study of a representative sample of water points – in contrast to much of the existing literature on water point sustainability, which often takes the form of small-*n*, purposively-sampled case studies, or has limited empirical content. Additionally, this study innovatively uses both qualitative and quantitative data from both primary and secondary sources to build up a rich picture of the rural water supply sector in Malawi, combining deductive hypothesis-testing with inductive theory generation. As such, it explicitly links a technical analysis of the proximate factors that appear to explain variation in water point sustainability, with a theoretical analysis of the underlying political, social and economic dynamics influencing those factors.

Secondly, the conclusions. By linking technical and theoretical analysis I have been able to go beyond critiquing community management in practice to showing how it is flawed in theory. I have analysed the way that community management interacts with a neopatrimonial context through a process of institutional bricolage that results in what has been called civil society failure, but in fact reflects failures on the part of the state and donors. The study has provided an explanation for the enduring strength of the community management model, by using political economy analysis to demonstrate the powerful incentives that perpetuate the model despite its flaws. Finally, this thesis has engaged with recent debates regarding the optimal balance between collective action and principal-agent action, suggesting that the solution to the failure of principal-agent accountability lies not in placing greater emphasis on collective action – at least not in rural water supply - but rather in strengthening top-down performance discipline by focusing attention on the metrics that matter (e.g. continued water point functionality).

My findings and conclusions thus extend both the empirical literature on rural water supply, and the theoretical literature on participation, political economy, and public service provision.

8.3.2 Future directions

There are many possible directions in which this study could be extended. Here I briefly outline four areas that I consider to be particularly important.

Analysis of cost-effectiveness

The first area in which I would wish to extend this work is in the analysis of cost-effectiveness. Initially I had hoped to compare data on results (e.g. number of days that a water point is functional) with information on inputs (capital costs and running costs). This turned out to be beyond the scope of this study; simply analysing results data alone was complex enough, without attempting to analyse inputs too. Nevertheless, this would be an extremely practical, useful piece of research, which could test the working hypothesis that high-quality installations (such as GITEC water points) might be more expensive (perhaps considerably so) in the short term, but nevertheless more cost-effective than lower-quality installations once sustainability is taken into account.

Experimental research

Even if my critique of community management is fully accepted, the question of 'what would be better?' remains. The three proposals presented in section 8.1.2 require rigorous testing to see whether they would indeed lead to improved sustainability. This would be comparatively simple for a major donor to fund, on a pilot basis.

Comparative sectoral case studies

One interviewee (D4) reflected that "of course, education and health they are much better, well organised. The water sector is not well organised". One major question that demands investigation is why performance in Malawi's WASH sector is so poor, when performance in its health and education sectors appears to be so much better. One hypothesis could be that progress in the health sector has been exogenous, driven largely by donors who have themselves been driven by high-profile global efforts to tackle HIV and strengthen health systems. If this is indeed the case, then it is important to investigate what Malawi's WASH donors need to do differently to secure similar progress in WASH.

Comparative country analysis

The conclusions of this study have clear implications beyond the specific sector that was the focus of the research. Relating my findings to the literature gives me confidence that the phenomena I identify are not limited to Malawi alone, nor just to the rural water supply sector. However, as noted in Chapter Two, water point functionality appears to be much higher in some countries (e.g. Senegal, Madagascar) than others. Further research is needed to examine the extent to which the problems analysed in this thesis are also found in other countries and sectors; and to explore in more detail whether my critique of community management is fully justified.

8.4 CONCLUSION

Researching and writing this thesis has been a challenging, stimulating, and occasionally uncomfortable undertaking. The process of examining one apparently technical question in depth has, somewhat unexpectedly, opened up a large field of wider questions about the development process, the theory of participation, and the responsibilities of those with economic and political power.

In articulating my critique of community management I have been conscious of the danger of rejecting participation too strongly. I strongly believe in every person's right to have their voice heard, to be active both in their community and on the wider political stage. My findings highlight what happens when participation becomes an obligation rather than a right, when responsibility for public service provision is abdicated by government, and when institutional models collide.

My hope is that this thesis will contribute to a growing recognition in the international development sector of the unintended consequences of development interventions predicated on enforced collective action, a greater emphasis on accountability for sustainable results, and, ultimately, the realisation of the right to safe and sufficient water for all.

APPENDIX 1: RESEARCH INFORMATION SHEET

Ellie Chowns
Doctoral Researcher
International Development Department
University of Birmingham, UK.

Research Question: 'What are the main factors contributing to variation in the sustainability of improved community water points in rural Malawi?'

Introduction

I am a postgraduate student in the International Development Department at the University of Birmingham in the UK. Before becoming a student, I worked for over ten years for international development NGOs. That experience prompted this research, which is funded by the Economic and Social Research Council of the UK. As part of good research practice, this sheet offers detailed information about my research so that you can give your informed consent for participation in this study.

Purpose of my research

My aim is to develop a better understanding of the factors that support long-term sustainability of development projects. I am looking at why some development projects create benefits that last for a long time, but others do not. My research focuses on rural water supply, because water is such an important basic need and right, and because it is relatively easy to assess whether a water point is sustainable, i.e. continues to function over time. However, it is more difficult to assess why there is such significant variation in sustainability.

My research focuses particularly on three sets of factors:

1) Mechanisms for financing operation, maintenance and repairs (*incentives*);
2) Mechanisms for supporting and coordinating stakeholders (*institutions*);
3) Mechanisms for data collection, management and use (*information*).

I seek to find out which combinations of incentives, institutions and information are most effective at ensuring water point sustainability, and why.

Research design and methods

I am using a mixed methods sequential research design, with longitudinal, cross-sectional, and case study elements. Based on analysis of existing secondary data (the 2005 dataset of almost all water points (WPs) in Malawi) I have selected two pairs of neighbouring districts for collection of new qualitative and quantitative data:

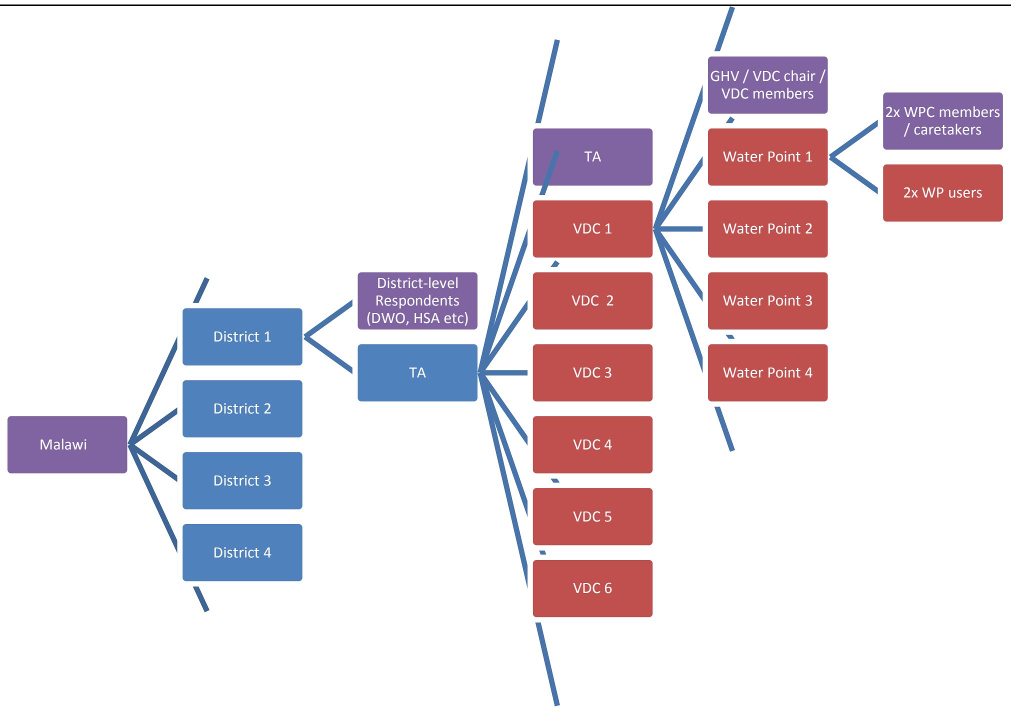
- Mangochi (high-functionality) and Ntcheu (low-functionality)
- Thyolo (high) and Chikwawa (low).

In high-functionality districts I conduct my primary fieldwork in the highest-functionality TA, and vice versa in low-functionality districts.

In each TA I randomly select 6 VDCs, and in each VDC I randomly select 4 WPs for data collection. For each WP I conduct surveys with two randomly-selected WP users, and two purposively-selected WP managers / maintainers. In total I will be conducting 384 surveys regarding 96 WPs in 24 VDCs in 4 Districts. In each District I will also spend some days staying in one of the survey villages to observe water use.

Additionally I will conduct interviews with key informants at District level (DWOs, AMs, NGOs, HSAs) and national level (MOIWD and others).

Sampling diagram



Intended use of the research

The results of this research will be shared with individuals and organisations that are involved in funding, installing, managing, maintaining and repairing rural water points both in Malawi and in other countries. I hope that this research will help identify ways to further improve the sustainability of rural water supply.

APPENDIX 2: INTERVIEW CONSENT FORM

What participation entails

I would like to conduct a semi-structured interview with you, which means that I have a set of questions that I would like to ask you, but that I am also interested to hear anything else you would like to tell me. I expect that the interview will take about 30 minutes, but please feel free to let me know if you would like to set a different time limit. I would like to voice-record the interview so that I can concentrate on listening to you rather than worrying about writing notes; I hope this is OK with you.

I may want to use quotes from you in the write-up of my research. I will not use your name, but I would like to be able to refer to you by your location, and your job title or role (e.g. District Water Officer, Dedza). This means there is a possibility that some people reading the research might be able to guess who said what. If you would be worried about this, and would prefer me to treat your response as anonymous, please let me know.

Before using any quotes in this way, I will do my very best to contact you (by email or by text) to give you the details of the quote, and check that you are happy for me to do this. I would therefore like to take your contact details (mobile number and email address).

When I have finished my thesis (in 2013) I will send you a copy by email, or send you a web link, so that you can read the whole document if you wish. I will also send a paper copy to the District Water Office in each District where I conduct research, as well as to the MOIWD.

My research is funded by the Economic and Social Research Council, which is a public body in the UK that funds research. It gets most of its funding from the UK government. A condition of ESRC funding is that they ask for a copy of the data I collect for their own archives and for sharing so that other researchers may use it in future. However, all data will be anonymised before it is sent to them.

By agreeing to be interviewed you are confirming that you accept these points and give your consent to participate in this research. However, you are free to withdraw from the research at any point if you wish.

Date of interview:	
Interviewee name:	
Job & Location:	
Email:	
Telephone:	
Other contact information:	
Please sign here to confirm that you consent to the interview on the basis outlined above:	

Thank you very much indeed for your time and kind assistance.

APPENDIX 3: SURVEY FORM: LIST OF WATER POINTS BY VDC

VDC Name, TA, District	
Date of survey	

	Informant name	M/F	Role / title
1			
2			
3			
4			
5			
6			

	Village Name	# hh
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Map & notes:

Villages and Water Points in the VDC

	VillageName	WPType	Functional?	Location	Installer	Installed	Problem / Notes
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
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41							
42							
43							
44							

Unprotected sources

Village	Type and Number

APPENDIX 4: SURVEY FORM: WATER POINTS

	Question	Answer
1.	Village	
2.	Date of survey	
3.	WP Location	
4.	ICWP Type	BH / Tap
5.	Afridev?	Yes / No
6.	Functional?	Yes / Partly / No
7.	Installation Date	
8.	Installer	
9.	Rehabilitation Date	
10.	Rehabilitator	
11.	Inscription	
12.	Pump make	
13.	Serial plate # & Date	
14.	Depth	
15.	# of rods	
16.	# BDs since installed	
17.	First BD date	
18.	First BD duration	
19.	First BD problem	
20.	First BD action taken	
21.	First BD repaired by	
22.	First BD repair cost	
23.	Last BD date	
24.	Last BD duration	
25.	Last BD problem	
26.	Last BD action taken	
27.	Last BD repaired by	
28.	Last BD repair cost	
29.	Active WP Committee?	Yes / No
30.	# members	
31.	Committee trained?	Yes / No
32.	Date of training	
33.	# days & trainer	
34.	Last time funds collected?	
35.	Did everyone contribute?	Yes / No Details:
36.	Amount of funds held now?	
37.	Spares in stock?	Yes / No Details:
38.	Spares bought from?	
39.	Cttee know parts and prices?	Yes / Partly / No Details:
40.	Photo taken?	Yes / No
41.	Names of people in photo	
42.	Consent secured?	Yes / No

APPENDIX 5: SURVEY FORM: USERS

#_____

	Question	Answer options
1.	Informed consent given?	0 no 1 yes
2.	Survey location / WP name	
3.	Survey date	
4.	Survey conducted…	1 In private 2 Others present
5.	Respondent gender	1 male 2 female
6.	Respondent found where?	1 at home 2 at water point 3 at VH home 4 other
7.	Are you a member of the VDC or WPC or other committee?	0 no 1 WPC 2 VDC 3 other
8.	How many people live in your household?	
9.	Who collects water in your household?	1 women 2 girls 3 boys 4 men
10.	How many litres of water does your household use each day? *(1 jerrycan = 25 litres)*	
11.	What is your main source of water in the dry season?	0 unprotected source e.g. well, river 1 protected source (ICWP) e.g. borehole, tap
12.	What is your main source of water in the wet season?	0 unprotected source e.g. well, river 1 protected source (ICWP) e.g. borehole, tap
13.	Do you harvest rainwater in the wet season?	0 no 1 yes
14.	Where do you get your household's water from if the IWCP is not working?	0 Unprotected well 1 River or stream 2 Other
15.	What do you use safe (protected source, ICWP) water for?	0 never use protected sources 1 Drinking 2 Cooking 3 Handwashing 4 Bathing 5 Washing dishes 6 Washing clothes 7 Irrigation 8 Other
16.	What do you use unsafe (unprotected source) water for?	0 never use unprotected sources 1 Drinking 2 Cooking 3 Handwashing 4 Bathing 5 Washing dishes 6 Washing clothes 7 Irrigation 8 Other

