CHAPTER 1: INTRODUCTION

Water is Life: Community-based research for sustainable safe water in rural Uganda

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Abstract

This is a book about community-based research in the service of improving the sustainability and equity of safe water production, consumption, and management at community level in rural Uganda. It provides an account of the findings of a five-year combined social science, natural science, and engineering research work programme (2009–14) which took place within and with the community, in the sense that the community identified their water needs and related their everyday struggles with water resourcing to the research team, and they contributed to the outcomes. Our research programme began 14 years after the Ugandan government enacted the 1995 Water Statute (which provided the framework for the use, protection, and management of water resources and supply, the constitution of water authorities, and the devolution of water supply undertakings), 10 years after the 1999 National Water Policy was rolled out, and six years short of the delivery date for the Millennium Development Goals on water.

Keywords: sustainability, research capacity building, water, equity, rural poverty

The project

The programme of research which forms the basis of this book was Water is Life: *Amazzi Bulamu*, supported by Irish Aid/Higher Education Authority funding for research capacity building around sustainable water development.[1] It involved the creation of a partnership between Irish third-level institutes and the University of Makerere in Uganda to involve Ugandan-based and Irish-based teams of academics in training Ugandan or Ugandan-based researchers to doctoral level in the practical action setting of a poor rural community. The involvement of the community in the programme from the outset was intended to empower the local community in the management of its own water resources into the future. Additionally, the programme was devised to build research capacity in a two-dimensional way – at third level by enhancing the quality of community-engaged research and at community level by providing access to the resources of the team of scientists and social

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scientists contributing to the goal of sustainable community water supply in that specific community. The project raised a number of key questions in relation to aspects of the realities of safe water in this community: accessibility, affordability, management, use of technological advances, impact of climate change, and gender relations. Issues were described and interventions were devised, all of which were based on sound and robust evidence-based research 'in the field'. In order to be truly capable of contributing to the agenda of poverty reduction, and have societal relevance, the research involved all key stakeholders from the outset.

This book tells a story about carrying out evidence-based research at community level in response to community needs; it is also a story about science being put to use in the building of sustainable communities. It was in order to assess and improve the community's access to and participation in water management that the researchers and the community entered the research collaboration. It was also in order to engage in the proposed practical action of producing and improving a community-managed sustainable water system for the parish. Overall, it describes and analyses what is happening in the water lives of a rural Ugandan community. In addition, it is a story of critique. It does not presuppose that community management is the right way to increase the sustainability of water supply systems, but only that it is the current emphasis in terms of policy roll-out of water systems as experienced by the community we report on here.

Global and national water context

The United Nations (UN) estimates that in excess of 1 million Africans still die every year from sanitation-, hygiene-, and drinking water-related diseases, which equates to approximately 115 Africans per hour or one person every 30 seconds. This is despite the fact that the targets for the UN Millennium Development Goal (MDG) 7C – to halve the proportion of the population without sustainable access to safe drinking water and basic sanitation – have been reached (WHO and UNICEF, 2012). Challenges remain and the WHO/UNICEF 2012 report highlights that global figures mask massive disparities between regions and countries, and within countries, with only 61 per cent of people in sub-Saharan Africa having access to improved water supply sources, compared with 90 per cent or more in Latin America and the Caribbean, northern Africa, and large parts of Asia. In fact, the 2014 WHO/UNICEF update estimates that 43 per cent of all people globally who lack access to drinking water live in sub-Saharan Africa. It also confirms that in cases where water supplies are not readily accessible, the burden of carrying water falls disproportionately on women and girls, and in many countries the wealthiest people have seen the greatest improvements in water and sanitation access, whereas people in poorer countries still lag far behind.

Access to safe drinking water has been greatly expanded through implementation of the MDGs. However, the MDGs will reach their target date

at the end of 2015, and therefore the post-2015 development agenda will need to ensure the creation of a development framework which takes into account the inconsistencies between sub-Saharan Africa and the rest of the world, and which also reflects the fact that nearly half of the more than 700 million people who still lack ready access to improved sources of drinking water live in sub-Saharan Africa.

