

10-14-2015

The Role of Community Participation in Water Production and Management: Lessons From Sustainable Aid in Africa International Sponsored Water Schemes in Kisumu, Kenya

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The Role of Community Participation in Water Production and Management: Lessons
From Sustainable Aid in Africa International Sponsored Water Schemes in
Kisumu, Kenya

by

Erick Oniango Ananga

A dissertation submitted in partial fulfillment
of the requirement for the degree of
Doctor of Philosophy
in Geography and Environmental Science and Policy
School of Geosciences
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Date of Approval:
September 22, 2015

Keywords: urban-based water schemes, informal settlements, beneficiary satisfaction,
performance factors

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DEDICATION

This dissertation is dedicated to my mother Wilfrida Wadede and father Charles Okolo Ananga, who taught me the importance of higher education; to my wife Vivian, who has been patient with the process and supported me wholeheartedly; to my daughter Zoe Wadede who gave me a reason to get out of bed every morning and the urge to set a good example; and to Eileen Annette Fisher who supported me and gave me a job while undertaking my undergraduate and graduate studies in England.

ACKNOWLEDGMENTS

First and foremost, I would like to thank my major adviser, Prof. Ambe J. Njoh for helping me through this endeavor. He has been an inspiration to me. His teaching has motivated me to love my continent and focus my research on water and sanitation issues in Africa. The comments and corrections he made in this work, without doubt, have enhanced its quality. I would also like to extend special thanks and appreciation to my supervising committee. Each member of the committee provided invaluable support on this journey. Thank you, Dr. Fenda Akiwumi for always listening to me and encouraging me to work hard and stick to the journey. Thank you, Dr. Hesborn Wao for helping with the mixed methods section and ensuring the study adhered to the scientific method. Thank you, Dr. Jennifer Collins, Dr. Kamal Alsharif and Dr. John Daly for accepting to be on the committee and the faith and trust you have had in me. I must stress that all the committee members have immensely helped me as a doctoral student here at USF. I would not have done this without their support and encouragement.

I would also like to acknowledge the support provided by the following people: my best friend Zuleika De Aguiar for reading, criticizing and adding value to all the work I completed as a doctoral student in the United States; Sustainable Aid in Africa International for supporting my data collection efforts; Women groups, water management committee members and water consumer groups who participated in the focus group discussions; Carolyn Rivera for helping with the office protocols; my brother George Ananga for helping fund part of this dissertation.

George was also very instrumental in introducing me to the academic world by going through my undergraduate work while studying at the University of East Anglia in the United Kingdom.

My appreciation also goes to the School of Geosciences, USF, Dr. Kevin Archer, Dr. Mark Hafen and Dr. Alfred Mbah. Dr. Archer introduced me to the Socratic teaching philosophy. Dr. Hafen trained me on how to be an effective teacher and Dr. Mbah chaired the examining committee. Overall, I have learnt a lot from the School of Geoscience. The teaching experience I have gained will go a long way to help me establish a career in teaching and research.

Finally, my heartfelt appreciation goes to my wife Vivian who is the captain of the house. I love you and thank you for listening to my constant complaints and demand for perfection in everything we do.

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ABSTRACT

Few studies have attempted to determine the tenability of Community Participation (CP) theory in explicating Water Production and Management dynamics in Urban Informal Settlements. Consequently, several gaps exist in knowledge of the value of this important theory for efforts to improve water service delivery in such settlements. The main purpose of this study is to contribute to efforts addressed to filling these gaps. Four water schemes established by Sustainable Aid in Africa International in partnership with different communities in the informal neighborhoods of Kisumu Kenya are used as empirical referent. The study is guided by the following three Research Questions; 1) what is the relationship between community participation and beneficiary satisfaction with the work of the water management committees in the four schemes? 2) what are the contributions (positive or negative) of community participation on the production of clean potable water supply in the informal settlements? 3) what are the participation-related factors affecting the performance of the schemes?

Uncovering answers to these questions entailed the use of a mixed methods approach. The approach involved the application of both quantitative and qualitative techniques. The former was employed mainly to answer the first two Research Questions and latter to deal with Research Question Three. The quantitative component of data collection involved administering a survey questionnaire through a simple random sampling technique. Logistic Regression and Chi-square Tests were employed to analyze the quantitative data. In the qualitative phase, Focus

Group Discussions, Observation, Transect Walks and Photographic evidence was used to collect data analyzed through Constant Comparison Analytic technique.

For Research Question One, the logistic regression results indicate that five participatory variables are significantly associated with beneficiary satisfaction with the work of the water management committees. These are provision of paid or unpaid labor to the water schemes, household willingness to intervene against pipe vandalism, meeting attendance, willingness to contribute money or time to the community water scheme and whether a household has ever made a complaint about water supply/quality issues. For Research Question Two, the chi-square test shows that households who use community managed water schemes and attend water and sanitation meetings tend to practice better water handling hygiene in the settlements. For Research Question Three, the following factors are identified to be either aiding and/or impeding the success of the schemes; networking and collaboration, continuous community engagement/participation, the formation of water consumer groups, coordination and organizational management, extent of institutional formalization, provision of dividends to the community, clannism, population increase, and poverty and community fatigue.

This dissertation sheds new light on the role played by CP in managing vital resources such as water in urban informal settlements/neighborhoods. An important policy contribution is that CP can be used as a viable strategy in the establishment of effective water schemes in urban informal settlements. Furthermore, it can act as an antidote with regards to water quality improvements in urban informal settlements/neighborhoods.

1. INTRODUCTION

Global population increase continues to create new challenges on the management of natural resources. Studies by Chitonge (2014), Hopewell and Graham (2014) and Gleick (2014) suggest that in the coming years the challenge will be phenomenal in emerging cities in Africa. It is projected that the urban population growth on the continent will double between 2000 and 2030 (Alabaster, 2010). The growth will be more pronounced in cities where the population is below one million with the majority of the inhabitants living below the poverty line (Torres, 2012; Van der Bruggen et al, 2010). Three factors at the root of this unprecedented growth include natural increase, reclassification of rural areas as urban centers, and most importantly, rural-urban migration (Chitonge, 2014; Hardoy et al, 2014; Satterthwaite, 2014). The daunting task facing local authorities is how to adequately supply clean potable water to the predominantly poverty stricken urban dwellers (Bakker et al, 2008).

Experts have proposed varied management mechanisms targeted at improving access to water in the developing world (Ghai et al 2014; Gleick, 2000; 2003; Mitchel, 2005; Pahl-Wostl, 2007; World Bank, 1993; 2004). The most notable among the suggested models is the *demand-responsive approach* as opposed to the *traditional supply driven interventions* (Naiga et al, 2012; Nicole, 2000; World Bank, 1998). The demand-responsive approach was popularized in Africa in the 1990s by major development organizations such as the World Bank. The concept is anchored in the idea of Community Participation (CP) which advocates greater beneficiary involvement in water service production and management (Whittington et al, 2009). It includes

beneficiaries taking the initiative to demand improved water services while at the same time taking a leading role in project design, implementation, development and sustainability. The demand-responsive approach requires beneficiaries to own the system by constantly making meaningful contributions either in the form of cash or labor to community-based water projects (Sara & Katz, 1998). It is premised on the belief that such involvement ultimately leads to better designed projects, better targeted benefits and more cost-effective and timely delivery of water. Most significantly, CP is seen as effective in terms of equitable distribution of water and in curtailing corruption and other rent-seeking activities (Asian Development Bank, 1998; DFID, 2000; World Water Forum, 2000).

Several water projects in rural villages in Africa and Asia have been established based on the demand-responsive model with the following studies heralding its success (Engel, Iskandarani & Useche, 2005; Cleaver, 1996; Isham & Kahkonen, 2002; Isham, Narayan & Pritchett, 1994; Kleemeier, 1995; 1998; 2000; Manikutty, 1995a; 1995b; 1997; Narayan, 1995; Prokopy, 2004; 2005; 2009; Russ & Takahashi, 2013). Few studies have attempted to determine the tenability of CP theory in explicating water production and management dynamics in urban informal settlements. Consequently, several gaps exist in knowledge of the value of this all-important theory for efforts to improve water service delivery in such settlements. The main purpose of this study is to contribute to efforts addressed to filling these gaps. It accomplishes this objective mainly by exploring and evaluating the effectiveness of CP theory in water production and management in urban informal settlements/neighborhoods. Specifically, the study examines the nature and role of CP in water service delivery in urban informal settlements/neighborhoods in the city of Kisumu, Kenya. Four water schemes established and

funded by Sustainable Aid in Africa International (SANA), in partnership with different communities in the informal settlement of Kisumu, are examined.

SANA is a non-governmental organization (NGO) located in Kisumu. The organization was established from the Kenyan Rural Domestic Water Supply and Sanitation Program in 2003. The mission of SANA is to contribute to the improvement of access to safe water and proper sanitation for people through the promotion of CP and sustainable technologies. SANA has four main objectives: (1) To promote and be actively engaged in the provision of urban water supplies and environmental sanitation; (2) To train communities on current health related techniques and assist them in capacity building for water sustainability at the community level; (3) To promote overall natural resource management with emphasis on environmental concerns at the community level; and (4) To mobilize and distribute funds and other resources for the promotion of water, health and sanitation issues.

Currently, through the use of participatory techniques, SANA has established and funded several water schemes in Kisumu. This study focuses on examining four schemes. These are Wandiege Water and Sanitation Scheme (WWSP), Obunga Water and Sanitation Scheme (OWSP), Asengo Water and Sanitation Scheme (AWSS), and Paga Water and Sanitation Scheme (PWSS). The four water schemes offer a rare opportunity for examining the tenability of CP theory in explicating water production and management dynamics in urban informal settlements/neighborhoods.

Before proceeding it is important and necessary to provide a brief definition of three important terms used throughout this study. These are Urban Informal Settlement /Neighborhoods, Water Production and Water Management. There are several definitions for the term urban informal settlements. The most prominent of these include unplanned settlements,

squatter settlements, marginal settlements, unconventional dwellings, non-permanent structures, inadequate housing and slums (Hofmann et al 2008; Huchzermeyer & Karam, 2006; Huchzermeyer, 2004). This study adopts the definition advanced by the United Nations (UN). According to the UN (e.g. 2007), *informal settlements/neighborhoods* are settlements having the following characteristics: (1) lack structured planning, (2) has an informal or insecure property tenure, (3) has limited participation in government activities which leads to inadequate service provisioning, and (4) has a vulnerability to discrimination for the residents. This definition is considered apropos for the present study because it encapsulates most of the essential characteristics of informal settlements. The first two characteristics are based on the physical and/or the rule of law constraints, while the third and fourth fall under the social constraints domain. The four schemes used as empirical referents in this study are located in places which according to the UN definition would be considered as informal settlements.

Equally important are the terms, Water Management and Water Production. Water management can be considered as an essential component of water production. Generally, prudent water management techniques has shown to be beneficial to society in regards to ensuring efficiency, maximizing equity and reducing environmental damage through the promotion of greater public participation (Brooks, 2006). Unfortunately, a lack of clarity in the definition of the two terms still remains in existing literature. Water production simply refers to activities and processes involved in making water available and suitable for human use/consumption. On the same token, water management can be considered a part of water production; however, it is a concept which often becomes significant after water is produced. That is, after all the processes needed to make water available or run through the taps have been achieved. According to Brooks (2002), water management involves activities or actions geared

towards getting the most from the produced water. Deverill (2001) called these actions practical strategies which are targeted at improving efficiency, distributional equity and sustainable use of water. Savenjie & van der Zaag (2002) defined water management as the development and implementation of mechanisms aimed at managing water demands. The outcome is to ensure efficient and sustainable use of water as a scarce resource.

Brook (2006) goes further in providing a well thought definition of what the term water management ought to be. He asserts that water management should reflect a series of steps that bring water from source to use. Thus, water management can be viewed within the prism of any method, whether technical, economic, administrative, financial or social that will accomplish one or more of the following four items. (1) Managing the quantity or improving the quality of water needed in accomplishing a particular task. (2) Reducing the loss in quantity or quality of water as it flows from its source through use to eventual disposal. (3) Shifting the timing of use from peak hours to off peak periods for purposes of making water more equitable. (4) Increasing the ability of the water system to continue to serve society during times when water is limited. Along the same vein, Crigg (1996, pg. 6) compared water management to the art of building a house. Crigg asserted that before building a house we need policies, plans, specifications, codes, materials, builders with specific skills and buyers. As building a house has a set of rules, water management also has a set of rules. However, they are more complex than building a house. This is because it involves policies and plans for guidance, rules and codes, materials for construction and operation, teamwork, skills, customers and water users. It is a complex and multifaceted undertaking.

From these definitions it is apparent that the term water management and water production are intertwined. It will be impossible to pick one away from the other. Overall, we

can think about water production and management both in terms of technology and policy (Brook, 2006). These may include issues such as piping, tap installation, chlorination, pricing, managing expectations, balancing losses and even human emotional issues which might be related to water. Ultimately, this is where citizen participation becomes an essential element in water production and management.

As correctly argued by Crigg (1996) in this century managing water resources requires skills and approaches that goes beyond pure engineering, science, management or law. To ensure efficiency, equity, and sustainable use of water citizen participation is necessary especially in developing countries and specifically in cities such as Kisumu where water is considered a scarce resource. World Health Organization and Unicef (2006) estimated that in Sub-Saharan Africa between the year 1990-2004, the number of people without access to clean potable water increased by 23 percent. At the same time, the region experienced 85% increase in its urban population with the majority of people having no access to safe drinking water (*Ibid*). The focus of this study is to examine the role which citizens can play in water production and management in urban informal settlements and specifically in Kisumu, Kenya.

The study contains seven chapters. This introductory chapter progresses in the following order. The next section discusses the broader theoretical framework within which this study is situated. Following this is a presentation of the study objectives, research questions, study area, and its significance in environmental policy and planning. It ends with an outline of the remaining six chapters.

1.1 Theoretical Framework

The management of water resources in the developing world has traditionally been considered as a government responsibility in accordance with the supply driven model (Lane,

2006). Advocates of state-controlled strategies argue that access to water is a human right and that it is the state's obligation to ensure its access to the public (Gleick, 1994; Prasad, 2006; Scanlon, Cassar & Nemes, 2004; Trawick, 2003). More significantly, because of the huge capital investment required in water supply services, proponents believe that only the state has the capacity to guarantee its equitable distribution especially in poor neighborhoods. In fact, state-control advocates stress that water should never be treated primarily as a commodity based on the market principles. This is because markets are purely driven by profit motives (Prasad, 2006). Overall, such arguments imply that the state has the capacity and duty to provide water services to everyone (Johnston, Gismondi & Goodman, 2006; Laxer & Soron, 2006). In this scenario, the state, through municipalities, therefore assumes full responsibility in the production and management of water resources. This has historically been the case in most developing countries. A few specific cases include the Kenya Water Resources Management Authority and the Cameroon National Water Company (Fongong et al, 2004), and the Ghana Water and Sewerage Corporation before the establishment of the community co-management models (Fuest, 2005).

In the mid-1980s, water supply systems in many developing countries began experiencing major problems with regards to quality, reliability, and coverage (Irwin, 1997; McIntosh, 1997). These problems arose due to the failure by most states in meeting their obligations (Panayotou, 1997). Several studies reported that local and national governments were reluctant to invest in improving water infrastructure (Bayliss, 2003; Bakker et al, 2008; Bakker, 2010). Customer care was poor and taps continued to dry up due to spillage and wastage especially in poor neighborhoods (Savedoff & Spiller, 1999). The situation became worse and untenable by the early 1990s when most states failed to offer viable solutions to these problems.

Under such circumstances policy makers begun to prescribe a series of reforms with the most notable one being privatization of the water sector (Prasad, 2007).

Private sector participation, although controversial, became fashionable as an alternative strategy for managing water resources in the developing world in the early 1990s (McGranahan & Mulenga, 2009). This was after the complete failure of supply-driven interventions popularized by the state. It was argued that privatization would expand service coverage to the poor, bring in the needed investment, relieve government from the problems of budget deficits, and most importantly, lead to improvements in efficiency and performance by reducing red tape (Cross & Morel, 2005; Davis, 2005; Kerf et al, 1996; Naegele, 2004; Shirley, 2002; UN DESA, 2004). Indeed, the ideological arguments in favor of privatization of the water service delivery in the developing world were backed by empirical evidence. The most prolific amongst the studies undertaken on water privatization debate was completed by Estache and Rossi (1999). This study focused on urban centers in the Asian countries. By using a 1995 survey data assembled by the Asian Development Bank, the study compared the performance of private water and public water utilities. The variables of interest were productivity indicators operationalized as simple input-output relations (e.g. the number of workers per client or connections). A stochastic cost frontier method was employed to analyze the data. Results from the study showed that privately-operated water utilities were more efficient than those which were publicly managed.

Another significant study by Estache and Kouassi (2002) analyzed outcomes in water service delivery in African countries where privatization had taken root as an optional government policy. Based on panel data sampled from 121 different African water utilities between 1995 and 1997 and using stochastic and parametric frontiers technique, the study found that private ownership was associated with a lower inefficiency score than publicly run water

utilities. The inefficiency of public water utilities was exemplified by among other things, the rate of corruption existing in government institutions. Other noteworthy studies which have shown that private water utilities perform better than publicly owned utilities include Clark Kosec & Wallsten, 2004; Kirkpatrick et al, 2004; Shirley & Menard, 2002; and the World Bank, 2004.

However, contrary to the foregoing positive findings are studies which show that privatization has no effect on efficiency, productivity or improvement of water access in poor neighborhoods. For instance, Clarke and Wallsten (2002) found that while private sector participation in water service delivery leads to more supplies to poorer households, there may be offsetting service difficulties and higher charges when supplies are privatized. Similarly, an empirical study by Bayliss (2002) reported that privatization created negative impacts on the poor in terms of job losses, decreased earnings, and reduced access to services. Birdsall and Nellis (2003) found that privatization resulted in income disparity between people thus expanding the inequality gap between the rich and the poor. A case in Puerto Rico, as reported by Interpress (1999), deserves mention here. According to Interpress, a state-run water management system completely collapsed immediately after a privatized French multinational company, Vivendi, took over. With Vivendi as the managing authority, an audit by Interpress found that there were deficiencies in management and repairs, financial reporting, addressing consumer concerns, and water service billing and record-keeping. In an extensive review of water utility ownership, Braadbaart (2002), found that privately-owned utilities were not more efficient than their publicly-run counterparts.

The point here is that each side in the debate between privatization versus state delivery of water supply services presents a passionate argument. Empirical research conducted on the

two approaches is inconsistent depending on the type of study or data researchers prefer to review. It is also important to restate that the two approaches are tethered on the traditional supply-driven intervention model, which has a somewhat limited role for public participation.

There is a third approach which has been entertained in the water service delivery sector. *This approach, also known as the demand responsive approach calls for CP in water resource management.* Proponents of this approach argue that it can be used as an alternative strategy in improving water access to the poor. This study focuses mainly on this topic. That is, the demand-responsive approach subsumed under the CP ideology as an alternative approach in water resource production and management.

The ideological reasoning behind the acceptance of CP theory in development planning is varied (Harvey and Reed, 2007). In Africa the idea gained currency in the 1960s and specifically in the donor funded projects (Wood, 2003). However, as Njoh (2003) and Svendsen and Teisen (1969) have argued, participation had long been practiced in pre-colonial Africa where it was common to see community members working together for the purpose of executing local development projects. In Tanzania, as noted by Svendsen et al. (1969), communities collectively engaged in activities such as building schools, roads and community village health posts using their own labor and materials. Similarly, in Kenya under the presidency of Jomo Kenyatta and leadership of Jaramogi Oginga Odinga, communities in the spirit of participation coined a Kiswahili term, *Harambee*, meaning *pulling together for purposes of development* (Smith, 1992). The same is documented in South Africa prior to the European colonization era where chiefs were required to solicit community views before exercising their powers (Mansuri & Rao, 2013). To this Njoh (2003) added, colonial authorities working in Africa had no alternative but to incorporate CP as a component of their development planning agenda. In fact as further

articulated by Njoh (2006; 2010), two factors remain to account for the significance of CP in Africa tradition and ethos. The first is its contextual relevance in maximizing utility of scarce resources like water or land. The second, Njoh argues is its compatibility with the democratic principles, a concept widely practiced in the African continent before the arrival of the Europeans.

Several factors have contributed to the recognition of CP as a major tool for success in different development projects especially in the water service sector in Africa (DFID, 2006). The World Bank lists some of the reasons why they promote CP in their projects (Lamb, Varettoni and Shen, 2005). First, it is recognized that national and local governments have failed to effectively manage development projects and programs under their charge. The second is based on the notion that development workers have a moral obligation to listen to the needs of the beneficiaries. Third is the litany of empirical evidence showing positive outcomes for projects where CP techniques have been administered. Finally, CP is seen to be effective in terms of inclusion. In Africa, women overwhelmingly bear the burden of water collection (Kehler, 2013). Despite this, their voices are often excluded in the decision-making processes which in fact render them as passive actors in the development process. The process of exclusion does not only end with women but extends to the chronically poor who are often viewed as short term maximizers of utilities. In this respect, participation provides an avenue for such groups to express their opinions, experiences or desires (Bhasin, 1985; Chambers, 1983; Fals-Borda, 1988; Rahman, 1987).

Besides, arguments presented by the World Bank, there are other reasons validating the use of CP as an alternative strategy in water production and management. Most prominent among them, according to McCommon et al (1990), is the spillover effects on other development

sectors within the community. These include benefits such as improved health care facilities, recovery of financial costs or potential financial savings. Mansuri and Rao (2004) argue that, participation leads to an empowered beneficiary community who are better trained in managing more complex community services. Thus, the new skills gained by the community through training will prepare them for participating in other sectorial development activities.

Additionally, the experiences acquired in such trainings increases the community's power over local issues thus creating a domino effect on other development initiatives. Carter et al (1999) reinforces this point, by arguing that the concept of participation was embraced especially by governments unable to deliver or maintain services to the people. Such governments used the success of participation in development projects as an opportunity to relinquish their responsibility of managing public services.

According to Bakker (2008), a significant factor which brought forth the application of CP in water production and management was the failure of privatization. He asserts that by the mid-2000s, it had become clear that water privatization initiatives were failing to achieve some of their declared objectives. This was more visible in poor neighborhoods where the private sector was reluctant to invest. In fact, field studies in mid-2000 indicated that despite the huge amount of resources ploughed into the privatization agenda, water access in poor neighborhoods was deteriorating (Byliss & Fine, 2007; Hukka & Katko, 2003; McDonald & Ruiters, 2005). Furthermore, most of the large multinational organizations which had embraced the privatization bandwagon began to withdraw from the contracts they had earlier committed themselves to. In order to mitigate such problems, Bakker (2008) contends that participation had to be reintroduced as a viable tool in solving the quagmire. Bakker's argument has been advanced further in a seminal review by Mansuri and Rao (2013) titled *Localizing Development- Does*

Participation work. In this work, the two scholars argue that participation has become popular because it has provided what the market/the state had failed to achieve. That is, (1) aligning development priorities with those that reflected beneficiaries' goals; (2) promoting dialogue between beneficiaries and their development partners; and (3) expanding resources which were not previously accessible to the poor. Most importantly, participation as theorized by Mansuri et al. (2013) or Chambers (1997) is seen as being helpful in checking elite preferences and replacing them with the desires of the poor.

It is worth noting here that Mansuri's and Rao's arguments on the power of CP are intertwined with those advocated by the decentralization advocates (see, e.g., Adamolekun, 1991; Agrawal & Ribot, 1999; Anderson & Ostrom, 2008; Crook & Manor, 1998; WRI, 2003). Generally, proponents of the decentralization scholarship promote it on the basis that it reduces the gap between the government and the people thus creating an avenue for audit. In a decentralized government, just like in a perfectly operated community water project, the citizens are able and are allowed to voice their preferences and needs to the overseeing authority. They are also able to monitor performance, and in so doing, improve transparency and accountability within the system. Enhanced accountability thus translates to improved service delivery to the poor and the marginalized. A similar observation was made in a well-argued essay by McGranahan and Mulenga (2009). They posit that the process of participation is central in making markets or governments to work better for the people.

The theory of CP as an alternative approach in development planning is, however, not shared by everybody. Abraham and Platteau (2004) warn that on the basis of power structures which exist in paternalistic societies, the process of participation may be inherently subject to elite capture. Mansuri and Rao (2004) extend this observation by noting that the exercise of

voice and choice as advocated in participatory development may add some costs to the poor. In other words, the process of participation may involve financial losses due to the productive time it takes away from the poor. Fuest (2005) criticized participation based on the ground that it is an additional burden on the poor to require them to pay users' fee for water. Atempurgre (1997), Gary (1996), and Ioris (2007) contented that just like privatization theory, CP is probably a reflection of the far-fetched neo-liberal Western ideas being exposed through the Bretton Woods institutions on the vulnerable. Parfitt (2004) puts it vividly that, participation is simply another seductive method used by development agencies to pursue top down development agendas. This is the same argument that was advanced by Hickey and Mohan (2004). They noted that at times the process of participation may mutate with existing power structures and political systems thus further disenfranchising the poor.

Others like Burkey (1993), Oakley and Mardsen (1984), and Stiefel and Wolfe (1994) saw participation as a technocratic and paternalistic activity designed to manage natives as objects or as unpaid hands in self-help schemes. Indeed, in such schemes the roles allocated to natives, they contend, is often manual and minimal. Locals hardly make decisions and any involvement serves as a means of indoctrinating them into the values and priorities of the bureaucrats. More precisely in the African context, Larson and Ribot (2004) drew attention to the problem of distributional inequality. Participation through elected or traditional authorities is the same as modern day colonial indirect rule.

Nagle (1992) and Mosse (2002) have advanced some of the strongest empirically-supported criticisms against participation. In a study of USAID water projects, Nagle found that the promotion of CP techniques may lead to an increase in management and administrative staff. This was because organized communities were only happy to interact with staff who were

considered high within the management strata. Along the same vein, Mosse found that participatory exercises are mostly public events and are open ended regarding target groups. Because of this, they are inherently political and reflect local relations of power and gender.

Despite of the aforementioned criticisms, the concept of CP has been widely used in establishing rural water schemes in Africa. Yet, it is also accurate to assert that CP's quantitative effects remains to be thoroughly researched or documented in African urban space. In fact, very little attention has been given to monitoring and evaluating community-operated urban water schemes located in informal settlements. More priority has been accorded to research on public versus private provisioning of water supply services or the effects of CP in rural water supply systems. The present study seeks to fill this gap by exploring and evaluating the tenability of community participation theory in explicating water production and management dynamics in urban informal settlements.

1.2 Research Objectives and Questions

The primary task in this study is to examine the nature and role of CP theory in water service delivery in urban informal settlements. Four water schemes established by SANA in partnership with different communities in Kisumu informal settlements are examined. The study seeks to attain the following three specific objectives which are guided by three research questions.

Objectives

1. To examine the relationship between CP and beneficiary satisfaction with the work of the water management committees in the four schemes established by SANA.
2. To evaluate the contribution (positive or negative) of CP on the production of clean water supply in informal settlements in Kisumu.

3. To evaluate the participation-related factors affecting the performance of the schemes.

Research Questions

1. What are the relationship between CP and beneficiary satisfaction with the work of the water management committees in the four schemes?
2. What are the contributions (positive or negative) of CP on the production of clean potable water supply in the informal settlements?
3. What are the participation-related factors affecting the performance of the schemes?

The responses to these questions are guided by the following hypotheses which hinge on well-established knowledge on the theory of CP in development planning.

- H1 CP will lead to increased beneficiary satisfaction with the work of the water management committees.
- H2 Households participating in water meetings and relying on community managed water schemes will tend to practice better water handling hygiene than households who do not.
- H3 There are several participation-related factors which may affect the performance of urban-based community operated water schemes.

1.3 The Study Setting - Kisumu Water Schemes

The four water schemes examined in this study are located in informal settlements in Kisumu, Kenya (Figure 1.1). The city of Kisumu is situated in western Kenya, adjacent to Lake Vitoria, the second largest fresh water lake in the world. Its proximity to this large body of freshwater notwithstanding, Kisumu faces significant water shortage problems. Yet, water is not the city's only problem. It faces problems arising from poor town planning (Kisumu City Development Strategies 2004-2009). This problem is more acute in the informal areas of the city. Here, more than anywhere else in the city, buildings are congested with heaps of garbage and

streams of raw sewage flowing along narrow alleyways (Figure 1.2 & 1.3). Approximately 75 percent of informal settlement residents live in temporary and semi-permanent structures (Maulidi, 2012).