17.	If you use unprotected water sources, why?	0 never use unprotected sources 1 ICWP broken 2 ICWP low yield 3 ICWP water is expensive 4 ICWP far away 5 ICWP queue too long 6 ICWP tastes worse 7 ICWP water too hard 8 Other
18.	How long do you normally have to queue at the ICWP?	0 no time 1 less than 10 minutes 2 10-30 minutes 3 over 30 minutes
19.	How far do you have to walk to the ICWP?	0 Less than 500m 1 More than 500m
20.	How many households use this water point?	
21.	Is there enough water for the number of users?	1 yes always enough 2 normally enough 3 often not enough 4 never enough
22.	Is there another functioning ICWP within one kilometre of this one?	0 no 1 yes
23.	Who initiated installation of the water point?	1 The community themselves 2 An outside organisation
24.	Were you involved in any of the following decisions about this WP?	0 No, not involved in any 1 Technology type 2 Siting 3 Management arrangements 4 Financing arrangements 99 Don't know / can't remember
25.	Were other community members involved in any of the following decisions about this WP?	0 No, not involved in any 1 Technology type 2 Siting 3 Management arrangements 4 Financing arrangements 99 Don't know / can't remember
26.	Did the community contribute financially to installation?	0 No 1 Yes 99 Don't know
27.	How much altogether? (MWK)	
28.	How much for her household? (MWK)	
29.	Did your household contribute in-kind to installation?	0 No, did not contribute in kind 1 Labour 2 Local materials 3 Land 4 Other 99 Don't know / can't remember
30.	Did the community contribute in-kind to installation?	0 No, did not contribute in kind 1 Labour 2 Local materials 3 Land 4 Other 99 Don't know / can't remember
31.	Do you know how much the WP cost to install altogether?	0 no 1 yes
32.	If yes, how much? (MWK)	

33.	Did community have to set up a bank account at installation?	0 no 1 yes 99 don't know
34.	How much did community put into that account? (MWK)	
35.	Does that account still exist?	0 no 1 yes 99 don't know
36.	If yes, how much is in it (MWK)?	
37.	Who installed the WP?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
38.	If NGO or other, please give details	
39.	Who paid for it?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
40.	Who paid for it? (extra text if required)	
41.	Who owns it?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
42.	Who owns it? (extra text if required)	
43.	Who is responsible for day to day management?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
44.	Who is responsible for day to day management? (extra text if required)	

45.	Who is responsible for doing maintenance and minor repairs?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
46.	Who is responsible for doing maintenance and minor repairs? (extra text if required)	
47.	Who is responsible for doing major repairs?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
48.	Who is responsible for doing major repairs? (extra text if required)	
49.	Does the community contribute financially to operation and maintenance of the WP?	0 no 1 yes, pay per bucket 2 yes, pay monthly per household 3 monthly per person 4 yearly per household 5 yearly per person 6 occasionally, when repairs are needed 7 occasionally, various reasons/not sure why 8 other
50.	If pay per bucket, how much per bucket?	
51.	If pay regularly per household, how much?	
52.	Are some households exempt?	0 No 1 Yes
53.	Which households are exempt from paying for water?	0 None 1 Elderly 2 Disabled 3 Sick 4 Poor or vulnerable 5 Female-headed households 6 Child-headed households 7 Other
54.	What proportion of users are exempt?	1 All or almost all 2 About three-quarters 3 About a half 4 About a quarter 5 Less than a quarter 6 Very few or none

55.	What proportion of those that are supposed to pay actually do pay?	1 All or almost all 2 About three-quarters 3 About a half 4 About a quarter 5 Less than a quarter 6 Very few or none
56.	Is there any penalty for non-payment?	0 No penalty 1 Yes: not allowed to use ICWP 2 Yes: 'naming and shaming' 3 Yes: other
57.	When was the last time your household paid a contribution for water?	
58.	How much did you pay (MWK)?	
59.	Who collected the money?	0 no-one (no money has been collected) 1 WPC member 2 VDC member 3 VH/GVH 4 other 99 don't know / can't remember
60.	Where is the money for the WP kept?	0 nowhere (no funds are held) 1 in a bank account 2 by a WPC member 3 by a VDC member 4 by the VH / GVH 5 other 99 don't know / can't remember
61.	Do the WPC report back to the community on how the money is spent?	0 no, never 1 yes, sometimes 2 yes, always 99 don't know
62.	How good do you think the financial management of this water point is?	1 Very poor 2 Quite poor 3 OK 4 Good 5 Excellent
63.	Any other comments?	
64.	What are the benefits of this WP? (if it is functioning)	1 Less time spent fetching water 2 Less waterborne disease 3 Subjective well-being (washing more etc) 4 Other
65.	If other, please give details.	
66.	Are there any problems with this water point?	0 no, no problems 1 Frequent breakdowns 2 Water quantity (low yield) 3 Cost 4 Distance 5 Time queuing 6 Quality (taste) 7 Quality (hardness) 8 Other
67.	If other, please give details.	

68.	How satisfied are you with the management arrangements for this WP?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
69.	How satisfied are you with the financial arrangements for this WP?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
70.	How satisfied are you with the overall performance of this WP?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
71.	What type of latrine do you have? (check visually)	0 None 1 Private 2 Shared 3 Cover 4 Good privacy 5 Good cleanliness 6 Good ventilation 7 Ecosan
72.	Latrine notes	
73.	What type of handwashing facility do you have (check visually)	0 None 1 HWF but no water or soap 2 HWF with water but no soap 3 HWF with soap but no water 4 HWF with water and soap
74.	Notes…	

APPENDIX 6: SURVEY FORM: MANAGERS

#______

	Question	Answer options
1.	Informed consent given?	0 no 1 yes
2.	Survey location / WP name	
3.	Survey date	
4.	Survey conducted...	1 In private 2 Others present
5.	Respondent gender	1 male 2 female
6.	Respondent found where?	1 at home 2 at water point 3 at VH home 4 other
7.	Are you a member of the VDC or WPC or other committee?	0 no 1 WPC chair 2 WPC treasurer 3 Other WPC member 4 WP caretaker (paid) 5 WP caretaker (unpaid) 6 VDC chair 7 VDC treasurer 8 Other VDC member 9 VH 10 GVH
8.	WP type	1 Borehole - Hand. Drilled - Manual Pump 3 Borehole - Mech. Drilled - Manual Pump 4 Borehole - Mech. Drilled - No Pump 5 Borehole - Mech. Drilled - Powered Pump 6 Spring - Protected 7 Standpipe - Gravity Fed 8 Standpipe - Motorized System 88 Other Protected Source
9.	WP functionality	0 Not functional 1 Partly functional 2 Functioning well
10.	If not functioning, why is this?	
11.	WP installation date	
12.	WP ID	
13.	How many households use this water point? (approximately)	
14.	Is there enough water for the number of users?	1 yes always enough 2 normally enough 3 often not enough 4 never enough

15.	Is there another functioning ICWP within one kilometre of this one?	0 no 1 yes
16.	Who initiated installation of the water point?	1 The community themselves 2 An outside organisation
17.	Were you involved in any of the following decisions about this WP?	0 No, not involved in any of these decisions 1 Technology type 2 Siting 3 Management arrangements 4 Financing arrangements 99 Don't know / can't remember
18.	Were other community members involved in any of the following decisions about this WP?	0 No, not involved in any of these decisions 1 Technology type 2 Siting 3 Management arrangements 4 Financing arrangements 99 Don't know / can't remember
19.	Did the community contribute financially to installation?	0 No 1 Yes 2 Don't know
20.	How much altogether?	
21.	How much for his/her household?	
22.	Did your household contribute in-kind to installation?	0 No, did not contribute in kind 1 Labour 2 Local materials 3 Land 4 Other 99 Don't know / can't remember
23.	Did the community contribute in-kind to installation?	0 No, did not contribute in kind 1 Labour 2 Local materials 3 Land 4 Other 99 Don't know / can't remember
24.	Do you know how much the WP cost to install altogether?	0 no 1 yes
25.	If yes, how much? (MWK)	
26.	Did community have to set up a bank account at installation?	0 no 1 yes 99 don't know
27.	How much did community put into that account? (MWK)	

28.	Does that account still exist?	0 no 1 yes 99 don't know
29.	If yes, how much is in it (MWK)?	
30.	Amount verified from written records?	0 no 1 yes
31.	Who installed the WP?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
32.	If NGO or other, please give details	
33.	Who paid for it?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
34.	Who paid for it? (extra text if required)	
35.	Who owns it?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
36.	Who owns it? (extra text if required)	
37.	Who is responsible for day to day management?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know

38.	Who is responsible for day to day management? (extra text if required)	
39.	Who is responsible for doing maintenance and minor repairs?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
40.	Who is responsible for doing maintenance and minor repairs? (extra text if required)	
41.	Who is responsible for doing major repairs?	1 Community 2 VH 3 VDC 4 WPC 5 WP caretaker 6 District Govt / DWO 7 National Govt / MOIWD 8 NGO 9 Area Mechanics 10 Other 99 Don't know
42.	Who is responsible for doing major repairs? (extra text if required)	
43.	Date of last leakage test.	
44.	Date of last discharge test.	
45.	Date of last dismantling and checking of wearing parts.	
46.	Date of last tightening of nuts on fulcrum pin.	
47.	# of times dismantled in last 12 months	
48.	# of times dismantled since installation	
49.	Who does the maintenance?	0 No-one / maintenance not done 1 WPC (group) 2 WPC (single member) 3 Area Mechanic 4 Other
50.	Is this person paid?	0 no 1 yes
51.	If yes, how much?	
52.	Date of last breakdown	

53.	Type of last breakdown	0 Has never broken down 1 Bobbin 2 Cup seal / U-seal 3 Bearing bush outer 4 Bearing bush inner 5 O-ring 6 Rod centraliser 7 Rod 8 Rising Main 9 Headset 10 Theft 11 Other 99 Unknown
54.	Type of last breakdown (extra details if required, e.g. if theft)	
55.	Duration of last breakdown (# of days)	
56.	Was repair attempted?	0 no 1 yes
57.	Who attempted repair?	0 No-one 1 WPC member/s 2 Other villagers 3 Area mechanic 4 DWO 5 Other govt 6 Installer 7 NGO 8 Other
58.	Who attempted repair? (give details if required)	
59.	Was repair successful?	0 no 1 yes
60.	Cost of repair (labour, MWK)	
61.	Cost of repair (parts including transport costs, MWK)	
62.	# of breakdowns in last 12 months?	
63.	# of breakdowns since installation?	
64.	# of months after installation until first breakdown?	
65.	Type of first breakdown?	0 Has never broken down 1 Bobbin 2 Cup seal / U-seal 3 Bearing bush outer 4 Bearing bush inner 5 O-ring 6 Rod centraliser 7 Rod 8 Rising Main 9 Headset 10 Theft 11 Other 99 Unknown
66.	Duration of first breakdown?	
67.	How many days in the last year has the WP NOT been functional?	
68.	How many days in the last 5 years has the WP NOT been functional?	
69.	How many times has the WP broken down due to a broken U-seal?	
70.	How many times has the WP broken down due to a broken O-ring?	
71.	How many times has the WP broken down due to a broken rod?	

72.	Which of these spare parts do you have in stock here in the village?	0 None 1 Bobbin 2 Cup seal / U-seal 3 Bearing bush outer 4 Bearing bush inner 5 O-ring 6 Rod centraliser 7 Rod 8 Other
73.	If you don't have a spare part in stock, how far do you have to travel to get it? (time in hours for one return journey)	
74.	How much does it cost for transport?	
75.	How much does a new U-seal cost? (MWK)	
76.	How much does a new O-ring cost? (MWK)	
77.	How much does a new rod cost? (MWK)	
78.	Do you feel that you have problems accessing spare parts?	0 no, not at all 1 sometimes, for some parts 2 yes, problems getting most/all parts
79.	Was a WP committee created when the WP was installed?	0 no, no committee was created 1 yes, a new one was created 3 a committee already existed
80.	Is the WP Committee active now?	0 no 1 yes
81.	How many times has the WPC met in the past 12 months?	
82.	# of months since last meeting?	
83.	How many active members on the WPC?	
84.	How many have received at least 3 days of training in WP maintenance and repair?	
85.	How many are the same people that were on the WPC when the WP was installed?	
86.	How many attended last meeting?	
87.	How many are women?	
88.	Is the chair a man or woman?	1 man 2 woman
89.	Is the treasurer a man or woman?	1 man 2 woman
90.	If there was a WP committee before, but it is no longer active, why is this?	
91.	If there is no WP committee, who is managing the WP?	

92.	Does the community contribute financially to operation and maintenance of the WP?	0 no 1 yes, pay per bucket 2 yes, pay monthly per household 3 monthly per person 4 yearly per household 5 yearly per person 6 occasionally, when repairs are needed 7 occasionally, various reasons/not sure why 8 other
93.	If pay per bucket, how much per bucket?	
94.	If pay regularly per household, how much?	
95.	Are some households exempt?	0 No 1 Yes
96.	Which households are exempt from paying for water?	0 none 1 Elderly 2 Disabled 3 Sick 4 Poor or vulnerable 5 Female-headed households 6 Child-headed households 7 Other
97.	What proportion of users are exempt?	1 All or almost all 2 About three-quarters 3 About a half 4 About a quarter 5 Less than a quarter 6 Very few or none
98.	What proportion of those that are supposed to pay actually do pay?	1 All or almost all 2 About three-quarters 3 About a half 4 About a quarter 5 Less than a quarter 6 Very few or none
99.	Is there any penalty for non-payment?	0 No penalty 1 Yes: not allowed to use ICWP 2 Yes: ‘naming and shaming’ 3 Yes: other
100.	When was the last time funds were collected from households?	
101.	How much did each household have to pay?	
102.	How much was collected in total?	

103.	Who collected the money?	0 no-one (no money has been collected) 1 WPC member 2 VDC member 3 VH/GVH 4 other 99 don't know / can't remember
104.	Where is the money for the WP kept?	0 nowhere (no funds are held) 1 in a bank account 2 by a WPC member 3 by a VDC member 4 by the VH / GVH 5 other 99 don't know / can't remember
105.	Do the WPC report back to the community on how the money is spent?	0 no, never 1 yes, sometimes 2 yes, always 99 don't know
106.	Are written records kept of WP income and expenditure?	0 no 1 reportedly yes, but not available 2 yes, seen but poor quality 3 yes, seen and good quality 99 don't know
107.	How much was collected in the past 12 months? (MWK)	
108.	How much was spent on WP O&M in the past 12 months? (MWK)	
109.	Total collected since installation? (MWK)	
110.	Total expended since installation? (MWK)	
111.	Total currently held in WP fund? (MWK total)	
112.	If this is significantly less than would be expected based on theoretical hh contributions, why do they think this is?	
113.	How good does the respondent think the financial management of this water point is?	1 Very poor 2 Quite poor 3 OK 4 Good 5 Excellent
114.	Any other comments?	
115.	Have you ever received any post-construction support from the installer?	0 no, none 1 single monitoring visit 2 multiple monitoring visits 3 extra training 4 maintenance (free) 5 maintenance (had to pay) 6 repairs (free) 7 repairs (had to pay) 8 other 99 don't know

116.	Have you ever received any post-construction support from the district government / DWO?	0 no, none 1 single monitoring visit 2 multiple monitoring visits 3 extra training 4 maintenance (free) 5 maintenance (had to pay) 6 repairs (free) 7 repairs (had to pay) 8 other 99 don't know
117.	Have you ever received any post-construction support from central government / MOIWD?	0 no, none 1 single monitoring visit 2 multiple monitoring visits 3 extra training 4 maintenance (free) 5 maintenance (had to pay) 6 repairs (free) 7 repairs (had to pay) 8 other 99 don't know
118.	Have you ever received any post-construction support from any other source?	0 no, none 1 single monitoring visit 2 multiple monitoring visits 3 extra training 4 maintenance (free) 5 maintenance (had to pay) 6 repairs (free) 7 repairs (had to pay) 8 other 99 don't know
119.	Give details of other source	
120.	What are the benefits of this WP? (if it is functioning)	1 Less time spent fetching water 2 Less waterborne disease 3 Subjective well-being (eg washing more) 4 Other
121.	If other, please give details.	