According to the WHO/UNICEF Joint Monitoring Programme (JMP), as a result of a combination of government and non-governmental organization (NGO) interventions, access to an improved water source in Uganda increased from 39 per cent in 1990 to 68 per cent in 2010 (WHO and UNICEF, 2012). Generally, Uganda's institutional framework for water management follows a decentralized system in which powers have been devolved from the national to the lower levels of government. The structure operates at four levels: national, district, sub-county, and village/community. At the village level, water users or water user groups for a particular water source are supposed to decide on the type of 'improved' water facilities they want, pay their share (5 per cent) of construction costs, and manage the operation of the facilities, as stipulated in the Water Yes Statute (1995) and National Framework for Operation and Maintenance of Rural Water Supplies (GoU, 2011a). At the time of this study's inception, it was estimated that in rural areas 20 per cent of handpumps had broken down and 17 per cent of 'improved' water sources were not functioning MWE, 2011b; RWSN, 2012). The national average in terms of use of unprotected sources for rural communities was reported as 30 per cent (UBOS, 2010: 121). 'Unimproved' water sources are defined by the JMP as those that, by nature of their construction or through active intervention, are not protected from outside contamination, especially faecal matter; examples include unprotected springs, unprotected dug wells and surface water (WHO and UNICEF, 2000: 4). The logic of the community-based research was to place multidisciplinary research teams at the service of the community to help assess the reality of their water needs, to develop sustainable water provision and to advise government, community and household-level actors on practical actions to be taken to resolve some of the enduring problems, of which there are many.

The community

Focusing on water sustainability at community level required an in-depth focus; thus, one case study area, or social space, was identified – a parish comprising 15 villages. The parish selected for this research is located in the Lwengo District in south Uganda, an area containing approximately 11,786 households (UBOS, 2006), where the baseline survey[2] showed that the majority of households earned less than 50,000 Ugandan shillings a month (Macri et al., 2013: 19). The survey recorded that while over 64 per cent of the households interviewed had three meals the previous day, 25 per cent had only two meals and 11 per cent had only one meal (Macri et al., 2013: 21).

Almost half (48 per cent) of the households surveyed comprised more than six members and over a quarter (27 per cent) comprised either four or five members (Macri et al., 2013: 16). In addition, the main source of income was agriculture, either crop farming (62 per cent) or mixed farming (20 per cent), which obviously involved accessing water (Macri et al., 2013: 19). This community-based research was, therefore, carried out in a poor rural setting of intertwined economic poverty and water poverty.

This community remains water poor despite some progress nationally in this regard. What do we mean by 'water poor'? Poverty of water supply clearly equates with poverty of household. The time spent accessing water severely impairs household wealth. In particular, the burden of water carrying militates against income-generating activities for women, and increases the educational disadvantage of their children. In addition to this, the consumption of poor-quality water adds health poverty into the household equation, which further exacerbates the household's economic and social problems.

Health problems related to poor-quality water supply are rife in the case study area. The baseline quantitative research carried out in the area indicated that in the previous year 76 per cent of the households had members who experienced malaria, 42 per cent had at least one family member who suffered from stomach complaints, 37 per cent had members who experienced diarrhoea, and 18 per cent had experienced worms (Macri et al., 2013: 34). This information was provided by households that were asked to calculate the incidence of water-related illnesses in their households in the previous year. Diarrhoea and worms are two commonly reported problems resulting from the use of poor-quality water. Apart from the health implications, water-related diseases have a significant impact on the income of the household, with 67 per cent of respondents indicating that these diseases had resulted in increased family expenses over the previous year (Macri et al., 2013: 34). In addition, water-related illnesses had an impact on school attendance for 43 per cent of households, and led to diminished ability to earn money in the case of 38 per cent of households (Macri et al., 2013: 35). For this community, a great many of their problems stemmed from poor water quality, to the extent that 90 per cent felt that improved health of their household members and a reduction in the frequency of water-related diseases in their community were of paramount importance (Macri et al., 2013: 36). This was a community that recognized the importance of water all too well and believed wholeheartedly in the true colloquial meaning of *amazzi bulamu*, that is 'water is life'.

There is no access to piped water in the case study area, nor are there any plans to introduce this; by contrast, in urban areas, progress is being made on this front. In rural areas, water collection is time-consuming, and women and children invest an inordinate amount of time and energy collecting water. This community had experienced improvements in water supply through government organizations and NGOs to the degree that, according to our survey of the area in 2011, there were 10 boreholes, 24 shallow wells, and one protected spring. Almost all of the surveyed households were within a

1 km radius of an improved water source and, if these sources were properly maintained, there would be few quality issues with the water collected there. Access to safe drinking water was possible so long as the improved water source was in a functioning condition and householders: 1) were in an economic position to afford jerrycans; 2) were able to carry them; and 3) had the time to queue. Only one of the 10 local boreholes was functioning, however. Of the 24 local shallow wells, 17 were not working. When asked about the main source of water used, about 40 per cent of all survey participants said that they used an unprotected source as their main supply of water (Macri et al., 2013: 28). Therefore, the number of dysfunctional 'improved' water sources in this community was well above the reported rural average (MWE, 2011b; RWSN, 2012). The community was also above the national average in terms of use of unprotected sources for rural communities, which was 30 per cent (UBOS, 2010: 121). Use of these water sources creates ill health; needless to say, a combination of economic, water, and health poverty was evident among the villagers. Clearly, water problems remained in abundance and it was in this context that we were to engage in practical action with the community.