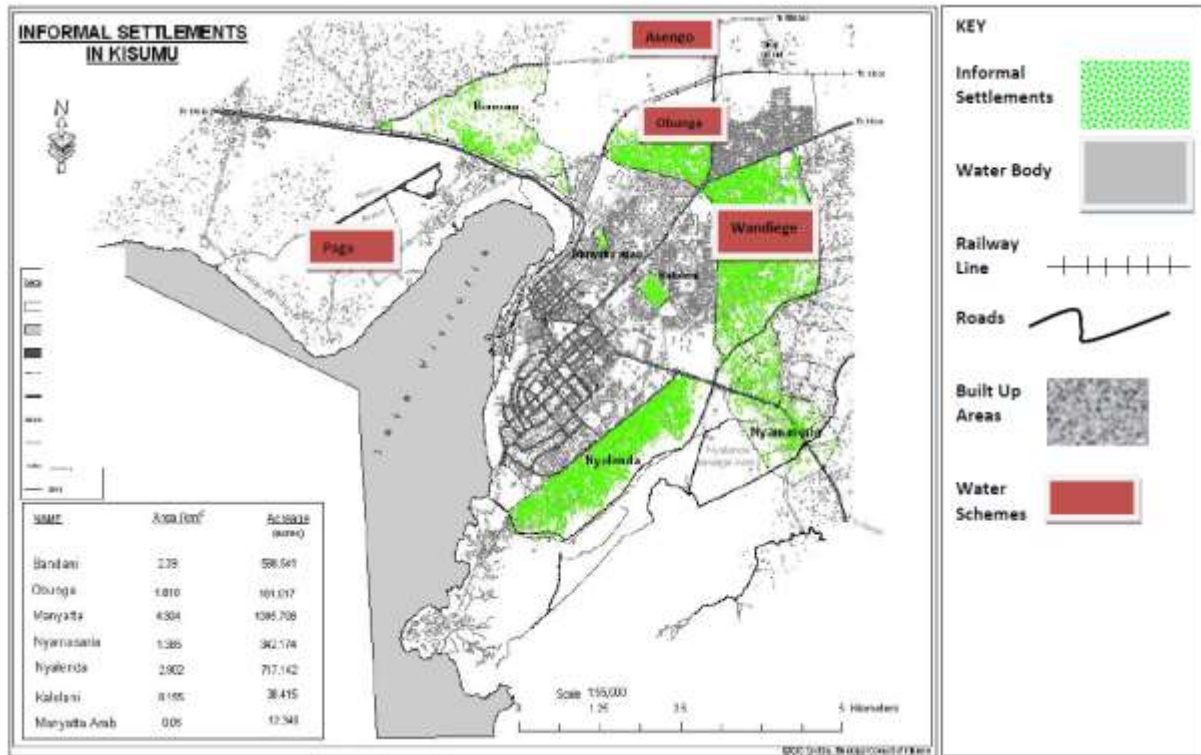


Figure 1.1 Map of Study Area Showing the Location of Water Points

The water problem in Kisumu presents a unique challenge. According to a report by the Kisumu City Development Plan (2014), tap water service is irregular in the informal settlements. Consequently, most residents depend on water vendors, nearby rivers and water from private boreholes to meet their fresh water needs (Otieno, 2013; Owuor et al, 2012). These alternative freshwater sources present significant health risks. They are poorly planned and are often located close to known agents of ground water pollution such as pit latrines. In fact, the frequent outbreaks of waterborne diseases such as cholera and typhoid in Kisumu are arguably a function of the city’s poorly planned water supply system (Maoulidi, 2011).



Figure 1.2 Community Water Kiosks in Obunga Kisumu (Source: Author)



Figure 1.3 Street in Obunga Kisumu (Source: Author)

Over the years, there have been many, sometimes disparate initiatives aimed at addressing the city's water problematic. During the last ten years SANA has played a leading role in this regard. It has worked with communities in Kisumu on various water schemes. Serving mainly in a funding and technical capacity, SANA's aim has been to improve water service delivery. Sustainable Aid in Africa International (SANA) has funded four water schemes in the city. The four schemes are: (1) Wandiege Water and Sanitation Scheme, (2) Obunga Water and Sanitation Scheme, (3) Asengo Water and Sanitation Scheme and, (4) Paga Water and Sanitation scheme. This study primarily focuses on examining the effectiveness of these schemes which were established under the auspices of CP. The hope of SANA was that the schemes if properly managed by the communities would reduce the burdens of acute water shortages in the informal settlements. A description of each scheme is in order.

1.3.1 Wandiege Water and Sanitation Scheme (WWSP)

Initiated in 2001, the Wandiege Water and Sanitation (WWSP) is a community based and operated water scheme in the informal settlement of Manyatta in Kisumu (Figure 1.4). It was established as a community self-help group with support from SANA and the local community to meet the potable water needs of its members. The community donated land and identified areas where the water kiosks were to be constructed. They also provided labor and money for the piping network. The water kiosks are operated and managed by democratically elected community members. On its part, SANA furnished the necessary funds and technical know-how. The scheme's mission was to improve access to safe water and better sanitation for the areas residents.

Currently it serves a population of 15,000. Prominent among its assets are a water system consisting of a borehole with a depth of 110 meters, a pumping station, a tower with two storage

tanks of 10,000 liters each, a pipeline system of 10 kilometers, 24 water kiosks, 148 metered connections, a chlorine dozer for water treatment and an office building (SANA, 2014).

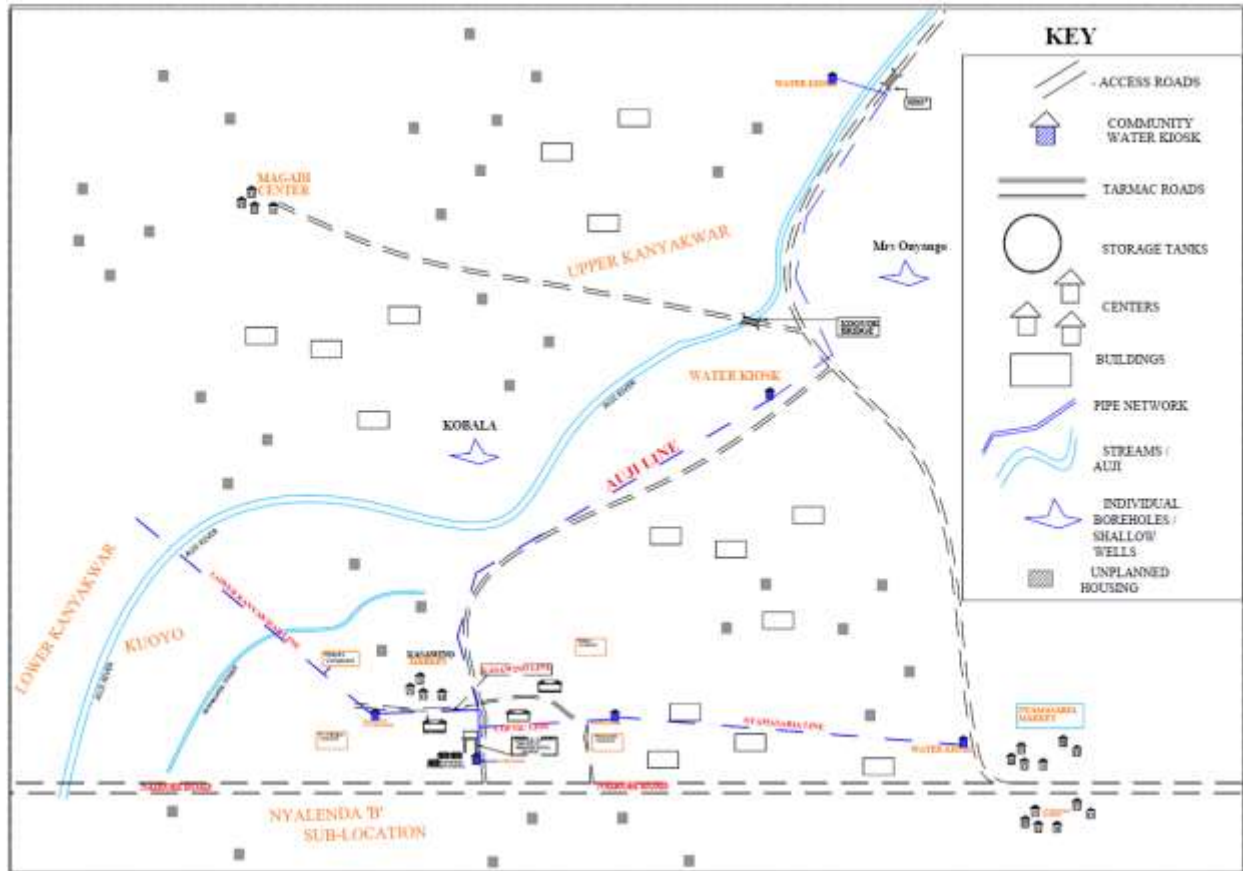


Figure 1.4 Wandiege Water Scheme Service Areas (Source: Author)

1.3.2 Obunga Water and Sanitation Scheme (OWSP)

Established in 2003, the Obunga Water and Sanitation Project (OWSP) is also a community operated scheme (Figure 1.5). It was initiated under the Kenyan Government Water Reform Act of 2002. The Act accorded autonomous companies the responsibility of providing water and sanitation services in urban areas. However, it gave them a list of principles to abide by which included considering water both as a social and an economic good. In this spirit, the Kisumu Water and Sewerage Company (KIWASCO) collaborated with SANA to implement a community water management model in Obunga. The model known as the delegated

management model (DML) involves selling water to the community in bulk at a subsidized price. In turn, beneficiaries are responsible for pipe layout and repairs, tariff collection, policing of pipes and revenue submission to KIWASCO. Presently OWSP serves a population of 30,000. Its assets include three water storage tanks, 60 water points and several water kiosks.

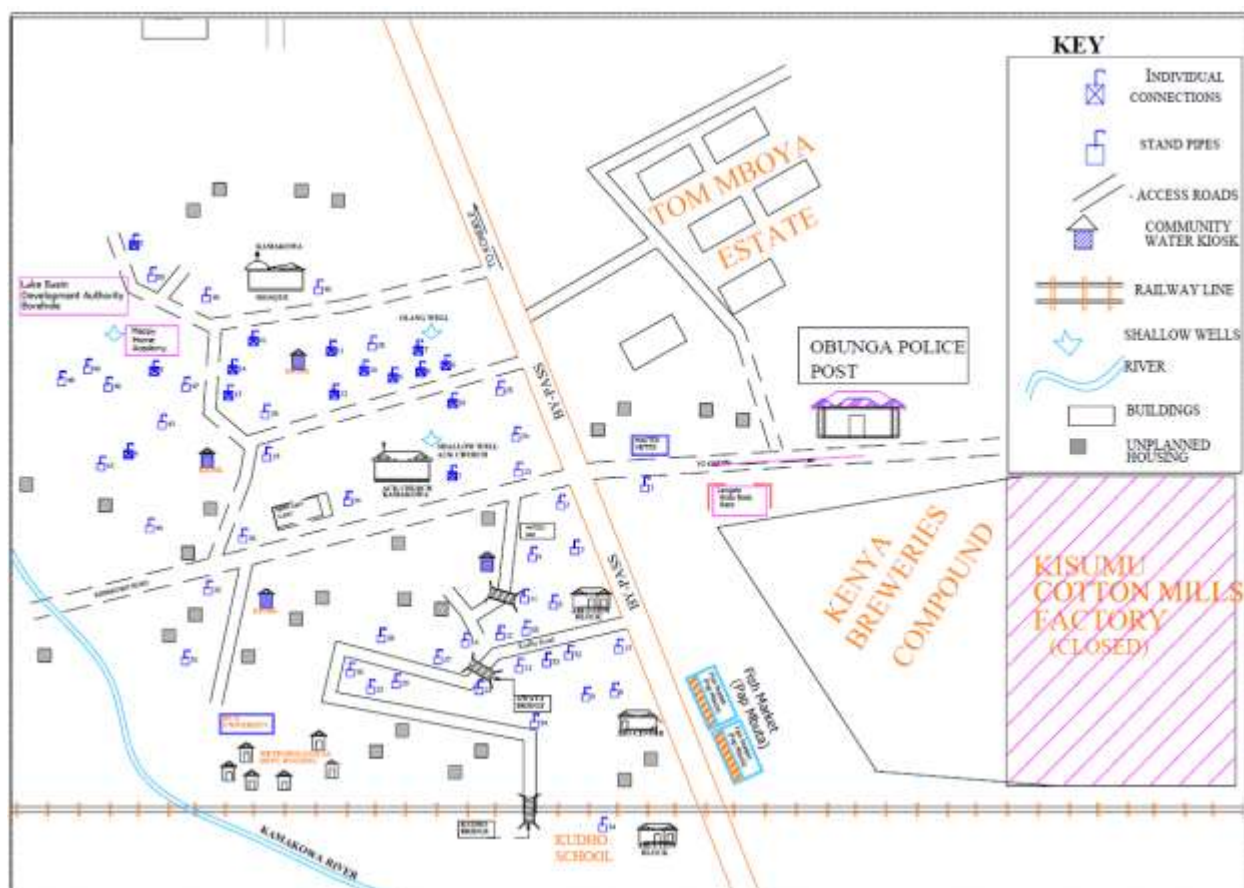


Figure 1.5 Obunga Water Scheme Service Areas (Source: Author)

1.3.3 Asengo Water and Sanitation Scheme (AWSS)

Asengo Water and Sanitation Scheme (AWSS) is a part-gravity and part-diesel operated scheme located in the north of Kisumu (Figure 1.6). It was established in 2005 as a joint venture between SANA and the community. Specifically, SANA provided the initial financial support for upgrading the spring water which the community previously relied on. They also provided

the necessary technical support. The community provided labor, land and furthermore identified construction locations for the intake tanks. What makes this project unique is that the initial financial assistance of \$40,000 USD from SANA was advanced to the community as a soft loan. The community has been able to steadily repay the loan.

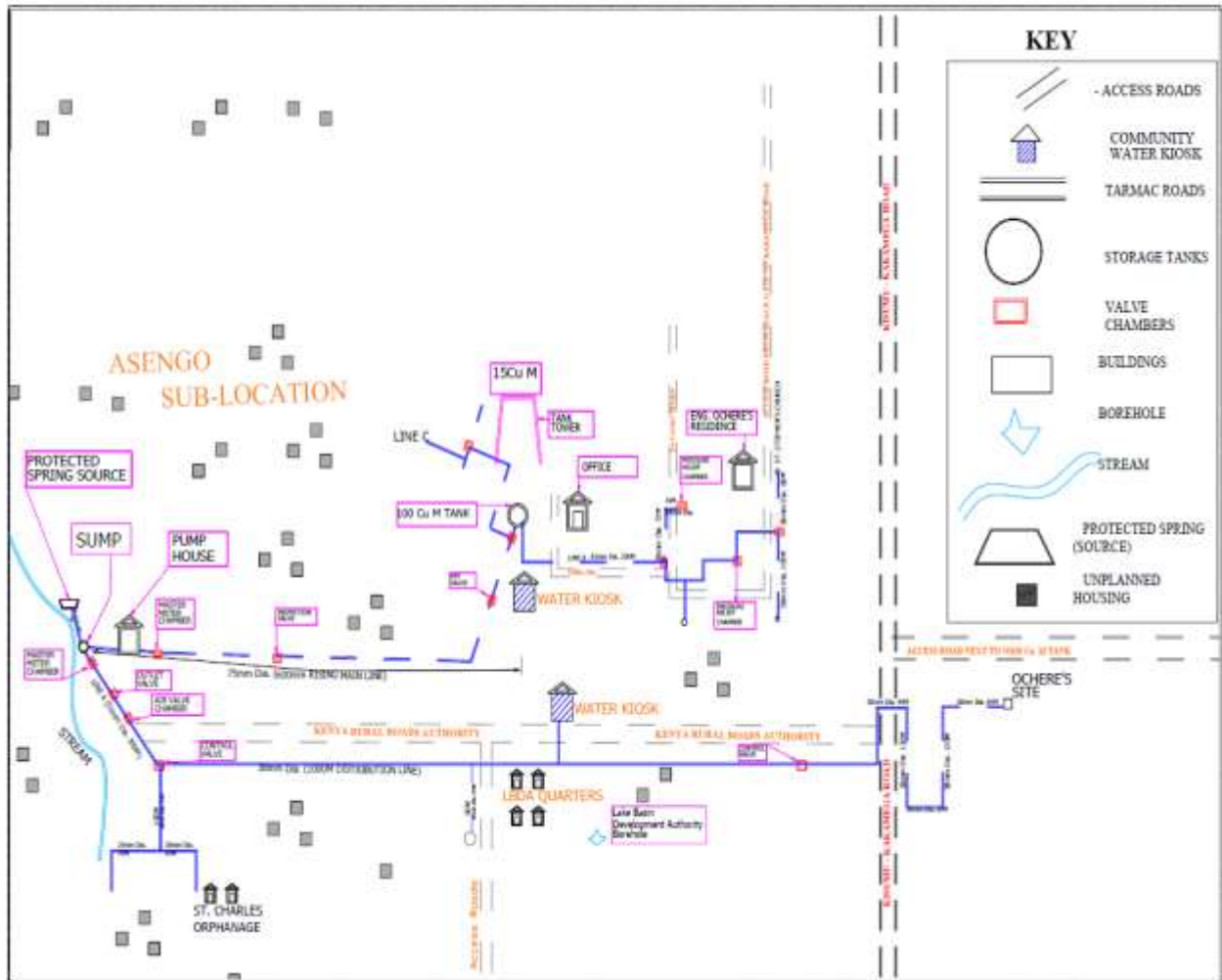


Figure 1.6 Asengo Water Scheme Service Areas (Source: Author)

Today the scheme is under the direct management of a community elected board of trustees. Its assets include two intake tanks and six water kiosks. It serves a population of over 20000 members (SANA, 2014).

1.3.4 Paga Water and Sanitation Scheme (PWSS)

Located on the western side of Kisumu, the Paga Water and Sanitation Scheme (PWSS) was established in 1989 (Figure 1.7). The original funding for the scheme was sourced from the Kenyan Government under the Kisumu City Slums and Peri-Urban Poverty Alleviation Program. Initially, the funds were used to build a 10,000 liter tank, a 3 kilometer pipe line and to purchase a diesel pump intended for pumping water from Lake Victoria to the feeder tank. The scheme served the community for two years until the diesel pump was stolen resulting in the project's interruption in 1992.

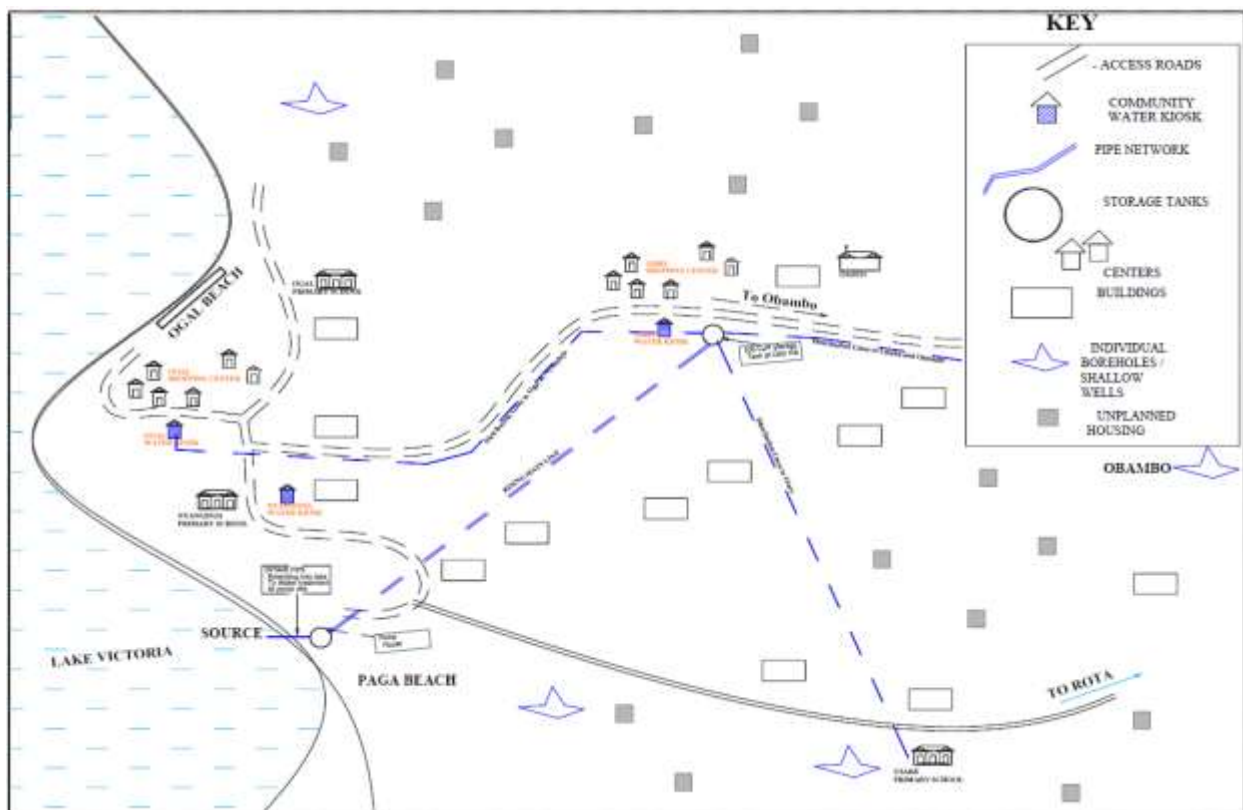


Figure 1.7 Paga Water Scheme Service Areas (Source: Author)

In partnership with SANA, the community revived the project in 2007 and today it serves a population of 17000 people. The role played by the community's members in reviving the

project was phenomenal. They identified the need for clean water, donated land, contributed labor and most importantly created an enabling environment for the project to restart. SANA augmented the community's effort by injecting funds and technical support. Currently, the scheme's assets consist of a 75,000-liter water tank, a 12-kilometer pipe line, three water kiosks and several stand pipes.

As the foregoing narrative suggests, each of the four water schemes is unique. Together, they offer almost a laboratory-like environment for a study on the nature and role of CP theory in water service delivery in urban informal settlements. All four schemes are located in urban informal settlements/neighborhoods where the inhabitants lacked decent water supply and sanitation services. As shown in figure 1.2 and 1.3, sanitation is poor in the location of the four schemes. This is due to poor planning and water logging often experienced during the rainy seasons. Lastly all the four schemes are community-operated and were all established with strong elements of participation and SANA playing a central role in this process. Table 1.1 presents a summary of the schemes' key attributes.

The research methodology adopted for the study consists of three segments. (1) Administering a household questionnaire survey to a randomly selected representative sample of community members of the four schemes. (2) Conducting focus group discussions with beneficiaries and the management teams of the four water schemes. And (3) making use of field notes, transect walks and personal observation to supplement the data collected.

The purpose of the survey was to gather quantified information for answering Research Questions One and Two. The qualitative segment of the methodology helped in addressing Research Question Three.

Table 1.1 Summary of the Schemes Key Attributes

Attributes	Wandiege	Obunga	Asengo	Paga
Year started	2001	2003	2005	1989
Role played by the community	<ol style="list-style-type: none"> 1. Donated land 2. Identified locations for water kiosks 	<ol style="list-style-type: none"> 1. Management of water kiosks 2. Identified locations for water kiosks 3. Provide security to the schemes assets 	<ol style="list-style-type: none"> 1. Provided labor and land 2. Identified sites for the intake tanks 	<ol style="list-style-type: none"> 1. Identified the need to clean potable water 2. Donated land and labor
Role played by SANA	Provided funds and technical know how	<ol style="list-style-type: none"> 1. Provided funds and technical support 2. Sourced for collaboration between the community and Kisumu Water and Sewerage Company 	<ol style="list-style-type: none"> 1. Provided funds for upgrading the spring water 2. Provided technical support 	<ol style="list-style-type: none"> 1. Provided Funds 2. Provided Technical support
Population served in 2014	15,000 people	30,000 people	20,000 people	17,000 people
Schemes Assets	<ul style="list-style-type: none"> • A borehole • Two storage tanks • A pipe line system • 24 water kiosks • 148 metered connections • Chlorine dozer 	<ul style="list-style-type: none"> • Three water storage tanks • 60 water points • 10 water kiosks • Several individual water connections 	<ul style="list-style-type: none"> • 2 intake tanks • 6 water kiosks • Several individual water connections 	<ul style="list-style-type: none"> • 75,000 liter water tank • 12 kilometer pipe line • 3 water kiosks • Several stand pipes

1.4 Significance of the Study

This study seeks to fill a gap in Knowledge on the role of CP in water service delivery in developing countries in Africa in general and Kenya in particular. Despite evidence of success of CP in rural water production and management, few studies have attempted to evaluate its effectiveness in urban water delivery especially in the informal settlements. In fact, evidence on monitoring and evaluation is very scarce. The water management model which has been promoted in urban centers is privatization. However, in Africa, privatization has failed to achieve the benefits previously lauded especially for the poor who most often live in urban informal settlements. It is worth noting that informal settlements account for roughly 30 to 60 percent of the urban population (Uitto and Biswas, 2000; UNCHS, 2006). Those who live in these settlements are poor and most governments or private companies give lower priorities to issues affecting them. Indeed, in terms of water delivery and planning, the settlements are congested making it almost impossible to provide in house water or basic sanitation facilities. For these reasons and coupled with the neoliberal notion of cost recovery, urban planners and private companies have been hesitant to invest in slum-based water infrastructure. Consequently, millions of people are denied access to clean potable water. Specifically for Kenya, the available data from UN-Habitat (2005) reported that over 50% of those living in slums have no access to drinking water.

The study is also important from an environmental policy and urban planning perspective. In this regard, it showcases the role of communities in managing vital resources such as water. Participation reduces wastage and encourages better water handling hygiene. As articulated by Hardoy and Ruete (2013), the installation of more water infrastructure alone is not

enough. Complex urban environmental problems need more community involvement in order to support the structural and non-structural interventions.

In addition, the study is important from economic and development perspectives. To appreciate this, consider the fact that one of the greatest challenges still facing developing countries is how to finance the Millennium Development Goals (MGDs) in regards to water provisioning. According to Banerjee and Morella (2011), the price tag for reaching the MDG target on water access is estimated at \$22.6 billion per year. This equals 3.5 percent of Africa's gross domestic product (GDP). The money needed for operation and maintenance alone stands at 1.1 percent of Africa's overall GDP. The findings of this study are potentially useful in demonstrating, the value of incorporating CP in the water delivery process in poor communities. In addition an argument can be made that economic growth is intertwined with access to water. In other words, industries and people living in cities like Kisumu require water. As shown in Chapter Four, access, reliability and the effectiveness of the water infrastructure can be greatly improved through CP mechanisms.

Furthermore, the study is significant from a public health perspective. Unsafe water and poor sanitation are major causes of disease worldwide. According to a report by UN-Habitat (2012), over half of the world's hospital beds are occupied by people suffering from illnesses associated with contaminated water and currently more people die as a result of polluted water than are killed by all forms of violence including wars. In a recent study, Norton (2014) observed that every year lack of adequate drinking water and poor sanitation causes 5 to 10 million deaths. At least 1.6 million of the victims are children under the age of five years with most of them living in the developing world. Chapter Six demonstrates that CP is an antidote for better hygiene in water handling. Finally, findings from this study confirm the need for policymakers to

incorporate CP in urban water management in informal settlements. As persuasively argued by Koundouri (2004), water scarcity whether quantitative, qualitative or both, simply emanates from users inefficiency and poor management. The contribution of physical constraints is marginal and the crisis lies mostly at the heart of inefficient management (ibid). Water problems can be ameliorated if policy makers communicate clearly and develop working partnership with the poor. Indeed, they need to take into account the views and perceptions of the poor.

1.5 Organization of Chapters

This study is divided into seven chapters. Chapter One begins with an introduction and overview of the theoretical framework for the entire study. Also included in the chapter are study objectives, research questions, description of the study area and significance of the study in reference to environmental policy and planning. In Chapter Two, a review of the related literature is presented. The central issues raised in the review are the historical and theoretical roots on the definition of CP theory, indicators used in ascertaining participation, key studies which have examined the impacts of CP in water provisioning and management. The chapter concludes by highlights of gap in literature which the research hopes to fill. Chapter Three contains a presentation of the methodological issues. These include a definition of the mixed methods approach, the rationale for adopting the approach, potential shortfalls and how they are addressed.

Chapter Four presents findings on the relationship between participation and beneficiary satisfaction with the work of the management committees which can be used as a reflection for sustainability. Chapter Five presents findings on the relationship between participation and clean water supply in the settlements. Chapter Six presents findings on the major participation-related

factors influencing the performance of the schemes. Finally, Chapter Seven consists of general conclusions, contribution to literature, study limitation and suggestions for future research.

2. REVIEW OF THE RELATED LITERATURE

This dissertation is intended to contribute to the broader research on *community participation* (CP) in water production and management in developing countries. The goal in this chapter is three-fold. The first is to trace the roots and theoretical foundation of the concept of CP. The second is to highlight indicators which have been used to measure CP in development projects. The third is to survey some key empirical studies which have examined the effects of CP in water service delivery. The gap in literature that provides the rationale for this inquiry is discussed in the conclusion.

2.1 Historical and Theoretical Foundations of Community Participation (CP)

The history and debates that surrounds CP theory in development planning are long and theoretically unique. Mansuri and Roa (2013) confirm this by suggesting that the origin of CP, alternatively referred to in literature as “*public participation*,” “*community-driven development*,” or “*citizen participation*”, is as old as the idea of democratic governance. More worthy of note, CP has existed and evolved in many cultures over the years.