122.	Are there any problems with this water point?	0 no, no problems 1 Frequent breakdowns 2 Water quantity (low yield) 3 Cost 4 Distance 5 Time queuing 6 Quality (taste) 7 Quality (hardness) 8 Other
123.	If other, please give details.	
124.	How satisfied are you with the management arrangements for this WP?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
125.	How satisfied are you with the financial arrangements for this WP?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
126.	How satisfied are you with the availability of spare parts?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
127.	How satisfied are you with the availability of external support?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
128.	How satisfied are you with the overall performance of this WP?	1 Very dissatisfied 2 Slightly dissatisfied 3 Don't know / no response 4 Quite satisfied 5 Very satisfied
129.	What type of latrine do you have? (check visually)	0 none 1 Private 2 Shared 3 Cover 4 Good privacy 5 Good cleanliness 6 Good ventilation 7 Ecosan
130.	Latrine notes	

131.	What type of handwashing facility do you have (check visually)	0 None 1 HWF but no water or soap 2 HWF with water but no soap 3 HWF with soap but no water 4 HWF with water and soap
132.	HWF notes	

APPENDIX 7: INTERVIEW SCHEDULE

Introduce self and research, and secure informed consent (go through Participant Information Sheet and Consent Form).

Interview to be conducted in English if possible, otherwise in Chichewa with Research Assistant translating.

Interview to be voice recorded, if consent given.

Date:	
Interviewee:	
Consent form attached?	Yes / No

Guide Questions

1. Please could you tell me who you are and what work you do / what involvement you have in the water supply sector?

2. My research is looking at the question of sustainability: specifically, why some water points keep working for a long time, while others stop working quite quickly. Do you feel that there is a problem with sustainability of water points in this district / in Malawi, and if so why? (Prompt for examples).

3. Introduce Factor Ranking Exercise. Prompt for explanation of ratings.

Ranking Exercise: Factors contributing to WP non-sustainability

Rank:	1	2	3	4	5	6	7	8	9	10
Factor:										
Rating:										

Notes:

I am particularly interested in three sets of issues: financing of maintenance and repairs; coordination and support mechanisms; and data management / communication of information.

4. Regarding financing of maintenance and repairs:
- How is this organised in this area currently, and why?
- How effective is the current approach?
- What do you think could be done to improve it? (Who needs to do what differently? What are the barriers? What would it cost?)

5. Regarding coordination and support:

- How is this organised in this area currently, and why?
- How effective is the current approach?
- What do you think could be done to improve it? (Who needs to do what differently? What are the barriers? What would it cost?)

6. Regarding data management / communication of information

- How is this organised in this area currently, and why?
- How effective is the current approach?
- What do you think could be done to improve it? (Who needs to do what differently? What are the barriers? What would it cost?)

7. Do you have any data on water points that you would be willing to share with me, such as lists of water points installed, or mapping or monitoring data? I am hoping to analyse as much secondary data as I can to build up as accurate a picture as possible. Of course I would share my analysis with you, and would acknowledge your assistance in my thesis, if you wish.

8. Finally, what do you think is the single most important thing that could be done to improve the sustainability of clean water supply in this area? Who should be responsible for it, and how much would it cost?

Thanks given	Yes / No
Recap/check on consent	Yes / No
Check whether copy of research is desired.	Yes / No

APPENDIX 8: VDCS SURVEYED

The study covered 4 Districts, 8 TAs, and 25 VDCs. One day was spent on data collection in each VDC, except for Namale, where we spent 2 days, because travel to and within the VDC was particularly slow. Numbers of WPs listed (L+W) and surveyed (W), and numbers of User (U) and Manager (M) surveys conducted, are also shown.

District & TA		Date	VDC	L+W	L	W	U+M	U	M	Total
Ntcheu	Chakhumbira	19/07/11	Lihako 1	34	28	6	0	0	0	34
		20/07/11	Zidana	18	0	18	13	6	7	31
		21/07/11	Tchayatchaya	8	1	7	0	0	0	8
		22/07/11	Namale	19	0	19	15	8	7	34
		Total		79	29	50	28	14	14	107
	Kwataine	25/07/11	Masitimale	24	6	18	12	8	4	36
		26/07/11	Chimphamba	36	22	14	14	8	6	50
		27/07/11	Nachiye	32	24	8	16	8	8	48
		Total		92	52	40	42	24	18	134
Mangochi	Mbwana Nyambi	19/10/11	Mkumba	19	3	16	12	8	4	31
		20/10/11	Mzinda	30	5	25	15	8	7	45
		21/10/11	Kumbalama	35	17	18	13	8	5	48
		Total		84	25	59	40	24	16	124
	Nankumba	24/10/11	Chamba	47	30	17	11	8	3	58
		25/10/11	Kasankha	41	21	20	12	8	4	53
		26/10/11	Chiwalo	48	29	19	11	8	3	59
		Total		136	80	56	34	24	10	170
Thyolo	Nsabwe	19/06/12	Ndaona	31	13	18	11	8	3	42
		20/06/12	Chalonda	30	17	13	12	8	4	42
		21/06/12	Mzundu	32	17	15	11	8	3	43
		Total		93	47	46	34	24	10	127
	Chimaliro	23/06/12	Chidothe	35	28	7	9	6	3	44
		24/06/12	January	38	26	12	11	8	3	49
		25/06/12	Boyidi	45	31	14	13	8	5	58
		Total		118	85	33	33	22	11	151
Chikhwawa	Lundu	27/06/12	Tomali	5	0	5	12	8	4	17
		28/06/12	Sekeni	22	7	15	8	6	2	30
		29/06/12	Nkhwazi	10	0	10	9	7	2	19
		Total		37	7	30	29	21	8	66
	Masache	30/06/12	Jackson	7	0	7	12	8	4	19
		01/07/12	Mphonde	13	5	8	12	8	4	25
		02/07/12	Masache	20	11	9	12	8	4	32
		Total		40	16	24	36	24	12	76
OVERALL TOTAL				679	341	338	276	177	99	955

APPENDIX 9: INTERVIEWEES

I conducted 20 formal semi-structured interviews with a total of 26 respondents; 5 were joint interviews. Interviews were conducted during fieldwork trips in 2011 and 2012. Of these interviews, 14 were voice-recorded and later transcribed, while at the other 6 I took comprehensive notes. Nineteen of the 26 individuals also provided responses to the factor ranking exercise.

Key:

Type	A = Area Mechanic D = Donor G(N) = National Government G(L) = Local Government N = NGO T = Traditional Authority
R/N	R = voice recorded N = notes taken
F	* = responded to factor exercise

List of interviewees:

Type	Organisation	Job Title	Location	R/N	F
A	Mzimba VDC	Area Mechanic	Mangochi	N	
D	DFID	Water and Sanitation Adviser	Lilongwe	R	
D	JICA	Senior Programme Officer	Lilongwe	R	*
D	JICA	Senior Programme Officer	Lilongwe	R	*
D	UNICEF	WASH Officer	Lilongwe	R	*
D	UNICEF	WASH Officer	Lilongwe	R	*
G(L)	Chikhwawa DWO	District Water Officer	Chikhwawa	R	*
G(L)	Mangochi DWO	Acting DWO	Mangochi	R	*
G(L)	Mangochi DWO	Water Monitoring Assistant	Mangochi	R	*
G(L)	Ntcheu District Council	Director of Planning and Development	Ntcheu	R	*
G(L)	Ntcheu DWO	District Water Officer	Ntcheu	R	
G(L)	Thyolo DWO	District Water Officer	Thyolo	R	*
G(N)	MOIWD	Economist (M&E)	Lilongwe	R	*
G(N)	MOIWD	Chief Civil Engineer, Water Supply Services	Lilongwe	N	*
G(N)	MOIWD	Deputy Director Water Supply Services	Lilongwe	N	*
G(N)	MOIWD (NWDP)	Acting Project Coordinator	Lilongwe	N	*
G(N)	MOIWD (NWDP)	Senior Civil Engineer	Lilongwe	N	*
N	Concern Universal	Project Manager	Ntcheu	R	*
N	Concern Universal	WASH Project Manager	Ntcheu	R	*
N	Engineers Without Borders	Co-Director	Lilongwe	R	
N	Engineers Without	Fellow	Mangochi	R	*

Type	Organisation	Job Title	Location	R/N	F
	Borders				
N	ICEIDA	Staff member	Mangochi	N	
N	InterAide	Joint Country Director	Lilongwe	R	
N	Water For People	Programme Manager	Chikhwawa	R	*
N	WaterAid	Country Representative	Lilongwe	N	
N	WES Network	National Coordinator	Lilongwe	R	*

I also met with 13 other key informants, but did not conduct formal interviews with them.

Type	Job Title and Organisation	Location
N	M&E Officer, WaterAid	Lilongwe
N	Fellow, Engineers Without Borders	Mzuzu / Lilongwe
N	Country Director, Concern Universal	Blantyre
G(N)	Local Government Finance Officer	Lilongwe
N	Fellow, Engineers Without Borders	Ntcheu
T	TA Chakhumbira	Ntcheu District
T	TA Kwataine	Ntcheu District
T	TA Mbwana Nyambi	Mangochi District
T	TA Nankumba	Mangochi District
T	GVH Ndaona (deputising for TA Nsabwe)	Thyolo District
T	TA Chimaliro	Thyolo District
T	TA Lundu	Chikhwawa District
T	TA Masache	Chikhwawa District

APPENDIX 10: BLOGS ANALYSED

I analysed the blogs of 28 individuals working in Malawi for Engineers Without Borders, an NGO. All were Canadian nationals undertaking placements in Malawian WASH institutions. Placement duration varied widely, as did the analytical value of the blog. The data comprised 739 blog posts totalling 1377 KB of data (nearly five times as much data as in the survey notes), with wide variation in terms of the percentage of material that related to their work and the subject of this study. After initially reading each blog in full, I classified them as of high, medium or low analytical value, and then thoroughly coded only those that I considered to be of high or medium value. The table below summarises the data analysed.

Code	# Posts	KB	First post	Last post	Placement locations	% re work	Analytical value
B20	15	68	13/02/2011	03/04/2012	Various, Mangochi	80%	High
B25	44	40	15/02/2010	17/12/2011	Thyolo, Chikhwawa	75%	High
B16	55	62	05/04/2011	10/08/2011	Machinga	75%	High
B24	19	59	01/09/2008	04/12/2011	Chileka, Lilongwe	70%	High
B15	13	29	21/07/2011	08/01/2012	Nkhata Bay, Mwanza	60%	High
B17	86	159	26/04/2011	04/12/2012	Ntcheu, Lilongwe	40%	High
B6	28	67	12/08/2012	11/02/2013	Mangochi	30%	High
B7	60	24	01/03/2010	01/12/2011	Karonga, Mzuzu, Lilongwe	30%	High
B11	48	207	01/12/2010	02/02/2012	Karonga, Salima, Lilongwe	20%	High
B4	30	21	01/07/2010	23/12/2011	Mzimba	35%	Medium
B27	13	52	28/03/2011	27/01/2012	Phalombe	30%	Medium
B13	27	61	11/03/2011	14/02/2012	Mzimba, Kasungu	20%	Medium
B26	29	58	11/04/2011	21/11/2011	Mzimba	10%	Medium
B1	9	15	25/03/2011	14/06/2011	Nkhata Bay	80%	Low
B21	16	16	01/04/2010	13/12/2010	Thyolo	50%	Low
B2	22	17	24/03/2011	08/08/2011	Maganga, Salima	30%	Low
B3	15	9	01/03/2011	22/11/2011	Mwanza	20%	Low
B5	7	21	23/04/2012	12/07/2012	Salima	20%	Low
B10	8	11	09/05/2012	09/08/2012	Mulanje	20%	Low
B19	19	15	28/04/2012	24/08/2012	Balaka	15%	Low
B22	16	202	28/04/2012	29/11/2012	Balaka	15%	Low
B8	23	19	01/04/2012	15/08/2012	Lilongwe	10%	Low
B12	13	7	12/05/2011	15/07/2011	near Lilongwe	10%	Low
B23	22	55	06/03/2012	14/02/2013	Phalombe, Zomba	1%	Low
B9	57	3	01/09/2011	01/05/2012	MphereMphere, Mzuzu	0%	Low
B14	18	8	26/03/2011	09/08/2011	Chitipa	0%	Low
B18	21	56	26/04/2011	27/08/2011	Mzuzu, Kamwendo	0%	Low
B28	6	16	06/03/2012	04/07/2012	Zomba	0%	Low

APPENDIX 11: QUANTITATIVE DATA ANALYSIS: RELATIONSHIPS BETWEEN VARIABLES AND SURVEY QUESTIONS

This Appendix sets out how the quantitative research instruments (the questions in the L, W, M and U surveys) relate to the first stage of the analytical framework (the outcome variables, proximate explanatory variables and associated hypotheses).

Key:

L = List of WPs by VDC
W = Water point survey
U = User survey
M = Manager survey
Thus 'L3' indicates question #3 in the List survey, 'W6' indicates question #6 in the Water point survey, and so on.

Outcome variables

I define the outcome of interest, water point sustainability, as 'continued functionality over time'. Since I am unable to observe multiple water points over time, I use several components of sustainability as proxy outcome variables: functionality at the time of the survey (FUNCT), frequency of breakdown (BREAKFREQ), duration of breakdown (BREAKLENGTH), days operational since installation (DAYSFUNCT), quality of water (WATERQUAL) and quantity of water (YIELD).