These are poor households and their water expenses can be crippling. When asked about their water-related expenditure, a majority of respondents indicated that most expenses were generated by the purchase of water storage equipment, normally jerrycans, and secondly, pump repairs. In this community, most households (45 per cent) used one to three jerrycans (5 gallons/22.7 litres per jerrycan) of water per day on average, while almost as many used between four and six jerrycans per day (44 per cent), and another 9 per cent collected seven or more jerrycans per day (Macri et al., 2013: 31). This is extremely time-consuming, given the reported problems with queuing, particularly in the dry season; it is also labour intensive, particularly for women and children, and debilitating, given the physical problems created for women and children as a result of carrying jerrycans on their heads. When asked about the qualities they would like to see in a water source, most respondents (70 per cent) referred to the clean and safe quality of the water, while 56 per cent of all survey participants said they would like to have access to an improved water source and 53 per cent said they would like the source to be closer to home (Macri et al., 2013: 32).

What we meet here in this book is a community of people experiencing water poverty imbricated with health, economic, educational, and gendered poverty. They continue to experience these difficulties after new water systems have been installed. The success or failure of these new water systems' operation is to some degree relegated by the state to the community, which is now held by the international community as being somewhat responsible for its own water – or, rather, water problems. Quality of water and access to it, given current national policy, is now considered to be to some degree the responsibility of the parish, although the government does recognize that the capacity for it to be delivered on a sustainable basis is dependent on the level of skills in the community, the quality of the leadership at community level,

and the willingness or ability in a neoliberal age of the community members to pay for water.

This research programme began with a needs-based assessment, wherein the community told us that the key problems faced in relation to water were failing pumps, quality of water supply, difficulties in accessing safe water, management difficulties, and associated costs. The parish resources were examined critically, under the advice of the local community, in terms of: the quality of the water resources available; the changing nature of those specific water resources; pump technologies in use; the possibilities of community engagement with solar technological advancements for safe water; the governance structures for managing water, household access, and equity of access to safe water; the gendered relations of water; and the resilience of the community to the impact of climate change on water supplies.

The chapters that follow are based on the findings produced by the researchers as they worked with the community towards the application of their own professional expertise to the problem, its solution, and associated actions. The knowledge for the practical action recommended was constructed from the combined knowledge of the community and the scientific disciplines engaged, as they worked together in the context of the reality of the everyday challenges of poor communities accessing and managing safe water.

Gender and governance

This book begins with the social arrangements for the provision and management of safe water in the community. Starting at the level of the smallest scale unit – the household – the gendered aspect of social arrangements is described. In this community, providing water for the household was strictly the responsibility of the women, who in turn often passed the work on to the children. On the other hand, accessing water for large stock animals or for commercial purposes was usually carried out by men. Where water was being accessed by vendors for resale, these were normally men and they usually had bicycles or motorbikes at their disposal. This gendered division of labour regarding water sourcing is the norm in Africa and beyond, and because of the key significance of gender, the first two chapters look at the gendered dimension of 'water life' and a variety of gender/water relationships that are at play in this community. In Chapter 2, Asaba et al. look into barriers to poor rural women's access to good-quality water for their households, since safe water remains a central problem for women and children in the case study area. They examine gender relations and inequalities in most of the mechanisms of access to water and in the governance structures at national and local levels, quantitatively and qualitatively. They examine payment arrangements, particularly maintenance and repair fees, to identify if these are impeding access by women and vulnerable children to water resources. They question whether the gender ratios for committees which are stipulated

in government policy are actually enforced and, based on in-depth interviews with water communities in their villages, they examine barriers to progress in the implementation of these gender ratios. Their approach, and indeed that of Magala et al. in Chapter 3, confirms that a gender-based analysis remains an essential tool for identifying access issues and, indeed, for an equality intervention for progressing the future gender equity and sustainability-based quality water supply for this community, and of course for the future health of households in the parish. Magala et al. explore the socially ascribed gendered roles at play in relation to domestic water collection and management. Women are culturally responsible for domestic water supplies and management. They explore the role of men in domestic water management, and seek to uncover the power they hold, given that fees are now required for the operation and maintenance of water resources in the community. They introduce us to how women see these responsibilities and provide rich cultural data which arises from the ethnographic work of Joyce Magala, who lived and worked in the community for over a year.