2.1.1 Community Participation from the African Perspective

In Africa, Njoh (2003) contends that participation had long been practiced by the indigenous communities before the arrival of the Europeans. Specifically, in a book titled *Self-help water supply in Cameroon*, Njoh stated that in precolonial Africa, it was common for communities to join hands in local development projects. Such projects included building chiefs’ palaces, market centers, erecting village bridges, or building community centers. In some cases

the partnerships extended in carrying out duties such as hunting or slaughtering of animals for communal consumption. Additionally during planting and cultivation seasons, communities in Africa used to work alternately in each other's farms. These activities have since continued and currently operate alongside modern institutions and systems. Julius Kambarage Nyerere (1968) can be credited as the first African leader to coherently articulate, align and incorporate traditional African participatory ethos into the mainstream development agenda.

Nyerere advocated a model of development planning in Tanzania which was entrenched on the foundations of *Ujamaa*, a Kiswahili word for family-hood (Nyerere, 1968). *Ujamaa* is what Njoh (2003) referred to in his book as *well-defined organized village groupings*. In Swahili the word *Ujama* can be distinguished by one key characteristic. That is, a person becomes successful by collectively working and pursuing ideals which are deemed beneficial for all.

In Nyerere's philosophy inscribed in the *Arusha Declaration* (1967) the idea of *Ujamaa* villages was translated into a communal political-economic management model guided by the following principles: (1) managing community natural resources (e.g. land, water or wealth) collectively at the village level with the aim of maximizing productive capabilities to the benefit of everybody that draw dependence on it; (2) Cultivating and fostering a kind of self-reliance by transforming economic and cultural attitudes of the masses in the villages. These involved encouraging people to develop a positive attitude towards work as a means of uniformly serving the individual, the community and the nation which is referred to in Swahili as *Kujenga taifa* (Nyerere, 1967).

To summarize Nyerere's vision, the core African participatory perspective was that African nations had to depend on themselves by investing in community collectivism. This was later to be known as villagization which in Kiswahili meant *Kushirikiana*. Nyerere advised

African leaders to listen to their people and embrace communal work ethic through cooperation. For Nyerere, this was the best path to achieving sustainable development. In this extract from the Arusha Declaration, Nyerere used thought-provoking terms in rooting for local initiative and CP in development planning. He stated that

At the root of the whole problem is our failure to understand and apply to our own activities the concept of self-reliance. We are still thinking that big schemes and orthodox methods will solve our problems. We do not approach a people by asking how we can solve it by our own efforts with the resources we have in front of us (these include local labor, knowledge and community network and cooperation – my own emphasis added)..... Indeed, local initiatives are often scorned, as not being modern enough..... When even any problem is being tackled or any new development is being proposed, our first question should be: what can as a village or district or region or nation do to solve the problem ourselves (Nyerere, 1967, p. 20).

Later on Nyerere's call for the use of local knowledge became a powerful concept within the academy of international development. Organizations such as the United Nations, United States Agency for International Development, and World Health Organizations subscribed to CP ethos in their work in the previously colonized nations (Njoh, 2003). In fact, studies by Chambers (1983), Cohen and Uphoff (1977), Crouch and Chamala (1979), Elliot (1976), Pearse and Stiefel (1979) and Roling (1978) attest to the foregoing assertion. These studies demonstrated that in many parts of the developing world, the majority of people had been excluded from the benefits of socio-economic development. For this, reason the concept of CP, as emulated in traditional African ethos, had to be reintroduced as a viable strategy for redressing the experience of underdevelopment in Africa.

2.1.2 CP from the Western Perspective

On the Western hemisphere, the modern theory of CP as illustrated by Mansuri et al (2013) can be traced to the classical works of Rousseau and Mill. In his famous book *The Social contract or principles of political right* (1762), Rousseau equated CP with the contemporary liberal democratic principles, a political model where people make interdependent decisions that take into account the will of everybody. That is, communities establishing policies based on a plethora of views with benefits and burdens equally shared by the masses. To Rousseau, CP was more than a method of involvement or decision-making. Instead it was a practical process by which individuals expressed empathy for one another, and in doing so, accommodated the public interest. Participation from this perspective, Mansuri et al (2013) stated, served an important educational function. In other words, the individual learned how to become a citizen by first having a sense of belonging in a community. Indeed, many scholars today would agree with Wraight (2008) in contending that Rousseau view of citizen participation has had remarkable influence on the Western political, philosophical and educational thought.

Within this framework, it is necessary to introduce the pioneering work of John Stuart Mill (1859, 1879). It has been argued that Mill's ideologies which are anchored in the work of Rousseau, also profoundly shaped the contemporary view of participation. To be specific, Mansuri et al (2013) argued that Mill basically rooted for CP based on the premise that a centralized form of governments was too intrusive on people's lives. In fact such fears led Mill to warn that universal suffrage and participation in national government were of little use if citizens were not prepared to be fully involved at the grassroots. For these reasons, Mill argued that collective management through community involvement would make people appreciate public over individual interest.

According to Mansuri et al (2013), Rousseau and Mill's ideas about participation were later refined in the eighteenth century by leading thinkers such as Henry Maine (1876) and George Howard Douglas Cole (1921). Maine, for instance, vouched for CP out of the recognition that it prepared people to be good active citizens. That is, the process of involving people in local development projects trained them to think in terms of the public good rather than individual interest. Moreover, for Maine, participation helped people in developing the ability to hold the State or the markets accountable. Notwithstanding, it also influenced the decisions that affected people's lives. In the Western political and philosophical growth participation therefore evolved into two main branches. This includes the Rousseau form of participation with tethered focus on building collective identity, and Mill's participation which was interested in the election of representative governments (Mansuri et al, 2013).

2.1.3 CP from the Asian Perspective

From the Eastern, or more specifically, the Asian perspective, the concept of CP was greatly popularized by the legendary work of Mahatma Gandhi (Mansuri & Rao, 2004). In a monograph titled *Village Swaraj*, first published in (1962), Gandhi strongly argued for the promotion of community/citizen participation as a viable strategy in development planning through the organization of village *Panchayats*. Panchayats was a kind of local community-controlled self-government at the village level. Gandhi's view on the creation of the *Panchayats* system was that, if organized along scientific lines, would ensure a greater participation of the people. Consequently, this led to a more effective and robust mechanism for implementing rural development projects such as village agriculture, health and hygiene, transportation, irrigation and cattle welfare. Gandhi dedicated most of his work to the cause of rural reconstruction through the promotion of CP as the center piece of management.

Mishra (2002) contends that for Gandhi, the utilization of the energy of the vast army of the rural unemployed through CP was the only viable antidote for mitigating some of the negative economic impacts created by the decade-long British rule in India. In Gandhi's terms, genuine involvement of ordinary citizens in all development activities including actual planning was key for economic growth of nations in the Southern hemisphere.

Overall, even though the evolution of the concept is quite long, the foundations of CP theory is further articulated in the contemporary works of scholars such as Bhasin (1985), Fals, Borda (1988), Fuglesang and Chandler (1986), Galjart (1981, 1982), Gran (1985), Rahman (1984, 1985), and Roling (1987). The common argument advanced by these scholars is that any effective model of development should adapt to the social, economic and political contexts of the people involved in the process. Indeed, two important assertions are made by all these scholars. First, they contend that poverty is structured and has its roots in the economic and political conditions of the people it affects. To combat poverty, it is important to develop the capacity of the people it affects so that they can have a say in, and have influence on the forces which control their lives. Second, that development programs or projects have largely ignored the vast majority of poor people. Thus, there is a need to re-think new forms of development interventions to ensure that the neglected majority have a chance to benefit from development initiatives. The idea emerging from these assertions is that there is a need for more grassroots public involvement in the development process.

The foregoing narrative suggests that community participation theory as an approach in social development has a common intellectual interconnectedness across all cultures. Despite this, there is no consensus on how the concept of CP should be defined. Instead, different analysts have proposed varying definitions for the concept.

2.1.4 Defining Community Participation

The roots of CP as an approach in social development can be traced to different cultures across the globe. For this reason, CP has many definitions. The Oxford English dictionary, for instance defines CP as “*having a share in as in benefits or profits*” or “*taking part in*”. This implies that the rights of people to get involved in any activity that affect their lives are upheld. Brager, Specht and Torczyner (1987) defined CP as a means of theoretically, intellectually or physically educating a community in order to increase their competence on issues that affect their own lives. From these two definitions participation can be viewed as a vehicle for influencing decisions that affect people’s lives. It can also be viewed as a tool for transferring power to the powerless.

Building on the aforementioned definitions, Armitage (1988) describe CP as a process by which individuals take action in responding to public concerns. These may include people voicing their opinions about decisions they may disagree with and living with the consequences of their choices. Mathbor (2008) suggested that CP may be as simple as a response to the traditional sense of powerlessness felt by the general public about decisions emanating from authorities. This view of community participation is shared by Njoh (2002) who noted that participation is a process which enables grassroots mobilization, which in turn, empowers the poor. Similarly, Bridgen (2004) contends that participation simply entails community involvement in and influence over the local decision making process. Within Njoh’s and Bridgen’s theoretical context, CP is seen as an instrumental process in which communities influence and become genuine partners in development initiatives or resource mobilization. Westergaard (1986) defined CP as a uniform undertaking by the marginalized meant to increase their control over resources whose distribution they would otherwise have no say. Similarly, the

World Bank Learning Group on Participatory Development (1995) defined participation as a *process through which stakeholder's influence and share control over development initiative, and the decisions and resources which affect them.* The United Nations Economic and Social Council Resolution (1929) defined CP as process which entailed voluntary or democratic involvement of the citizenry in: (1) contributing to the development effort, (2) sharing equally the benefits accrued from the process, and (3) decision-making in respect of setting goals, formulating policies and planning and implementing economic and social development.

All these definitions advanced by different scholars seem related. However, within the broader context of this inquiry and for the purpose of clarity, Paul's (1987) still prevails. Paul's definition incorporates most of the indicators which have been used to operationalize the act of community involvement. For this reason it will be adopted in this inquiry. Paul defined CP as an active process through which communities are able to influence the direction and execution of development projects. The purpose is to enhance their overall well-being rather than merely targeting the share of project dividends accrued at the end.

Paul's definition is based on the following four tenets. First, he stressed that the context of participation should be de-linked from political involvement. Second, that community, and not government bureaucrats or donor staff, should be at the forefront of participation. Third, that the success of CP should be measured through joint collaboration mechanisms employed in conjunction with the implementers and benefactors (which are the communities involved in the development process). Fourth, that CP should be seen as a process of achieving an outcome. Paul cautioned that this definition does not imply that there will be uniformity in all community development projects where CP mechanisms are applied. He stressed the necessity of considering factors such as project implementation methods and the scope in which beneficiaries

are integrated into the projects. This means the adoption of measures which are designed to enable participation of ordinary citizens at all levels of the development process. This definition is remarkable because, it extends the concept of community participation beyond the development of policy to decision making, implementation and finally evaluation (Stoker, 1997).

Based on Paul's definition and the theoretical foundation within which this study is situated, it is therefore important to pay special attention to indicators which can be used to measure participation. Indicators provide the foundations from which progress; effectiveness or outcome of development projects can be grounded or explained (Morrisset, 2000).

2.1.5 Community Participation Indicators

Participatory indicators are parameters used in ascertaining whether a project was implemented and/or is being operated through a participatory approach. In the community water services provisioning sector some of the major indicators which have been used to measure community participation were reviewed by Kabila (2002). Most of these indicators have featured in the work of leading CP analyst such as Awortwi (2012), Bowen (2008), Cornwall (2008), Harvey and Reed (2007), Khan and Anjum (2013), Prokopy (2005), Sara and Davis (2012), Wright (1997), Yacoob and Walker (1991) and Yohalem (1990). As outlined by Kabila (2002), such indicators include: (1) participation in decision making, (2) informed choice, (3) economic contributions, (4) representation, (4) responsibility, (5) authority, (6) control, and (7) partnership.

Participation in decision making refers to the fact that for a project to be considered as having been implemented or functioning under a CP paradigm, ideas emanating from the beneficiaries should be given preference. These include elements such as the incorporation of women's views into project implementation and operations. As Postel (1997) has argued, women are among the majority of people affected by water issues in the developing world.

Informed choice as a participatory indicator refers to the understanding that beneficiaries are adequately informed of the choices available to them. This furnishes them with the ability of managing projects upon their completion. *Economic contribution* refers to the act of beneficiaries willingly accepting to contribute money, labor, or materials to projects. Contribution can also take the form of participating in project activities such as meetings. *Representation* refers to the notion that diversity within the beneficiary community should be reflected in project management teams. Elections to position of leadership should be democratic. Minorities such as women or the chronically poor should be given equal opportunity for management roles. *Responsibility* means that the community should be made aware of the burden of responsibility. They should know that the project belongs to them and its failure or success falls on their shoulders. *Authority* as an indicator means that the government and donor agencies involvement in the decision making and operational mechanisms should be minimal. Involvement of such secondary agencies should only occur if requested by the beneficiaries. Finally, *Control* means that the community should be empowered to carry out major decisions and determine their outcome. The role of the government or donor agencies should remain consultative.

2.1.6 Key Studies on the Effects of CP in Water Provisioning

Several studies have been conducted to evaluate the impact of CP on the outcome of water supply projects. Table 2.1 shows a summary of these studies.

Narayan (1995) reviewed 121 rural water supply projects in 48 different countries. The data used in the study were generated from the project report evaluations. The main objective of the study was to understand the effect of beneficiary participation on project effectiveness. To accomplish this task a multivariate regression model was used with projects as the unit of

analysis. Participation was quantified on a 7-point scale. A score of one meant there was no participation while a score of seven meant there was a significant level of participation. The study also clustered stages of participation as projects progressed, for example through planning stages, construction, operation and maintenance. Using factor analysis, the statisticians determined that overall beneficiary participation could be used as the main measure of participation. Again by using factor analysis on the performance results of 20 projects an overall measure of project effectiveness was generated. Results from this study showed that beneficiary participation was more significant than any other factor i.e. appropriate technology or availability of repair technicians in achieving well-functioning water systems. Narayan's study has received two main criticisms on how it used statistical evidence to account for a causal impact of participation in project performance. The first is that it used subjective measures to gauge participation. Critics argue that this may not be accurate in statistical analysis (Verbeek, 2002). The second criticism came out of concern of the "halo effects" which is the potential bias in project rankings which might have emanated from project evaluators who could have been participatory proponents or vice versa (Prokopy, 2002).

A similar research to Narayans' study though qualitative in nature was undertaken in two regions in Kerala India by Manikutty (1997). The objective of this study was to investigate the impacts of CP on rural water projects funded by different development agencies. The study was based on a set of two projects identified as project I and project II. Participatory techniques were applied in project I but not in project II. Some of the participatory techniques applied in project I included making beneficiaries select stand pipe locations, asking beneficiaries to provide land in which stand pipes were to be erected, labor provision and maintenance. Some of the community members with medical knowledge were also requested to provide sanitation and health

Table 2.1 Key Studies Evaluating the Effect of CP on Water Supply Projects

Study	Objective/Focus of the Study	Operationalization of Participation	Operationalization of Success	Main Results/Findings
1. Narayan (1995) Study carried in 48 countries with data generated from project evaluations	Analyzed the effect of beneficiary participation on project effectiveness	Through factor analysis “overall beneficiary participation on a scale of 1 to 7”	Overall project effectiveness: results of factor analysis on 20 performance outcomes	CP found to be a significant indicator of overall project success
2. Manikutty (1997) – Two rural water projects in India	Investigated the relationship between CP and outcome in two rural water projects – one implemented under the CP regime and the other not – compare and contrast	Beneficiary voice in choice of system and equipment like pipes, willingness to contribute resources such as land, labor, & lastly level of women involvement in the water management committees	(a) Technological outcome (b) Percentage use of water source (c) Changes in health habits (d) Level of community commitments (e) Satisfaction of beneficiaries	Comparative results showed that CP led to better project outcome based on all the five variables used to measure success
3. Sara and Katz (1998) Reviewed 125 community based water projects in 6 countries	Primary hypothesis “ <i>water supply services which are demand responsive are more likely to be sustainable than services which are less demand responsive</i> ”	Demand responsiveness operationalized as (i) Willingness to pay, (ii) Prioritization and (iii) informed decisions	(a) Physical condition (b) Consumer satisfaction (c) O&M practices (d) Financial management (e) Willingness to sustain the system	Demand-responsiveness increases sustainability. Put differently sustainability is higher in communities when projects followed a demand-responsive approach

Table 2.1 Continued...

Study	Objective/Focus of the Study	Operationalization of Participation	Operationalization of Success	Main Results/Findings
4. Kleemeier (2000) – Study undertaken in Malawi - Data collected through focus group discussions, interviews and technical evaluations of projects	To determine whether rural water supplies that were implemented with strong foundations of effective community participation approach could achieve reasonable levels of sustainability - The study was anthropologically qualitative	Community willingness to provide labor, maintenance and minimal revenue for the water Groups of small committees democratically elected to work with both the beneficiaries, funding agencies and local government officials	(a) Schemes functionality in terms of supplying water efficiently (b) Physical conditions of the schemes in comparison to the number of years in operation (c) Consumer satisfaction	Two findings emerged The older the schemes got the less productive they became Smaller schemes functioned better than larger schemes thus making long term sustainability in larger schemes weak
5. Isham and Kahkonen (2001) – Two rural water projects in India and one in Sri Lanka – Data collected through household surveys and interview with water management committees	The study attempted to answer the following question “ <i>Under what circumstances is community based approach in water resource management most likely to succeed?</i> ”	Cash and labor contribution Operation and maintenance responsibility	(a) Quality of construction (b) Satisfaction with service (c) Health impacts	Well-designed/ well-constructed water services lead to improved health and reduced time in water collection CP is instrumental in establishing well-designed/well-constructed water services

Table 2.1 Continued...

Study	Objective/Focus of the Study	Operationalization of Participation	Operationalization of Success	Main Results/Findings
6. Prokopy (2005) – Two water supply projects in India analyzed - Data collected through household and village surveys	The study examined which variables within the participatory pantheon were instrumental in establishing successful water projects	Capital contribution Household involvement in decision making Transparency in water committee operations	(a) Consumer satisfaction (b) Tariff payment (c) Equal success (d) Time saving in water collection (e) Belief in the system	Positive relationship between the number of households in a village that contributed towards capital and better project outcome Positive association between more involvement in decision making and better project design
7. Priyan Das (2009) – study completed in fulfillment of a dissertation research at the University of California in Los Angeles – Data was collected through household surveys, interview and personal observations	Attempted to investigate how collective action by different actors particularly women influenced project effectiveness in community managed urban water supply systems in three cities in India	Community water and sanitation committee (CWASC) was formed in each city With help different agencies the committee was responsible for the planning, designing and implementing the water supply system The user committee was also responsible for collecting user fee for O&M	(a) Attitudes, behaviors and experiences both of providers and users (b) Assessment of water supply situation in the three study areas (c) Agency user relations (d) Level of women participation	Institutional management either impedes or facilitate collective action at the community level thus influencing project effectiveness Government and community partnership does lead to a boost in project effectiveness Women participation was found to be crucial within collective action institutions such as user committees

awareness. The variables that were analyzed included (a) technological outcomes measured in terms of water quality and percentage of taps in operation after a certain period of use, (b) use of water source measured by the percentage of people using water from project I (with CP techniques) versus the percentage of people using water from project II (without CP techniques), (c) changes in health habits, for example, comparing percentage change in health awareness between the two projects, (d) continued community involvement, defined as level of community commitment in terms of maintaining cleanliness near water stand pipe areas, keeping facilities in working condition or time taken to report defects, and (e) satisfaction of beneficiaries, measured through direct questioning to assess the extent to which the respondents were satisfied with the facilities provided by the project and their functioning.

The comparative results between the two set of projects shows superior outcome for project I which was implemented through a CP regime. For technological outcomes, the finding was that a high percentage of taps were in working condition upon project completion. More people switched over to using water which was provided through CP techniques. The water was cleaner and supply constant. Health care habits of the community changed, for example water points were kept clean and few people defecated near water points. Taps stayed in good working condition for longer periods of time. Breakages were reported and efficiently repaired in time, an indication of project sustainability. On the community empowerment front, there was a noticeable improvement in open communication between beneficiaries and government authorities. The overall satisfaction and sense of ownership by the beneficiaries were recorded as high. Manikutty summarized the superior outcome in project I as (a) better aggregation of preferences, (b) more effective generation of demand, (c) greater responsiveness by the bureaucracy, (d) sustainability through enhanced feeling of ownership, and (e) better design

through incorporation of local knowledge. Generally the result from this study indicated that CP is beneficial in delivering successful water project outcomes.

Building on Manikutty's work, Sara and Katz (1998) examined the relationship between CP and sustainability aspects of water projects. They hypothesized *that water supply services which were more demand- responsive were more likely to be sustainable at the community level than services which were less demand-responsive*. In this study a project was defined as being more or less demand-responsive to the degree that users make choices and commit resources in support of such choices. The dependent variable, sustainability was an index composed of factors such as consumer satisfaction, operation and maintenance practices, financial management and willingness to sustain the system.

The findings from this study indicated a statistically significant relationship between demand-responsiveness and project sustainability. Firstly, sustainability was found to be higher in communities where projects followed a demand-responsive approach. However, most projects were found to be lax in applying rules in the communities they worked. Secondly, sustainability was found to be higher when demand was expressed directly by household members instead of traditional chiefs or community representatives. Lastly, a designated community organization was a necessary bridge in ensuring the success of a project. This latter study has received a few criticisms since its publication. Some critics such as Thorsten (2007) have argued that the study relied on a very small sample size and therefore could not adequately demonstrate causal relationships. Furthermore the study has been criticized for relying excessively on additive approach for factors and indicators of sustainability using ordinal scoring (Ibid). It is argued that this method dwells heavily on subjective measurements thus limiting the degree of variation present among variables (Thorsten, 2007).

The findings in the Sara et al (1998) study are somewhat similar to the findings of Kleemeier (2000) whose work was anthropological in nature. Kleemeier examined a Malawi rural piped water scheme. Her primary goal was to determine whether rural water supplies implemented with strong foundations of effective participatory mechanisms could achieve reasonable levels of sustainability. The Malawi piped water scheme often presented model of success for the participatory approach.

Kleemeier concluded that CP is more robust in setting up community organizations capable of managing very small rural piped water projects. However, she contended that CP does not entirely address the needs of larger schemes thus making long term sustainability weak in such schemes. In this regard Kleemeier's suggestion is to introduce contribution as an incentive to promote sustainability. The management committee can utilize that extra revenue to solve problems whenever they arise. The study is among the few that have compared the effects of participation in both large and small communities.

Next, Isham and Kahkonen (2001) analyzed two rural water projects in India and one in Sri Lanka. Using quantitative and qualitative data from 1,088 households and 50 water committees, they examined *circumstances under which a community-based approach in water resource management is most likely to succeed*. They employed an econometric statistical technique in answering this question. Results from the econometric models came out in three interacting layers. First, it confirmed that well-designed and well-constructed water services lead to improved household health and reduced time of water collection. Secondly, well-designed and well-constructed water services could be better attained by involving more community members in the design process and also by allowing beneficiaries not outsiders to make final decisions about the type of services needed. Lastly they revealed that a community-based approach in

water resource production and management is most likely to succeed in communities with existing active community groups and associations. The project design in such communities was better and participation robust because households were already accustomed to working together. Indeed this was the researchers' most significant contribution in the study. The fact that social capital was instrumental for the success of community operated water projects. In terms of policy recommendations, the authors asserted that it is necessary for development workers to allocate some investment for social capital enhancement when constructing water projects under the CP regime.

Extensions of the findings by Isham et al (2001) are echoed in a quantitative study conducted by Linda Stalker Prokopy (2005) in India. This study extended the participatory dialogue by examining variables within the participatory domain are instrumental in establishing successful water projects. Two World Bank-assisted rural water and sanitation projects were used as a case study. The study employed data collected at both household and village levels, and used three distinct measures to gauge participation. These measures included capital contribution, household involvement in decision making, and transparency in water committee operations. Regression models were used to analyze the data with a view of quantifying project outcomes. The outcomes were indexed as follows (a) consumer satisfaction, (b) tariff payment, (c) equal access, (d) time saving and (b) belief in the system. Results generated from the study revealed that higher capital cost contribution was associated with higher beneficiary satisfaction with the working of the water system. Prokopy asserted that the high level of satisfaction could have been generated presumably by the fact that households having helped to pay for the system felt a sense of ownership. The second finding was that the more households felt they participated in decision making in a village the better the outcome from the project in terms of design and

operation. This supported the general conception that a voice in decision making is an indicator of genuine participation. Prokopy's study has been influential in promoting an understanding on the relationships between household participation and the performance of village level water supply projects.

Prior to Prokopy's study, an extensive literature review by Mansuri and Rao (2004) provided mixed results on the effectiveness of community participation in development projects. Included in the review are over 100 studies published in peer reviewed journals within the last decade. The general conclusions made in Mansuri and Rao's (2004) extensive review are as follow: 1) projects which adopt participatory techniques have not all been very successful in enhancing the livelihoods of the poor, 2) while several studies demonstrate the power of participation in creating effective community infrastructure, no study has managed to establish direct causal relationships between any outcome and participation, 3) most community development projects tend to be captured by elites and more so in communities where there is a high inequality gap between the rich and the poor, 4) the sustainability of community-based initiatives depend mostly on the existence of supporting institutional framework within the community, 5) collaboration between the community and external agents are essential for the success of projects however external facilitators are often poorly trained to make this happen, and 6) the naïve application of complex contextual concepts like participation, social capital and empowerment often lead to poor design and substandard implementation of development projects.

Another review by Lockwood (2003) also provides important insights on the effects of post-construction support and the sustainability of village water projects. The primary objective of Lockwood's review was to test the hypothesis *that sustainability is linked not only to the*

existence of specific conditions and factors before and during construction of water supply or sanitation system, but also to specific factors well beyond the end of construction. His findings are that from existing literature there is a lack of adequate evidence on the effectiveness of post-construction support. His reasoning for the lack of evidence is that most studies have mainly focused on measuring sustainability using pre-construction variables. For Lockwood, certainly there are other post-construction factors which may influence sustainability. These include the quality of project implementers and the existence of supportive policy environments.

The most recent study which is similar to this inquiry was undertaken by Priyan Das (2009) in India. Priyan Das's study is unique in two ways. First, it is among the few that have attempted to investigate the impact of CP in water production and management in a peri-urban setting. Secondly, it attempted to unravel how collective action by actors and specifically women affect success in community operated water schemes. The study also employed mixed methods to analyze the data which were collected through household surveys, in-depth interviews, and personal observations. The findings reveal that, institutional arrangement either impeded or facilitated collective action at the community level, thereby influencing project effectiveness. Secondly, a direct partnership for service delivery between users and the government boosted project effectiveness as it has the potential to transform agency user relations. Finally, although women participation in the project is not a significant factor for project effectiveness, in general, their participation in decision-making roles was found to be crucial within collective action institutions such as the user committees.

2.2 Gaps in the Literature

A survey of the relevant literature shows that the concept of community participation has a rich history. CP has been applied in water service production and management for decades in

the developing world. Based on existing empirical evidence, providing water to those living in rural areas has somewhat improved by the introduction of participatory techniques. Most of the studies reviewed in Table 2 support this assertion.

In urban centers adequate water provisioning still remains an elusive goal especially for those living in informal settlements (Gulyani et al, 2010). Evidence suggests that poor maintenance and management of water infrastructure plus inefficient resource allocation are the main causes of inept service delivery (Franceys, 2008). From both theoretical and practical standpoints, development workers and urban planners have often responded by pursuing policies aimed at urban water commoditization (Gleick et al, 2006; UN Environmental Programme, 2002; Young & MacDonald 2003). The arguments advanced by privatization scholars are based on the premise that pure monetization of water in urban centers (which include informal settlements/neighborhoods) leads to a reduction in cost and demand (Petrova, 2006). Decreased demand creates changes in consumption preferences which will make consumers less wasteful.

In short the commoditization of water in urban centers as advocated by neoliberals is premised on the belief that it would make water resources more efficient, economically sustainable and most importantly, equitable (Postel, 1997). That is to say, investors will have the incentive to expand water service delivery to places located at the fringes of urban peripheries often characterized by informality (Hung & Chie, 2013; Olmstead & Stavins 2007; Rogers, De Silva & Bhatia, 2002; Valinas, 2005). Several municipal councils in the developing world therefore adopted or were forced by major development organizations to incorporate privatization as the best strategy for improving urban water service delivery (Budds & McGranahan, 2003). However, it is now time to recognize that despite all the efforts made to privatize urban water services, management has not improved to the scale required especially in

the urban informal settlements. In many cities across the developing world water supply systems are still characterized by intermittent water supply, corruption and high levels of leakage (Postel, 1997; Stottmann, 2000). In fact, water leakage alone in selected African cities is estimated to have an equivalent cost of USD1 billion per year (Banerjee & Morella, 2011). It is thus clear that there is a problem in theory and practice necessitating a study.

This study will provide further evidence on the nature and role of CP theory in explicating water production and management dynamics in urban informal settlements. It is important to acknowledge the fact that informal settlements have unique characteristics which privatization or public provisioning of water have somewhat failed to address. One of these characteristics is the fact that infrastructure in informal settlements/neighborhoods are cramped and precariously constructed. The settlements are often located in flood-prone areas. Sanitation is poor and this results in physical constraints with regards to water infrastructure development.