Variable	Survey questions used for statistical analysis	Other relevant survey questions
FUNCT Functionality	• L3 W6 M9 Functional?	
BREAKFREQ Frequency of breakdown	• W16 M63 # of breakdowns since installed? • M62 # of breakdowns in last 12 months?	• W17 First breakdown date • W23 Last breakdown date • M52 Date of last breakdown • M53 Type of last breakdown • M54 Type of last breakdown (extra details if required, e.g. if theft) • M56 Was repair attempted?

Variable	Survey questions used for statistical analysis	Other relevant survey questions
		• M57 Who attempted repair? • M58 Who attempted repair? (give details if required) • M59 Was repair successful? • M60 Cost of repair (labour, MWK) • M61 Cost of repair (parts including transport costs, MWK) • M64 # of months after installation until first breakdown? • M65 Type of first breakdown? • M69 How many times has the WP broken down due to a broken U-seal? • M70 How many times has the WP broken down due to a broken O-ring? • M71 How many times has the WP broken down due to a broken rod? • L7 Problem / Notes
BREAKLENGTH Duration of breakdown	• W18 M66 First breakdown duration • W24 M55 Last breakdown duration	
DAYSFUNCT % of days operational	In the last year: calculated from 365 minus • M67 How many days in the last year has the WP NOT been functional? Since installation: calculated from AGE minus • M68 How many days in the last 5 years has the WP NOT been functional?	
WATERQUAL Quality of water	• U66 M117 Are there any problems with this water point? - Quality (taste); Quality (hardness)	Note: I did not have the technical capacity to collect and analyse data on other aspects of water quality.

Variable	Survey questions used for statistical analysis	Other relevant survey questions
YIELD Quantity of water	• U66 M117 Are there any problems with this water point? - Water quantity (low yield); Time queuing • U21 M14 Is there enough water for the number of users?	Note: I did not have the time or equipment to collect objective data on yield.

Explanatory variables

Variables that were identified in the literature review but are not tested by this study are shown in italics.

Variable	Survey questions used for statistical analysis	Other relevant survey questions
DESIGN AND INSTALLATION FACTORS		
Geology		• W14 Depth • W15 # of rods This is difficult to assess without detailed geological data.
Climate		No survey question. This is difficult to assess without detailed meteorological data.
Siting		• U19 How far do you have to walk to the ICWP? • U22 Is there another functioning ICWP within one kilometre of this one? • U24 Were you involved in any of the following decisions about this WP? • U25 Were other community members involved in any of the following decisions about this WP?

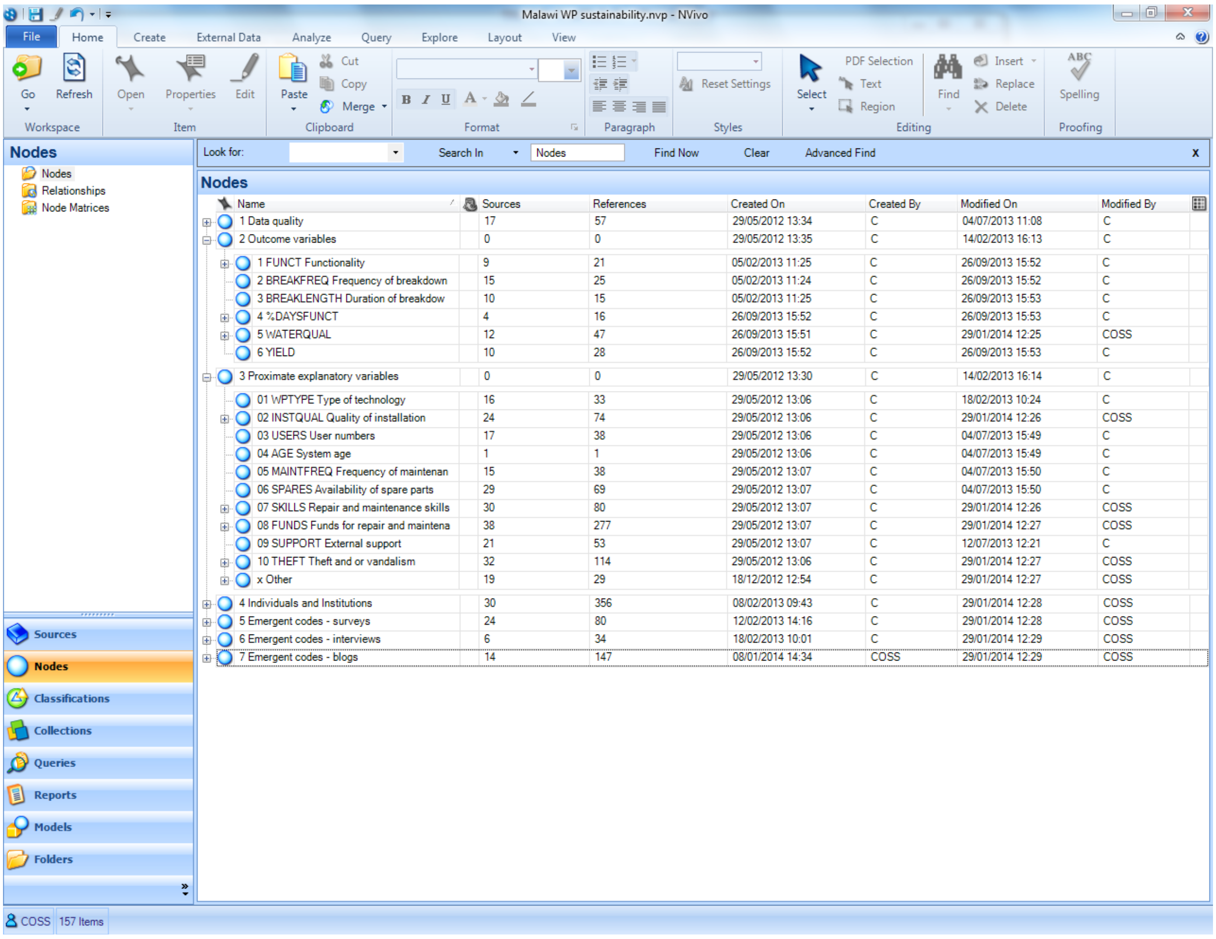
Variable	Survey questions used for statistical analysis	Other relevant survey questions
WPTYPE Type of technology	• L2 W4 M8 WP Type	• W5 Afridev? • W12 Pump make
INSTQUAL Quality of installation	• L5 W8 M31 U37 and M32 U38 Installer, combined into one	• W10 Rehabilitator
USERS User numbers	• U20 M13 How many households use this water point? • U18 How long do you normally have to queue at the ICWP?	• L #hh in village (divided by #WPs)
AGE System age	• L6 W7 M11 Installation Date (subtracted from Survey Date)	• W9 Rehabilitation Date
POST-CONSTRUCTION FACTORS		
MAINTFREQ Frequency of maintenance	• M43 # of months since last leakage test. • M44 # of months since last discharge test. • M45 # of months since last dismantling and checking of wearing parts. • M46 # of months since last tightening of nuts on fulcrum pin. • M47 # of times dismantled in last 12 months. • M48 # of times dismantled since installation.	
SPARES Accessibility of spare parts	• W37 M72 Which spare parts do you have in stock? • M73 If you don't have a spare part in stock, how far do you have to travel to get it? (time in hours for one return journey) • M78 Do you feel that you have problems accessing spare parts?	• W38 Spares bought from? • M74 How much does it cost for transport? • M75 How much does a new U-seal cost? (MWK) • M76 How much does a new O-ring cost? (MWK) • M77 How much does a new rod cost? (MWK) • M126 How satisfied are you with the

Variable	Survey questions used for statistical analysis	Other relevant survey questions
		availability of spare parts?
SKILLS Availability of maintenance and repair skills	Responsibility for maintenance and repairs: • M39 U45 / M40 U46 Who is responsible for doing minor maintenance and repairs? • M41 U47 / M42 U48 Who is responsible for doing major maintenance and repairs? Water Point Committees • M79 Was a committee created when the WP was installed? • W29 M80 Is the WP committee active now? • M81 How many times has the WPC met in the last 12 months? • W30 M83 How many active members are on the committee? • M87 How many are women? • W31 W32 W33 M84 How many WPC members have received at least 3 days of training in WP maintenance and repair?	• W27 M57 M58 Last breakdown – who attempted repair? • W26 M59 Was repair successful? • M49 Who does the maintenance? • M82 How many months since last WPC meeting?
FUNDS Availability of funds for maintenance and repair	• M24 U31 Do you know how much the WP cost to install altogether? • M25 U32 If yes, how much? • M26 U33 Did the community have to set up a bank account at installation? • M27 U34 How much did the community put into that account? • M28 U35 Does that account still exist? • M29 U36 If yes, how much is in it? • M30 Amount verified from written records? • U49 M92 Does the community	• U50 M93 If pay per bucket, how much per bucket? • Wx How many households contribute financially to this WP? • M106 Are written records kept of WP income and expenditure? • M107 How much was collected in the past 12 months? • M108 How much was spent on WP

Variable	Survey questions used for statistical analysis	Other relevant survey questions
	contribute financially to operation and maintenance of the WP? • U51 M94 If pay regularly per household, how much? • U52 M95 Are some households exempt? • U53 M96 Which households are exempt from paying for water? • U54 M97 What proportion of users are exempt? • (W35) U55 M98 Did everyone contribute [to the last collection] / What proportion of those that are supposed to pay actually do pay? • U56 M99 Is there any penalty for non-payment? • (W34) U57 M100 Last time funds collected / When was the last time your household paid a contribution for water? • U58 M101 How much did you pay (MWK)? • M102 How much was collected in total? • U59 M103 Who collected the money? • U60 M104 Where is the money for the WP kept? • U61 M105 Do the WPC report back to the community on how the money is spent? • W36 M111 Amount of funds held now / Total currently held in WP fund? [*Fa*] • [Amount of funds that should in theory be held – *Ft*] • [Discrepancy between theoretical and actual amounts held – *Ft*-*Fa*] • U62 M113 How good do you think the financial management of this water point is?	O&M in the past 12 months? • M109 Total collected since installation? • M110 Total expended since installation? • M112 If this is significantly less than would be expected based on theoretical hh contributions, why do they think this is? • U63 M114 Any other comments? • U69 M120 How satisfied are you with the financial arrangements for this WP?

Variable	Survey questions used for statistical analysis	Other relevant survey questions
	• U69 M120 How satisfied are you with the financial arrangements for this WP?	
SUPPORT Availability of external support	• Have you ever received any post-construction support from: M115 the installer, M116 the district government / DWO, M117 central government / MOIWD, M118 any other source? (Give details). • M122 How satisfied are you with the availability of external support?	
THEFT Incidence of theft	Note: No explicit question on theft or vandalism was included in any of the surveys. Instead, I analyse whether it was spontaneously mentioned by respondents. • Is theft of WP parts reported? • Is financial mismanagement reported? • Is community conflict reported?	

APPENDIX 12: QUALITATIVE DATA ANALYSIS: CODING STRUCTURE



Name	Sources	References	Created On	Created By	Modified On	Modified By
1 Data quality	17	57	29/05/2012 13:34	C	04/07/2013 11:08	C
2 Outcome variables	0	0	29/05/2012 13:35	C	14/02/2013 16:13	C
1 FUNCT Functionality	9	21	05/02/2013 11:25	C	26/09/2013 15:52	C
2 BREAKFREQ Frequency of breakdown	15	25	05/02/2013 11:24	C	26/09/2013 15:52	C
3 BREAKLENGTH Duration of breakdow	10	15	05/02/2013 11:25	C	26/09/2013 15:53	C
4 %DAYSFUNCT	4	16	26/09/2013 15:52	C	26/09/2013 15:53	C
5 WATERQUAL	12	47	26/09/2013 15:51	C	29/01/2014 12:25	COSS
6 YIELD	10	28	26/09/2013 15:52	C	26/09/2013 15:53	C
3 Proximate explanatory variables	0	0	29/05/2012 13:30	C	14/02/2013 16:14	C
01 WPTYPE Type of technology	16	33	29/05/2012 13:06	C	18/02/2013 10:24	C
02 INSTQUAL Quality of installation	24	74	29/05/2012 13:06	C	29/01/2014 12:26	COSS
03 USERS User numbers	17	38	29/05/2012 13:06	C	04/07/2013 15:49	C
04 AGE System age	1	1	29/05/2012 13:06	C	04/07/2013 15:49	C
05 MAINTFREQ Frequency of maintenan	15	38	29/05/2012 13:07	C	04/07/2013 15:50	C
06 SPARES Availability of spare parts	29	69	29/05/2012 13:07	C	04/07/2013 15:50	C
07 SKILLS Repair and maintenance skills	30	80	29/05/2012 13:07	C	29/01/2014 12:26	COSS
08 FUNDS Funds for repair and maintena	38	277	29/05/2012 13:07	C	29/01/2014 12:27	COSS
09 SUPPORT External support	21	53	29/05/2012 13:07	C	12/07/2013 12:21	C
10 THEFT Theft and or vandalism	32	114	29/05/2012 13:06	C	29/01/2014 12:27	COSS
x Other	19	29	18/12/2012 12:54	C	29/01/2014 12:27	COSS
4 Individuals and Institutions	30	356	08/02/2013 09:43	C	29/01/2014 12:28	COSS
5 Emergent codes - surveys	24	80	12/02/2013 14:16	C	29/01/2014 12:28	COSS
6 Emergent codes - interviews	6	34	18/02/2013 10:01	C	29/01/2014 12:29	COSS
7 Emergent codes - blogs	14	147	08/01/2014 14:34	COSS	29/01/2014 12:29	COSS

APPENDIX 13: QUALITATIVE DATA ANALYSIS: CODING FREQUENCY

Coding frequencies in NVivo for proximate explanatory variables (Survey notes and interviews only).

	Variable name	Sources	As % of total	As % of Sources (n=45)	Rank by % of Sources	Refs	As % of total Refs	Rank by % of Refs
1	WPTYPE	16	7%	36%	8	33	4%	9
2	INSTQUAL	24	11%	53%	5	74	10%	4
3	USERS	17	8%	38%	7	38	5%	7
4	AGE	1	0%	2%	10	1	0%	10
5	MAINTFREQ	15	7%	33%	9	38	5%	7
6	SPARES	29	13%	64%	4	69	9%	5
7	SKILLS	30	13%	67%	3	80	10%	3
8	FUNDS	38	17%	84%	1	277	36%	1
9	SUPPORT	21	9%	47%	6	53	7%	6
10	THEFT	32	14%	71%	2	114	15%	2
	TOTAL	**223**	**100%**			**777**	**100%**	

REFERENCES

AfDB (2012). The African Development Bank in Action: Activities in the water and sanitation sector in Malawi. African Development Bank.

Afrobarometer. (2014). "Afrobarometer Round 5 (2010-2012), Most important problems - 1st response." Retrieved 29 January 2014, from http://www.afrobarometer-online-analysis.com/aj/AJBrowserAB.jsp.