Moving beyond the household level and 'upwards' to the community level, Mugumya et al. tackle the other key social arrangement, namely the role of the community in managing water resources, in Chapter 4. 'Community-based water management' is the social and political arrangement for delivery and management of safe water in rural domestic water supply, and is the policy instrument that dominates the water lives of this community. While it is strongly advocated, and is in place as the key strategic and practical way to sustainable service delivery in developing country contexts in general, its effectiveness in the context of this poor community is critically scrutinized. The authors take us through the various governance dynamics in the policy and service delivery framework at national, regional, and community level as a backdrop to explaining what we see happening at the community/village level in terms of governance or lack of governance of the improved water sources. Since the majority of 'improved' water sources were not functioning in this community at the beginning of the Water is Life project, this chapter is critical to an understanding of why this sorry state of water affairs existed. It describes the household and village water management structures, as do Asaba et al. in Chapter 2, but also crucially examines service delivery by the relevant local government water-sector actors, water-focused NGOs, spare-parts dealers, handpump mechanics, and technical support units. Technical personnel from the Directorate of Water Development of the Ministry of Water and Environment (MWE), national-level spare-parts dealers, donors, and key water-sector government organizations and networks were all interviewed to form the basis of this chapter's examination of key governance dynamics in the rural safe water-service delivery framework. This chapter asks and answers the question: do, or can, poor communities have the capacity to sustainably manage water facilities, and are they part of the route to equitable access to, and sustainability of, safe water in rural communities?

Asiimwe and Naige take a step back from this specific community with an overview of the national picture (Chapter 5). They summarize the overall water policy in Uganda and the governance challenges faced there. Providing us with an overall history of the issues and barriers at national level to safe water provision, they go on to discuss the paradox of water as either a public good and right or a profitable commodity affordable by a few. They generate a critical discussion on how this paradox should or could be managed at national level. Private–public partnership arrangements and state dependence on donor and development partners are critically scrutinized, while keeping in mind the government's responsibilities to both the urban and rural poor.

Findings in the first few chapters, in common with other research, clearly articulate that the provision and management of water at household level are firmly the responsibility of women, with water collection duties often being assigned to children. Chapters 2 and 3 stress that when men do get involved, it is not normally to assist in the management of water at household level. In Chapter 2, Asaba et al. highlight that a number of social and environmental factors interlink women and water in rural Uganda. In particular, they have established that despite the fact that 64 per cent of the rural population in Uganda are considered to have access to 'improved' sources of water (MWE, 2014), access to safe water remains a significant issue for women and children in the study area. As well as the enormous amount of time that women must invest every day in the process of collecting and managing water supplies for their households, both women and children face a number of risks associated with the process of collecting water. Such risks include walking long distances over uneven and hilly terrain, animal attacks, accidental drownings, verbal and physical abuse, and in some cases sexual violence. In addition, the heavy loads being carried lead to a number of chronic physical ailments, including chest pain, fatigue, headaches, and nosebleeds. Asaba et al. point out that as most of the power in relation to the 'formal' institutions around water management are male-dominated, as are water payment arrangements for the most part, these arrangements can leave women and children without the necessary access to water resources, particularly when men, as heads of households, do not pay the operation and management fees levied by community water committees. They therefore conclude that education and sensitization in relation to safe water and community-based management could bring about genuine transformation.

The narrative of the lived experiences of the daily routines of women in relation to water management in the study area, as described by Magala et al. in Chapter 3, clearly reaffirms that the burden of water collection takes a heavy toll on women and children. It is not just a physical burden, but is also a time burden, which impacts on their ability to engage in other activities. This means that their ability to reach their full potential is compromised. The findings described in Chapter 3 confirm that the majority of water management tasks at household level are carried out by women, with little or no involvement by men in this activity. The authors therefore recommend that men must be encouraged to become involved with water management at household level

through a combination of appropriate dialogue and social inclusion processes. It is concluded that by increasing access to water, either by ensuring effective operation and management procedures for nearby pumps, or by bringing water supplies closer to households through harvesting rainwater, opportunities for women to improve their personal circumstances could be increased.