3. METHODS

This chapter begins with description of the mixed-methods approach, a well-known approach in the social science, which is seldom employed in development planning research. This is followed by two broad sub-sections discussing the quantitative and qualitative aspects of the study respectively. The last section contains a discussion of some data quality and management issues encountered in the study. However, before proceeding with the description of the mixed methods approach, it is necessary to briefly expand on the two most dominant research approaches often used in development planning. These are the quantitative or qualitative research design/approach.

Leading scholars in the field of development planning have attempted to define qualitative and quantitative research designs by offering a wide range of working definitions. Others have done the same by identifying a set of key characteristics found in the two approaches. Denzin and Lincoln (2000:3) defined qualitative research approach as a situated activity that locates the observer in the world. Put differently, it consists of a set of interpretive and material practice that makes the world visible. These practices Denzin et al. (2003) contended turn the world into a series of representations depicted through field notes, interviews, conversations, photographs, recordings and memos to the self. Within this framework, Denzin et al. (2003:3) observed that qualitative research involves “*an interpretive, naturalistic approach to the world where researchers study things in their natural settings, attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them*”. Some of these

characteristics are echoed by Bryman (1988:8) who stated that “*the way in which the individuals being studied understand and interpret their social reality is one of the central motifs of qualitative research*”. Indeed, some of the words used in the foregoing definitions are also reflected in the work of other theorists (see e.g., Hammersley and Atkinson, 1995; Miles and Huberman, 1994; Patton, 2002). In the field of data collection, the main aspects of qualitative research identified by these experts include observational methods, in-depth interviewing, focus group discussions, narratives and analysis of documentary evidence (Ritchie & Lewis, 2003). In the development planning and especially in the water production and management sector, the following studies some of which have been reviewed in chapter two adopted the qualitative research strategy (see e.g, Chambers, 1983; Kleemeier, 2000; Manikutty, 1997; Njoh, 2002; Oakley, 1991; Prokopy, 2002; Smith, 1994; Social Policy & Development Center, 1996).

Quantitative research design is another approach often used in the development planning arena. Generally it is viewed as being associated with the positivist/post-positivist paradigm where data is objectively collected and converted into numerical forms (Onwuegbuzie et al, 2004). The aim is to draw generalizations of results from a sample to an entire population of interest (Babbie, 2004). According to Aliaga and Gunderson (2000), quantitative research involves “*explaining phenomena by collecting numerical data that are analyzed using mathematical based methods and specifically statistics*”. Creswell (2004) asserted that quantitative research approach is generally based on the following five pillars. 1) Ontological assumption which implies that reality is objective and singular from the researcher. 2) Epistemological assumption meaning the researcher is different from that being researched. 3) Axiological assumption which calls for a bias free research where there is a separation of emotions from the process of scientific inquiry. 4) Rhetorical assumption meaning an involved

investigator. 5) Methodological assumption meaning a deductive process based on cause and effect. Quantitative research approaches mainly rely on surveys and different statistical techniques to gather and analyze data respectively. In the development planning arena and specifically in water production and management sector, the following studies have employed quantitative research design (see, e.g. Dayal et al, 2000; Esman & Uphoff, 1984; Finsterburch & van Wicklin, 1989; Isham & Kahkonen, 2002; Khawja, 2002; Prokopy, 2005; Sara & Katz, 1998).

Combining qualitative and quantitative research approaches is now becoming common. This approach also known as the mixed method approach was employed in this inquiry. The study will now turn to focus on this approach. It is important to note that it has rarely been employed in development planning research with exception of the following studies (see e.g. Narayan, 1995; Das, 2009).

3.1 Mixed Methods

The mixed methods approach was employed in this study to collect and analyze both primary and secondary data. Axim and Pearce (2006) define mixed methods as a research approach characterized by the application of both qualitative and quantitative techniques into one study. This definition is consistent with that advanced by Creswell et al (2003), Green et al (1989) and Tashakkori et al. (1998). The mentioned scholars refer to mixed methods as the “*pragmatic approach*” because it is a practical, yet philosophically-grounded research approach. Onwuegbuzie and Leech (2009) noted that the approach falls into two broad categories, namely fully and partially mixed methods. The difference between the two is that in fully mixed methods both qualitative and quantitative techniques are mixed within one or more stages of the research process or across stages. However, in partially mixed methods, both the quantitative and

qualitative elements are conducted either concurrently or sequentially in their entirety before the data interpretation stage.

The partially mixed methods design is further divided into four components based on time orientation and emphasis status (Onwuegbuzie et al, 2009). These are: (1) partially mixed concurrent equal status design, (2) partially mixed concurrent equal dominant status design, (3) partially mixed sequential equal status design, and (4) partially mixed sequential dominant status design.

In the present inquiry, *a partially mixed concurrent equal status design* is employed. The model involved collecting quantitative and qualitative data simultaneously with all phases having equal weight (Caracelli & Green, 1997; Onwuegbuzie et al, 2009). Data integration took place after the analysis of each strand was completed. Questionnaire surveys were used to collect quantitative data. Focus group discussions (FGDs), archival inquisition, transect walks and observations were used to gather qualitative data.

Quantitative data were used to investigate the possible impacts of CP on beneficiary satisfaction with the work of the management committees in the water schemes. They were also used to examine the contribution of CP on the production of clean potable water supply in the informal settlement/neighborhoods (see, table 3.1). The qualitative data were used in showcasing the participatory-related factors affecting the performance of the schemes. However, in some instances both data sources were used to corroborate/triangulate findings in some qualitative and quantitative sections (Green et al, 1989; Morgan, 1998). According to Bryman (1998) *the concept of complementarity* is one of the strengths of mixed methods approach. Table 3.1 provides a summary of the research design employed by the study. Included in the design are data collection techniques, sampling criteria and the techniques employed in data analysis.

Table 3.1 Summary of the Research Design Employed by the Study

Research Question (RQ)	Data Sources	Sampling Design	n	Quantitative Phase		Qualitative Phase	
				Data Collection Instrument	Data Analysis	Data Collection	Data analysis
RQ1 – What are the relationship between CP and beneficiary satisfaction with the water management committee work in the four schemes?	Primary	Simple Random	318	Survey	Logistic Regression	Not Applicable	Not Applicable
RQ2 – What are the contributions (positive or negative) of CP on the production of clean potable water supply in the informal settlement?	Primary	Simple Random	318	Survey	Chi-square test	Not Applicable	Not Applicable
RQ3 – What are the participatory-related factors affecting the performance of the schemes?	Primary	Purposive non-random sampling	91	Not Applicable	Not Applicable	<ol style="list-style-type: none"> 1. 12 FGDs each with 8 participants 2. Observations 3. Transect walks 4. Archival data 	Constant Comparative Analysis

A detailed discussion of these techniques thus follows under two main sub-headings namely the quantitative phase and qualitative phase.

3.2 Quantitative Phase – Data Source and Sampling

3.2.1 Surveys

As shown in Table 3.1, the study relied on data collected through surveys to answer RQ1 and RQ2. Survey methods were adopted because it allowed us to collect a large amount of data in a short period of time. Moreover, as compared to other data collection techniques, surveys tend to be less expensive considering the fact that this is a PhD dissertation with limited time frame and resources. Lastly, to answer RQ1 and RQ2 we needed original numerical data from individuals in the communities which were too large to directly observe. The survey was administered through simple random sampling technique to households living in the settlements where the schemes are located. The Kenya Independent Voter Register (KIVR) was used as the sampling frame for the survey. The KIVR contains all the names of all registered voters living within defined geographical areas in Kenya. In Kenya, all persons over the age of eighteen must have a national identification card and must be a registered voter in their location of residence (Laws of Kenya, The Constitutions of Kenya, 2010).

After obtaining the KIVR the research team approach was simple. To ensure fair representation of the target population, we used excel software to randomly select 100 people from each schemes locality. That is Obunga, Asengo, Wandiege and Paga. The selected sample size corresponds to guidelines provided by Onwuegbuzie et al (2004). In reference to correlational and causal-comparative research designs, they recommend a minimum sample size of 64 participants for one-tailed hypotheses and 82 participants for two-tailed hypotheses tests.

The next task was locating the houses where the randomly selected people lived. With the help of the local chiefs and SANA staff, the research team which comprised of the Principal Investigator (P1), one supervisor and three research assistants, we were able to locate and survey the eldest member of each household. For households who were not present during the first visit, a second survey was arranged. In cases where the research team was unable to locate a household member a replacement was sourced using simple random sampling criterion. To ensure fair representation of male and female respondents, interviews were both carried out in the morning and late evening. The reason for this is that, in Kenya most men tend be at work during the day.

The questionnaire survey had a total of 57 items (see, Appendix C). These included informed consent section, household demographic details, water situation in the household and lastly household water and sanitation situation. Using simple random sampling technique a total of 360 households were surveyed out of a total population of approximately 75,000 people. The response rate was 86 percent. The survey was carried out by the principal investigator, one supervisor and three research assistants. This constituted the research team for the entire study including the qualitative data collection phase. The supervisor works as a program coordinator for a local NGO in Kisumu. She was well conversant with the city geography and different water and sanitation programs in the city. The three research assistants were all graduate students at Nairobi University, Kisumu campus. The supervisor was recommended by the team leader of SANA. The three research assistants were recruited through a rigorous interview process. They all had prior experience with data collection techniques. In fact they were able to demonstrate prior data collection knowledge during the interviewing process. Moreover, they produced documentary evidence indicating their previous data collection work experience with different

internationally recognized organizations such as Care International Kisumu Office, USAID and Action Aid.

The role of the P1 and the supervisor included overseeing the administration of the questionnaire survey, checking the completed questionnaires for errors or omissions and lastly helping with data entry in SPSS. The reason for choosing SPSS was due to the fact that it was the only statistical package which P1 was well conversant with. The three research assistants were responsible for face to face administration of the questionnaire survey. They were also tasked with making observation and taking notes on the conditions of water sources, water storage facilities and sanitation conditions of households interviewed. Before embarking on the field, the research assistants were properly trained by the P1. The training covered administrative details such as, interview duration, number of interviews expected to be completed in a day, Luo traditional protocol approaches. Most importantly, the principal investigator and the supervisor went through all the items in the questionnaire survey and ensured that they were well understood by the three research assistants. This process included practicing reading the questions loud and rephrasing any words or questions that appeared ambiguous. The data collection time was between 8.00am and 5.00pm. During this time the supervisor and the principal investigator were available for consultation for any further queries/or problems which the research assistants may have encountered.

The research team (that is, the PI, a supervisor and three research assistants) gained entry in the community through the help of local chiefs and two SANA employees. The chiefs made local announcements of the impending research activity and purpose in community weekly meetings. Before this took place the chiefs were adequately briefed on the purpose of the study and how its findings may be useful in improving water service delivery in Kisumu's informal

settlements. Table 3.2 summarizes activities undertaken as part of community entry process. This is in compliance with University of South Florida IRB ethics guidelines. The USF IRB requires researchers to ensure that they establish relationships with community members prior to commencing their research. They must also adhere to community customs and protocols during the entire research process. These actions are important because they helped in promoting trust being the research team and the subjects. In addition they also helped in promoting public support and ensuring that moral and social values of the community were upheld.

Table 3.2 Community Entry Procedure by the Research Team

Step	Activity
1	Initial visit made to the community Chiefs Office
2	Chiefs briefed on the research objectives and potential benefits to the community and the city
3	Data collection period announced in community weekly meetings

It is important to note that during the actual data collection time most of the residents were very receptive to the research team. This is because the community was well acquainted with SANA’s work in the settlement. All the research assistants were also fluent in Luo and Kiswahili which are the dominant languages in Kisumu. The approximate length of each survey was 50 minutes. The survey took a total of 10 days with each research assistant completing approximately 9 questionnaires per day.

3.2.2 Quantitative Data Analysis

The purpose of the quantitative analysis was two-fold. (1) To explore what impacts CP has had on beneficiary satisfaction with the work of the management committees in the four water schemes. (2) To investigate what kind of contribution (positive or negative) CP has made in the production of clean potable water supply in the informal settlement. Primary data from the survey (N =318) were used to perform descriptive and logistic regression analysis. The main aim was to establish if there was an association between the dependent variable (DV) and independent variables (IV). Logistic regression analysis was appropriate for this type of investigation because the dependent variable (beneficiary satisfaction with the work of the management committee) had a binary outcome. Moreover, as stipulated by Pohlmann and Leitner (2004), logistic regression is superior in providing accurate estimates especially in studies where dependent data violates the assumptions found in ordinary least squares regression.

To explore the relationship between CP and beneficiary satisfaction with the work of the water management committees in the four schemes, both the bivariate and multivariate logistic regression models were employed (RQ1). The DV (beneficiary satisfaction with the work of the management committee) and IV (participatory variables) originated from direct questions on the survey instrument. Beneficiary satisfaction was attained by the question “overall, how satisfied are you and your household with the management work of the committee responsible for managing your main source of water?”

The IV consisted of a series of participatory indicators which have been used in previous studies. In the bivariate model, each independent variable (participation) was regressed against the dependent variable (beneficiary satisfaction with the management committee’s work. In the

multivariate model participatory variables were regressed against the dependent variable beneficiary satisfaction with the management committee's work.

To explore what kind of contribution (positive or negative) that CP has made in the production of clean potable water supply in the informal settlement (RQ2), the study developed five models. The five models contained five DV each independently regressed against two IV. The DV and IV originated from direct questions in the questionnaire survey and are aided by what is contained in previous literature (see, e.g. IRC, 1999, Kleemeier, 2000; Manikutty, 1997). They were operationalized as follows:

DV = (1) satisfaction with the smell of water.

DV = (2) cleaning and covering water storage containers.

DV = (3) visited doctor's clinic.

DV = (4) willing to protect areas around water points.

DV = (5) perception of current access to clean portable water.

The two IV were:

IV = (1) main source of water

IV = (2) attended WATSAN meeting

3.3 Qualitative Phase – Data Source and Sampling

3.3.1 Focus Group Discussions (FGDs)

Data from FGDs were used to answer research RQ3. Participants were selected by purposive non-random sampling (Onwuegbuzie & Collins, 2007). They included water management committees, women groups and water consumer groups. The assumption made was that the selected participants who have lived in the settlement for many years have in-depth

knowledge on the functionality of the schemes. Patton (1990) would refer to this as an information rich-group.

A total of 12 FGDs were carried out with approximately eight participants in each group. Each FGD took approximately one hour twenty minutes. Table 3.3 provides a summary of the information matrix of the FGDs. Table 3.4 provides a summary of the demographic characteristics of the FGDs. As can be seen from the table, each FGD consisted of between eight to twelve participants. The rationale for the range stems from the recommendation provided by (Johnson & Christensen, 2004; Onwuegbuzie, Jiao & Bostick, 2004). They advise that focus groups should consist of enough participants capable of yielding diverse information. However, they should not include too many people as these may make some participants uncomfortable thus refraining from sharing their opinions.

The FGDs were carried out at the community water offices. The location choice was based the fact that they were the most accepting environment where participants would be free and thoughtful when expressing their opinions and ideas (Krueger & Casey, 2000). The FGD data were collected using a questioning route. The questioning route included the following. (1) Two introductory questions (e.g., “since the establishment of the scheme what impacts do you think the scheme has created in this settlement in regards to water service delivery”). (2) Three transition questions (e.g., “what participatory related factors do you think have contributed to the management success of this water scheme”). (3) Five key questions (e.g., “reflect back and make a list of four most important factors you think have influenced the management success of your scheme”). (4) A concluding question where participants were welcomed to add any comments they may have wished to express.

The FGDs were conducted in the local Luo language in order to accommodate all the audience. With the participants' consent, all discussions were taped. The tape-recorded materials were necessary to complement the long-hand notes thereby reinforcing the validity of the data (Maxwell, 1992). We explained the purpose of the study, potential benefits and assured participants that the study posed no risks to them. To ensure confidentiality, participants were made aware that our discussions would remain private.

Table 3.3 Information Matrix of the Focus Group Discussions

Scheme	Women group	Water consumer group	Management committee	Total
Wandiege	1	1	1	3
Obunga	1	1	1	3
Asengo	1	1	1	3
Paga	1	1	1	3
Total	4	4	4	12

Table 3.4 Characteristics of the Focus Group Discussion Participants

Water scheme	Discussion subgroup	N	Mean age (years)	House-	Residency > 5	Scheme membership >	Education		Source of Income		
				hold size > 7 (%)	years (%)	3 years (%)	At least Primary (%)	At least Secondary (%)	Trader/ small Business (%)	Salaried (%)	Wage (%)
Wandiege	women	8	34	13	88	25	100	50	75	0	0
	consumer	8	30	13	38	0	100	86	88	0	13
Asengo	women	7	29	0	71	71	100	29	71	14	0
	consumer	5	31	20	80	60	100	40	40	20	20
Paga	women	7	34	0	86	86	100	43	71	14	14
	consumer	5	36	40	100	80	100	100	20	40	0
Obunga	women	12	37	8	75	33	100	33	75	25	0
	consumer	8	30	0	63	50	100	63	75	13	0
All	Management	11	52	9	100	91	100	91	55	36	0

3.3.2 Observation, Transect Walks and Photographic Evidence

Personal observation and transect walks were also employed as supplementary tools for qualitative data collection. Transect walks are a series of leisure-like trips designed to familiarize the research team with the target communities. The reason for using this approach was to the acquisition of critical knowledge of the water and sanitation conditions within the settlements. They were also used to confirm and cross-check which water points were operating optimally and beneficiary water consumption practices. Most of the observation occurred during community water meetings. Occasionally the research team which consisted of the principal investigator, a supervisor and three research assistants also made unannounced visits to the schemes where they freely interacted with the beneficiaries. On such occasions the team took notes and photographs which helped in strengthening the validity of the findings. In fact, the photographic evidence enabled the research team to gather factual evidence on the state of each water scheme and those frequently attending community water meetings.

The team also took photographs of the location of the water offices and community water points in the settlement. Language was not a problem because all members of the research team spoke Luo and Kiswahili fluently. Generally, observation and transect walks offered unique and valuable insights into how the schemes operated and how the beneficiaries interacted with each other. These variables may be hard to quantify or when quantified may fail to provide accurate information on what is actually taking place on the ground.

3.3.3 Qualitative Data Analysis

The main purpose in qualitative analysis was to obtain insights on the major participatory-related factors accounting for/and or impeding success of the schemes. Data analysis was based on an inductive research strategy. Specifically, constant comparison analysis

technique was employed. That is, themes (codes) which emerged from the focus group discussions were processed and then corroborated with supporting evidence from survey data, observation, transect walks and photographs.

The FGD's were conducted in the local Luo language. Data analysis was conducted in seven stages. The first stage involved transcribing the FGD data from Luo to English. Because of potential translation drawbacks, great effort was made in preserving the original statements and ideas of the participants. The second stage involved reading the transcripts aloud and classifying the statements made by the FGD participants into smaller meaningful chunks. Upon completion the codes were then attached to the chunks whereby each code corresponded with a unique non-repetitive statement. In the third stage the research team listened to the audio tapes again and classified more statements into codes. Listening to the tapes was very helpful. It enabled the team to glean more information and verify additional quotations of interest. The fourth stage involved grouping the codes by similarity and identifying themes. The fifth stage involved classifying the themes into those that facilitated versus those that impeded the schemes' success. The last two stages involved the cross-case analysis of the themes and legitimization of the findings.

The findings were legitimized by observing the following protocol. One, the classified themes were corroborated with notes gathered through observation; transect walks and photographic evidence (data triangulation; Denzin, 1978). Second, before classifying the themes the research team went back and undertook member checking with the participants. Also known as descriptive triangulation, this technique involved reading the themes and asking FGD participants if they accurately depicted their statements (Janesick, 2000; Merriam, 1998). Finally, in order to improve rigor, secondary data generated from peer reviewed articles were

also used to cross-validate the findings (Onwuegbuzie & Teddlie, 2003; Greene, Caracelli & Graham, 1989).

3.4 Rationale for Using Mixed Methods

Arguments supporting the use of mixed methods in research design and analysis abound in the relevant literature. In chapter 6 of his book on “*Quantity and quality in social research*” Bryman (1988) discusses a list of claims supporting the adoption of the mixed methods approach. They include: (a) the logic of triangulation, (b) appropriateness in solving the problem of generality, (c) the idea of complementarity, (d) structure and process and (e) further interpretation of relationships.

The logic of triangulation is the notion that one type of inquiry can be used to crosscheck the findings of another study or within a single study. This enhances validity. Solving the problem of generality is an argument based on the premise that addition of quantitative evidence may help mitigate the fact that it is not often possible to generalize qualitative findings. In supporting this assertion, Green (2007) noted that the use of mixed method provides a researcher with the techniques to probe the contested and challenge the given by engaging in multiple perspectives.

The concept of complementarity is the belief that findings generated by qualitative techniques can be used to patch up gaps left unattended by quantitative techniques or vice versa. According to sociologist Lieberson (1992), the foundations of good research rest on “*building blocks of evidence*” from a variety of perspectives and methods. *Structure and process* is the idea that quantitative research is considered to be better at getting to the *semantic features* of social life. On the same note qualitative studies are usually stronger in terms of detailing aspects of social life. By building on the idea of complementarity, an argument can be made that the

strength from both branches can help in improving quality and accuracy. Lastly, *further interpretation of relationships* is the notion that quantitative research is known for allowing researchers to analyze and compare different variables or for establishing relationships. However, they are weak in exploring reasons for the existence of such relationships. In such cases qualitative methods can be employed to help explain the broad relationships established by quantitative data.

Morgan (2007) showcased through examples two specific benefits of the mixed methods approach. First, he noted that many researchers would describe the process of theory development in qualitative research as being very inductive and quantitative research as being very deductive. However, few qualitative studies start without any sense of a research question or theoretical foundations. On the same token, few quantitative studies move from theory to hypothesis test and then stop. The truth Morgan (2007:10) notes is that all research projects make several moves between theory reconstruction and data analysis. For Morgan, “*a strong mixed methods approach call for abduction, the complementary and constant dialectic between inductive and deductive theoretical development rather than a reliance on one of the other*”.

In the present study the application of the mixed methods approach was expected to yield *complementary results* and also support *further interpretation of relationships*. Specifically, the quantitative data were designed to help in establishing a relationship between participation and beneficiary satisfaction with the work of the water management committees in the schemes. They were also vital in highlighting the relationship between participation and clean water service delivery in the settlements. In short, the approach enabled the study to tease out associations between quantifiable variables as opposed to those that can-not be easily quantified. Sydenstricker-Neto (2004) asserts that a strong mixed method way of thinking is a promising

means to generate a better understanding of complex problems. It has the potential to offer more venues for producing outcomes that are more meaningful to both audiences and stakeholders.

Despite its strengths and potential benefits, the mixed methods approach has shortfalls. One pitfall for using mixed methods in this study was the fear of data incompatibility (Brannan, 1992). To address this problem before it occurred, the research questions in this study were modelled and framed to complement each other. The research questions were also subjected to a review by experts in the field before data collection phase. Johnson and Onwuegbuzie (2004) observed that the foundation of study is the research questions. The methods are secondary and should follow research questions in a way that offers the best chance in obtaining useful answers.

3.5 Selection Criteria for the Studied Schemes

The journey for selecting the schemes examined in this dissertation inquiry begun in the summer of 2013. In June 2013, the Principal Investigator (P1) traveled to Kenya to review several potential water projects for the present study. The P1 visited several organizations working in partnership with different communities in the water service sector in Kisumu. After two weeks of consultation and observation the work of SANA in the water service delivery sector in Kisumu stood out. They had well-established water projects in Kisumu urban informal settlements. Accordingly, the P1 approached SANA and arranged to meet their director to begin the process of sampling different water schemes for a case study in this dissertation.

Table 3.5 is a summary of activities involved in the selection process. The first meeting between the P1 and SANA's director took place on 20th July 2013. In this meeting the director described their work in the water service provisioning in Kisumu. He also introduced the P1 to his staff and on the same day made available some vital organization document for any future perusal. These included financial reports, memorandum of understandings between SANA and

Table 3.5 Summary of Selection Process of the Studied Water Schemes

Task	Step 1	Step 2	Step 3
1	List all Non-Governmental Organizations (NGOs) working in the water sector in Kisumu	Sampled all NGOs known to be involved in the water service provision in Kisumu, Kenya	Selected SANA
2	Arranged and interviewed the team leader of SANA	Arranged for a meeting with SANA staff members	Visited 7 water schemes established by SANA in collaboration with different communities around Kisumu
3	After consultation and review of available secondary data, four schemes were purposively sampled. That is (Paga, Wandiege, Asengo and Obunga)	Arranged and made a second visit to the four sampled schemes	Began writing the then proposal and three months later successfully defended a proposal and the study got approved by the dissertation committee and IRB

the communities they were working with in Kisumu, minutes of community meeting attendance and history on the establishment of different water schemes. The second meeting took place three days later. During the course of this meeting, one of the staff was instructed to show the Principal Investigator different water schemes SANA had established in the city. During the visits the P1 was introduced to the water project management teams and the project beneficiaries who were responsible for daily maintenance and operation of the schemes. The P1 also used this opportunity to know the schemes better and take some insightful personal observations on the schemes functionality. In total seven schemes were visited.

The next task involved the selection process of the examined schemes. The four schemes were purposively sampled based on three parameters: (1) history and available operational

evidence, (2) recommendation from SANA and the schemes management team, and (3) the research questions of interest in this dissertation. With regards to the evidence, the four chosen schemes had detailed and sufficient secondary data. They were also located in strategic random sections of the city. The strategic location of the schemes was good because it enabled the research team to generate diverse responses thus improving the credibility of the findings. With regards to Parameter Number 2, SANA's reason for choosing the four schemes was based on the premise that the two schemes were performing really well, one just average, while the fourth one's performance was abysmal. For these reasons they were more interested in knowing the underlying reasons behind the difference in performance in order to improve their intervention tactics. On Parameter Number 3, the primary goal of Research Question Number One was to investigate the relationship between CP and beneficiary satisfaction with the work of the management committee of the schemes. For this reason consideration had to be given to schemes which had been in operation for a significant length of time. Additionally, the third research question concerned factors which affect the performance of the schemes. In this regard, we sampled schemes which were performing well and those which were perceived to be performing poorly.

3.6 Data Quality Management Issues

Previous studies point out that there are many errors which may arise in a research process. According to Babbie (2004) potential errors might occur during data collection, methods used to store the data collected or during the time of data analysis. Data quality management should, therefore, be observed during the entire research process. *Data quality management* refers to the establishment and deployment of roles, responsibilities and policies and procedures concerning data acquisition, maintenance, dissemination and disposition (Babbie, 2004). The

following techniques were employed to enhance data quality in both the qualitative and quantitative phase.

3.6.1 Qualitative Data

One way in which data quality can be compromised is when researchers or their assistants are not properly trained (Alkin et al, 1979). To ensure data quality in this inquiry the research teams were adequately trained on data collection and storage techniques. This applied to both the qualitative and quantitative phases. The PI who moderated most of the FGDs have taken research methods courses at the University of South Florida which prepared him for the task. Moreover audio tapes were used for the FGDs. These were later transcribed verbatim and formatted before analysis. All FGDs were conducted in privacy thus respecting the confidentiality of all the participants. Notes and audio tapes did not contain any personal identifies of the participants and were kept in locked filing cabinets.

According to Sikes (2000) one major threat to qualitative data is the fear that at some point participants lied and researchers used the information as facts. To enhance credibility and reliability of the qualitative findings in this inquiry, triangulation and prolonged engagement techniques were employed (Denzin, 1978; Lincoln & Guba, 1985). Triangulation included both investigator triangulation (i.e. using different personnel to moderate the FGDs) and data triangulation (i.e. the FGDs was composed of a variety of people that is women groups, water management committees and water consumer groups). By using triangulation the research team was able to cross-check statements made by all the participants for similarities and differences. By applying the prolonged engagement technique all the FGDs took place within a three-month period. This enabled the team to informally interact further with the participants thus gaining more insightful information about factors affecting the performance of the schemes. The research

team also made sure that there was fair representation of both women and men among FGD participants. In fact this is the reason why we included women groups as a unit within the FGD participants. Table 3.3 shows the number of women groups who participated in the FGDs.

The application of the aforementioned techniques enabled the research team avoid what Denzin and Lincoln (2005) have called a crisis of representation. This implies the difficulty in capturing the phenomena or attributes we intended to via text. Indeed we are confident to assert that the qualitative findings in this study have theoretical generalizability (Ryan et al, 2002) and empirical applicability (Babbie, 2004).

3.6.2 Quantitative Data

In quantitative studies validity of the findings is always an issue. This study is no exception. The concept of validity refers to the extent to which the information collected accurately depicts the phenomena being studied (Babbie, 2004). One can argue that it is closely linked to how the research was conceptualized (i.e. variables operationalization), data collection procedures and the techniques used to interpret the findings.