Agrawal, A. (2001). "Common Property Institutions and Sustainable Governance of Resources." World Development **29**(10): 1649-1672.

Ahmed, A. U., R. V. Hill, L. C. Smith, D. M. Wiesmann, T. Frankenberger, K. Gulati, W. Quabili and Y. Yohannes (2007). The world's most deprived: Characteristics and causes of extreme poverty and hunger International Food Policy Research Institute (IFPRI)

Aladuwaka, S. and J. Momsen (2010). "Sustainable development, water resources management and women's empowerment: the Wanaraniya Water Project in Sri Lanka." Gender & Development **18**(1): 43-58.

Alise, M. A. and C. Teddlie (2010). "A Continuation of the Paradigm Wars? Prevalence Rates of Methodological Approaches Across the Social/Behavioral Sciences." Journal of Mixed Methods Research **4**(2): 103-126.

AMCOW (2011). Pathways to Progress: Transitioning to Country-Led Service Delivery Pathways to Meet Africa's Water Supply and Sanitation Targets. AMCOW Country Status Overviews - Regional Synthesis Report. Nairobi, World Bank Water and Sanitation Programme**:** 100.

Asunka, J. (2013). What People Want From Government: Basic Services Performance Ratings, 34 Countries. Policy Brief #5, Afrobarometer.

Awortwi, N. (2013). "The riddle of community development: factors influencing participation and management in twenty-nine African and Latin American communities." Community Development Journal **48**(1): 89-104.

Babajanian, B. V. (2011). "Problematising the community-contribution requirement in participatory projects: evidence from Kyrgyzstan." Development in Practice **21**(3): 317-329.

Bach, D. C. and M. Gazibo, Eds. (2012). Neopatrimonialism in Africa and Beyond. Abingdon, Routledge.

Bailis, R., A. Cowan, V. Berrueta and O. Masera (2009). "Arresting the Killer in the Kitchen: The Promises and Pitfalls of Commercializing Improved Cookstoves." World Development **37**(10): 1694-1705.

Baird, S., C. McIntosh and B. Özler (2013). "The regressive demands of demand-driven development." Journal of Public Economics **106**(0): 27-41.

Bakalian, A. and W. Wakeman (2009). Post-Construction Support and Sustainability in Community-Managed Rural Water Supply - Case Studies in Peru, Bolivia, and Ghana. Water Sector Board Discussion Paper #14. Washington DC, World Bank – Netherlands Water Partnership.

Baland, J.-M. and J.-P. Platteau (1999). "The Ambiguous Impact of Inequality on Local Resource Management." World Development **27**(5): 773-788.

Banerjee, A. V., R. Banerji, E. Duflo, R. Glennerster and S. Khemani (2010). "Pitfalls of Participatory Programs: Evidence from a Randomized Evaluation in Education in India." American Economic Journal: Economic Policy **2**(1): 1-30.
Banerjee, A. V., R. Chattopadhyay, E. Duflo, D. Keniston and N. Singh (2012). Can Institutions be Reformed from Within? Evidence from a Randomized Experiment with the Rajasthan Police. NBER Working Paper. Cambridge, Massachusetts, National Bureau of Economic Research.
Banerjee, A. V. and E. Duflo (2008). "Mandated Empowerment." Annals of the New York Academy of Sciences **1136**(1): 333-341.
Banerjee, A. V. and E. Duflo (2012). Poor economics. London, Penguin.
Barder, O. (2009). Beyond Planning: Markets and Networks for Better Aid. Working Paper 185. Washington DC, Center for Global Development.
Barnett, C., M. Chisvo, E. Kadzamira, E. van der Meer, M. Paalman and C. Risner (2006). Evaluation of DFID Country Programmes, Country Study: Malawi, 2000-2005. Evaluation Report EV661. London, DFID.
Batley, R. (2006). "Engaged or divorced? Cross-service findings on government relations with non-state service-providers." Public Administration and Development **26**(3): 241-251.
Baumann, E. (2006). "Do operation and maintenance pay?" Waterlines **25**(1): 10-12.
Baumann, E. and K. Danert (2008a). Operation and Maintenance of Rural Water Supplies in Malawi: Study Findings. St Gallen, Switzerland, SKAT.
Baumann, E. and K. Danert (2008b). Operation and Maintenance of Rural Water Supplies in Malawi: Proposed O&M Framework and Action Plan. St Gallen, Switzerland, SKAT.
Baumann, E. and S. Furey (2013). How Three Handpumps Revolutionised Rural Water Supplies: A brief history of the India Mark II/III, Afridev and the Zimbabwe Bush Pump. Field Note No 2013-1. St Gallen, Rural Water Supply Network.
Bazeley, P. (2007). Qualitative Data Analysis with NVivo. London, SAGE.
Bergman, M. M. (2010). "On Concepts and Paradigms in Mixed Methods Research." Journal of Mixed Methods Research **4**(3): 171-175.
Bergman, M. M. (2011). "The Good, the Bad, and the Ugly in Mixed Methods Research and Design." Journal of Mixed Methods Research **5**(4): 271-275.
Bhandari, B. and M. Grant (2007). "User satisfaction and sustainability of drinking water schemes in rural communities of Nepal " Sustainability: Science, Practice and Policy **3**(1): 12-20.
Bhatnagar, B. and A. C. Williams (1992). Participatory development and the World Bank: potential directions for change, World Bank Publications.
Björkman, M. and J. Svensson (2010). "WHEN IS COMMUNITY-BASED MONITORING EFFECTIVE? EVIDENCE FROM A RANDOMIZED EXPERIMENT IN PRIMARY HEALTH IN UGANDA." Journal of the European Economic Association **8**(2-3): 571-581.
Blaikie, P. (2006). "Is Small Really Beautiful? Community-based Natural Resource Management in Malawi and Botswana." World Development **34**(11): 1942-1957.
BMZ, I. (2011). The Risk of Vanishing Effects: Impact evaluation of drinking water supply and sanitation programmes in rural Benin, The Netherlands Ministry of Foreign Affairs / German Federal Ministry for Economic Cooperation and Development.

Boesten, J., A. Mdee and F. Cleaver (2011). "Service delivery on the cheap? Community-based workers in development interventions." Development in Practice **21**(1): 41-58.
Booth, D. (2011a). "Introduction: Working with the Grain? The Africa Power and Politics Programme." IDS Bulletin **42**(2): 1-10.
Booth, D. (2011b). "Towards a Theory of Local Governance and Public Goods Provision." IDS Bulletin **42**(2): 11-21.
Booth, D. (2012). Development as a collective action problem: addressing the real challenges of African governance, Africa Power and Politics Programme. **Synthesis Report of the Africa Power and Politics Programme:** 132.
Booth, D., D. Cammack, J. Harrigan, E. Kanyongolo, M. Mataure and N. Ngwira (2006). Drivers of Change and Development in Malawi. Working Paper 261. London, Overseas Development Institute.
Botchway, K. (2001). "Paradox of Empowerment: Reflections on a Case Study from Northern Ghana." World Development **29**(1): 135-153.
Bratton, M. (2012). "Citizen Perceptions of Local Government Responsiveness in Sub-Saharan Africa." World Development **40**(3): 516-527.
Bratton, M. and N. Van de Walle (1997). Democratic experiments in Africa: Regime transitions in comparative perspective. Cambridge, Cambridge University Press.
Brett, E. A. (2003). "Participation and accountability in development management." Journal of Development Studies **40**(2): 1-29.
Bruhns, H. (2012). Weber's patrimonial domination and its interpretations. Neopatrimonialism in Africa and Beyond. D. C. Bach and M. Gazibo. Abingdon, Routledge.
Brundtland, G. H. (1987). Our common future : World Commission on Environment and Development / [chairman Gro Harlem Bruntland]. Oxford, Oxford : Oxford University Press.
Bryman, A. (1988). Quantity and Quality in Social Research. London, Routledge.
Bryman, A. (2007). "Barriers to Integrating Quantitative and Qualitative Research." Journal of Mixed Methods Research **1**(1): 8-22.
Bryman, A. (2008). Social Research Methods (3rd edition). Oxford, OUP.
Burger, R. and T. Owens (2010). "Promoting Transparency in the NGO Sector: Examining the Availability and Reliability of Self-Reported Data." World Development **38**(9): 1263-1277.
Cammack, D. (2007). "The Logic of African Neopatrimonialism: What Role for Donors?" Development Policy Review **25**(5): 599-614.
Cammack, D. (2012). Peri-urban governance and the delivery of public goods in Malawi, 2009-2011. APPP Research Report. London, APPP / ODI.
Cammack, D. and E. Kanyongolo (2010). Local governance and public goods in Malawi. APPP Working Paper. London, APPP/ODI.
Cammack, D. and T. Kelsall (2011). "Neo-patrimonialism, Institutions and Economic Growth: The Case of Malawi, 1964–2009." IDS Bulletin **42**(2): 88-96.
Campbell, M. (2009). Study of the Sustained Effects of a Water Project.
Carter, R. (2009). Operation and maintenance of rural water supplies. RWSN Perspectives No. 2. St Gallen, Rural Water Supply Network.
Carter, R., E. Harvey and V. Casey (2010). User financing of rural handpump water services. IRC Symposium 2010: Pumps, Pipes and Promises.

Carter, R. C. (2011). "Editorial." Waterlines **30**(4): 267-269.
Carter, R. C. and R. Rwamwanja (2006). Functional sustainability in community water and sanitation: a case study from South-West Uganda. London, Tearfund.
Carter, R. C., S. F. Tyrrel and P. Howsam (1999). "The Impact and Sustainability of Community Water Supply and Sanitation Programmes in Developing Countries." Water and Environment Journal **13**(4): 292-296.
Casey, K., R. Glennerster and E. Miguel (2012). "Reshaping Institutions: Evidence on Aid Impacts Using a Pre-Analysis Plan." The Quarterly Journal of Economics.
Chabal, P. and J. P. Daloz (1999). Africa Works: Disorder As Political Instrument, International African Institute in association with James Currey, Oxford.
Chambers, R. (1983). Rural Development: Putting the Last First, Routledge.
Chambers, R. (1994). Paradigm shifts and the practice of participatory research and development, Institute of Development Studies (UK).
Chambers, R. (1997). Whose Reality Counts?: Putting the First Last, ITDG Publishing.
Chambers, R. (2008). Revolutions in Development Inquiry. London, Earthscan.
Chang, H. J. (2003). Globalization, Economic Development and the Role of the State, Zed Books.
Chikhwawa District Water Office (2010). Chikhwawa District WASH database. accessed via Edwin Mchilikizo, Chikhwawa District Water Officer, June 2012.
Chinsinga, B. (2011a). "The politics of land reforms in Malawi: The case of the Community Based Rural Land Development Programme (CBRLDP)." Journal of International Development **23**(3): 380-393.
Chinsinga, B. (2011b). "Seeds and Subsidies: The Political Economy of Input Programmes in Malawi." IDS Bulletin **42**(4): 59-68.
Chiweza, A. L. (2005). "Participation: Reality or Rhetoric in Rural Communities of Malawi?" Tanzanet Journal **5**(1): 1-8.
Chiweza, A. L. (2010). A review of the Malawi decentralisation process: Lessons from selected districts. Blantyre, Government of Malawi, Ministry of Local Government and Rural Development, and Concern Universal.
Chowdhury, M. S. H., M. Koike, S. Akther and D. Miah (2011). "Biomass fuel use, burning technique and reasons for the denial of improved cooking stoves by Forest User Groups of Rema-Kalenga Wildlife Sanctuary, Bangladesh." International Journal of Sustainable Development & World Ecology **18**(1): 88-97.
Christensen, P., M. R. Mikkelsen, T. A. S. Nielsen and H. Harder (2011). "Children, Mobility, and Space: Using GPS and Mobile Phone Technologies in Ethnographic Research." Journal of Mixed Methods Research.
CIA (2013). The World Factbook: Malawi, CIA.
Cleaver, F. (1999). "Paradoxes of participation: questioning participatory approaches to development." Journal of International Development **11**(4): 597-612.
Cleaver, F. (2001). Institutions, agency and the limitations of participatory approaches to development. Participation: the new tyranny? B. a. U. K. Cooke. London, Zed Books**:** 36-55

Cleaver, F. (2004). The social embeddedness of agency and decision-making. Participation - From Tyranny to Transformation? Exploring New Approaches to Participation in Development. S. Hickey and G. Mohan. London, Zed Books.
Cleaver, F. (2007). "Understanding Agency in Collective Action." Journal of Human Development **8**(2): 223-244.
Cleaver, F. (2012). Development Through Bricolage: Rethinking Institutions for Natural Resource Management. London, Routledge.
Cleaver, F., T. Franks, F. Maganga and K. Hall (2013). "Institutions, Security, and Pastoralism: Exploring the limits of hybridity." African Studies Review **56**(03): 165-189.
Cleaver, F. and K. Hamada (2010). "'Good' water governance and gender equity: a troubled relationship." Gender & Development **18**(1): 27-41.
Cochran, J. and I. Ray (2009). "Equity Reexamined: A Study of Community-Based Rainwater Harvesting in Rajasthan, India." World Development **37**(2): 435-444.
Colin, J. (1999). VLOM for Rural Water Supply: Lessons from Experience, WELL: Water and Environmental Health at London and Loughborough. **WELL Study, Task No. 162**.
Collin, M. (2011, 26 April 2011). "Political security, for the price of a bag of fertiliser." Retrieved 1 March 2013, from http://aidthoughts.org/?p=2424.
Collinson, S. e. (2003). Power, Livelihoods and Conflict: Case Studies in Political Economy Analysis for Humanitarian Action. London, Overseas Development Institute. **Report 13, Humanitarian Policy Group**.
Concern Universal (2006). Lessons from a Direct Welfare Transfer Intervention: A Pilot Project by Concern Universal in Malawi. Blantyre, Concern Universal.
Conroy, A. C., M. J. Blackie, A. Whiteside, J. C. Malewezi and J. D. Sachs (2006). Poverty, AIDS and Hunger: Breaking the Poverty Trap in Malawi. Basingstoke, Palgrave Macmillan.
Cooke, B. and U. Kothari, Eds. (2001). Participation: the new tyranny? London, Zed Books.
Copestake, J. and R. Williams (2012). Political economy analysis, aid effectiveness and the art of development management. Bath Papers in International Development and Well-Being no. 18. Bath, Centre for Development Studies, University of Bath.
Cornia, G. A., R. Jolly and F. Stewart (1987). Adjustment with a Human Face: Protecting the vulnerable and promoting growth, Clarendon Press.
Cornwall, A. (2007). "Buzzwords and fuzzwords: deconstructing development discourse." Development in Practice **17**(4-5): 471-484.
Cornwall, A. and D. Eade (2010). Deconstructing development discourse : buzzwords and fuzzwords / edited by Andrea Cornwall and Deborah Eade. Rugby, Rugby : Practical Action Pub. in association with Oxfam GB.
Crook, R. C. and D. Booth (2011). "Conclusion: Rethinking African Governance and Development." IDS Bulletin **42**(2): 97-101.
Crook, R. C. and J. Manor (1998). Democracy and Decentralisation in South Asia and West Africa: Participation, Accountability and Performance, Cambridge University Press.
Danert, K., R. C. Carter, A. MacDonald and E. Baumann (2009). Cost-effective boreholes in sub-Saharan Africa. 34th WEDC International Conference. Addis Ababa, Ethiopia.