In Chapter 4, Mugumya et al. have validated, from their findings, that rural water policy implementation in Uganda is greatly challenged by complex and multifaceted community-level issues. Their findings demonstrate that while coordination efforts exist both at national and local government levels, the activities of the relevant institutions and bodies remain insufficiently anchored in communities. The authors argue that while in the framework of community-based water management systems (CBWMS), stakeholder collaborations are largely based on trust, the evidence gathered from their study reveals that these partnerships and collaborations, which are crucial for CBWMS and the functionality of rural domestic water supply infrastructure, are being threatened by declining trust among all stakeholders. This is particularly so in relation to operation and management, and supply of parts. The authors conclude that the way in which policy actors directly engage with communities is vital in realizing the goals of CBWMS.

In Chapter 5, Asiimwe and Naige confirm that the challenges associated with the operation and management of water resources account for much of the non-functionality of water sources in Uganda – in fact, more than half of all failures. They, like Asaba et al., confirm that girls in particular are often not safe when engaged in the process of collecting water. Throughout this chapter the authors address the challenges of management and access to safe and affordable water in Uganda, not least the underfunding of the water sector by the government. They emphasize the role of the state and its responsibility in the provision of safe and affordable water, but stress that NGOs and communities are important players in the proper management and provision of water. They argue that the rural and urban poor who cannot afford to pay should remain the focus of the government and its National Water and Sewerage Corporation. They also stress that there is a strong argument for the private sector to provide water to institutional and commercial users who can afford to pay.

Scientific and technological interventions towards improving resilience

In Chapter 6, Rugumayo et al. point out the realities of the challenges that Uganda faces in relation to integrated water resource management, including spatial and temporal variability in water resources, potential impacts of climate change, a lack of public and sectoral awareness (including limited and inadequate availability of data), inadequate funding for the sector, and limitations in human resources capacity in the water sector. A distinction is made between those environmental factors that cannot be controlled (e.g. geology, topography, and climate), and those factors that can be controlled

(groundwater contamination, deforestation, wetland degradation, and directional climate change). In addition, the potential impact of projected increases in temperature through climate change on Uganda's future water availability is pointed out as being of huge concern for the future sustainability of both water quality and quantity. This reality must be managed effectively and in an integrated manner in order to ensure development and sustainability for Uganda and Ugandans in the coming decades. The remaining chapters describe technological or scientific interventions explored and pursued by the science-based researchers.

Following the overall challenges already described earlier and in Chapter 6 in particular, the later part of the book deals more directly with interventions at household and community level – technical interventions designed to work alongside communities to improve their water supply.

Safe water interventions, through schools and through households, are the focus of the next two chapters. In Chapter 7, Asiimwe et al. describe a research intervention with 700 pupils from 14 primary schools in an effort to make water from a variety of both improved and unimproved water sources safer. Since so-called improved water sources may not be adequately protected and therefore may not supply safe water, pupils agreed to drink only solar disinfection (SODIS) treated water whether at school or at home. The SODIS technique involves filling transparent plastic/glass containers with contaminated water, exposing it to unobscured sunlight for a minimum of six hours in strong sunny conditions, or longer (usually 48 hours) under cloudy weather, in order to improve its quality. The team monitored the effectiveness of SODIS on the microbial quality of water by recording incidence of diarrhoea and/or gastro-intestinal complaints that had been causing pupil absenteeism. Asiimwe et al. provide an account of the success of this strategy. A further intervention, closely linked, but approaching the problem of poor-quality water with householders as opposed to primary school children, is described by Nalwanga et al. in Chapter 8. Thirty households participated in this study of their harvested rainwater systems. The quality of the water in the tanks was examined, as was the usefulness, practicalities, and training requirements of applying SODIS treatment to improve the water quality from the rainwater harvesting tanks.

In Chapter 7, Asiimwe et al. found that open water sources such as ponds and unprotected open dug wells were the most frequently used water sources for the schools and communities in their study area. They further identified that none of the schools had any form of drinking water treatment plan in place, and pupils drank untreated water from whatever source the school used. All untreated water samples tested during the course of the study were found to be unfit for human consumption and were contaminated with coliform bacterial pathogens of faecal origin. This included water from 'improved' sources. SODIS, however, proved to be effective in improving the microbial quality of drinking water; absenteeism fell from 1.9 days per child per semester pre-intervention to 0.2 days post-intervention. Based on these findings and on