To ensure validity in the quantitative part of this study, the research questions were modeled with the aid of current literature dwelling on CP in water service delivery. This assertion is reinforced by the theoretical framework shown in chapter one and the related literature reviewed in chapter two. Furthermore, the research questions (RQ1 & RQ2) which were mostly addressed by the survey data were evaluated and re-adjusted accordingly by experts in the field. Similarly, the variables pursued in the questionnaire survey are complemented by what is contained in current literature. Furthermore a simple random sampling technique was used in collecting the survey data. The research team used the latest Kenya Independent Voter register (2012) to draw a sample for the study. This document contains the names of all

registered voters in Kenya who by law must be over the age of eighteen and must possess a national identification card (Laws of Kenya, The New Constitution, 2010). Voting is mandatory for all persons over the age of eighteen in Kenya (Laws of Kenya, The New Constitution, 2010). This meant that everybody over the age of eighteen living within the location of the sampled schemes had an equal chance of being surveyed for the study. Put together the rigorous process helped in solving the potential errors such as instrumentation problems or researchers bias. Tashakkori and Teddlie (1998) observe that instrumentation issues or researchers bias are major problems in quantitative analysis. The former occurs when the results from a measure lack the appropriate level of consistency or inadequate results. The latter happens when the research personnel favors one technique over another technique thus resulting in statistical testing errors. In this study logistic regression was employed in answering research question one and two. So far it is considered as one of the best techniques in analyzing studies where the dependent variable has a binary outcome. This implies that those analysis where the assumptions of linear regression are not valid, i.e. where the relationship between x and y is nonlinear, error terms are heteroscedastic and lastly error terms are not normally distributed (Cabrera, 1994; Cox & Snell, 1989; Tabachnick & Fidell, 2001). Overall, this study followed the scientific method in sampling the participants. The variables analyzed are anchored on those formulated in previous peer reviewed articles. The logistic regression analysis used in answering research question one and two is considered one of the most rigorous analytical techniques in studies similar to this. That is, those analysis where the dependent variable has a binary outcome.

3.7 Ethical Consideration

Before undertaking this study the principal investigator applied for an approval with University of South Florida Institutional Review Board (IRB). An IRB is a board charged with

protecting the rights and welfare of people involved in research. IRB reviews plans for research involving human subjects. In the United States of America, institutions that accept funding from the federal governments are required to have an IRB charged with reviewing all research involving human subjects (see, Appendix A). This requirement is mandatory for all studies even if the research is not funded by the federal government. In this study, University of South Florida Institutional Review Board ensured that it was carried out in accordance to policies which are designed to protect humans participating in a research.

Moreover while in the field all the participants were asked to voluntarily sign an informed consent form prior to participation (see, Appendix B, C, D, E, F, G, H, & I). The survey informed consent form included the principal investigator information, the study objectives and its benefits, confidentiality issues and any related risks. The FGD informed consent form also addressed the same issues. Throughout the data collection period the research team continually re-evaluated sampling designs and procedures for ethical and scientific appropriateness (Onwuegbuzie et al, 2007). All the data collected were confidentially stored and have only been used in this dissertation study. Nobody was coerced into participating in this study.

4. EMPIRICAL EFFECTS OF CP ON BENEFICIARY SATISFACTION WITH THE WORK OF THE WATER SCHEMES' MANAGEMENT COMMITTEES

This chapter presents the findings for Research Question One. The question is concerned with the relationship between participation and beneficiary satisfaction with the work of the water management committees in the four schemes. Consumer satisfaction with the work of the management committees can be used as a reflection on these projects effectiveness in regards to water service delivery in Kisumu informal settlements. Included in the findings are household demographic characteristics, descriptive statistics of the dependent and independent variables, bivariate and multivariate logistic regression results. The chapter concludes with a discussion of how the results reported here relate to previous studies.

Overall, the results from both logistic regression models indicate an association between participatory variables and beneficiary satisfaction with the work of the water management committees. A measure for consumer satisfaction was attained in the questionnaire survey item 40, by the question “*Overall, how satisfied are you and your household with the management work of the committee responsible for managing your main source of water?*” The respondents’ answers were regressed against a series of participatory indicators. These were questions which originated from the questionnaire items. The findings reveal that households which were actively participating in the schemes’ activities tended to be more satisfied with the work of the water management committees. In other words, the management committees were doing everything possible to ensure that the schemes were continually supplying water, beneficiary complaints were effectively resolved thus making them more willing to provide labor to the schemes. Most

importantly, beneficiaries were also more willing to continue paying for water drawn from the schemes or intervene against pipe vandalism in their community whenever they encountered it.

4.1 Selected Sample Demographic Characteristics

Table 4.1 contains a summary of the economic and demographic characteristics of the sampled households. As can be seen in the table over 65 percent of households sampled have lived in the settlements for more than two years. Most participants, therefore, had a clear sense of how the schemes operated. This information is consistent with the FGD data culled from the Introductory Questions (See, Appendix I). The water consumer group FGD participants observed that majority of the beneficiaries they represent had lived in the settlements for a significant period of time. Furthermore, majority of them have relied on the community managed water scheme as their main source of water.

Household size in the settlement averages between 4 and 5 people. These consist mostly of father, mother, children and sometimes relatives. This is a common characteristic in the African urban space. Most often, young people move to urban centers with their families in search of jobs. Unfortunately they end up living in informal settlements/neighborhoods when they are unable to gain fulltime employment. In some isolated cases, supplementary data gathered through observation and transect walks reveal that there are polygamous families and orphaned children present in the four settlements. Some of the orphan children live together as families and most of depend on food assistance from well-wishers.

Level of education varies across the settlements. Primary and secondary education is the peak level. Specifically, Paga leads at 56 percent with respondents reporting their highest level of education as primary. For secondary level education, Obunga leads at 44 percent while Paga come at a distant fourth with 27 percent of the respondents reporting as having achieved

secondary level education. Most of the residents in the settlements are poor, which accounts, at least in part, for the low level of education. However, Asengo seems to be an exception with regards to education level. Sixteen percent of respondents in Asengo reported their highest level of education as University. This corresponds with monthly income where Asengo has the lowest number of people reporting their monthly income as below Kshs 20,000 (equivalent USD 230). Generally, in Kenya just like in any other country around the world income is highly correlated to education level.

Table 4.1 Demographic and Economic Characteristics of Sampled Household

Demographic Characteristics	Wandiege	Obunga	Asengo	Paga
Total number of households surveyed	79	80	79	79
% of respondents who are female	69	72	59	84
% of respondents who are male	32	28	41	16
Average households size	5	4	4	4
Number of females living in a household	223	157	187	175
Number of males living in a household	197	163	168	156
% of respondents highest level of education no formal education	6	8	3	11
% of respondents highest level of education primary	31	9	24	56
% of respondents highest level of education secondary	38	44	34	27
% of respondents highest level of education diploma	23	32	23	4
% of respondents highest level of education university	3	8	16	3
% of household main source of income Wage employment	20	28	23	37
% of household main source of income Artisan/Blacksmith	1	11	0	8
% of household main source of income salaried employment	28	23	44	16
% of household main source of income is trading/small business	51	38	33	39
% of household monthly income below Kshs 20,000 (USD 230)	79	89	68	79
% of household monthly expenditure below Kshs 20,000 (\$ 230)	90	94	87	71
% of respondents number of years lived in the settlement > 2yrs	67	65	77	85

Being in low income areas, most residents in the locale of the studied schemes depend on meagre income-generating activities. As compared to other sources of income listed in the survey, majority of the residents depend on trading and small business as their main source of income. Percentages of household whose main source of income are trading and small businesses are reported as follows, 51 percent in Wandiege, 38 percent in Obunga, 33 percent in Asengo and 39 percent in Paga. Trading and small business include activities such as women selling second-hand clothing, vegetables, charcoal and fish mongering, and men operating small kiosks, video shows and welding workshops.

In the developing world, water vending is an activity which is most often carried out by women (Kjellen, 2000; Kjellen & Mc Granahan, 2006; Whittington et al, 1989). As can be seen from the table, the respondents were predominantly women. Specifically, in Wandiege 69 percent of the participants were women while 32 percent were men. Similar patterns are reflected in Obunga (72 percent), Asengo (59 percent) and Paga (84 percent).

To provide baseline data and for control purposes, it is important to note that there are different sources of water in the settlements. This is illustrated in the study setting section. The selection of respondents' surveyed was done randomly. This meant that regardless of the respondent's main source of water everyone living in the settlements locale had the same chance of being chosen to participant in the survey.

Table 4.2 presents a summary of household's main source of water. As can be seen from the table, in Wandiege 65 percent of households depend on community managed water kiosk, 48 percent in Obunga, 37 percent in Asengo and 75 percent in Paga. Those who rely on piped individual community managed are however few. In Wandiege 29 percent of households depend on piped individual community managed water schemes, 28 percent in Obunga, 42 percent in

Asengo and none in Paga. Probably financial reasons contribute to this observation. Most people in the settlement cannot afford individual water connection to their homes.

Table 4.2 Household Main Source of Water

% of household who reported main source of water as	Wandiege n:79	Obunga n:80	Asengo n:79	Paga n:79	Total n:317
Community managed water kiosk	65	48	37	75	56
Piped individual community managed	29	28	42	0	25
Private vendor	4	3	5	0	3
Borehole	3	13	0	6	5
Rain Harvesting/roof catchment	0	1	3	0	1
Well	0	9	4	8	5
Spring	0	0	10	5	4
River	0	0	0	6	2

4.2 Description of Dependent and Independent Variables

In the following section descriptive statistics of the dependent (beneficiary satisfaction with the work of the management committee) and independent variables (participation) are presented.

4.2.1 Beneficiary Satisfaction with the Work of the Management Committee (DV)

Table 4.3 contains the descriptive statistics of households' response to the question, *how satisfied are you and your household with the management work of the committee responsible for managing your main source of water*. Overall, the table indicates that 57.4 percent of the households surveyed reported being satisfied with the committee responsible for managing main source of water. However, there are some variations amongst the individual schemes.

Table 4.3 Household Responses to the Question “*how satisfied are you and your household with the management work of the committee responsible for managing your main source of water*”

% of household who reported being	Wandiege n:79	Obunga n:80	Asengo n:79	Paga n:79	Total n:317
Satisfied	81	73.8	58.2	16.5	57.4
Not Satisfied	19	26.3	41.8	83.5	42.6

4.2.2 Participation (IV)

Different analysts have suggested several indicators which can be used to measure participation. Most of these indicators as employed by previous studies have already been covered in the literature review section. Yacoob and Walker (1991) used upfront cash contribution and labor as primary indicators of participation in development projects. Manikutty (1997) suggested three indicators which can be used to ascertain participation. These are beneficiary voice in choice of the water system, resource contribution and the level of women involvement in management committees. Sara and Katz (1998) specify beneficiary willingness to pay and contribution in decision making as a basis for operationalizing participation. Isham et al (2001) measured participation in terms of cash contribution, labor provision and beneficiaries taking responsibility in terms of operation and maintenance.

Cash contribution has extensively been used as a measure of participation. However, it has been criticized by scholars such as Agarwal (2001), Cooke et al (2001) and Schouten et al (2003). Specifically, Agarwal (2001) has classified cash contribution as a form of low level participation. This is because; in most development projects beneficiaries are hardly given a choice to make decisions once they contribute money. Anti-liberalization proponents such as Peet, 2003 and Roy, 2002 have also criticized cash contribution purely on the basis that the poor should not pay for water. These arguments have prompted scholars like Prokoby (2005) to suggest other indicators which can be used alongside cash contribution in ascertaining participation. These are (1) meeting attendance, (2) contribution in meetings, and (3) beneficiary involvement in managerial work.

Building on Prokoby's (2005) work, this study employed the following indicators of participation;

- (1) Provision of paid labor to the scheme.
- (2) Payment of water bills in time.
- (3) Willingness to pay water bills in time.
- (4) Willingness to contribute money/ time for an expansion of the community managed water scheme,
- (5) Willingness to intervene in case of pipe vandalism.
- (6) Attendance to public meeting where water and sanitation issues are discussed, and
- (7) Complaints about water supply and quality issues.

Table 4.4 contains the descriptive statistics for household level measures of participation used in the modeling.

Table 4.4 Participatory Indicators Used in the Models

% of households who reported	Wandiege n:79	Obunga n:80	Asengo n:79	Paga n:79	Total n:317
Having provided paid/unpaid labor to the community managed water scheme	57	61.3	34.2	1.3	38.5
Always paying their water bills in time	93.7	81.3	83.5	82.3	85.2
Still willing to continue paying their water bills in time	93.7	82.5	81	84.8	85.5
Willing to contribute money or time for an expansion of the community managed water scheme	67.1	80	83.5	43	68.5
Willing to intervene if they experience pipe vandalism in their community	68.4	82.5	97.5	15.2	65.9
Having attended a public meeting in the last two years where water and sanitation service provisioning issues were discussed	60.8	70	40	17.7	47.3
Have or any member of their household made a complaint about water supply/quality issues over the last three years	50.6	37.5	49.4	81	54.6

Presented next are the results of the univariate and multivariate logistic regression models.

4.3 The Models and Results

The question being explored in both the models is *what is the relationship between CP and beneficiary satisfaction with the work of the water management committees in the four schemes?* The dependent variable (DV) and the independent variables (IV) originated from direct questions in the questionnaire survey. The DV is *household satisfaction with the work of the*

management committee responsible for managing their main source of water. The responses were coded as 1 if a respondent said “satisfied” and 0 if a respondent said “not satisfied”.

The IVs are *LABOUR*, *PAYBILL*, *WILLTOPAY*, *INTERVENE*, *ATTMEET*, *CONTRIBUTION* and *COMPLAINT*. *LABOUR* refers to whether the respondent has ever provided paid or unpaid labor to the community managed water scheme in his settlement. *PAYBILL* refers to whether the respondents pay their water bills in time. *WILLTOPAY* refers to whether the respondent is still willing to continue paying their water bills in time. *INTERVENE* refers to whether the respondents is willing to intervene if they ever experience water pipe vandalism in their community. *ATTMEET* refers to whether the respondents have ever attended a public meeting where water and sanitation service provisioning issues were discussed. *CONTRIBUTION* refers to respondent’s willingness to contribute money or time for an expansion of the community managed water scheme. *COMPLAINT* defined as whether the respondent or any member of his/her household has ever made a complaint about their water supply/quality issues over the past three years.

4.3.1 Bivariate Logit Analysis

Table 4.5 presents the results of the bivariate model. All the independent variables are significantly associated with the dependent variable ($p = 0.01$). Specifically for *LABOUR* the results indicate that the odds of being satisfied with the work of the management committee is 6.2 times higher for households that had provided paid or unpaid labor to the community operated water scheme. For *PAYBILL* the result shows that the satisfaction level of household with the management work of the committee responsible for managing main source of water was 2.3 times higher among households who always paid their water bills in time.

The same trend is evident in variables *WILLTOPAY*, *INTERVENE*, *ATTMEET*, *CONTRIBUTION* and *COMPLAINT*. Among the aforementioned variables the result for *INTERVENE* is quite robust. The findings indicate that the odds of being satisfied with the work of the management committee is 7.4 times higher for households who were willing to intervene if they ever experienced pipe vandalism in their community.

For *CONTRIBUTION* the findings indicate that the odds of being satisfied with the work of the water management committee is 5.4 times higher for those households who showed willingness to contribute money or time for the expansion of the community managed water scheme. Contribution of money and time has frequently featured in CP literature as an indicator of high level participation. Another notable variable in the model is *COMPLAINT*. Recall this variable was earlier defined as whether the respondent or any other member of his/her household have ever made a complaint about their water supply/quality issues over the past three years. The results for this variable indicate that the satisfaction of households with the management work of the committee responsible for managing main source of water reduced by 72% if the household did not complain about water supply/quality issues in the past 3 years compared to those that complained.

4.3.2 Multivariate Logit Analysis

The base equation tested in the multivariate analysis was as follows

$$\text{Logit} (SATISFACTION) = \beta_0 + \beta_1 (LABOUR) + \beta_2 (PAYBILL) + \beta_3 (WILLTOPAY) + \beta_4 (INTERVENE) + \beta_5 (ATTMEET) + \beta_6 (CONTRIBUTION) + \beta_7 (COMPLAINT).$$

Where Dependent variable

Logit (*SATISFACTION*) = Satisfied or not satisfied with the management committee (0 or 1)

Independent variables

Labor = provided paid or unpaid labor to community water scheme (0 or 1)

Paybill = payment of water bills in time (0 or 1)

Willtopaybill = Still willing to continue paying water bills in time (0 or 1)

Intervene = willing to intervene if ever experience pipe vandalism (0 or 1)

Attmeet = Ever attended public meeting where water and sanitation issues are discussed (0 or 1)

Contribution = Willingness to contribute money or time for an expansion of community (0 or 1) managed water scheme

Complaint = Ever complaint about water supply/quality issues over the past 3 years (0 or 1)

Reported in Table 4.6 are the results of the multivariate model. The model fit was good with a significant chi-square value. The model indicated that there is an association between some participatory variables and beneficiary satisfaction with the work of the committee responsible for managing their main source of water.

The five independent variables which were significantly associated with the dependent variable *LABOUR*, *INTERVENE*, *ATTMEET*, *CONTRIBUTION* and *COMPLAINT*.

For *LABOUR* the results suggested that holding other variables constant, the odds of being satisfied with the work of the management committees was 2.4 times higher for households who had provided paid or unpaid labor to the community managed water scheme.

For *INTERVENE* the results indicated that holding other variables constant, the odds of being satisfied with the work of the management committee was 2.6 times higher for respondents who were willing to intervene if they ever experienced pipe vandalism in their community. The same trend was seen in variables *ATTMEET*, *CONTRIBUTION* and *COMPLAINT*.

Table 4.5 Bivariate Logit Results for Beneficiary satisfaction with the work of the Management Committees as Function of Various Participatory Variables (n = 317)

Independent Variables	Log-odds (β)	Wald	df	Odds ratio (e^{β})	95% CI for odds ratio	Model Statistics	
						Nagelkerke R Square	Percentage Predicted Correct
Labour	1.835	44.007***	1	6.264	3.643 – 10.771	0.203	67.2
Paybill	0.643	7.199***	1	2.374	1.262 – 4.465	0.031	61.5
Willtopay	0.842	6.862***	1	2.322	1.236 – 4.360	0.030	61.5
Intervene	2.007	56.323***	1	7.443	4.406 – 12.572	0.245	73.2
Attmeet	1.716	45.996***	1	5.564	3.388 – 9.136	0.2	69.1
Contribution	1.697	41.377***	1	5.456	3.254 – 9.150	0.179	70
Complaint	-1.270	27.230***	1	0.281	0.174 – 0.453	0.117	64

Notes ***Significant at the 0.01 level

Table 4.6 Multivariate Logit Results for Beneficiary satisfaction with the work of the Management Committees as Function of Various Participatory Variables (n = 317)

Independent Variables	Log-odds (β)	Wald	df	Odds ratio (e^{β})	95% CI for odds ratio
Labour	0.899	7.308**	1	2.456	1.280 - 4.712
Paybill	0.078	0.020	1	1.081	0.370 - 3.158
Willtopay	0.808	2.082	1	2.243	0.749 - 6.717
Intervene	0.966	7.966**	1	2.627	1.343 - 5.139
Attmeet	1.085	10.959**	1	2.960	1.557 - 5.629
Contribution	0.624	3.125*	1	1.867	0.934 - 3.731
Compalint	-1.480	21.510**	1	0.228	0.122 - 0.425

Notes **Significant at 0.05 level

*Significant at 0.10 level

Nagelkerke R Square 0.449

For *ATTMEET* the results indicated that holding other variables constant, the odds of being satisfied with the management committee was 2.9 times higher for respondents who had attended water and sanitation meeting in the last three years. Meetings provide a venue for raising complaints about water issues. One assertion is that households often attend meetings when they feel that the management is addressing their concern about water issues.

4.4 Discussion of Findings

A principle finding in this chapter is that there is an association between specific participatory variables and beneficiary satisfaction with the work of the management committee responsible for managing main source of water. This implies that participation influences beneficiaries' satisfaction with the management team. A high level of beneficiary satisfaction with the management is a significant variable in water resource management because it can be used as a proxy for reflection on the projects effectiveness with regards to service delivery. In fact, Prokoby (2005) reinforces this assertion by conceptualizing project effectiveness through the following five key variables; 1) beneficiary satisfaction with the service provided by the management, 2) tariff payments, 3) equal access, 4) time savings in water collection, and 5) consumers belief in the system. Nance and Ortolano (2007) also view participation as a double edge sword. First, it enhances beneficiary satisfaction with the service which in turn leads to better performance in water service delivery sector.

Rogers and Hall (2003:27) provided a broad list of principles for effective water service governance as follows; i) Open and Transparent, ii) Inclusive and Communicative, iii) Coherent and Integrative, iv) Equitable and Ethical, v) Accountable, vi) Efficient and vii) Responsive and Sustainable. *Openness and transparency* implies that water institutions should operate in an open manner by using a language that is accessible and understandable to the people. Policy decisions

should be done in a transparent way with all users aboard. *Inclusive and communicative* means that the effectiveness and success in water service delivery depend on beneficiary participation in policy formulation from conception to implementation and final delivery. *Coherent and integrative* means, policies and action should be coherent. Coherency requires political leadership to ensure a consistent approach within a complex system. *Equitable and ethical* mean that water systems should be guided by ethical principles which are based on the rule of law. *Accountable* means, rules and consequences for violation should be clearly spelt out. A well-built arbitration system should be in place to ensure that conflicts are peacefully resolved. *Efficiency* means that, the economic cost of water should be balanced against social, political and environmental costs. *Responsive and sustainable* implies that the managing institution should be built with an eye towards long-term sustainability. Water governance should strive to serve the future generations as well as present users.

One can argue that the above listed principles can be better accomplished in water systems where there is a well-structured functioning management team. The best way to measure whether the management team is optimally functioning is through beneficiary satisfaction with their overall work. As the logistic regression results suggest, a high percentage of beneficiaries who were participating in the schemes activities reported being satisfied with the work of the water management team. This implies that the water schemes are effectively operating with regards to water service delivery in the informal settlements. The participatory variables worth highlighting in this regard are *labor* and *meeting attendance*. The bivariate model reveal that the odds of being satisfied with the work of the management committee is high among households who have provided paid or unpaid labor to the community operated scheme compared to those who have not. An argument can be made that provision of paid or unpaid labor are important

variables for project effectiveness. This is because for water to continue flowing, the system needs adequate maintenance. In urban informal settlements where there is limited structural planning, maintaining water projects require a great deal of unskilled labor. These include activities such as ensuring that water tanks are regularly cleaned, tracing breaks and leaks, keeping the pipelines clear and covering exposed pipes (Kleemeier, 2000). The more households show their trust in the management committee the more they will be willing to provide free or cheap labor as shown by the bivariate model.

In addition, both the bivariate and multivariate models also indicate a strong association between meeting attendance and household satisfaction with the management. Households who report having attended community water meetings tend to be more satisfied with the management than households who have never attended community water meetings. One can argue that meeting attendance can be recipe for project effectiveness from three different angles. One speculation in literature is that households who regularly attend meetings will most often report defects whenever they occur (Paul, 1987). They are also more likely to use meetings as a venue to voice their opinions and call for improvements. Most importantly they will also be more knowledgeable on how the management spends revenue collected from water sale. The more beneficiaries take such action the more the project will become effective in term of technical performance and improved service delivery.

Beneficiary satisfaction with the management committee is not only good for effectiveness in water service delivery. As suggested by different analysts, it can also aid in the establishment of sustainable community operated water schemes. According to WASH technical report (1994) sustainable projects are seen as those which are able to maintain a flow of benefits for a significant specified period of time after external funding stops. In such projects

sustainability is evaluated based on the following seven criteria. 1) Functionality of the management committees (that is whether the management committees periodically meet and maintain constant support and communication with the beneficiaries). 2) Whether most of the beneficiaries covered by the project are using the facility (often 50% usage is considered adequate for establishing sustainability. 3) Functionality of the facilities (for example 75% of the water systems should be delivering water at any given time of the assessment for it to be considered sustainable). 4) Existence of a vibrant relationship between the management and other officials. 5) Availability of technical repair operators and spare parts. 6) Existence of partnership between the facility and government agencies. 7) Existence of adequate financial resources.

Similarly, the World Health Organization handbook (WHO, 1994) views sustainability as the creation and maintenance of conditions that ensure adequate technical performance and financial success of projects. The handbook also calls for the necessity of information sharing between the community and agencies as prerequisites for sustainability. The UN's Agenda 21 definition of sustainability is broad. It views sustainable development as a way of reversing poverty by giving the poor more access to the resource they need to live. Agenda 21's definition of sustainability includes economic development, social development and environmental protection.

Harvey and Reed (2007) suggest that most of these principles of sustainability are attainable in societies/communities/schemes where there is a functioning system/overseeing body. In fact this is rarely recognized in existing literature apart from the WASH (1994) report which documents that sustainability of water systems is mostly dependent on the performance of institutions. In this analysis the overseeing institution is the management team since the schemes

are entirely managed by the community. According to WASH (1994) a functioning management team can help water schemes avoid issues which may impede long term sustainability especially after the project's completion. These include issues such as technical hitches which lead to wastage or revenue loss. In this regard one can argue that consumer satisfaction is a variable which policy makers can use when reflecting on items which augments sustainability.

The findings reported here are consistent with those revealed by previous studies. Some of these studies show correlation or associations between participation and better outcome in water supply projects (see in Chapter Two, e.g. Briscoe & Ferranti, 1988; Isham & Kahkonen, 2001; Manikutty, 1997; Narayan, 1995; Prokopy, 2005; Sara & Katz, 1998). In this study, the results indicate that there is an association between participation and beneficiary satisfaction with the work of the management committee. Consumer satisfaction as the results suggest is essential for the projects effectiveness and in aiding long-term sustainability. Lockwood (2003) argued that sustainability is not linked only to the existence of specific conditions and factors before and during construction of water supply or sanitation system, but also to specific factors well beyond the end of construction.

5. EMPIRICAL RELATIONSHIP BETWEEN CP AND THE PRODUCTION OF CLEAN POTABLE WATER SUPPLY IN THE INFORMAL SETTLEMENT

In this chapter, quantitative techniques are employed to examine the link between CP and the production of clean water supply in the settlements. The primary concern is with Research Question Two: *What are the contributions (positive or negative) of CP to the production of clean potable water supply in informal settlements.* It is hypothesized that households that rely on community-managed water schemes and at least attend WATSAN meetings practice better water handling hygiene in the settlement. In other words CP contributes positively to the production of clean potable water supply in the informal settlement as evidenced by households' overall perceptions and water handling behaviors. The chapter is divided into three sections. Part One presents the descriptions of the dependent and independent variables analyzed. Part Two presents the results of the chi-square tests on relationships between the two independent and the five dependent variables. Part Three presents logistic regression analysis results of each of the two independent variables regressed against the five dependent variables. Part four is a summary and discussion of the overall findings.

5.1 Description of the Dependent and Independent Variables

The literature review section in chapter Two sheds light on how previous studies have operationalized participation. In the present study, participation assumed the independent variables (IV) status and was measured by two actions. These are (1) *Household main source of water (Remember there are other sources of water in the informal settlements apart from the*

four community managed water schemes) and (2) Attendance to community water and sanitation meeting in the last two years.

The dependent variable DV, *willingness to practice better water handling hygiene*, was measured by the following five indicators:

1. *Household satisfaction level with the smell of water*: Percentage of households that report being satisfied or not satisfied with the smell of their main source of water.
2. *Water storage containers cleaned and covered*: Percentage of households who clean and cover or not clean and cover their water storage containers.
3. *Doctor's office/clinic visits in the last six months and diagnosed with the following water borne related diseases (Cholera, Typhoid, Scabies or Bilharzia)*: Percentage of households who have visited a doctors clinic or not visited a doctors clinic in the last six month and diagnosed with water borne related disease.
4. *Willingness to protect areas around water points in their community from contamination*: Percentage of households reporting willing to protect or not protect areas around water points from contamination.
5. *Perception of current access to water*: Percentage of households who report current access to water in their community being accessible or not accessible.

5.2 Results of the Relationship between Independent and Dependent Variable

The five unique measures of the dependent variables are each modeled individually against each of the two independent variables using chi-square test. The primary goal was to find out if *willingness to practice better water handling hygiene* as conceptualized by the five unique measures is associated with *participation*. This goal hinges on the hypothesis that households who rely on community managed water schemes as their main source of water and attend

WATSAN meetings will practice better water handling hygiene in the settlements. The results are presented in tables 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10 and 5.11. Note the numbers in parentheses are total number of respondents in each category.

Table 5.1 contains the chi-square test result on the association between *household satisfaction with the smell of water (DV)* and *main water source (IV)*. The computed chi-square test indicate that the association is statistically significant at the $p = 0.01$ level. According to the table, 61% of households whose main water source was *community managed kiosk* were satisfied with the smell of water compared to with 39% of households that were not satisfied. Similarly, 87.2% of households whose main water source was *piped individual community managed* reported being satisfied with the smell of water compared to 12.8% that were not. On the other spectrum only a meagre 37.5% of households who draw water from the *well* reported being satisfied with the smell compared to 62.5% who were not. The same trend can be observed among those households who rely on *spring* and *river* as their main source of water. In fact only 40% of those household who rely on *river* as main source of water indicated being satisfied with the smell of their water compared with 60% that were not. Further scrutiny of the data shows that, of the 317 households surveyed, a total of 176 who reported being stratified with the smell of their water rely on *community managed schemes*.