Daraja (2011) "Maji Matone hasn't delivered. Time to embrace failure, learn, and move on.".

Davis, P. and B. Baulch (2011). "Parallel Realities: Exploring Poverty Dynamics Using Mixed Methods in Rural Bangladesh." Journal of Development Studies **47**(1): 118-142.

de Koning, J. (2011). Reshaping institutions : bricolage processes in smallholder forestry in the Amazon. Proefschrift Wageningen, s.n.].

de Renzio, P. and D. Angemi (2012). "COMRADES OR CULPRITS? DONOR ENGAGEMENT AND BUDGET TRANSPARENCY IN AID-DEPENDENT COUNTRIES." Public Administration and Development **32**(2): 167-180.

de Saint Méloir, B. (2009). InterAide Support to Operation and Maintenance of Rural Water Supplies in Malawi in 2008. Member Experiences No 1. St Gallen, Switzerland, Rural Water Supply Network.

De Vaus, D. (2001). Research design in social research, Sage.

Deaton, A. (2010). "Instruments, Randomization, and Learning about Development." Journal of Economic Literature **48**(2): 424-455.

Delaplace, D. (2011). WasNan KAP Survey 2011 Analysis: Report submitted to ICEIDA.

Devarajan, S., S. Khemani and M. Walton (2014). "Can Civil Society Overcome Government Failure in Africa?" The World Bank Research Observer **29**(1): 20-47.

DFID (2006). Eliminating World Poverty: Making governance work for the poor: A White Paper on International Development. London, Department for International Development.

DFID (2011). DFID's Approach to Value for Money (VfM). London, DFID.

DFID (2012). Water, Sanitation and Hygiene Portfolio Review. London, Department for International Development.

Dill, B. (2009). "The Paradoxes of Community-based Participation in Dar es Salaam." Development and Change **40**(4): 717-743.

Dillon, B. (2012). "Using mobile phones to collect panel data in developing countries." Journal of International Development **24**(4): 518-527.

Dionne, K. Y. and B. Dulani (2013). "Constitutional provisions and executive succession: Malawi's 2012 transition in comparative perspective." African Affairs **112**(446): 111-137.

Dorward, A. and E. Chirwa (2011). "The Malawi agricultural input subsidy programme: 2005/06 to 2008/09." International Journal of Agricultural Sustainability **9**(1): 232-247.

Drazen, A. (2000). Political Economy in Macroeconomics. Princeton, Princeton University Press.

Duflo, E. (2012). Paternalism versus Freedom? and Hope as Capability. Tanner Lectures, 2 and 3 May 2012. Cambridge, MA, Mahindra Humanities Center, Harvard University.

Duflo, E., P. Dupas and M. Kremer (2012). School Governance, Teacher Incentives, and Pupil-Teacher Ratios: Experimental Evidence from Kenyan Primary Schools. Working Paper. Boston, J-PAL, MIT.

Dupas, P. (2009). "What Matters (and What Does Not) in Households' Decision to Invest in Malaria Prevention?" American Economic Review **99**(2): 224-230.

Elbers, C., S. Godfrey, J. W. Gunning, M. van der Velden and M. Vigh (2012). Effectiveness of Large Scale Water and Sanitation Interventions: The One Million Initiative in Mozambique. Discussion Paper TI 2012-069/2. Amsterdam, Tinbergen Institute / Erasmus University Rotterdam, the University of Amsterdam and VU University Amsterdam.
Ellis, F., M. Kutengule and A. Nyasulu (2003). "Livelihoods and Rural Poverty Reduction in Malawi." World Development **31**(9): 1495-1510.
Ellis, F. and E. Manda (2012). "Seasonal Food Crises and Policy Responses: A Narrative Account of Three Food Security Crises in Malawi." World Development **40**(7): 1407-1417.
Erdmann, G. and U. Engel (2009). Neopatrimonialism Revisited : Beyond a Catch-All Concept. Hamburg, SUB Hamburg Carl von Ossietzky.
ESRC (2012). ESRC Framework for Research Ethics (FRE) 2010, Updated September 2012. Swindon, ESRC.
Esrey, S. A. (1996). "Water, Waste, and Well-Being: A Multicountry Study." American Journal of Epidemiology **143**(6): 608-623.
Eyben, R. and S. Ladbury (1995). Popular participation in aid assisted projects: why more in theory than practice, Power and Participatory Development, Theory and Practice, Nelson and Wright, Intermediate Technology Publications, London.
Faguet, J.-P. (2014). "Decentralization and Governance." World Development **53**(0): 2-13.
Farrington, C. (2011). "Putting good governance into practice III: measuring intrinsic and instrumental empowerment in local government contexts." Progress in Development Studies **11**(2): 151-161.
Ferguson, J. (1990). The anti-politics machine : "development", depoliticization, and bureaucratic power in Lesotho / James Ferguson. Cambridge, Cambridge : Cambridge University Press.
Field, A. (2009). Discovering Statistics Using SPSS (3rd edition). London, Sage.
Finlay, L. (2002). "Negotiating the swamp: the opportunity and challenge of reflexivity in research practice." Qualitative Research **2**(2): 209-230.
Finlay, L. and B. Gough (2008). Reflexivity: A Practical Guide for Researchers in Health and Social Sciences, Wiley.
Fonseca, C., R. Franceys, C. Batchelor, P. McIntyre, A. Klutse, K. Komives, P. Moriarty, A. Naafs, K. Nyarko, C. Pezon, A. Potter, R. Reddy and M. Snehalatha (2011). Life-cycle costs approach: costing sustainable services. WASHCost Briefing Note**:** 37.
Franks, T. and F. Cleaver (2007). "Water governance and poverty." Progress in Development Studies **7**(4): 291-306.
Fukuyama, F. (1989). "The End of History?" The National Interest(Summer 1989).
Ghosh Banerjee, S. and E. Morella (2011). Africa's Water and Sanitation Infrastructure: Access, Affordability, and Alternatives. Washington DC, World Bank.
Golooba-Mutebi, F. (2012). "IN SEARCH OF THE RIGHT FORMULA: PUBLIC, PRIVATE AND COMMUNITY-DRIVEN PROVISION OF SAFE WATER IN RWANDA AND UGANDA." Public Administration and Development **32**(4-5): 430-443.

GOM (2005a). Guidebook on Decentralisation and Local Government in Malawi. M. o. L. G. a. Development. Lilongwe, Malawi-German Programme for Democracy and Decentralisation.
GOM (2005b). National Water Policy. M. o. I. a. W. Development. Lilongwe, Government of Malawi.
GOM (2007). Malawi Growth and Development Strategy: From Poverty to Prosperity 2006-2011, International Monetary Fund. **IMF Country Report No. 07/55**.
GOM (2008). Mangochi Road Map, Government of Malawi.
GOM (2009). Water and Sanitation Sector Joint Sector Review Report. M. o. I. a. W. Development. Lilongwe, Ministry of Irrigation and Water Development.
GOM (2010a). 2010-2011 Local Authority Itemised Budget Estimates. M. o. L. G. a. R. Development. Lilongwe, National Local Government Finance Committee.
GOM (2010b). 2010-2011 Local Authority Output Based Budget Estimates. M. o. L. G. a. R. Development. Lilongwe, Government of Malawi, National Local Government Finance Committee. **Local Authority Budget Document 4**.
GOM (2011a). Inter-Governmental Fiscal Transfer System (IGFTS). N. L. G. F. Committee. Lilongwe.
GOM (2011b). Irrigation, Water and Sanitation Sector 2010 Joint Sector Review Meeting Report. M. o. I. a. W. Development. Lilongwe, Ministry of Irrigation and Water Development**:** 53.
GOM (2011c). Estimates for Expenditures for 2011/12– 2013/14 Financial Years for Local Councils. M. o. Finance. Lilongwe, Government of Malawi, Ministry of Finance.
GOM (2012a). Malawi Sector Performance Report 2011: Irrigation, Water and Sanitation. I. a. W. D. Ministry of Agriculture. Lilongwe, Ministry of Agriculture, Irrigation and Water Development.
GOM (2012b). Malawi Growth and Development Strategy II 2012-2016 Washington DC, International Monetary Fund. **IMF Country Report No. 12/222**.
GOM. (2013). "Official Website." Retrieved 25 February 2013, from http://www.malawi.gov.mw/.
Gorard, S. (2010). Research Design, as Independent of Methods SAGE Handbook of Mixed Methods in Social & Behavioral Research. A. Tashakkori and C. Teddlie, SAGE.
Gorton, M., J. Sauer, M. Peshevski, D. Bosev, D. Shekerinov and S. Quarrie (2009). "Water Communities in the Republic of Macedonia: An Empirical Analysis of Membership Satisfaction and Payment Behavior." World Development **37**(12): 1951-1963.
Grindle, M. (2002). Good Enough Governance: Poverty Reduction and Reform in Developing Countries. Cambridge, Massachusetts, Kennedy School of Government, Harvard University.
Guest, G., A. Bunce and L. Johnson (2006). "How Many Interviews Are Enough?" Field Methods **18**(1): 59-82.
Guijt, I. and M. K. Shah (1998). The Myth of Community: Gender issues in participatory development. London, Intermediate Technology Publications.
Gutierrez, E. (2007). "Delivering pro-poor water and sanitation services: The technical and political challenges in Malawi and Zambia." Geoforum **38**(5): 886-900.

Hall, K., F. Cleaver, T. Franks and F. Maganga (2014). "Capturing Critical Institutionalism: A Synthesis of Key Themes and Debates." European Journal of Development Research **26**(1): 71-86.
Handa, S., C. Huang, N. Hypher, C. Teixeira, F. V. Soares and B. Davis (2012). "Targeting effectiveness of social cash transfer programmes in three African countries." Journal of Development Effectiveness **4**(1): 78-108.
Hankin, P. (2001). The Afridev Handpump - problems and solutions. 27th WEDC Conference. Lusaka, Zambia, WEDC.
Harris, D., M. Kooy and L. Jones (2011). Analysing the governance and political economy of water and sanitation service delivery. ODI Working Paper. London, ODI.
Harrison, G. (2008). "From the global to the local? Governance and development at the local level: reflections from Tanzania." The Journal of Modern African Studies **46**(02): 169-189.
Harvey, P. (2004). Borehole sustainability in rural Africa: An analysis of routine field data. 30th WEDC International Conference. Vientiane, Lao PDR.
Harvey, P. and J. Narkevic (2009). Sustainable rural water supplies (SRWS) flagship: work plan January 2009 - December 2011. St Gallen, Switzerland, Rural Water Supply Network.
Harvey, P. and B. Reed (2004). Rural Water Supply in Africa: Building Blocks for Handpump Sustainability. Loughborough, WEDC Publications, Loughborough University.
Harvey, P. A. (2007). "Cost determination and sustainable financing for rural water services in sub-Saharan Africa." Water Policy **9**(4): 373–391.
Harvey, P. A. and R. A. Reed (2007). "Community-managed water supplies in Africa: sustainable or dispensable?" Community Development Journal **42**(3): 365-378.
Haysom, A. (2006). A study of the factors affecting sustainability of rural water supplies in Tanzania. Dar es Salaam, WaterAid Tanzania.
Heinrich, C. J. and Y. Lopez (2009). "Does Community Participation Produce Dividends in Social Investment Fund Projects?" World Development **37**(9): 1554-1568.
Hesse-Biber, S. (2010). "Qualitative Approaches to Mixed Methods Practice." Qualitative Inquiry **16**(6): 455-468.
Hirschman, A. O. (1970). Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations, and States, Harvard University Press.
Howard, G. and J. Bartram (2003). Domestic Water Quantity, Service Level and Health. Geneva, World Health Organisation.
Hunter, P. R., A. M. MacDonald and R. C. Carter (2010). "Water Supply and Health." PLoS Med **7**(11): e1000361.
Hutton, G. and J. Bartram (2008). "Global costs of attaining the Millennium Development Goal for water supply and sanitation." Bulletin of the World Health Organization **86**: 13-19.
Hutton, G. and L. Haller (2004). Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level. Geneva, World Health Organisation.
IFAD. (2013). "Malawi: Geography, agriculture and the economy." Retrieved 1 March 2013, from http://www.ruralpovertyportal.org/country/geography/tags/malawi.

IFAD. (2013). "Rural poverty in Malawi." Retrieved 1 March 2013, from http://www.ruralpovertyportal.org/country/home/tags/malawi.
Isham, J., D. Narayan and L. Pritchett (1995). "Does Participation Improve Performance? Establishing Causality with Subjective Data." The World Bank Economic Review **9**(2): 175-200.
Ivankova, N. V., J. W. Creswell and S. L. Stick (2006). "Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice." Field Methods **18**(1): 3-20.
J-PAL (2012). Cleaner Water at the Source. Policy Briefcase. A. L. J. P. A. Lab. Cambridge, Massachussetts.
Jakobsen, H. (2012). "Focus groups and methodological rigour outside the minority world: making the method work to its strengths in Tanzania." Qualitative Research **12**(2): 111-130.
Jerven, M. (2012). "FOR RICHER, FOR POORER: GDP REVISIONS AND AFRICA'S STATISTICAL TRAGEDY." African Affairs **112/446**: 138-147.
Jerven, M. (2013). "The Political Economy of Agricultural Statistics and Input Subsidies: Evidence from India, Nigeria and Malawi." Journal of Agrarian Change: n/a-n/a.
JICA (2012). JOINT SECTOR ANALYSIS: INTEGRATED RURAL DEVELOPMENT, GREEN BELT IRRIGATION AND WATER DEVELOPMENT REPORT (Draft for Discussion). Lilongwe, Malawi, JICA Japan International Cooperation Agency**:** 11.
Jimenez, A. and A. Perez-Foguet (2008). Quality and sustainabilty aspects in water access indicators: an example from Same District, Tanzania. 33rd WEDC International Conference. Accra, Ghana.
JMP (2010). Progress on sanitation and drinking-water, 2010 update. Geneva, WHO / UNICEF.
JMP (2011). Drinking Water Equity, Safety and Sustainability: JMP Thematic Report on Drinking Water 2011. Geneva, UNICEF / World Health Organisation.
JMP (2012a). Progress on Drinking Water and Sanitation - 2012 Update, UNICEF/WHO Joint Monitoring Programme.
JMP (2012b). Malawi: Estimates for the use of Improved Drinking-Water Sources. Geneva, JMP.
JMP (2013). Progress on Sanitation and Drinking-Water: 2013 Update. Geneva, World Health Organisation and UNICEF.
Johnson, R. B., A. J. Onwuegbuzie and L. A. Turner (2007). "Toward a Definition of Mixed Methods Research." Journal of Mixed Methods Research **1**(2): 112-133.
Jolly, R. (1991). "Adjustment with a human face: A UNICEF record and perspective on the 1980s." World Development **19**(12): 1807-1821.
Jones, P., R. Drury and J. McBeath (2011). "Using GPS-Enabled Mobile Computing to Augment Qualitative Interviewing: Two Case Studies." Field Methods **23**(2): 173-187.
Jones, S. (2011). "Participation as citizenship or payment? A case study of rural drinking water governance in Mali." Water Alternatives **4**(1): 54-71.
Kahneman, D. (2012). Thinking, Fast and Slow. London, Penguin.
Kampala, R. (2007). Waterpoints mapping: WSSCC's experience from Malawi. Presentation, 16 April 2007. Geneva, Switzerland.