the fact that schoolchildren proved to be effective 'ambassadors' for SODIS at household level, the authors therefore conclude that SODIS technology should be promoted at school, community, and household level to improve access to safe water, and thus improve people's health. In Chapter 8, Nalwanga et al., who explored the potential of using SODIS to disinfect harvested rainwater (HRW) found that although the practice of HRW is promoted and encouraged throughout Uganda, and especially in rural areas where centralized distributed water systems are rare, little thought has been given to the quality of the HRW. They present SODIS as an effective and low-cost alternative to other, more traditional forms of treatment, including sand filtration, boiling, and chlorination. Their findings clearly showed that when SODIS was carried out on HRW following the correct procedures, treatment efficiencies of up to 100 per cent could be achieved. They therefore recommend that 2 litre bottles should be exposed for a minimum of seven hours in sunny weather, but under cloudy conditions, bottles should be exposed for two full days (48 hours) so as to ensure total disinfection. In addition, they recommend that training is required at community level on the effective use of SODIS and on the dangers of using contaminated water.

Engineering expertise forms the basis of Chapter 9, in which a very direct intervention is designed for the handpumps in the area which, it has been noted, were in an almost continuous state of disrepair. Functioning handpumps are essential in order to provide access to safe drinking water from groundwater sources. The functional sustainability of handpumps is poor in this community. Lubwama et al. identified handpump problems faced by the rural community, specifically related to wear of piston seals, and investigated a novel surface-engineering approach to improve the wear resistance. Out of a total of 34 handpumps they examined in this area, only 10 were functional. By observing handpump usage on a daily basis and through a series of targeted community interviews, many of the problems highlighted by handpump users were identified as being either directly or indirectly related to the functionality of the piston seal. Consequently, as expected, direct consultations with the resident handpump mechanics in the immediate area revealed the piston seal to be the component replaced most often during breakdown maintenance interventions. Based on extensive testing under a range of conditions, the deposition of diamond-like carbon and silicon doped diamond-like carbon films onto the nitrile rubber piston seals, which increases wear resistance and thus reliability and functional sustainability, is suggested as a potential solution into the future.

The final chapter in Part II looks to the uncertain future of water in this community given the reality of encroaching climate change. Since the people in this community rely on surface water, it can be predicted that they will endure additional hardships. Tembo et al. argue that there need to be processes in place to support adaptive capacity in a changing climate. They go on to prescribe what they consider to be quality processes for this community (and other vulnerable communities) that will genuinely help its resilience in

the face of climate change. Their model of 'dynamic' assessment emerges from deep ethnographic work in the community, holding informal discussions with community members, and involving them in generating data about their village with geographic information systems (GIS) for their capacity enhancement, specifically regarding water sources and their use. They demonstrated, through their mixed-methods approach, which involved prolonged and repeated interactions with the community, that participatory GIS (PGIS) can assist in revealing critical data about people and their environments – data that otherwise might not materialize. They make the suggestion that PGIS could assist communities in communicating their situation to decision-makers, which in turn might lead to a shift in attitude on the part of local government. The authors strongly advocate that strategies to address the effects of climate change on populations should take into account the knowledge contained within the local community to enhance future adaptive capacity.

There are clearly huge unmet water needs in this community requiring action by people both in the community and outside it. This book examines why these needs remain unmet despite the enactment of the Water Statute in 1995, the rollingout of the National Water Policy in 1999, the improved water resources, the community-based management schemes, and their stipulated gender ratios. The deficiencies of these enabling frameworks are apparent to the community and the researchers alike. While much activity has been generated to meet the MDGs (UN, 2000) on water, this book tells the tale of how water resources, as well as their quality and sustainability, are currently distributed, protected, and managed in one case study parish with a view to working with communities towards development.

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Notes

1. Water is Life: *Amazzi Bulamu* is a research project designed to build research capacity in Ireland and Africa and to conduct research that supports sustainable water resource management as a catalyst for sustainable economic and social development in rural Uganda. The project comprises a partnership of Irish Higher Education Institutions (Dundalk Institute of Technology (lead), NUI Maynooth, Dublin City University, Trinity College Dublin, the Royal College of Surgeons in Ireland, University College Dublin and Queen's University Belfast, Makerere University, Uganda, the Medical Missionaries of Mary, and various NGOs. The project is funded directly through the Irish Aid/HEA Programme of Strategic Co-operation in support of the Irish Aid mission to develop the capacity of the higher education sector for developmental research. The programme is managed by the Higher Education Authority (HEA on behalf of Irish Aid).
2. The field research for the baseline survey was carried out in 2011. The overall findings are published as Macri et al. (2013).

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