In Table 5.2 the chi-square test results on the association between *households satisfaction with the smell of water (DV)* and *attendance to WATSAN meetings* is significant at $p = 0.01$. Specifically, as showcased in the table 82.7% of households that reported having attended WATSAN meeting were satisfied with the smell of water compared with 50.3% of households that did not. Similarly, 49.7% of households that did not attend WATSAN meeting were not satisfied with the smell of water compared with 17.3% of households that attended.

Table 5.3 indicates that the association *between cleaning and covering of water storage containers (DV) and main source of water (IV)* is strong. The statistical significance is at $p = 0.01$ with an associated chi-square value of 37.572. As the table reveals 97.7% of households whose main water source was *community managed water kiosk* carried out cleaning and covering of water storage containers compared with only 2.3% of households that did not. Along the same vein, all households who reported main source of water being *piped individual community managed* cleaned and covered their water storage containers. These results indicate a somewhat different behavioral pattern with those households who rely on other sources of water such as *borehole, spring and river*. Indeed, as can be seen from the table, the percentage of households who report not cleaning and covering their water containers are slightly high for *borehole* (23.5%), *well* (18.8%), and *spring* (8.3%). This finding is significant as several studies show that access to an improved water source does not always ensure use of clean water. In fact it has been noted that microbiological quality of water in household storage containers is frequently lower than at the source (Lindskog & Lindskog, 1988). This indicates that water contamination often occurs during collection, transportation and storage.

In Table 5.4 the chi-square test results indicate a statistically insignificant association between *cleaning and covering water storage containers* and *attending WATSAN meetings*. The p value is 0.074 and the accompanying chi-square value is very low at 3.196. However, in table 5.5 the test shows a statistically significant pattern ($p = 0.048$) between *being diagnosed with water borne related disease (DV)* and *main source of water (IV)*. According to the table, only 33.9% of households whose main source was community managed water kiosk visited a doctor's clinic compared with 66.1% who did not. Similarly, a staggering 67.9% of households who rely on piped individual community managed as main source of water report not visiting a doctor's

clinic compared to 32.1 who did. The statistics appears to be different at the other end of the table. In particular, households who rely on other sources seem to be visiting doctor's clinic more than their counterparts who rely on community managed schemes. In these categories those who rely on river as the main water source is leading. That is 80% of households whose main water source was river reported visiting a doctor's clinic with water borne related disease compared with only 20% of households that did not. This is followed by *spring* with 66.7% visiting a doctor's clinic compared with 33.3% that did not, *borehole* 47.1% compared with 52.9% and lastly *well* at 43.8% compared with 56.3% respectively.

The chi-square p value in table 5.6 equals 0.539. This is an indication that there is a statistically insignificant relationship ($p = 0.01$) between *visiting a doctor's clinic with water borne related disease* and *attendance to WATSAN meeting*.

Moving on to table 5.7, the results here confirms the existence of an association between *willingness to protect areas around water points from contamination* (DV) and *main source of water* (IV). The statistical significance of this relationship is 0.003. This means that there is a 99% probability that willingness to protect areas around water points from contamination is related to households' water source. Specifically, as can be seen from the table, 98.9% of households who reported main water source as being *community managed water kiosk* were willing to protect areas around water points from contamination. Among these households, only 1.1% reported unwillingness to *protect areas around water points from contamination*. Similarly, 98.7% of households whose main source of water was *piped individual community managed* were willing to protect areas around water points compared to 1.3% of households that were not willing in this category. Protecting areas around water points from contamination includes activities such as removing rubbish around water points or discouraging defecation

around water sources. As the result suggests those who rely on other source of waters seems less willing to take initiatives which promote cleanliness around water points. However, overall the results in table 5.7 are still encouraging. This is because the percentages of those who rely on other sources and are willing to protect areas around water points are still high compared to those who are not.

Inspection on the relationship between willingness to protect areas around water points from contamination and attendance to WATSAN meetings in table 5.8 shows no sufficient evidence. With the p value of 0.811 the associated chi-square statistic of 0.057 the results suggest that this relationship could have occurred only by chance.

Of prime interest in table 5.9 was whether there was a relationship between *household perception to current access to water* (DV) and *main source of water* (IV). The chi-square value of 36.013 and $p = 0.01$ indicates that a significant relationship does exist between the two variables. Specifically, 65% of households whose main water source was *community managed water kiosk* perceived that they were accessible to clean potable water compared with 35% that indicated they were inaccessible. Along the same lines, 93.6% of households whose main source was *piped individual community managed* perceived that they were accessible to clean potable water compared with only 6.41% that indicated they were inaccessible.

A further perusal of table 5.9 reveals a different story among those households whose main source of water are *private vendor, borehole, well* and *spring*. In this category, only 33 % of households whose main water source were private vendor perceived that they were accessible to clean potable compared with 66.7% that did not. This was followed by spring (50%), borehole (52.9%) and well (62.5%) respectively.

Table 5.1 Relationship between Household Satisfaction with the Smell of Water (DV) and Main Water Source (IV)

		respondents main water source								
		Community managed kiosk	Piped individual community managed	Private vendor	Borehole	Rain Harvesting	Well	Spring	River	Total
Water smell satisfying	Yes	(108) 61	(68) 87.2	(6) 66.7	(10) 58.8	(2) 66.7	(6) 37.5	(6) 50	(2) 40	(208) 65.6
	No	(69) 39	(10) 12.8	(3) 33.3	(7) 41.2	(1) 33.3	(10) 62.5	(6) 50	(3) 60	(109) 34.4
Total		(177) 100	(78) 100	(9) 100	(17) 100	(3) 100	(16) 100	(12) 100	(5) 100	(317) 100
Pearson Chi-square = 26.446		d.f. = 7		p = 0.000*		n = 317				

Table 5.2 Relationship between Household Satisfaction with the Smell of Water (DV) and Attendance to WATSAN Meetings (IV)

		ever attended water and sanitation meeting		
		Yes	No	Total
Water smell satisfying	Yes	(124) 82.7	(84) 50.3	(208) 65.6
	NO	(26) 17.3	(83) 49.7	(109) 34.4
Total		(150) 100	(169) 100	(317) 100
Peason Chi-square = 36.694		d.f. = 1		p = 0.000* n=317

Table 5.3 Relationship between Cleaning and Covering Water Storage Containers (DV) and Main Source of Water (IV)

		Respondents main water source								Total
		Community managed kiosk	Piped individual community managed	Private vendor	Borehole	Rain Harvesting	Well	Spring	River	
Storage containers cleaned and covered	Yes	(173) 97.7	(78) 100	(9) 100	(13) 76.5	(2) 66.7	(13) 81.3	(11) 91.7	(5) 100	(304) 95.9
	No	(4) 2.3	(0) 0	(0) 0	(4) 23.5	(1) 33.3	(3) 18.8	(1) 8.3	(0) 0	(13) 4.1
Total		(177) 100	(78) 100	(9) 100	(17) 100	(3) 100	(16) 100	(12) 100	(5) 100	(317) 100
Pearson Chi-square = 37.572		d.f. = 7		p = 0.000*		n = 317				

Table 5.4 Relationship between Cleaning and Covering Water Storage Containers (DV) and Attendance to WATSAN Meetings (IV)

		ever attended water and sanitation meeting		
		Yes	No	Total
Storage containers cleaned and covered	Yes	(147) 98	(157) 94	(304) 95.9
	No	(3) 2	(10) 6	(13) 4.1
Total		(150) 100	(167) 100	(317) 100
Pearson Chi-square = 3.196		d.f. = 1		p = 0.074
n = 317				

Table 5.5 Relationship between Being Diagnosed with Water Borne Related Disease (DV) and Main Source of Water (IV)

		Respondents main water source								
		Community managed kiosk	Piped individual community managed	Private vendor	Borehole	Rain Harvesting	Well	Spring	River	Total
Visited a doctors clinic diagnosed water borne disease related illness	Yes	(60) 33.9	(25) 32.1	(5) 55.6	(8) 47.1	(0) 0	(7) 43.8	(8) 66.7	(4) 80	(117) 36.9
	No	(117) 66.1	(53) 67.9	(4) 44.4	(9) 52.9	(3) 100	(9) 56.3	(4) 33.3	(1) 20	(200) 63.1
Total		(177) 100	(78) 100	(9) 100	(17) 100	(3) 100	(16) 100	(12) 100	(5) 100	(317) 100

Pearson Chi-square = 14.202 d.f. = 7 p = 0.048* n = 317

Table 5.6 Relationship between Being Diagnosed with Water Borne Related Disease (DV) and Attendance to WATSAN Meetings (IV)

		ever attended water and sanitation meeting		
		Yes	No	Total
Visited a doctors clinic diagnosed water borne disease related illness	Yes	(58) 38.7	(59) 35.3	(117) 36.9
	No	(92) 61.3	(108) 64.7	(200) 63.1
Total		(150) 100	(167) 100	(317) 100

Pearson Chi-square = 0.378 d.f. = 1 p = 0.539 n = 317

Table 5.7 Relationship between Willingness to Protect Areas around Water Points from Contamination (DV) and Main Source of Water (IV)

		Respondents main water source								
		Community managed kiosk	Piped individual community managed	Private vendor	Borehole	Rain Harvesting	Well	Spring	River	Total
Will to protect areas around water from contamination	Yes	(175) 98.9	(77) 98.7	(9) 100	(14) 82.4	(3) 100	(15) 93.8	(12) 100	(5) 100	(310) 97.8
	No	(2) 1.1	(1) 1.3	(0) 0	(3) 17.6	(0) 0	(1) 6.3	(0) 0	(0) 0	(7) 63.1
Total		(177) 100	(78) 100	(9) 100	(17) 100	(3) 100	(16) 100	(12) 100	(5) 100	(317) 100
Pearson Chi-square = 21.893		d.f. = 7		p = 0.003*		n = 317				

Table 5.8 Relationship between Willingness to Protect Areas around Water Points from Contamination (DV) and Attendance to WATSAN Meetings

		ever attended water and sanitation meeting		
		Yes	No	Total
Will to protect areas around water from contamination	Yes	(147) 98	(163) 97.6	(310) 97.8
	No	(3) 2	(4) 2.4	(7) 2.2
Total		(150) 100	(167) 100	(317) 100
Pearson Chi-square = 0.057		d.f. = 1		p = 0.811
		n = 317		

Table 5.9 Relationship between Perception on Current Access to Water (DV) and Main Source of Water (IV)

		Respondents main water source								Total
		Community managed kiosk	Piped individual community managed	Private vendor	Borehole	Rain Harvesting	Well	Spring	River	
Perception of current access to water	Acc	(115) 65	(73) 93.6	(3) 33.3	(9) 52.9	(2) 66.7	(10) 62.5	(6) 50	(5) 100	(223) 70.3
	Not Acc	(62) 35	(5) 6.4	(6) 66.7	(8) 47.1	(1) 33.3	(6) 37.5	(6) 50	(0) 0	(94) 29.7
Total		(117) 100	(78) 100	(9) 100	(17) 100	(3) 100	(16) 100	(12) 100	(5) 100	(317) 100

Pearson Chi-square = 36.013 d.f. = 7 p = 0.000* n = 317

Table 5.10 Relationship between Perception on Current Access to Water (DV) and Attendance to WATSAN Meetings (IV)

		Ever attended water and sanitation meeting		
		Yes	No	Total
Perception of current access to water	Accessible	(134) 89.3	(89) 53.3	(223) 70.3
	Not accessible	(16) 10.7	(78) 46.3	(94) 29.7
Total		(150) 100	(167) 100	(317) 100

Pearson Chi-square = 49.204 d.f. = 1 p = 0.000* n = 317

Table 5.11 Summary of the Empirical Results between CP and Household Willingness to Practice Better Water Handling Hygiene in the Settlements

Dependent variables (DV)	Independent Variables (IV)	Results
Water smell satisfying	Main source of water	Significant at $p < 0.01$ (Chi-square = 26.446)
Water smell satisfying	Attendance to WATSAN meeting	Significant at $p < 0.01$ (Chi-square = 36.696)
Storage containers cleaned and covered	Main source of water	Significant at $p < 0.01$ (Chi-square = 37.572)
Storage containers cleaned and covered	Attendance to WATSAN meetings	Not significant at $p < 0.01$
Visited a doctors clinic and diagnosed with water borne related illness	Main source of water	Significant at $p < 0.01$ (Chi-square = 14.202)
Visited a doctors clinic ad diagnosed with water borne related illness	Attendance to WATSAN meetings	Not significant at $p < 0.01$
Willingness to protect areas around water from contamination	Main source of water	Significant at $p < 0.01$ (Chi-square = 21.893)
Willingness to protect areas around water from contamination	Attendance to WATSAN meetings	Not significant at $p < 0.01$
Perception of current access to water	Main source of water	Significant at $p < 0.01$ (Chi-square = 36.013)
Perception of current access to water	Attendance to WATSAN meetings	Significant at $p < 0.01$ (Chi-square = 49.204)

Table 5.10 above also shows a significant association between household *perceptions of current access to water* and *attendance to WATSAN meetings*. The chi-square value is high at 49.204 with a $p = 0.01$. That is 89.3% of households that attended WATSAN meeting perceived that they were currently accessible to clean portable water compared with 10.7% who indicated they were inaccessible. Similarly, 53.7 of households that did not attend WATSAN meeting perceived that they were currently accessible to clean portable water compared with 46.3% that indicated they were inaccessible.

Finally, table 5.11 above displays the summary of the empirical results between CP and household willingness to practice better water handling hygiene in the settlements. As can be seen from the table there is a significant relationship $p = 0.01$ between water smell satisfying and main source of water. The relationship between water smell satisfying and attendance to WATSAN meeting is also significant at $p = 0.01$. Similar results can also be seen on the relationship between cleaning and covering water storage containers and main source of water $p < 0.01$, doctors clinic visits and main source of water $p = 0.01$, willingness to protect areas around water points from contamination and main source of water $p = 0.01$, perception of current access to water and main source of water $p = 0.01$, and, lastly perception of current access to water and attendance to water and sanitation meetings $p = 0.01$.

5.3 Additional Tests - Logistic Regression

To validate the foregoing results logistic regression analysis tests were performed between the DVs and IVs. The two IVs are *household main source of water* and *attendance to WATSAN meetings* regressed on each DV. However unlike the situation in the previous case *household main source of water* was collapsed to constitute two categories. These include, those whose main source of water are community management and those who rely on other sources

such as private vendor, borehole, rain harvesting, well, spring and river. The general representation of each of the 10 models was follows;

$$\text{Ln} \left[\frac{p(y=1)}{p(y=0)} \right] = \beta_0 + \beta x + \varepsilon$$
, where $\text{Ln} \left[\frac{p(y=1)}{p(y=0)} \right]$ refers to the probability that an event will occur to the probability that it will not; β_0 = intercept, β = vector of model coefficients, x = vector of independent covariates and factors and lastly ε = error term.

Table 5.12 contains a summary of the results obtained. As the table shows, there is a statistically significant relationship between the dependent variables and independent variables in seven cases. These are, (1) households who report being satisfied or not satisfied with the smell of water and main source of water at p value <0.01; (2) Households who report being satisfied or not satisfied with the smell of water and attendance to WATSAN meeting p value <0.01; (3) Households who clean and cover or not clean and cover their water storage containers and main source of water p value <0.01; (4) Households who have visited a doctor's clinic or not visited a doctor's clinic in the last six month and diagnosed with water borne related disease and main source of water; (5) Households reporting willing to protect or not protect areas around water points from contamination and main source of water p value <0.05; (6) Households who report current access to water in their community being accessible or not accessible and main water source; (7) Households who report current access to water in their community being accessible or not accessible and attendance to WATSAN meeting p value <0.01.

These results complement those obtained by the chi-square test. The result which indicated that there is an association between some participatory variables and willingness to practice better water handling by households living in the informal settlements of Kisumu, Kenya.

Table 5.12 Logit Results on Willingness to Practice Better Water Handling Hygiene as a Function of Participation

Dependent variable	Independent variable	Results		Model statistics	
		Wald	Odds ratio (e^{β})	Nagelkerke R square	% Predicted correct
Water smell satisfying	Main source of water	6.541***	2.089	0.028	65.6
Water smell satisfying	Attendance to WATSAN meeting	34.097***	4.712	0.157	65.6
Storage containers cleaned and covered	Main source of water	14.481***	10.656	0.169	95.9
Storage containers cleaned and covered	Attendance to WATSAN meeting	2.901	3.121	0.037	95.9
Visited a doctors clinic and diagnosed with water borne related illness	Main source of water	6.981***	0.469	0.030	63.7
Visited a doctors clinic and diagnosed with water borne related illness	Attendance to WATSAN meeting	0.233	1.154	0.002	63.1
Willingness to protect areas around water from contamination	Main source of water	5.104**	5.792	0.081	97.8
Willingness to protect areas around water from contamination	Attendance to WATSAN meeting	0.057	1.202	0.001	97.8
Perception of current access to water	Main source of water	6.946***	2.165	0.030	70.3
Perception of current access to water	Attendance to WATSAN meeting	42.261***	7.340	0.218	70.3

Notes *** Significant at the 0.01 level

** Significant at 0.05 level

5.4 Discussion of Findings

Analysis of the empirical relationship between CP and the production of clean potable water supply in Kisumu informal settlements produce some very insightful results. Among the variables examined, the findings demonstrate that there is a statistically positive association between participation and clean water supply. Specifically households that use community managed water schemes as their main source of water tend to (1) be satisfied with the smell of water, (2) clean and cover their water storage containers, (3) rarely report being diagnosed with water borne related diseases, (4) are more willing to protect areas around water points from contamination, and (5) have a positive perception of current access to water. Similarly, households that participant in water-related activities such as attending water and sanitation (WATSAN) meetings tend to be (1) satisfied with the smell of their water, (2) are more willing to protect areas around water points from contamination, and (3) have a positive perception of current access to water. These findings complement the theory of community participation in many ways. Most importantly, the overall finding that participation leads to better outcome in the water service delivery (Briscoe & Ferranti, 1988; Finsterburch & Van Wicklin, 1987; Isham, Narayan & Pritchett, 1995). In this case, the production of clean potable water supply in the informal settlements/neighborhoods of Kisumu Kenya.

Unlike in previous studies the variables examined in this chapter add a new dimension to participation in water service delivery. While earlier studies have used main source of water and meeting attendance as indicators of participation, they have failed to directly link these variables to household sanitary behaviors. Indeed a study by Manikutty, Mavalankar & Bhatt (1996) is one of the only few studies which have attempted to link participation to changes in beneficiary health habits. The variables used in operationalizing changes in health habits in this study

included using a tumbler to draw water from the containers and washing of hands with soap or no soap after defecation. The results from this inquiry indicated that there was a reduction in water-borne related diseases in villages where households actively participated in health education seminars. That is, beneficiaries in those villages tended to wash their hands with soap after defecation thus leading to a reduction in water borne related diseases.

Overall the results uncovered in this study indicate a strong positive association between household participation and willingness to practice better water handling hygiene. This demonstrates that household participation should be encouraged in the water service delivery sector in the informal settlement/neighborhoods. This is because the level of water quality meant for consumption is well documented as the main cause of most infectious diseases (WHO 1992). However, despite this knowledge, millions of people around the world still experience severe health problems due to contaminated drinking water (WHO/UNICEF, 2008). Postel (1997) estimated that around 80 percent of illnesses in the developing world are attributed to waterborne diseases. In fact, a study by the World Health Organization in (2010) reported that over 2.6 billion people live under improper sanitary conditions. The same report documents that almost 900 million people have no access to clean potable water. Pruss et al (2008) reported that almost 10 percent of the total burdens of diseases globally are attributed to unsafe water and unhygienic sanitation. In Kisumu, the main focus of this study, it is estimated that 80 percent of cholera transmissions and deaths are attributed to lack of access to safe potable water. Gleick (2002) document that by 2020 approximately between 34 and 76 million people will perish from waterborne related diseases. The level of water quality is one of the most serious public health crises facing humanity. For these reasons it requires keen attention from both policy makers and academic theorists. Furthermore access to clean potable water and better sanitation is important

because as argued by different scholars, it is the foundation for healthier and economically viable communities (Hutton et al 2007).

Chattopadhyay and Duflo (2004) contended that one of the major obstacles to the provision of safe drinking water is the fact that governments and international organizations have been slow in engaging local communities and utilizing their capacity through participatory methods. They advise that the engagement of local people is essential for promoting better management practice in natural resource utilization. In terms of clean potable water supply, tapping the capacity of local communities can be accomplished through various methods. For example introducing them to new skills while at the same time augmenting the knowledge they already possess with current scientific knowledge, introducing them to water filtering techniques, encouraging families to boil water before usage, using proper storage techniques, promoting hygiene and cleanliness around water points, and periodically cleaning water storage facilities such as tanks. It should not be assumed that water quality can only improve through more infrastructural investment. Community participation in the form of hygiene education and better management practice are all powerful techniques which could be used for improving water quality.

Thompson et al (2003) acknowledges that the use of technology to improve water quality is best accomplished when supported by participatory mechanisms. In communities where participation is absent, improving water quality can be difficult. Several studies attest to this assertion. A dissertation study by Stigler (2013) employed mixed methods techniques to examine health and cultural outcomes of new water infrastructure projects in two indigenous communities in Baja, Mexico. The results from the study revealed that after receiving new water infrastructure in both communities, neither saw a reduction in rates of gastrointestinal illness. Household point-

of-use water quality was still poor despite the introduction of the new infrastructure. Beneficiaries failed to accept the new infrastructure and the reason cited for doing so was the cultural significance of the previous water source from the community point of view. The recommendation made by the study was that it is important to incorporate CP into the planning and implementation of water improvements.

A review of 57 public health studies by Wright (2004) identified households as active agents that play a significant role in water contamination after collection. Clasen and Bastable (2003) also reported a similar occurrence in Sierra Leone where there was a difference in the level of water quality between the source and households storage facilities. In Clasen et al (2003) study out of the 100 homes sampled, 92.9% of the samples were contaminated with fecal coliforms at levels higher than those found at the source.

In a study carried out in South Africa and Zimbabwe (Conroy, 2006), 24 households in low-income communities were surveyed and water samples were taken, finding that more than 40% of samples taken from homes were unsafe even though the water had come from improved sources. These evidences suggest that improvements of water infrastructure alone do not lead to clean water supply. Better sanitary behaviors/improvements are needed at household level in order to improve clean potable water supply. In fact this chapter has statistically demonstrated that community participation can fulfill this role. Specifically it shows that there is an empirical link between participation and clean potable water supply at least in the case of Kisumu informal settlements.

6. PARTICIPATION-RELATED FACTORS AFFECTING THE PERFORMANCE OF THE SCHEMES

6.1 Introduction

Presented in this chapter are findings associated with Research Question Three. The question read thus: “*What are the participation-related factors affecting the performance of the schemes?*” The chapter is divided into four sections. The introduction deals with the concept of success. Section Two and Three focus on factors the FGD participants perceived to have contributed to the success/or impeded success of the schemes respectively. The chapter concludes with a discussion on how the results relate to previous literature.

Much debate has taken place on how to define or conceptualize success in projects. The Oxford English dictionary defines success as the accomplishment of an aim or a favorable outcome. However, reviewing of literature reveals the ambiguity and multidimensional nature of the term success. Belout (1998) asserts that the term essentially connotes two things: efficiency and effectiveness. In economics, Ducker (1998) described efficiency as to *do things right*, or to improve results by maximizing outputs. On the one hand, effectiveness is defined as *the ability to attain project goals and objectives*. Ika (2009) considers project success as the ability of a project to fall within the time, cost and quality constraints. This definition is reflected in Atkinson (1999) and Westerveld (2003) works. These authors advanced the idea that to be considered successful; a project must fall within the golden triangle of time, cost and quality. However, it is worth noting that a project may fall within this triangle but fail upon its completion or fail to deliver expected results after several years in operation.

Shenhar et al (1996) discussed the term project success within the following criterion: a) internal project objectives, b) benefit to customers, c) direct contribution, and d) future opportunity. Crawford (2005) described project success based on the perception of the beneficiaries. That is, if the project met the technical performance specifications and/or its mission from the beneficiary's perspective. A second criterion is the extent to which a project's outputs, operating procedures, and interaction with its proximate environment are considered satisfactory by the project's primary beneficiaries (cf., Crawford, 2005). This is essentially the notion of success employed in this study.

The FGD participants *were asked whether they considered the four schemes as having been successful (FGD interview protocol in the appendix section)*. The FGD participants uniformly expressed satisfaction with the projects as far as their; technical performance, years of operation, health benefits and improvement in water access were concerned. All the four schemes apart from Paga had operated for over 12 years since their establishment. The FGD participants also acknowledged that schemes had met their mission of improving access to safe clean water and better sanitation to the residents. They further observed that improvement in water service delivery came with other associated health benefits such as a decrease in water borne diseases.

Table 6.1 is a summary of percentage of households who felt that there has been an improvement in water reliability in their community since 2013. Table 6.2 is a summary of percentage of households who have suffered from water borne related diseases in the settlement in the last six months. This information was generated from the survey data. Both tables corroborate the information coming from the FGD data. As can be seen from the two tables, majority of the beneficiaries feel that there has been a dramatic improvement in water reliability

in the settlement. Similarly few respondents report having suffered from any of the four major water borne diseases in the last six month.

Table 6.1 Percentage of Respondents Positively Reviewing Water Reliability in their Community since 2013 (n: 317)

Scheme	% main water source reliable	% main water source not reliable
Wandiege	94.9	5.1
Obunga	71.3	28.8
Asengo	62	38
Paga	14	65
Total	61.5	38.5

Table 6.2 Percentage of Respondents who reported a Family member having suffered from Water Borne Related Disease (n: 317)

	% any household member suffered any of the following waterborne related diseases				
	Cholera	Typhoid	Scabies	Bilharzia	None
Wandiege	2.5	24	1.3	3.8	68
Obunga	21.3	35	3.8	0	40
Asengo	5.1	30.4	0	1.3	63.3
Paga	2.5	34.2	1.3	1.3	60.8
Total	7.9	30.9	1.6	1.6	58

Presented next are the participatory related factors which were deemed by the FGD as having contributed to the success of the schemes.

6.2 Contributing Factors to the Success of the Schemes

The analysis reveals that six factors (Table 6.3) beginning with the most dominant to the least dominant contributed to the success of the schemes. These included networking and collaboration, continuous community engagement/participation, the formation of water consumer groups, coordination and organizational management, extent of institutional formalization and provision of dividends. Some of these factors such as networking and collaboration, continuous community engagement/participation and coordination and organizational management have featured in previous studies as determinants of success (see e.g. Botes & van Rensburg, 2000;

Khawaja, 2003; McGowan & Burns, 1988; Njoh, 2002; 2006, Rondinelli, 1991; Tandler, 1993; Uphoff, 1996).

6.2.1 Networking and Collaboration

Comments from the (FGDs) indicated that networking and collaboration with other organizations have played a key role in the success of all the four schemes. For instance, SANA provided a 40, 000 US dollar loan to the Asengo Water and Sanitation Scheme (AWSS). This loan has enabled the scheme to be financially sustainable. They used it to lay extra pipes, erect two extra water kiosks and build two additional storage tanks. The additional pipes invariably improved water access in the community. Prior to the completion of the SANA-supported water schemes, members of the community depended on the same source of water as cattle. Currently the majority of people in the community rely on the newly constructed community water kiosks. It is also worth noting that improved piping network came along with the new bathing places for women thereby resulting in improved sanitation.

Apart from the loan provision, SANA has been at the forefront in human resource mobilization in AWSS. They have brought in different donors who have provided vocational training on sanitation and its importance. Such training has ushered in quality and professionalism in the general management of water both as a commodity and a basic human need. In the words of one participant from AWSS *“The training we have received from working with other partners like SANA has really helped us make this scheme a success. We started this project as lay men who believed that water should be given for free. However, the financial management seminars arranged by SANA has enabled us to prudently manage our finances”*.

Results from FGDs with the other schemes also point to better outcome which came as a result of having partnered and collaborated with different organizations. A case worth noting is

the benefits which Obunga Water and Sanitation project (OWSP) have generated as a result of its cooperation with organizations like Umande trust, Pamoja and Secode. The Umande Trust is a rights based organization headquartered in Kisumu. It specializes in designing and building bio-centers. These are toilets modelled to convert human wastes into biogas and liquid fertilizers. Through its partnership with OWSP, Umande Trust has been able to build a bio-center for the community. The biogas produced by the center is sold to community members who use it as a source of fuel for cooking. The extra revenue from the venture is ploughed back into the scheme.

The second organization which has partnered with OWSP is Secode (Sustainable Environment and Community Development Project). Its partnership with the scheme has led to improved efficiency in service delivery. As observed in one of our transect walks, the most significant problem which OWSP has battled with for years was meter chamber vandalism. The majority of people living in the settlement are youths who are poor and unemployed. Most of them depend on stealing and selling meter chambers to scrap metal traders. For this reason, OWSP partnered with Secode who then sponsored the reinforcement of meter chambers with concrete blocks. Today the problem of meter chamber vandalism has reduced.