Kasungu District Assembly (2007). Kasungu District Rural Water Sanitation and Hygeine Programme District Strategy and Investment Plan for WASH 2007-2015. Malawi, Ministry of Irrigation and Water Development.
Kelsall, T. (2008). "Going with the Grain in African Development?" Development Policy Review **26**(6): 627-655.
Kelsall, T. (2011). "Rethinking the Relationship between Neo-patrimonialism and Economic Development in Africa." IDS Bulletin **42**(2): 76-87.
Khwaja, A. I. (2009). "Can good projects succeed in bad communities?" Journal of Public Economics **93**(7–8): 899-916.
Kitschelt, H. and S. I. Wilkinson (2007). Patrons, Clients and Policies: Patterns of Democratic Accountability and Political Competition, Cambridge University Press.
Klasen, S., T. Lechtenfeld, K. Meier and J. Rieckmann (2012). "Benefits trickling away: the health impact of extending access to piped water and sanitation in urban Yemen." Journal of Development Effectiveness: 1-29.
Kleemeier, E. (2000). "The Impact of Participation on Sustainability: An Analysis of the Malawi Rural Piped Scheme Program." World Development **28**(5): 929-944.
Kleemeier, E. (2010). Private Operators and Rural Water Sipplies: A Desk Review of Experience. Water Papers. Washington DC, World Bank Water Partnership Program.
Kleemeier, E. and J. Narkevic (2010). Private Operator Models for Community Water Supply: A global review of private operator experiences in rural areas. WSP Field Note, February 2010. Nairobi, Water and Sanitation Program / World Bank.
Koch, D.-J., A. Dreher, P. Nunnenkamp and R. Thiele (2009). "Keeping a Low Profile: What Determines the Allocation of Aid by Non-Governmental Organizations?" World Development **37**(5): 902-918.
Komives, K., B. Akanbang, R. Thorsten, B. Tuffuor, W. Wakeman, E. Larbi, A. Bakalian and D. Whittington (2008). Post-construction support and the sustainability of rural water projects in Ghana. 33rd WEDC International Conference. Accra, Ghana.
Kremer, M. and E. Miguel (2007). "The Illusion of Sustainability." The Quarterly Journal of Economics **122**(3): 1007-1065.
Labonne, J. and R. S. Chase (2009). "Who is at the Wheel When Communities Drive Development? Evidence from the Philippines." World Development **37**(1): 219-231.
Lane, J. (2012). "Barriers and Opportunities for Sanitation and Water for All, as Envisaged by the New Delhi Statement." IDS Bulletin **43**(2): 13-20.
Lashaw, A. (2012). "How progressive culture resists critique: The impasse of NGO Studies." Ethnography.
Leach, M., R. Mearns and I. Scoones (1999). "Environmental Entitlements: Dynamics and Institutions in Community-Based Natural Resource Management." World Development **27**(2): 225-247.
Leftwich, A. (2005). "Politics in Command: Development Studies and the Rediscovery of Social Science." New Political Economy **10**(4): 573-606.
Lilja, N., P. Kristjanson and J. Watts (2010). "Rethinking impact: understanding the complexity of poverty and change – overview." Development in Practice **20**(8): 917-932.

Lincoln, Y. S. and E. G. Guba (1985). Naturalistic Inquiry, SAGE Publications.
Lipton, M. (1986). "Seasonality and Ultrapoverty." IDS Bulletin **17**(3): 4-8.
Lockwood, H. (2012). "From policy to practice in rural water - 'it's the money stupid'." Retrieved 7 February 2012, from http://waterservicesthatlast.wordpress.com/2012/02/07/from-policy-to-practice-in-rural-water-its-the-money-stupid/.
Lockwood, H. (2013). "A Swedish Smorgasbord of sustainability: compacts, checks and clauses." Water Services That Last http://waterservicesthatlast.wordpress.com/2013/10/01/a-swedish-smorgasbord-of-sustainability-compacts-checks-and-clauses/ Accessed 2/01/2014.
Lockwood, H., A. Bakalian and W. Wakeman (2010). Assessing sustainability in rural water supply: the role of follow-up support to communities, Aguaconsult.
Lockwood, H. and M. Kang (2012). Closing the gap: WASH sector devolution and decentralisation in Malawi. Triple-S Working Paper 2. The Hague, The Netherlands, Triple-S / IRC International Water and Sanitation Centre.
Lockwood, H. and S. Smits (2011). Supporting Rural Water Supply: Moving towards a Service Delivery Approach. Rugby, Practical Action Publishing.
Lockwood, M. (2006). The state they're in: an agenda for international action on poverty in Africa. Rugby, Practical Action Publishing.
Logan, C. (2013). "The roots of resilience: Exploring popular support for African traditional authorities." African Affairs **112**(448): 353-376.
Lucas, B. (2011). Helpdesk Research Report: Output-based aid in water and sanitation. Birmingham, GSDRC.
MacDonald, A., Ó Dochartaigh, B. And Welle, K. (2009). Mapping for Water Supply and Sanitation (WSS) in Ethiopia. RiPPLE Working Paper #11.
Madrigal, R., F. Alpízar and A. Schlüter (2011). "Determinants of Performance of Community-Based Drinking Water Organizations." World Development **39**(9): 1663-1675.
Makuwira, J. (2011). "Civil Society Organizations (CSOs) and the Changing Nature of African Politics: The Case of the CSO–Government Relationship in Malawi." Journal of Asian and African Studies **46**(6): 615-628.
Malawi Electoral Commission. (2009). "2009 Election Results Reports." Retrieved 20 June 2013, 2013, from http://www.mec.org.mw/Elections/2009ResultsReports/tabid/98/Default.aspx.
Mangochi District Council (2010). Mangochi Rural Water Atlas 2010: A Status Report on Rural Water. Malawi, UNICEF / Mangochi District Council.
Mansuri, G. and V. Rao (2013). Localizing Development: Does Participation Work? World Bank Policy Research Report. Washington, D.C., The World Bank.
Marks, S. J. and J. Davis (2012). "Does User Participation Lead to Sense of Ownership for Rural Water Systems? Evidence from Kenya." World Development **40**(8): 1569-1576.
Martinussen, J. (1997). Society, state, and market: a guide to competing theories of development. London, Zed Books.
Masangwi, S. J., T. D. Morse, N. S. Ferguson, G. Zawdie, A. M. Grimason and J. J. Namangale (2009). "Behavioural and environmental determinants of childhood diarrhoea in Chikwawa, Malawi." Desalination **248**(1–3): 684-691.

Mason, N. M. and J. Ricker-Gilbert (2013). "Disrupting Demand for Commercial Seed: Input Subsidies in Malawi and Zambia." World Development **45**(0): 75-91.
Matamula, S. (2008). Community Based Management for Sustainable Water Supply in Malawi. 33rd WEDC International Conference. Accra, Ghana.
Mathew, B. (2004). Ensuring sustained beneficial outcomes for water and sanitation (WatSan) programmes in the developing world. Cranfield, Institute of Water and Environment, Cranfield University.
McCracken, J. (2012). A History of Malawi 1859-1966. Suffolk, James Currey.
Mcloughlin, C. and R. Batley (2012). The effects of sector characteristics on accountability relationships in service delivery. ODI Working Paper. London, Overseas Development Institute.
McNicholl, D. (2011). Accessing Hand Pump Spare Parts: A Study of Northern Malawi. 35th WEDC International Conference. Loughborough, UK.
MEJN (2010). Analysis of the water supply sector financing in Malawi. Lilongwe, Malawi Economic Justice Network.
Mertens, D. M. (2010). "Divergence and Mixed Methods." Journal of Mixed Methods Research **4**(1): 3-5.
Mertens, D. M. and S. Hesse-Biber (2012). "Triangulation and Mixed Methods Research." Journal of Mixed Methods Research **6**(2): 75-79.
MLGRD. (2013). "Decentralisation History: Democratic Decentralisation Timeline." Retrieved 28 February 2013, from http://www.mlgrd.gov.mw/?page_id=46.
Mohan, G. and K. Stokke (2000). "Participatory Development and Empowerment: The Dangers of Localism." Third World Quarterly **21**(2): 247-268.
Moore, M. (2001). "Political underdevelopment: What causes 'bad governance'." Public Management Review **3**(3): 385-418.
Moore, M. and J. Putzel (1999). Thinking strategically about politics and poverty. IDS Working Paper 101. Brighton, Institute of Development Studies.
Morfit, N. S. (2011). "“AIDS is Money”: How Donor Preferences Reconfigure Local Realities." World Development **39**(1): 64-76.
Mosse, D. (2005). Cultivating Development: An Ethnography of Aid Policy and Practice. London, Pluto Press.
Msukwa, C. A. P. S. and D. Taylor (2011). "Why can't development be managed more like a funeral? Challenging participatory practices." Development in Practice **21**(1): 59-72.
Narayan, D. (1995). The contribution of people's participation : evidence from 121 rural water supply projects. Washington DC, World Bank.
Nelson, N. and S. Wright (1995). Power and Participatory Development: Theory and Practice, Intermediate Technology Publications.
Nicol, A., L. Mehta and J. Allouche (2012). "Introduction: ‘Some for All Rather than More for Some’? Contested Pathways and Politics since the 1990 New Delhi Statement." IDS Bulletin **43**(2): 1-9.
Nkhoma, B. (2011). "The politics, development and problems of small irrigation dams in Malawi: Experiences from Mzuzu ADD " Water Alternatives **4**(3): 383-398
NSO (2008). National Population and Housing Census, Full Report., National Statistical Office of Malawi.

Ntcheu District Council (2008). Ntcheu District Socio-Economic Profile. Ntcheu, Government of Malawi.

Ntcheu District Council (2010a). Ntcheu District Development Plan 2010-2013. Ntcheu, Government of Malawi.

Ntcheu District Council (2010b). Ntcheu District WASH Sector Strategy and Investment Plan DSIP 2010-2015 Ntcheu, Government of Malawi.

Null, C., M. Kremer, E. Miguel, J. G. Hombrados, R. Meeks and A. P. Zwane (2012). Willingness to pay for cleaner water in less developed countries: Systematic review of experimental evidence. Systematic Review 006. London, 3ie: International Initiative for Impact Evaluation.

Nunan, F. (2006). "Empowerment and institutions: Managing fisheries in Uganda." World Development **34**(7): 1316-1332.

O'Reilly, K. and R. Dhanju (2012). "Hybrid drinking water governance: Community participation and ongoing neoliberal reforms in rural Rajasthan, India." Geoforum **43**(3): 623-633.

Oakley, P. (1991). Projects With People: The Practice of Participation in Rural Development. Geneva, International Labour Office.

ODI (2004). Towards Better Integration of Water and Sanitation in PRSPs in Sub-Saharan Africa: lessons from Uganda, Malawi and Zambia. WPP Briefing Paper No. 5. London and Nairobi, ODI and WSP-Africa.

OECD (2010). Glossary of Key Terms in Evaluation and Results Based Management. Paris, OECD.

Olivier de Sardan, J.-P. (2011). "The Eight Modes of Local Governance in West Africa." IDS Bulletin **42**(2): 22-31.

Olken, B. A. (2005). Monitoring corruption: Evidence from a field experiment in Indonesia, National Bureau of Economic Research.

Olken, B. A., J. Onishi and S. Wong (2012). Should Aid Reward Performance? Evidence from a field experiment on health and education in Indonesia

Olson, M. (1977). The Logic of Collective Action: Public Goods and the Theory of Groups. London, Harvard University Press.

Opare, S. (2011). "Sustaining water supply through a phased community management approach: lessons from Ghana's "oats" water supply scheme." Environment, Development and Sustainability **13**(6): 1021-1042.

Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge, Cambridge University Press.

Pearce, J. and C. Howman (2013). RWSN Water Point Mapping Group: A Synthesis of Experiences and Lessons discussed in 2012. St Gallen, Rural Water Supply Network.

Persha, L. and K. Andersson (In press). "Elite capture risk and mitigation in decentralized forest governance regimes." Global Environmental Change(0).

Picciotto, R. (2012). "Experimentalism and development evaluation: Will the bubble burst?" Evaluation **18**(2): 213-229.

Poteete, A. R. and E. Ostrom (2008). "Fifteen Years of Empirical Research on Collective Action in Natural Resource Management: Struggling to Build Large-N Databases Based on Qualitative Research." World Development **36**(1): 176-195.

Poteete, A. R. and J. C. Ribot (2011). "Repertoires of Domination: Decentralization as Process in Botswana and Senegal." World Development **39**(3): 439-449.

Pritchett, L., M. Woolcock and M. Andrews. (2010). "Capability Traps? The Mechanisms of Persistent Implementation Failure." Working Paper 234 Retrieved 31 January 2013, from http://www.cgdev.org/files/1424651_file_Pritchett_Capability_FINAL.pdf.

Prokopy, L. S. (2005). "The relationship between participation and project outcomes: Evidence from rural water supply projects in India." World Development **33**(11): 1801-1819.

Putnam, R. D. (2001). Bowling Alone, Simon & Schuster.

Rakner, L., L. Mukubvu, N. Ngwira, K. Smiddy and A. Schneider (2004). The budget as theatre - the formal and informal institutional makings of the budget process in Malawi. Final Report, July 2004. Bergen, Chr. Michelsen Institute.