Similarly, the WWSP management team also partially credited the organization's success to partnership fostered with various organizations. These included the Millennium cities initiative, KIWASCO and Pamoja trust. As noted by their chairman the three organizations have always responded to the community needs. For example, they built a community hall and toilets which the community is renting for additional income. Through negotiation, KIWASCO has accepted to work with Wandiege by closing some of the water kiosks they were operating in the informal settlements. As previously mentioned KIWASCO is a privatized water company with

huge capital investment within the city of Kisumu. As a result of its monopolistic tendencies it has been providing stiff competition to Wandiege water scheme.

6.2.2 Continuous Community Engagement/Participation

The OWSP participants stated that continuous community participation and engagement have been instrumental to their survival as an actor in the water service provisioning domain. As the secretary of their management team put it *“When we initiated this project in the year 2003, we had many water vendors who were operating in this slum. When we came in they resented our initiative because water vending was their only source of income. However most people in the community came to our rescue and supported us in carrying out the project”*. This statement is further reinforced by the secondary evidence documented in their books of accounts. They indicate that 90 percent of beneficiaries who draw water from OWSP pay their water bills in time (OWSP, 2014).

It is important to acknowledge that the timely payment of bills in any organization is a pertinent factor in ensuring continuity. In the case of the OWSP, timely payment of water bills has enabled the management to judiciously carry out its operations with limited hitches. For instance they have been able to repair and maintain the water pump and pay their employees on time. Most importantly, the timely payment of the water bills has facilitated the repayment of loans advanced to the scheme by SANA International. These were loans secured by the scheme for initial pipe extensions during the projects initiation.

6.2.3 The Formation of Water Consumer Groups

A comparison of all the FGDs data suggest that the formation of the water consumer group did play a role in the success of the studied schemes. A participant of WWSP listed three distinct responsibilities of their water consumer group to be as follows. First, dissemination of

Table 6.3 Contributing Factors to the Success of the Schemes

Factor	Components
1. Networking and collaboration	<ul style="list-style-type: none"> • Benefits generated through attraction of more revenues • Sharing of new skills and training which help the project meet its goal and mission • Additional labor if requested • Limit to losses coming from water pipe vandalism
2. Continuous community engagement/participation	<ul style="list-style-type: none"> • Creating a strong sense of community ownership • Generation of constant revenue to the schemes • Provision of additional security to the schemes assets • Goodwill to the scheme i.e. timely payment of bills
3. Formation of water consumer groups	<ul style="list-style-type: none"> • Facilitate in operation and maintenance processes • Bridging the gap between beneficiaries and the management • Improvement of transparency and fairness • A show of adherence to democratic principles • Expanding networking and collaboration among water users or with other related agencies
4. Coordination and organizational management	<ul style="list-style-type: none"> • Monitoring and evaluation i.e. performance evaluation • Quick response/solution to technical glitches such as bursting pipes or vandalism • Efficient, transparent and accountable revenue management • Better containment of beneficiary expectation
5. Extent of institutional formalization	<ul style="list-style-type: none"> • Enabling order • Better planning since beneficiary information are kept in a central place • Easy way to reach the management • Quick response rate to issues such as pipe breakages • Central location for meeting attendance and carrying out procurements. Other partners will also have easy access to the management team
6. Provision of dividends	<ul style="list-style-type: none"> • Creation of a stronger sense of ownership • Generation of additional revenue • Expansion of the service through additional revenue • Community empowerment through additional financial liberation

information – that is, ensuring that the beneficiaries are well informed about any new water service reforms. They achieve this by convening periodic public awareness forums. In Wandiege, the positive benefit generated by the forum is manifested by the fact that most residents are aware of their rights and obligations as water consumers. Second, there has been a marked improvement in cooperation and partnership between water service providers throughout Kisumu County. This has provided a platform where stakeholders in the water industry can exchange ideas and experiences with the hope of improving service delivery. Finally, water consumer groups, a manifestation of cooperation, provide relevant feedback by acting as the “community voice” on issues which require management and stakeholder consultation. Specifically in the case of WWSP, their water consumer group monitors community experiences and provides feedback to the management. For example, as pointed out by one committee member the water consumer group has been very vocal in water price negotiation. Two years ago five liters of water used to cost three Kenyan Shillings (Kshs 3) but due to high electricity cost the price had to be adjusted to Kshs 5. Before this change took effect beneficiaries had to be consulted. Credit for this innovation goes to the scheme’s water consumer group. This is yet another mark of cooperation-for facilitating smooth transition.

The instrumental roles of the water consumer groups are also evident in the other three schemes. The responses from PWSS showed that its consumer group has achieved three important results. First, they have ensured that members of the community know their right to quality water. Second, they have ensured that these members are aware of their right to regular water supply. Finally, they have supported the community in demanding and obtaining accurate periodic audited books of accounts from the management committee. As confirmed by the chairman this knowledge and awareness is what has kept them up-to-task with their roles.

The same can be said of OWSP where the consumer group has ensured that the community knows its responsibility in helping the scheme meet its goals and objectives. They have done this by making beneficiaries pay their water bills on time. Moreover they have ensured that unauthorized usage or interference with water facilities are accurately reported to the management committee.

Cooperation articulated in terms of water consumer groups also played an indispensable role in the Asengo Water and Sanitation scheme (AWSS). Note that water for AWSS scheme originates from a spring from Nandi Hills. As a result of human population growth and poverty, human activities especially stone harvesting and charcoal burning have increased around the Nandi hills area thus lowering water quality. However, as revealed by the FGD participants, the water consumer group has fought the negative human activities around the Nandi hill watershed with vigor. They have pressurized both the management team and local government authorities to ensure that water quality does not deteriorate to unusable levels. In the last two years their efforts have yielded positive returns because as compared to the other three water schemes the quality of Asengo water is higher. The color of the water is clearer and the community boasts relatively low incidences of water borne diseases.

Note that the scheme has two main supply lines, the upper and the lower lines. The former is powered by electricity while the latter is gravity operated. Because of high electricity bills, the water service for beneficiaries relying on the upper line can be classified as averagely below standards. In one of our transect walks, the community living along the upper line vehemently complained of the poor service and lack of water during dry seasons. However, because each community has a representative in the water consumer group team, they have been able to advocate for equal distribution of water without favoring any group.

6.2.4 Coordination and Organizational Management

Good coordination and organizational management played a significant role in Asengo Water and Sanitation Scheme (AWSS). A participant from this scheme stated that their management team is composed of men and women of integrity who respond quickly to complaints about water service delivery or technical glitches. Sometimes members of the management team contribute their own money to supplement financial contributions by members of the community. As noted by another FGD participant, at the beginning of 2014 the AWSS management contributed their own money to repair the main meter chamber. For the community, this confirmed that the team was leading by example. Another community member stated that they act as true custodians of their property which is water.

When asked why he thought the management team had done a good job in ensuring the project's success, one participant stated *“In Obunga our management committee has established a transparent and accountable system. We receive our water bills in time and these bills reflect the amount of water we use. The bills are never exaggerated as compared to the early 1990s when the Kisumu municipal council was in charge of the water systems in this city. When the management team wants to adjust the water prices they do involve us in the process and our views are expressed through our water consumer group. We get reliable water even though sometimes the pipes are dry and we have to rely on the water vendors. Still we are happy with their work”*.

The foregoing narrative however contradicts findings for PWSS. In fact, almost all the FGD participants in this scheme associated the problem of infrequent water supply and lack of success to the management team. The team was seen as passive participants consisting of retirees out of touch with the reality in urban water service provisioning. As stressed by the chairman of

the water consumer group team, in this scheme, the management has neither convened any community water meetings for the last year nor organized any elections during the last five years. For these reasons there is limited trust in the management team.

The beneficiaries in PWSS do not even trust SANA. This is captured by a statement made by one woman FGD participant – *“SANA International failed to provide our management team with good technical advice. For example we were lukewarmly consulted when the project was being initiated. From this point we knew that we were starting on shaky ground and this is the reason for the schemes abysmal performance”*. Such views were prevalent throughout the entire community. They charge the leadership with corruption and feel the need for more elections and consultations on matters relating to the scheme. Contrary to the community, the management of PWSS attributed inefficiency in the scheme to a lack of political goodwill. There has been political rivalry in the community between the area member of parliament and some community elders. According to the chairman, another reason which has contributed to a hindrance in their performance is geographical constraints. The scheme is located in a hilly and rocky land thus making it difficult to lay pipes. Some of the pipes are exposed over the ground which attracts thieves thereby increasing operation costs. Additionally, human settlements in this area are sparsely distributed. This means that the pipe network has to cover long distances which come with extra costs.

6.2.5 Extent of Institutional Formalization

Most community based water schemes in the developing world are operated from beneficiary houses, under trees, in schools or churches. Often they lack centralized office spaces and most of the work are done on voluntary basis (Paul, 1987).

The findings in this study reveal that the formulation of a structured centralized office composed of salaried employees positively correlated to the success of the schemes. This observation was particularly pronounced in three schemes. Data from the focus group discussion on OWSP indicated that having an office space has enabled them to have their beneficiaries' information at the touch of a computer button (Figure 6.1, 6.2, 6.3, 6.4).



Figure 6.1 Asengo Water Scheme Office (Source: Author)

Specifically, as illustrated by their secretary, the availability of office space has enabled them to co-locate employees such as plumbers and line patrollers in one place. This has improved their response rate on issues such as pipe breakages, theft and vandalism. Most importantly, the management too has had a place where they can carry out project needs and procurement procedures in a transparent manner. It has a place where it can hold periodic

meetings. Other partners such as SANA and other organizations also have a central location where they can reach the community. The foregoing view was also shared by the other two schemes apart from Paga Water and Sanitation Scheme (PWSS) which does not have a central office and salaried staff. Work in this scheme is done purely on voluntary basis. The water kiosks are managed by the women group and whenever there are issues of pipe breakages the management has to hire a private plumber to address the problem. Indeed in this study we carried out a total of 12 FDGs thus culminating to 3 per community. Most of these discussions took place in the community offices apart from Paga where we held out FDG under a tree due to lack of a designated office space (see, figure 6.4).



Figure 6.2 Wandiege Water Scheme Office (Source: Author)



Figure 6.3 Obunga Water Scheme Office (Source: Author)



Figure 6.4 Focus Group Discussion Meeting at Paga Water Scheme (Source: Author)

6.2.6 Provision of Dividends to the Community

The Wandiege Water and Sanitation Scheme (WWSS) have a unique arrangement with its beneficiaries. Although the project is community-operated, it has adopted a business model that almost rivals that of blue chip companies in the western world. After being in operation for four years the management in consultation with the community decided to securely float the water scheme's shares. Community members were invited to buy a limited number of shares which ranged from Kshs 100 to Kshs 10,000 (1 USD equals Kshs. 84) per share. Many people from the community bought these shares and today as showcased by the FGDs participants, the community is receiving benefits accrued from this venture.

The money raised from the sale of the shares has effectively been utilized in extending the pipe network and in building build more water kiosks. Some part of the money has been used to construct a bio-center and the community ablution block complete with payable public showers. Apart from these investments the community now receives yearly dividends which are pegged on the profits generated by the water scheme. The following remark by one of the male participants exemplifies beneficiaries contentment with the dividend payments; *“Because we receive yearly dividends from this scheme we feel we own the project and therefore ready to protect it from any invaders. It acts as a source of income for us while at the same time providing us with clean water. Some of us have used the money we get from the dividends in starting new businesses”*.

6.3 Impediments to the Schemes Success

The results indicate that four factors were perceived by the participants as having slowed the success in the schemes. These included clanism, population increase, and poverty and community fatigue. Refer to Table 6.4 for a summary of the aforementioned impediments.

Table 6.4 Factors which Impeded the Success of the Schemes

Factor	Components
Clanism	<ul style="list-style-type: none">• Biased representation in the management committee• Diminishes the community sense of ownership• Inefficient management (poor resource mobilization, poor policy implementation)• Limit the community the available skills needed to effectively operate the system• Lead to a weak or lack thereof democratic principles• Financial constraints due to diminished community sense of ownership
Population increase, poverty & community fatigue	<ul style="list-style-type: none">• Pressure on water system delivery• Diminished community sense of ownership• Destruction to watersheds due to population and increased human activities around water catchment areas

6.3.1 Clanism

Clanism played a significant role in impeding success in two schemes, including AWSS and PWSS. The AWSS is located in the urban district of Kisumu. However, historically before the expansion and immigration of different communities into the area, it has always been perceived that the area belonged to the Kaduong clan. Prior to Kenya's independence in 1963, the Kaduong clan had settled in the area where AWSS is currently located. The surrounding clans like Katieno and Kokuku had always been viewed as foreigners in the area.

Indeed, despite Kisumu's expansion and the dilution of the Kaduong clan by different communities, the perception that the AWSS belongs to the Kaduong clan remains prevalent. In fact, this view is supported by the composition of the scheme's executive committee. In spite of different communities living in the area the executive committee is generally composed of people from the native Kaduong clan. Yet, as a community-owned water scheme, the board should be representative of the people it serves. In one of the transect walk, a female FGD

participant noted that the water needs of persons from outside Kaduung the so called foreigners are typically ignored by the management.

Traces of clanism were also apparent in the Paga Water and Sanitation Scheme (PWSS). The PWSS was meant to serve three sub-locations along the Nyanza gulf which are the Osiri, Kanyawegi and Ojolla administrative sub-locations. After its completion the scheme was networked through the three sub-locations. As per its constitution the management composing of twelve committee members is to be recruited equally from within the three sub-locations. However because of clanism, this requirement has not been periodically honored. The FGD participants observed that whenever there are elections each community always wants to have a majority in the management committee. The following statement by one participant clearly captures how clanism has played a detrimental role in the general operations of the scheme. *“The element of clanism has prevented our water project from getting the right and dedicated people who are prepared to manage this project. Every clan from the three sub-locations wants to have a majority in the management committee. Unfortunately some of the people who vouch for the available twelve posts are driven by the expectation of financial gain. After being in the committee for a few months, they realize that there is no money and thus leave the project hanging”*.

Data from the FGDs further point out that clanism has also affected the effectiveness of the scheme on other fronts. For instance, it has led to poor turnout during meetings, poor policy implementation and poor resource mobilization. In terms of meeting attendance as lamented by one participant, it is imperative to recognize that meetings provide a venue where community members iron out matters affecting their project. However when there is a sense of *“our”* project as often seen in PWSS then not all members will see the project as a community owned project.

On the contrary, they will view it as a given clan's project and hence find no incentive for actively participating in its development. With this policy in place the community felt that only a certain clan from within the community was being targeted for water disconnection. They contend that the policy was never implemented across the board thus making them feel victimized.

Lastly in PWSS, information from our FGDs suggests that unlike the other schemes the element of clanism has made it very difficult for the management to mobilize a new resource base. In our discussions, one of the constraints mentioned as limiting optimal functioning of the scheme was lack of financial capital needed for expansion and improvement. The group mentioned that at one point the main water intake pump from Lake Victoria was damaged and did not operate for six months. When they approached the community for additional financial contribution to repair the pump most of the members were reluctant to participate. However our further in-depth inquiries revealed that the community members were dissatisfied with the structural composition of the management team. Quite a majority of the residents living in the three sub-locations felt that the management team was not democratically elected as per the scheme's constitution. This fact made them feel disenfranchised and for this reason they were reluctant to contribute additional resources.

As observed by various community development scholars' resource mobilization in community operated projects must start with its members. Paul (1987) contended that when that does not take place such projects are bound to fail.

6.3.2 Population Increase, Poverty and Community Fatigue

These three factors can be merged into one theme. As exposed by the FGDs they appear to might have impeded success in the four schemes. PWSS was designed to serve a population of

10,000 people. Currently the population in the area has increased three fold making it impossible to secure sufficient water service delivery to the new ballooned population. The same problem has been experienced in the other three schemes which as of today have a population of 20000, 40000 and 50000 people respectively (SANA, 2014). At their onset these projects were modeled to serve human populations of no more than 15000 people each (SANA, 2014).

Specifically for AWSS, population increase has come along with other problems such as stone and firewood harvesting around Riat hill which is the main watershed for the scheme. Currently, the area is experiencing deforestation which is mainly fueled by poverty, unemployment and the need for firewood. This problem and how it affects the schemes progress was accurately captured in the statement made by the chairman during FGD discussions. He observed that, *“One of the major obstacles which has hindered our growth as a community water service delivery scheme is population increase which is associated to poverty and unemployment. High rate of unemployment in this area has forced people to depend on the water catchment area for survival. They harvest stones from Riat hills watershed which they sell for Kshs 1500 per seven ton truck. Besides this, the youths also engage in charcoal burning which has devastating effects on the forests. The forest cover in Riat hills is getting destroyed up-to the roots because the youths go as far as digging out the tree stumps. For the women, they fetch firewood for sale. These activities if not curtailed is affecting the well-being of our water scheme.”*

Another notable impediment, as perceived by the participants, was community fatigue. In the case of the PWSS, water consumer group FGD participants observed that in the initial stages the project had taken too long to be operational. As a result some members lost interest in the project and were reluctant to contribute money or labor which curtailed the growth of the

scheme. The same problem somewhat manifested in the OWSP and WWSP. In the two schemes community fatigue came as a result of some members becoming dissatisfied with the amount of meetings and the time the meetings were convened. Women felt that there have been too many meetings thus interfering with their daily activities like cooking. On top of this they complained that most meetings were held in the evenings making it difficult for them to attend. At this time of the day they are busy preparing evening meals for their husbands while at the same time preparing children for bed.

6.4 Discussion of Findings

The afore-reported findings echo those of previous researchers. The findings on community partnerships and collaboration provide some empirically-grounded support for the commonly held notion that community partnership and collaboration with other organizations can be a recipe for success in development projects (cf., Uphoff, 1996). Rondinelli and Cheema (1988) observed that community self-help projects have rarely succeeded in places where there is limited support from public agencies or lack of collaboration with other non-governmental organizations. For Rondinelli and his colleagues, such agencies serve several important purposes. Apart from giving additional revenue, they provide skilled training for community leaders. This in turn helps them meet project goals. On their part, Egunjobi and Maro (1985) presented evidence showing how a community drinking water project in Igboho, Nigeria benefited from the additional financial help from the Ministry of Information and Social Development. The community used the money to build additional water reservoir dams. Further support to the findings comes from a study of the Kumbo community water supply project in Cameroon by Njoh (2006). According to Njoh, the project benefited from technical and financial support by the Canadian Development Agency and the Catholic Church.

The revelations on communal ownership of public works are also in concert with those of previous studies. Some of the studies have suggested that at the core of sustainability or success in any community-operated water scheme is the existence of a sense of ownership (see e.g., Kleemeier, 1995, 1998, 2000; Manikutty, 1995a, 1995b). One way to ascertain a community sense of ownership in projects is through active involvement which can be measured through various mechanisms. Most prominent among these are meeting attendances and cash or in-kind contributions (Prokoby 2004, 2005, 2009; Sara & Davis, 2012). Our FGDs data reaffirmed that continuous active community engagement/participation was one of the key variables which influenced success in the four schemes. To begin with, in the case of WWSP most participants contended that at the onset of the project residents were mobilized to contribute funds. All of them responded to this request without resentment or hesitation. They continue to play a big role in providing security to the project assets such as pipes and water kiosks. Because of this, there is a significant reduction in pipe vandalism.

The observation with respect to consumer group formation also echoes previous findings. For instance, Rondinelli (1991) stated that to ensure success in self-help projects, *appropriate and effective processes must be developed for water system operations and maintenance and the process must be institutionalized within the community*. A study by Narayan-Parker (1998) indicated that a five-step process for organizing village water committees contributed to the success of the Mombasa South Coast Hand-pump Project. The first and the second stage involved getting residents to elect water committees who were to act as pump caretakers. This was followed by training the elected committees on pump repair and installation. Lastly, equipping beneficiaries with appropriate operation and maintenance skills which involved helping them know how to balance their accounts books.

Robert Chambers (1994) identified monitoring, evaluations and feedback as important tools, which if appropriately implemented in self-help projects, have the potential for guaranteeing success. These tools can better be presented and/or implemented in water schemes where the management committees possess a high level of sophistication, organizational skills and commitment. Blakely and colleagues (1985) provided an example where good organizational skills and commitment from the committee contributed to the success of the Wonging'ombe rural water supply project in Tanzania. The committee in this project was efficient in dealing with practical matters such as complaints, providing constant feed-back to the funding agency or enticing beneficiaries into owning the project.

Similar observations can be reported in the present study. The findings suggest that another notable contributor to the success of the schemes is good coordination and prudent organization emanating from the management committees. This observation is supported by statements made by the FGDs participants. The treasurer of WWSP commented that the management team has been aggressive in implementing changes in the application process for individual water connection. The process has been made easy, transparent and quicker. In a study which used Mutengene self-help water project as empirical referent, Njoh (2002) discussed barriers to CP in development planning. By using a study by Botes and van Rensburg (2000) as a platform, Njoh identified almost a dozen barriers to CP in development planning. One barrier which hindered success was internal conflicts between members of the native population and non-native population (Njoh, 2002).

In another study in Yemen, Hodgkin (1989) report that maintenance of water points became problematic in communities where there was rampant ethnic and/or class conflict. As a result of such conflicts, communities which shared the same water points found it difficult to

share maintenance responsibilities. Indeed, for some villages water vendors opposed the introduction of community system. As previously stated in this study clanism mainly had negative effects on the success of two schemes namely Paga Water and Sanitation Scheme (PWSS) and Asengo Water and Sanitation Scheme (AWSS). These schemes are located at the edge of the Kisumu municipal urban boundary. The location factor might play a possible role in why in comparison to the other two schemes they are greatly affected by the problem of clanism. Specifically, the main water source in AWSS sits at a region which has been inhabited by the Kaduong clan for over a century and the region somewhat still has a rural outlook. For this reason the community has developed a strong traditional bond with the water source. In fact, as articulated by their chairman, the community sees the main source of water located at the foot of Riat hills as a spiritual gift from God to them. They feel that they ought to guard it and protect it from intruders often considered as foreigners. They have been able to express this feeling through their election patterns which indicates that out of the six executive committee members all of them emanate from the Kaduong clan. Similar attitudes and patterns exist in the PWSS where clanism has also played a negative detrimental role. As showcased by the FGD data, clanism in this scheme has led to poor turnout in community water meetings thus affecting policy implementation and resource mobilization.

Overall, the findings in this chapter has have exposed some of the factors which might have contributed to the success of the studied water schemes. Also identified in the chapter are factors which might have slowed/impeded success. Ideally the issues listed here should be considered for reflection by urban water development specialist in the ever mushrooming informal settlements in Africa. It is however important to recognize the fact that while these

Kisumu informal settlements have some issues that may be unique to their water production and social structure; they can still be used as a generalized example.

7. CONCLUSION

This chapter consists of three sections. Section One discusses the study's contribution to the literature on community participation in water production and management. Section Two discusses the study's limitation. The final section identifies and discusses directions for further research in the field of community participation in urban water production and management.

7.1 Contributions to Literature

The findings from this study make the following contribution to the field of community participation in water service delivery. It build on previous works by employing mixed methods approach and household level data to demonstrate; 1) individual relationships between different participatory variables and beneficiary satisfaction with the work of water management committees which is essential for effective water service delivery, 2) relationships between participation and clean water supply in the informal settlements of Kisumu Kenya which is necessary for waterborne related disease mitigation, and 3) highlight important participation-related factors which affect performance in urban based community operated water schemes. Previous studies have rarely used mixed methods approach and household level data to interrogate the effect of CP in urban water service delivery. Exceptions are the following, White et al (1972) research in East Africa; Briscoe et al (1981; 1990) studies in Bangladesh and Brazil; Asante et al (2002) research in the Ghanaian Volta Basin; Bohm et al (1993) study in the Philippines; Dayal et al (2000) global methodological assessments of rural water supplies in 15 countries; Prokopy (2002) research on rural water supplies in India and lastly Isham & Kahkonen

(1999). It is important to note that most of the afore-listed studies focused their analysis in rural and not urban informal environments.

The second contribution made by this inquiry is that previous studies have used clusters of indicators in ascertaining CP and better outcome in water supplies projects around the world (see, e.g. Kleemeier, 2000; Lockwood, 2003; Narayan, 1995; Prokoby & Thorsten, 2005; Sara & Katz, 1998; WASH, 1994). It is important to acknowledge that such measurement while valid may be masked by the effects of other variables. This study has specifically used *beneficiary satisfaction with the work of the management committee responsible for managing their main source of water* as an indicator of project effectiveness. The responses were then regressed against specific participatory variables in the bivariate model test. The objective was to ascertain which among the variables were associated with consumer satisfaction. The results indicate that households who participate/involved in the schemes activities tend to be more satisfied with the overall work of the management committee responsible for managing their main source of water. To the principle investigators knowledge this is the first attempt to use some direct measures of participation on beneficiary satisfaction with the work of the water management committees.

Third, this study has addressed the fact that despite evidence showing the success of CP in rural water service provisioning, very few studies have evaluated its effects in urban water delivery especially in informal settlements. The broader management model which has often been promoted in urban centers is privatization. However, in the Southern hemisphere it has failed to achieve the benefits previously anticipated and specifically in the case of urban informal environments. It is important to note that informal neighborhoods account for roughly 30 to 60 percent of the urban population. Those who live in these environments are poor and most governments or private companies give lower priorities to issues affecting them. Millions of

people are therefore denied access to clean potable water. Generally, the findings from this study demonstrate that CP can be used as a viable strategy in establishing more effective urban based community managed water schemes tested through consumer satisfaction with the management committee's work. It can also be used as a strategy for enhancing the delivery of clean potable water in urban informal settlement.

Finally, the study shed light into some of the new participation-related factors which may potentially aid or impede the establishment of community urban-based operated water schemes. Previous studies (i.e. Botes & van Rensburg, 2000; Cooke and Kothari, 2001; Njoh, 2002, 2006; Dukeshire & Thurlow, 2002; Platteau & Abraham, 2002; Platteau, 2004; Ngnikam, 2008; Mohammadi, 2010; Swapan, 2014) have highlighted factors such as intra group conflicts, population increase, lack of collaboration and active participation as factors which may aid or impede community operated water projects. The new factors which this study brings to the table are, 1) provision of yearly dividends to the beneficiary community, 2) the formation of water consumer groups, and 3) the establishment of a structured community office complete with salaried staff.

7.2 Study Limitation

The first potential limitation of this inquiry is that it mostly relied on information given by the respondents. However, the four projects used as empirical referent have been in operation for over ten years. There is a possibility that some of the respondents' accounts of events could have been lost due to human forgetfulness.

Another limitation is that most of the respondents were females because during the time of data collection most of the possible male respondents were out working. This might have resulted to some aspects of biasness. However, on the positive side and as argued elsewhere most

of the water related activities are performed by females i.e. fetching of water, washing of storage containers or cooking. In this regard women are an information rich group in studies like this.

The other limitation was the rare incidences of respondent being hesitant to answer some specific survey questions. These included the number of people living in a house, income or level of education. Some respondents felt that these are private questions and should not be disclosed to the public. For this reason the socioeconomic factors which might have been used for further analysis on consumer satisfaction questions have been omitted. Time constraint was another problem which hindered the scope of this study. The research team had three months to collect both quantitative and qualitative data concurrently. The dissertation had to be completed within a tight time schedule. Moreover because of limited time the research team was not able to return to the field to collect additional information after initial data analysis. Despite the limitations, two main possibilities for future research within the academy of community participation in urban water production and management will be put forth.

7.3 Avenues for Future Research

Based on the findings from this dissertation more studies are needed to help in validating the application of community participation as a viable strategy in urban water management. The quantitative results from this study indicate that CP has been very instrumental in the establishment of sustainable community based water schemes in Kisumu informal neighborhoods. Furthermore CP has also been effective in enhancing the delivery of clean potable water supply by promoting better water handling habits among households. In evaluating these benefits, one key question which remains is that more evidence is needed across cities in Africa with similar characteristics like Kisumu.

Other options for interested researchers may include carrying out comparative studies on the effects of CP in urban water provisioning between cities in Africa, Asia or Latin America. A comparative analysis between such cities would help enrich the sharing of knowledge and experiences between different communities. Furthermore such analysis could yield some interesting results considering the cultural differences between communities across the three continents.

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APPENDIX A:
IRB APPROVAL LETTER



RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

4/6/2015

Erick Ananga
USF School of Geosciences
4202 E. Fowler Avenue, NES 107
Tampa, FL 33620

RE: Expedited Approval for Continuing Review

IRB#: CR1_Pro00015949

Title: The Role of Community Participation in Water Production and Management - Lessons from Sustainable Aid in Africa International sponsored Water Schemes in the City of Kisumu Kenya

Study Approval Period: 4/28/2015 to 4/28/2016

Dear Mr. Ananga:

On 4/6/2015, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents outlined below.

Approved Item(s):

Protocol Document(s):

[The Role of Community Participation in Water production and Management](#)

The IRB determined that your study qualified for expedited review based on federal expedited category number(s):

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink that reads "John A. Schinka, Ph.D." The signature is written in a cursive style with a large, prominent 'J' and 'S'.

John Schinka, Ph.D., Chairperson
USF Institutional Review Board

APPENDIX B:

**INFORMED CONSENT FORM TO PARTICIPATE IN HOUSEHOLD
QUESTIONNAIRE SURVEY**

Please read this form carefully and ask any questions you may have before agreeing to take part in this study.

Overall this study is interested in evaluating the role of community participation in water production and management in urban informal settlement. It is part of a dissertation study for Erick Oniango Ananga who is a PhD candidate at the University of South Florida, Tampa Florida United States. If you choose to take part in this study, we will ask you a few questions about water and sanitation services in your community. The total amount of time for you to take part in this study is approximately 30 minutes.

We do not know of any risks from taking part in this research. If we learn of any we will let you know. We do not expect you to individually benefit from taking part in this research and your participation in this study is completely voluntary. You may choose not to take part. If you decide to take part now, you can change your mind at any time. You are free to stop taking part in this study at any time for any reason without penalty. If you decide you do not want to stay in the study, all data related to your participation will be destroyed.

In regards to confidentiality, your name will not appear in any report or publication of the research. Your informed consent form will be safely stored in a locked facility and only the researchers will have access to this information. There is no compensation for participating in this study. If you have questions about the research in general or about your role in the study, please feel free to contact Erick Oniango Ananga telephone number 254722805810 or email erickananga@mail.usf.edu. If you have any questions about your rights as a participant in the study you can call Research Integrity and Compliance at the University of South Florida at 813-974-5638. The USF ID number for this study is Pro00015949. By signing this form you as a participant hereby do accept that you understand the nature of this project and its risks and benefits and have had the opportunity to ask questions and to have your questions answered to your satisfaction. You hereby freely give consent to take part in this research.

Signature of Participant

Name of Participant

Date

Signature of Investigator

Name of Investigator

Date

APPENDIX C:

QUESTIONNAIRE SURVEY

THE ROLE OF COMMUNITY PARTICIPATION IN WATER PRODUCTION AND MANAGEMENT: LESSONS FROM SUSTAINABLE AID IN AFRICA INTERNATIONAL SPONSORED WATER SCHEMES IN KISUMU, KENYA

I am collecting data on behalf of Erick Oniango Ananga who is a PhD candidate at the University of South Florida, Tampa Florida, United States of America. Erick is undertaking a research on the effectiveness of community participation theory in water production and management. Specifically his proposed study will seek to analyze the relationship between community participation and outcomes in the water domain in urban informal settlements in the city of Kisumu, Kenya.

This questionnaire survey will help the study in understanding the context specific effects of community participation in water production and management. Where you live fall within his study area which is serviced by a community water service scheme supported by Sustainable Aid in Africa International (SANA). We would therefore like to request to ask you a few questions about water and sanitation services in your community. Your house has been selected randomly for this survey. The fact that you have been chosen is thus quite coincidental. The information you give to us will be kept strictly confidential and are basically for the study purpose only. Your personal details such as your name and your address will not be shared by anyone else. The interview will take about 30 minutes of your time.

Date of Interview	Day	Month	Year
Time interview commenced	Interviewer ID		
Time interview ended	Data entry ID		

PART 1 – HOUSEHOLD DETAILS

Q1. Water scheme serving the respondent community

1. Wandiege Water and Sanitation Scheme
2. Obunga Water and Sanitation Scheme
3. Asengo Water and Sanitation Scheme
4. Paga Water and Sanitation Scheme

Q2. Gender of the respondent

1. Male
2. Female

Q3. Who is the head of this Household?

1. Husband
2. Wife
3. Female single headed
4. Male single headed
5. Child headed

Q4. How many people live in this house?

1. 1 person
2. 2 persons
3. 3 persons
4. 4 persons
5. 5 persons
6. 6 persons
7. 7 persons
8. More than 7 persons

Q5. How many are

- (a) Male.....
(b) Female.....

Q6. How many of your household members belong to these age categories?

Age Brackets (Years)	No
(a) Day 1 – 10	
(b) 11 - 20	
(c) 21 - 30	

(d) 31 - 40	
(e) 41 - 50	
(f) Above 50	

Q7. What is the respondent highest level of education?

1. No formal education
2. Primary level
3. Secondary level
4. Diploma level
5. University level

Q8. What is the respondent spouse highest level of education?

1. No formal education
2. Primary level
3. Secondary level
4. Diploma level
5. University level
6. Not applicable

Q9. How many years have you been living in this settlement

1. Less than one year
2. 2 – 5 years
3. 6 – 10 years
4. Above 10 years

Q10. What is the household main source of income?

1. Wage employment
2. Artisan/ Blacksmith
3. Salaried employment
4. Trading /small business
5. Other specify.....

Q11. What is the household monthly income?

1. Kshs. 5,000 and below
2. Kshs. 5,001 – 10,000
3. Kshs. 10,001 – 15,000
4. Kshs. 15,001 – 20,000
5. Kshs. 20,001 – 25,001
6. Kshs. Over 25,001
7. Don't know

Q12. What is the household monthly expenditure?

1. Kshs. 5,000 and below
2. Kshs. 5,001 – 10,000
3. Kshs. 10,001 – 15,000
4. Kshs. 15,001 – 20,000
5. Kshs. 20,001 – 25,001
6. Kshs. Over 25,001
7. Don't know

PART 11 – WATER SITUATION IN THE HOUSEHOLD

Please can you tell me the different sources and uses of water for your household, indicate how you perceive its quality and how satisfied you are with the management committee of the water source you often use.

Q13. What is your main source of water?

1. Community managed water kiosk
2. Piped individual community managed
3. Private vendor
4. Borehole
5. Rain Harvesting/roof catchment
6. Well
7. Spring
8. River
9. Lake
10. Other specify.....

Q14. If your main source of water is community managed water kiosk or piped individual community managed scheme then what was your main source of water prior to the implementation of the community water scheme

1. Private vendor
2. Borehole
3. Rain Harvesting/roof catchment
4. Well
5. Spring
6. River
7. Other specify.....

Q15. If your main source of water is community managed water kiosk or piped individual community managed scheme then averagely how long does it take you to fetch water now?

1. 0 – 10 minutes

2. 11 – 20 minutes
3. 21 – 30 minutes
4. More than 30 minutes
5. Don't know

Q16. How long did it used to take you to fetch water prior to the implementation of the community managed water scheme?

1. 0 – 10 minutes
2. 11 – 20 minutes
3. 21 – 30 minutes
4. More than 30 minutes
5. Don't know

Q17. Between 2013 and 2014, what is your perception about water reliability in your community?

1. Improved
2. Same
3. Worse off

Q18. Averagely how much do you pay for water per month?

1. Kshs. 500 and below
2. Between Kshs. 501 and 1,000
3. Between Kshs. 1,001 and 1,500
4. Between Kshs, 1,501 and 2,000
5. Between Kshs, 2,001 and 2,500
6. Between Kshs. 2,501 and 3,000
7. Between Kshs. 3,001 and 3,500
8. Over Kshs. 3,500
9. Free (I don't pay for my water)

Q19. Are you conversant with water tap handling?

1. Yes
2. No

Q20. Is your main source of water reliable?

1. Yes
2. No

Q21. If main water source is not reliable, what is your alternative source?

1. Use storage/reservoir
2. River water
3. Borehole

4. Other (specify).....

Q22. What do you mainly use water for?

1. Domestic
2. Industrial
3. Both

Q23. Have you ever provided paid or unpaid labor to the community managed water scheme in your area?

1. Yes
2. No

Q24. Do you always pay your water bills in time?

1. Yes
2. No

Q25. Are you still willing to continue paying your water bills in time?

1. Yes
2. No

Q26. Are you willing to contribute money or time for an expansion of the community managed water scheme?

1. Yes
2. No

Q27. Has your water supply been interrupted over the past year?

1. Yes
2. No

Q28. If answer to Q27 is yes, how frequently has it been interrupted?

1. More than once a week
2. Once a week
3. Once a month
4. Once in six months
5. Once a year
6. Not applicable

Q29. How long was the interruption the last time it occurred?

1. A few hours
2. A day
3. A few days
4. A week
5. More than a week
6. Not applicable

Q30. What was the cause of interruption?

1. Broken Pipes
2. Dry spell
3. Power disconnection
4. Any other
5. Not applicable

Q31. Have you ever experience pipe vandalism in your community?

1. Yes
2. No

Q32. Are you willing to intervene if you ever experience pipe vandalism in your community?

1. Yes
2. No

Q33. Have you ever attended a public meeting during the last 2 years where water and sanitation service provisioning issues were discussed?

1. Yes
2. No

Q34. Who organized the public meeting?

1. County Government bodies
2. Local municipality
3. Political party/ ward councilors / members of parliament
4. SANA International
5. Local groups
6. Not applicable

Q35. What was the main theme of discussion in the meetings you have ever attended? (**Interviewer: Do not read out options. Let the respondent answer then tick**)

1. Water pricing
2. Addressing consumer complaints

3. Water conflict resolution
4. Improvement of water sources
5. Regulation of the water management committees
6. Developing sustainable and transparent incentives for community water users
7. Water conflict resolution
8. Any other
9. Not applicable

Q36. Did the public meeting lead to any improvement in the water service within the informal settlement?

1. Yes
2. No

Q37. Have you or any member of your household made a complaint about your water supply/quality issues over the past 3 years?

1. Yes
2. No

Q38. Who did you or your household made a complaint to?

1. Municipality
2. Water vendors
3. Landlord/employer
4. SANA International
5. Our selves
6. Not applicable

Q39. What was the result of the complaint?

1. Action taken in a day
2. Action taken in a few days
3. Action taken in a week
4. Action took several weeks
5. Action took more than a month
6. No action taken
7. Not applicable

Q40. Overall, how satisfied are you and your household with the management work of the committee responsible for managing your main source of water?

1. Satisfied
2. Not Satisfied

Q41. Do you have confidence in the people/institution involved in the supply of water and sanitation service in your settlement?

1. Yes
2. No

Q42. Indicate the extent to which you trust or distrust the following institution at present

	Strongly trust	Trust	Neither Trust nor distrust	Distrust	Strongly distrust	Do not Know
a) KIWASCO	1	2	3	4	5	6
b) SANA International	1	2	3	4	5	6
c) Private Water Vendors	1	2	3	4	5	6
d) Land Lords	1	2	3	4	5	6
e) Politicians	1	2	3	4	5	6
f) Kenya Government	1	2	3	4	5	6

PART 111 – HOUSEHOLD WATER AND SANITATION SITUATION

Q43. What is your perception of current access to clean portable water supply in your community?

1. Accessible
2. Not accessible

Q44. How do you perceive the quality of your main source of water?

1. Good
2. Average
3. Poor

Q45. How do you perceive the cleanliness around main water sources in your community?

1. Clean
2. Dirty

Q46. Are you satisfied with the color of your water?

1. Yes
2. No

Q47. Are you satisfied with the smell of your water?

1. Yes
2. No

Q48. Do you clean and cover your water storage containers?

1. Yes
2. No

Q49. Has any member of your household suffered from any of the following water related disease/condition recently (past 6 months prior to data collection)?

1. Cholera
2. Typhoid
3. Scabies
4. Bilharzia
5. None

Q50. If yes did you visit a doctor's clinic?

1. Yes
2. No

Q51. Are you willing to protect areas around water points in your community from contamination?

1. Yes
2. No

Q52. What is your main source of information on water safety system (storage, handling, treatment)?

1. Ministry of water
2. Government of Kenya
3. SANA International
4. Media
5. Other (Specify)

Q53. Do you have a toilet in your household?

1. Yes
2. No

Q54. If yes what type of toilet do you have?

1. Pit latrine outside the house
2. Flush latrine

3. Communal latrine
4. Not applicable

Q55. What is your perception about the status of your toilet?

1. Clean
2. Fair
3. Dirty
4. None

Q56. If your response in Q55 above in NO, then where do you go when you need a toilet?

1. Bush
2. Flying toilet
3. Dig small hole and cover
4. Neighbors toilet
5. Not applicable

Q57. Is there any general comment you may want to add to water situation in your area?

THANK YOU FOR YOUR TIME

APPENDIX D:

INFORMED CONSENT FORM FOR WOMEN FOCUS GROUPS

Major participatory related factors which have influenced or can potentially influence management success or failures of the water schemes

Overall this study is interested in evaluating the role of community participation in water production and management in urban informal settlement. It is part of a dissertation study for Erick Oniango Ananga who is a candidate at the University of South Florida. Specifically for this session we are interested in learning the major participatory related factors which have influenced or can potentially influence management success or failures of the schemes. Having a better understanding of these factors will enable policy makers to devise strategies that will lead to better management of urban based community operated water resources. You are being asked to participate in this discussion because you belong to one of the women groups in the four water schemes selected for the case study. If you choose to take part in this inquiry, we will ask you to engage in a discussion in the form of a focus group of approximately 8 people. You will be required to share your experiences regarding the major participatory related factors which have influenced or can potentially influence management success or failures of the scheme in your community. The focus group will be audio taped and later transcribed for analysis.

We do not know of any risks from taking part in this research. If we learn of any we will let you know. We do not expect you to individually benefit from taking part in this research and your participation in this inquiry is completely voluntary. You may choose not to take part. If you decide to take part now, you can change your mind at any time. You are free to stop taking part in this study at any time for any reason without penalty. If you decide not stay in the study, all data related to your opinion will be destroyed. In terms of confidentiality, your name will not appear in any report or publication of the research. Your consent form will be safely stored in a locked facility and only the researchers will have access to this information. There is no compensation for participating in this study. If you have questions about the research in general or about your role in the study, please feel free to contact Erick Ananga telephone number +254722805810 or email erickananga@mail.usf.edu. If you have any questions about your rights as a participant in the study you can call Research Integrity and Compliance at the University of South Florida at 813-974-5638. The USF ID number for this study is Pro00015949. By signing this form you as a participant hereby do accept that you understand the nature of this project and its risks and benefits and have had the opportunity to ask questions and to have your

questions answered to your satisfaction. You hereby freely give consent to take part in this research.

Signature of Participant

Name of Participant

Date

Signature of Investigator

Name of Investigator

Date

APPENDIX E:

INFORMED CONSENT FORM FOR WATER MANAGEMENT COMMITTEE FOCUS GROUPS

Major participatory related factors which have influenced or can potentially influence management success or failures of the water schemes

The overall objective of this study is to evaluate the role of community participation in water production and management in urban informal settlement. It is part of a dissertation study for Erick Oniango Ananga who is a PhD candidate at the University of South Florida. Specifically for this session we are interested in learning the major participatory related factors which have influenced or can potentially influence management success or failures of the schemes. Having a better understanding of these factors will enable policy makers to devise strategies that will lead to better management of urban based community operated water resources. You are being asked to participate in this discussion because you are in the management committee of one of the four water schemes selected for evaluation. If you choose to take part in this inquiry, we will ask you to engage in a discussion in the form of a focus group of approximately 8 people. You will be required to share your experiences regarding the major participatory related factors which have influenced or can potentially influence management success or failures of the scheme in your community.

We do not know of any risks from taking part in this research. If we learn of any we will let you know. We do not expect you to individually benefit from taking part in this research and your participation in this study is completely voluntary. You may choose not to take part. If you decide to take part now, you can change your mind at any time. You are free to stop taking part in this study at any time for any reason without penalty. If you decide that you do not want to stay in the study, all data related to your participation will be destroyed. In terms of confidentiality, your name will not appear in any report or publication of the research. Your consent form will be safely stored in a locked facility and only the researchers will have access to this information. There is no compensation for participating in this study. If you have questions about the research in general or about your role in the study, please feel free to contact Erick Ananga telephone number 254722805810 or email erickananga@mail.usf.edu. If you have any questions about your rights as a participant in the study you can call Research Integrity and Compliance at the University of South Florida at 813-974-5638. The USF ID number for this study is Pro00015949. By signing this form you as a participant do hereby accept that you

understand the nature of this project and its risks and benefits and have had the opportunity to ask questions and to have your questions answered to your satisfaction.

Signature of Participant

Name of Participant

Date

Signature of Investigator

Name of Investigator

Date

APPENDIX F:
**INFORMED CONSENT FORM FOR WATER CONSUMER FOCUS GROUP
DISCUSSIONS**

**Major participatory related factors which have influenced or can potentially influence
management success or failures of the water schemes**

The overall objective of this study is to evaluate the role of community participation in water production and management in urban informal settlement. It is part of a dissertation study for Erick Oniango Ananga who is a PhD candidate at the University of South Florida. Specifically for this session we are interested in learning the major participatory related factors which have influenced or can potentially influence management success or failures of the schemes. Having a better understanding of these factors will enable policy makers to devise strategies that will lead to better management of urban based community operated water resources. You are being asked to participate in this discussion because you are a member of a water consumer group in one of the four water schemes selected for evaluation. If you choose to take part in this inquiry, we will ask you to engage in a discussion in the form of a focus group of approximately 8 people. You will be required to share your experiences regarding the major participatory related factors which have influenced or can potentially influence management success or failures of the scheme in your community. The focus group will be audio taped and later transcribed for analysis.

We do not know of any risks from taking part in this research. If we learn of any we will let you know. We do not expect you to individually benefit from taking part in this research and your participation in this inquiry is completely voluntary. You may choose not to take part. If you decide to take part now, you can change your mind at any time. You are free to stop taking part in this study at any time for any reason without penalty. If you decide you do not want to stay in the study, all data related to your opinion will be destroyed. In terms of confidentiality, your name will not appear in any report or publication of the research. Your consent form will be safely stored in a locked facility and only the researchers will have access to this information. There is no compensation for participating in this study. If you have questions about the research in general or about your role in the study, please feel free to contact Erick Ananga telephone number +254722805810 or email erickananga@mail.usf.edu. If you have any questions about your rights as a participant in the study you can call Research Integrity and Compliance at the University of South Florida at 813-974-5638. The USF ID number for this study is Pro00015949. By signing this form you as a participant hereby do accept that you understand the nature of this project and its risks and benefits and have had the opportunity to ask questions and to have your

questions answered to your satisfaction. You hereby freely give consent to take part in this research.

Signature of Participant Name of Participant Date

Signature of Investigator Name of Investigator Date

APPENDIX G:

INTRODUCTION SCRIPT AND QUESTIONING ROUTE FOR WOMEN GROUPS FOCUS GROUP DISCUSSIONS

Good morning everybody and welcome to this session of our discussion. My name is Erick Oniango Ananga. I am a PhD candidate at the University of South Florida and I am here with Mrs. Rosemary Moi who is a program coordinator at SANA International. We are grateful for accepting to participate in this Focus Group Discussion (FGD). This study involves gathering information meant for evaluating the role of community participation in water production and management in urban informal settlement. Specifically it is our hope that the information gathered here will increase our knowledge on the major participatory related factors which have influenced or can potentially influence management success or failures of the water schemes established by SANA International in this settlement. Our findings will not only benefit the community here in Kisumu but also other NGOs around the world working on urban water service provisioning.

As a member of a women group in this scheme your experiences and views are very important to us. As you are all aware there are several factors which may influence the success or failures of urban based community managed water schemes so feel free to share your experiences and views even if they are different from other group members.

In order to moderate this discussion in an orderly manner, I will request all the participants to speak one at a time. We request that you select the name you would prefer to use during the entire session of the discussion and place it in front of you. During the discussion if you want to agree or disagree or add an opinion to what a member is saying then do feel free to interject. We request that for the entire session of the discussion, refer to fellow group member with the name they have selected and placed in front of them. The discussion will be audio taped and we request everyone to respect each other's privacy by not disclosing the content of issues addressed here with non-participants. All your views will be confidential and only your chosen names will be included in the final report. The discussion will last approximately one hour. Jacob will be taking notes while I will be listening, asking questions and ensuring that everybody get a chance to participate. Before we proceed I would like everybody to go through the informed consent form supplied and sign it. The informed consent form provides the overall information about the study. Before we begin the discussion I would like to ask if any of the group members

have a question. Questions are addressed after which the tape recorder turned on then the session begins.

Women Group FGD Questioning Route

Opening question

We will start with everybody saying their selected names and their role in the women group serviced by the water scheme.

Introductory questions

I1. How long have you been a member of this women group and what do you enjoy most as a member of a women group serviced by this water scheme?

I2. Since the establishment of the scheme what impacts do you think the scheme has created in this settlement in regards to water service delivery?

Transition questions- What are your opinions as a group about this water schemes as to whether it is a success or failure as a project?

T3. What factors do you think have contributed to the management success of this water scheme?

T4. What factors do you think have impeded or slowed the success of this water scheme?

T5. What factors do you think could have improved the success of this water scheme?

Key Questions

K6. Reflect back and make a list of four of the most important factors you think have influenced the management success of your water scheme. In a few minutes you will have an opportunity to share your views with the other team members.

K7. Again reflect back and make a list of four of the most important factors you think have impeded the management success of your water scheme. In a few minutes you will have an opportunity to share your views with other team members.

K8. Again reflect back and make a list of four most important factors you think could have improved the success of this water scheme

Ending question

E11. Our discussion of today was meant to help us understand factors which have influenced or can potentially influence management success or failures of the water schemes. Before we conclude the discussion I would like to invite anyone who may want add anything we may have missed.

APPENDIX H:

INTRODUCTION SCRIPT AND QUESTIONING ROUTE FOR WATER MANAGEMENT COMMITTEES FOCUS GROUP DISCUSSIONS

Good morning everybody and welcome to this session of our discussion. My name is Erick Oniango Ananga. I am a PhD candidate at the University of South Florida and I am here with Mr. Jacob Ochola who is a program coordinator at SANA International. We are grateful for accepting to participate in this Focus Group Discussion (FGD). This study involves gathering information meant for evaluating the role of community participation in water production and management in urban informal settlement. Specifically it is our hope that the information gathered here will increase our knowledge on the major participatory related factors which have influenced or can potentially influence management success or failures of the water schemes established by SANA International in this settlement. Our findings will not only benefit the community here in Kisumu but also other NGOs around the world working on urban water service provisioning.

Your experiences and views are very important to us because most of you have worked in this water scheme since its establishment. There are several factors which may influence the success or failures of urban based community managed water schemes so feel free to share your experience even if it is different from other group members.

In order to moderate this discussion in an orderly manner, I will request all the participants to speak one at a time. We request that you select the name you would prefer to use during the entire session of the present discussion and place it in front of you. During the discussion if you want to agree or disagree or add an opinion to what a member is saying then do feel free to interject. We request that for the entire session of the discussion refers to fellow group member with the name they have selected and placed in front of them. The discussion will be audio taped and we request everyone to respect each other's privacy by not disclosing the content of issues addressed here with non-participants. All your views will be confidential and only your chosen names will be included in the final report. The discussion will last approximately one hour. Jacob will be taking notes while I will be listening, asking questions and ensuring that everybody get a chance to participate.

Before we proceed I would like everybody to go through the informed consent form supplied and sign it. The informed consent form provides the overall information about the

study. Before we begin the discussion I would like to ask if there are any questions. Questions are addressed after which the tape recorder turned on then the session begins.

Water Management Committee FGD Questioning Route

Opening question

We will start with everybody saying their selected names and their role in the water management committee in this scheme.

Introductory questions

I1. How long have you been a member of this management committee and what do you enjoy most as a member of the management committee serviced by this water scheme?

I2. Since the establishment of the scheme what impacts do you think the scheme has created in this settlement in regards to water service delivery?

Transition questions- What are your opinions as a management committee about this water schemes as to whether it is a success or failure as a project?

T3. What factors do you think have contributed to the management success of this water scheme?

T4. What factors do you think have impeded or slowed the success of this water scheme?

T5. What factors do you think could have improved the success of this water scheme?

Key Questions

K6. Reflect back and make a list of four of the most important factors you think have influenced the management success of your water scheme. In a few minutes you will have an opportunity to share your views with the other team members.

K7. Again reflect back and make a list of four of the most important factors you think have impeded the management success of your water scheme. In a few minutes you will have an opportunity to share your views with other team members.

K8. Again reflect back and make a list of four most important factors you think could have improved the success of this water scheme

Ending question

E11. Our discussion today was meant to help us understand factors which have influenced or can potentially influence management success or failures of the water schemes. Before we conclude the discussion I would like to invite anyone who may want to add anything we may have missed.

APPENDIX I:

INTRODUCTION SCRIPT AND QUESTIONING ROUTE FOR WATER CONSUMER GROUP FOCUS GROUP DISCUSSIONS

Good morning everybody and welcome to this session of our discussion. My name is Erick Oniango Ananga. I am a PhD candidate at the University of South Florida and I am here with Mr. Jacob Ochola who is a program coordinator at SANA International. We are grateful for accepting to participate in this Focus Group Discussion (FGD). This study involves gathering information meant for evaluating the role of community participation in water production and management in urban informal settlement. Specifically it is our hope that the information gathered here will increase our knowledge on the major participatory related factors which have influenced or can potentially influence management success or failures of the water schemes established by SANA International in this settlement. Our findings will not only benefit the community here in Kisumu but also other NGOs around the world working on urban water service provisioning.

As an official of the water consumer group in this scheme your experiences and views are very important to us. As you are all aware there are several factors which may influence the success or failures of urban based community managed water schemes so feel free to share your experience even if it is different from other group members.

In order to moderate this discussion in an orderly manner, I will request all the participants to speak one at a time. We request that you select the name you would prefer to use during the entire session of the discussion and place it in front of you. During the discussion if you want to agree or disagree or add an opinion to what a member is saying then do feel free to interject. We request that for the entire session of this discussion you should refer to fellow group member with the name they have selected and placed in front of them. The discussion will be audio taped and we request everyone to respect each other's privacy by not disclosing the content of issues addressed here with non-participants. All your views will be confidential and only your chosen names will be included in the final report. The discussion will last approximately one hour. Jacob will be taking notes while I will be listening, asking questions and ensuring that everybody get a chance to participate.

Before we proceed I would like everybody to go through the informed consent form supplied and sign it. The informed consent form provides the overall information about the

study. Before we begin the discussion I would like to ask if any of the group members have a question. Questions are addressed after which the tape recorder turned on then the session begins.

Water Consumer Groups FGD Questioning Route

Opening question

We will start with everybody saying their selected names and their role in the water consumer group in this scheme.

Introductory questions

I1. How long have you been a member of this water consumer group and what do you enjoy most as a member of the consumer group serviced by this water scheme?

I2. Since the establishment of this scheme what impacts do you think it has created in this settlement in regards to water service delivery?

Transition questions- What are your opinions as a consumer group about this water scheme as to whether it is a success or failure as a project?

T3. What factors do you think have contributed to the management success of this scheme?

T4. What factors do you think have impeded or slowed the success of this water scheme?

T5. What factors do you think could have improved the success of this water scheme?

Key Questions

K6. Reflect back and make a list of four of the most important factors you think have influenced the management success of your water scheme. In a few minutes you will have an opportunity to share your views with the other team members.

K7. Again reflect back and make a list of four of the most important factors you think have impeded the management success of your water scheme. In a few minutes you will have an opportunity to share your views with other team members.

K8. Again reflect back and make a list of four most important factors you think could have improved the success of this water scheme

Ending question

E11. Our discussion today was meant to help us understand factors which have influenced or can potentially influence management success or failures of the water schemes. Before we conclude the discussion I would like to invite anyone who may want to add anything we may have missed.

APPENDIX J:

BACKGROUND INFORMATION FOR ALL FOCUS GROUP DISCUSSION PARTICIPANTS

Participants Information Sheet

1. What is your chosen name for this discussion
2. What is the name of the scheme serving your community?
 5. Wandiege Water and Sanitation Scheme
 6. Obunga Water and Sanitation Scheme
 7. Asengo Water and Sanitation Scheme
 8. Paga Water and Sanitation Scheme
3. What is your age.....
4. How many people live in your household
 1. 1 person
 2. 2 persons
 3. 3 persons
 4. 4 persons
 5. 5 persons
 6. 6 persons
 7. 7 persons
 8. More than 7 persons
5. What is your highest level of education?
 1. No formal education
 2. Primary level
 3. Secondary level
 4. College level
 5. University level
6. What is your main source of income
 1. Wage employment
 2. Artisan/Blacksmith
 3. Salaried employment
 4. Trading/Small business
 5. Other specify
7. How long have you been a member of this women group/ Water consumer group or Ware Management Committee in this Scheme?
 1. One year and less
 2. 2 to 3 year
 3. 4 to 50 year
 4. Over 5 years
8. How many years have you been living in this settlement
 1. One year and less

2. 2 - 5 years
3. 6 - 10 years
4. Above 10 years

ABOUT THE AUTHOR

I consider myself an International Development Planner/Human Geographer whose research focuses on Water and Sanitation issues in the developing world. I received a Bachelor's of Arts Degree in International Development Studies with Economics major at the University of East Anglia Norwich UK. I also hold a Master of Arts in Politics and International Development from the University of East Anglia. My doctoral dissertation which is reported here involved examining the tenability of community participation (CP) theory in explicating water production and management dynamics in urban informal settlements. My research is inspired by the fact that in the developing world adequate water provisioning in urban centers still remains an elusive problem.

While pursuing a Ph.D. degree at the University of South Florida, I have also been involved in several collaborative works. Apart from research, I have also been teaching as well as being involved in curriculum course development. I have taught World Regional Geography both the in class and online version of the course. I have also taught introduction to Environmental Sciences, Global Conservation and Global Environmental Perspectives. The interdisciplinary nature of my academic background and experience has equipped me well with the ability to teach courses in different disciplines. I can teach courses in geography, environmental sciences, international development, public policy, urban planning and politics.