Rauniyar, G., A. Orbeta and G. Sugiyarto (2011). "Impact of water supply and sanitation assistance on human welfare in rural Pakistan." Journal of Development Effectiveness **3**(1): 62-102.

Ray, B. and R. N. Bhattacharya (2011). "Transaction Costs, Collective Action and Survival of Heterogeneous Co-management Institutions: Case Study of Forest Management Organisations in West Bengal, India." Journal of Development Studies **47**(2): 253-273.

Reinikka, R. and J. Svensson (2003). The power of information: evidence from a newspaper campaign to reduce capture. WPS3239. Washington DC, World Bank.

Reinikka, R. and J. Svensson (2011). "The power of information in public services: Evidence from education in Uganda." Journal of Public Economics **95**(7-8): 956-966.

Ribot, J. C. (2007). "Representation, Citizenship and the Public Domain in Democratic Decentralization." Development **50**(1): 43-49.

Ribot, J. C., A. Agrawal and A. M. Larson (2006). "Recentralizing While Decentralizing: How National Governments Reappropriate Forest Resources." World Development **34**(11): 1864-1886.

Rigon, A. (2014). "Building Local Governance: Participation and Elite Capture in Slum-upgrading in Kenya." Development and Change: n/a-n/a.

Rosenberg, A., K. Hartwig and M. Merson (2008). "Government–NGO collaboration and sustainability of orphans and vulnerable children projects in southern Africa." Evaluation and Program Planning **31**(1): 51-60.

Rudge, L. and E. Bosc (2009). Sustainability factors for water points in Liberia. 34th WEDC International Conference. Addis Ababa, Ethiopia.

RWSN (2005). RWSN Strategy Paper: Sustainable Handpumps. St Gallen, Rural Water Supply Network.

RWSN. (2009, 21 April 2009). "Handpump Data, Selected Countries in Sub-Saharan Africa." from http://www.rural-water-supply.net/_ressources/documents/default/203.pdf.

RWSN. (2013). "[List of public domain handpumps]." Retrieved 14 March 2013, from http://www.rural-water-supply.net/en/implementation/proprietary-handpumps.

Ryan, G. W. and H. R. Bernard (2003). "Techniques to Identify Themes." Field Methods **15**(1): 85-109.

Sansom, K. and L. Koestler (2009). African Handpump Market Mapping Study: Summary Report for UNICEF WASH Section and Supply Division, Delta Partnership.
Sara, J. and T. Katz (1997). Making the rural water supply sustainable: Report on the impact of project rules, UNDP-World Bank Water and Sanitation Program.
Savedoff, W. D. and K. D. Martel (2011). Cash On Delivery Aid for Health: What Indicators Would Work Best? New York, Center for Global Development Working Paper 275.
Schou, A. and M. Tsoka (2010). "The design of decentralised demand-driven programmes and equity: Learning from implementation in Malawi councils." Journal of International Development **22**(5): 541-555.
Schouten, T. and P. Moriarty (2003). Community Water, Community Management: From System to Service in Rural Areas. Rugby, Practical Action Publishing.
Scoones, I. (2010). Sustainability. Deconstructing Development Discourse: Buzzwords and Fuzzwords. A. C. a. D. Eade. Rugby, Practical Action Publishing.
Scott, O. (2010). Near term success, long term failure. EWB Failure Report 2010.
Scott, O. (2012). "Supporting institutionalized monitoring systems for rural water supply and sanitation in Malawi." Waterlines **31**(4): 272-279.
Selaya, P. and R. Thiele (2012). "THE IMPACT OF AID ON BUREAUCRATIC QUALITY: DOES THE MODE OF DELIVERY MATTER?" Journal of International Development **24**(3): 379-386.
Shaffer, P. (2013). "Ten Years of “Q-Squared”: Implications for Understanding and Explaining Poverty." World Development **45**(0): 269-285.
SKAT-RWSN (2007). Installation and Maintenance Manual for the Afridev Handpump, Revision 2. St Gallen, SKAT-RWSN.
Smits, S. (2013). "Stockholm Syndrome." Water Services That Last http://waterservicesthatlast.wordpress.com/2013/10/04/stockholm-syndrome/ Accessed 2/01/2014 2014.
Spencer, L. and G. Britain (2003). Quality in Qualitative Evaluation: A framework for assessing research evidence, Government Chief Social Researcher's Office, Cabinet Office.
Srivastava, S. (2012). "Swajaldhara: ‘Reversed’ Realities in Rural Water Supply in India." IDS Bulletin **43**(2): 37-43.
Sugden, S. (2001). Assessing sustainability - the sustainability snapshot. 27th WEDC Conference. Lusaka, Zambia.
Sugden, S. (2003). Indicators for the water sector: examples from Malawi. London, WaterAid.
Sumner, A. and M. Tribe (2008). International Development Studies: Theories and Methods in Research and Practice. London, Sage.
SustainableWASH.org (2011). The WASH Sustainability Charter.
Sutton, S. (2010). Accelerating Self Supply: A Case Study from Zambia 2010. Field Note No. 2010-3. St Gallen, RWSN.
Sutton, S. (2011). Accelerating Self Supply: Summary of progress in introducing a new approach. Field Note No. 2011-2. St Gallen, RWSN.
Swidler, A. and S. C. Watkins (2009). "“Teach a Man to Fish”: The Sustainability Doctrine and Its Social Consequences." World Development **37**(7): 1182-1196.

Tarekegne, T. M. (2009). SUSTAINABILITY OF RURAL WATER SUPPLY AND SANITATION SERVICES IN ETHIOPIA: A CASE STUDY OF TWENTY VILLAGES IN ETHIOPIA. MPS in Integrated Watershed Management and Hydrology, Cornell.
Tashakkori, A. and C. Teddlie (2003). Handbook of Mixed Methods in Social & Behavioral Research, SAGE Publications.
Tashakkori, A. and C. Teddlie (2010). "Putting the Human Back in ''Human Research Methodology'': The Researcher in Mixed Methods Research." Journal of Mixed Methods Research **4**(4): 271-277.
Taylor, B. (2009a). Management for Sustainability: Practical lessons from three studies on the management of rural water supply schemes. Dar es Salaam, WaterAid Tanzania.
Taylor, B. (2009b). Addressing the Sustainability Crisis: Lessons from research on managing rural water projects. London / Dar es Salaam, WaterAid.
Teddlie, C. and F. Yu (2007). "Mixed Methods Sampling." Journal of Mixed Methods Research **1**(1): 77-100.
Thaler, R. H. and C. R. Sunstein (2008). Nudge: Improving Decisions about Health, Wealth, and Happiness, Yale University Press.
Thompson, J., I. T. Porras, J. K. Tumwine, M. R. Mujwahuzi, M. Katui-Katua, N. Johnstone and L. Wood (2001). Drawers of Water II: 30 years of change in domestic water use & environmental health in east africa. London, International Institute for Environment and Development.
Thomson, P., R. A. Hope and T. Foster (2012). "Is silence golden? Of mobiles, monitoring, and rural water supplies." Waterlines **31**(4): 280-292.
Thomson, P., Rob Hope and Tim Foster (2012). "GSM-enabled remote monitoring of rural handpumps: a proof-of-concept study." Journal of Hydroinformatics **14**(4): 829–839.
Thorpe, R. and R. Holt (2008). The SAGE Dictionary of Qualitative Management Research., SAGE Publications.
Tiba, Z. (2011). "'Maize is Life, but Rice is Money!' A Village Case Study of the2001/02 Famine in Malawi." Journal of Agrarian Change **11**(1): 3-28.
Tracy, S. J. (2010). "Qualitative Quality: Eight “Big-Tent” Criteria for Excellent Qualitative Research." Qualitative Inquiry **16**(10): 837-851.
Trémolet, S. and M. Rama (2012). Tracking national financial flows into sanitation, hygiene and drinking-water. Working Paper. Geneva, WHO - GLAAS: UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water.
Triple-S (2009). Providing Reliable Rural Water Services That Last. Briefing. The Hague, IRC.
Tsoka, M. and J. Chunga (2013). Summary of Results Afrobarometer Round 5 Survey in Malawi, 2012. Cape Town, Afrobarometer.
UCLA. (2013). "Resources to help you learn and use SPSS." Retrieved 28 February 2013, from http://www.ats.ucla.edu/stat/spss/.
UN (2010). General Assembly Resolution 64/292: The human right to water and sanitation. A/RES/64/292. U. Nations.
UN. (2013). "Goal 7: Ensure Environmental Sustainability." Retrieved 7 March 2013, from http://www.un.org/millenniumgoals/environ.shtml.
UN (2013). Map of Malawi, United Nations.
UNDP (2006). Beyond scarcity: Power, poverty and the global water crisis. Human Development Report, UNDP. **2006**.

UNDP. (2013). "Malawi Country Profile: Human Development Indicators." Retrieved 25 February 2013, from http://hdrstats.undp.org/en/countries/profiles/MWI.html.

Vajja, A. and H. White (2008). "Can the World Bank Build Social Capital? The Experience of Social Funds in Malawi and Zambia." The Journal of Development Studies **44**(8): 1145-1168.

van de Walle, N. (2012). Democracy and clientelism in Africa today. Neopatrimonialism in Africa and Beyond. D. C. Bach and M. Gazibo. Abingdon, Routledge.

van Donge, J. K., D. Henley and P. Lewis (2012). "Tracking Development in South-East Asia and sub-Saharan Africa: The Primacy of Policy." Development Policy Review **30**: s5-s24.

Vandemoortele, M. and K. Bird (2011). Improved economic conditions in Malawi: Progress from a low base. Development Progress. London, Overseas Development Institute.

Vollan, B. (2012). "Pitfalls of Externally Initiated Collective Action: A Case Study from South Africa." World Development **40**(4): 758-770.

Waddington, H. and B. Snilstveit (2009). "Effectiveness and sustainability of water, sanitation, and hygiene interventions in combating diarrhoea." Journal of Development Effectiveness **1**(3): 295-335.

Waddington, H., B. Snilstveit, H. White and L. Fewtrell (2009). Water, sanitation and hygeine interventions to combat childhood diarrhoea in developing countries. Synthetic Review 001. London, International Initiative for Impact Evaluation.

WASHCost (2012). Providing a basic level of water and sanitation services that last: cost benchmarks. WASHCost Infosheet 1.

Washwatch. (2013). "Malawi." Retrieved 25 February 2013, from http://www.washwatch.org/southern-africa/malawi.

Water for People. (2013). "Field Level Operations Watch." Retrieved 5 March 2013, from http://www.waterforpeople.org/programs/field-level-operations-watch.html.

WaterAid (2001). Looking Back: The long-term impacts of water and sanitation projects. London, WaterAid.

WaterAid (2005). 2005 Malawi WP Database. Lilongwe, UNICEF.

WaterAid (2008). Applications of Google Earth for water point mapping. London, WaterAid.

WaterAid (2011). Off-track, off-target: Why investment in water, sanitation and hygiene is not reaching those who need it most. London, WaterAid.

WaterAid (n.d.). Technology Notes. London, WaterAid.

Webster, J., G. Dejachew, B. Tseion, M. Mehari and G. Tesfaye (1999). Sustainability of rural water and sanitation projects. 25th WEDC Conference. Addis Ababa, Ethiopia, WEDC.

Weingast, B. and D. Wittman (2006). The Oxford Handbook of Political Economy. Oxford, OUP.

Welle, K. (2005). Learning for Advocacy and Good Practice - WaterAid Water Point Mapping. Report of findings based on country visits to Malawi and Tanzania. London, ODI and WaterAid.

Welle, K., F. Schaefer, J. Butterworth and K. Bostoen (2012). "Enabling or Disabling? Reflections on the Ethiopian National WASH Inventory Process." IDS Bulletin **43**(2): 44-50.
White, G. F., D. J. Bradley and A. U. White (1972). Drawers of Water: Domestic Water Use in East Africa. Chicago, University of Chicago Press.
White, H. and D. Phillips (2012). Addressing attribution of cause and effect in small n impact evaluations: towards an integrated framework. Working Paper. London, International Initiative for Impact Evaluation.
White, P. (2009). Developing research questions, Palgrave Macmillan.
Whittington, D., J. Davis, L. Prokopy, K. Komives, R. Thorsten, H. Lukacs, A. Bakalian and W. Wakeman (2008). How well is the demand-driven, community management model for rural water supply systems doing? Evidence from Bolivia, Peru, and Ghana. Manchester, Brooks World Poverty Institute, University of Manchester.
Whittington, D., M. Jeuland, K. Barker and Y. Yuen (2012). "Setting Priorities, Targeting Subsidies among Water, Sanitation, and Preventive Health Interventions in Developing Countries." World Development **40**(8): 1546-1568.
WHO (2009). Global health risks: Mortality and burden of disease attributable to selected major risks. Geneva, World Health Organisation.
WHO (2011). Guidelines for drinking-water quality, fourth edition. Geneva, World Health Organization.
WHO (2012). GLAAS 2012 Report: UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water: The Challenge of Extending and Sustaining Services. Geneva, World Health Organisation.
Wild, L. and D. Harris (2012). More than just ‘demand’: Malawi’s public-service community scorecard. Project Briefing No. 69, Overseas Development Institute.
Wiles, R., G. Crow, S. Heath and V. Charles (2008). "The Management of Confidentiality and Anonymity in Social Research." International Journal of Social Research Methodology **11**(5): 417-428.
Williamson, J. (1993). "Democracy and the “Washington consensus”." World Development **21**(8): 1329-1336.
World Bank (2004). World Development Report 2004: Making Services Work for Poor People. Washington DC, World Bank / Oxford University Press.
World Bank. (2013a). "Data: Malawi." Retrieved 25 February 2013, from http://data.worldbank.org/country/malawi?display=graph.
World Bank. (2013b). "Malawi Overview." Retrieved 1 March 2013, from http://www.worldbank.org/en/country/malawi/overview.
World Bank. (2013c). "Malawi - Second National Water Development Project." Retrieved 6 March 2013, from http://www.worldbank.org/projects/P096336/second-national-water-development-project?lang=en.
World Bank. (2014). "Net ODA received (% of GNI)." Retrieved 23/01/14, from http://data.worldbank.org/indicator/DT.ODA.ODAT.GN.ZS?order=wbapi_data_value_2011+wbapi_data_value+wbapi_data_value-last&sort=desc.
WPP (2010). Washington DC, World Bank Water Partnership Program.
Zulu, L. C. (2008). "Community Forest Management in Southern Malawi: Solution or Part of the Problem?" Society & Natural Resources **21**(8): 687-703.

Zulu, L. C. (2012). "Neoliberalization, decentralization and community-based natural resources management in Malawi: The first sixteen years and looking ahead." Progress in Development Studies **12**(2-3): 193-212.