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„Intentions compared to observed processes and effects:
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Abstract

This thesis analyzes the process and effects of a Research for Development project in Rakai, Uganda, using data collected during a research stay in the field during the summer of 2013. In the course of the WATERCAP project, agricultural trainings were conducted with farmer groups in order to achieve enhanced water management among the farmers. For this purpose, rainwater harvesting tanks were built on selected farmers' properties.

The aim of the author's research was to compare the project's conceptualization of processes and effects with her own observations as well as with the perceptions of the farmers and project staff. For this purpose, qualitative interviews with the project's stakeholders were conducted. This allowed for a comparison of actors' views and made it possible to understand values underlying stakeholders' actions. It was assessed if processes took place in a participatory manner and how the project impacted water management practices within the farmer groups. The epistemological interest was to develop an understanding of the complexity and change mechanisms that determine project processes and effects.

From a perspective of innovation in Complex Adaptive Systems (CAS), decision making and communication processes were assessed. The results show that the planned establishment of an innovation platform (IP) was not fully accomplished. As a consequence, institutionalized mechanisms for decision making and communication were not in place which challenged the participation especially of the farmers. Concepts and mechanisms such as participation and IPs had not been fully characterized beforehand which led to misunderstandings in the course of project implementation. A relation between sense of ownership and participation in decision making was found, with ownership being stronger among the group with opportunities to influence than among those groups who were informed on decisions made by others. Regarding communication, the facilitation of formal exchange among stakeholders to adjust expectations, discuss challenges and be informed on processes was not systematically implemented. The absence of a full IP in place impeded a more effective monitoring, mutual learning and decision making at all times as the project would have intended.

Regarding the project's effects, the intended effects varied from the ones observed in the field. While the project aimed at enhancing commercial production through the water tanks,

the observed effects were rather related to farmers' basic needs such as water access and nutrition. Something that can be learned from this assessment is the importance of stakeholders' mutual identification of desired effects in order to produce realistic outcomes and integrate the needs of stakeholders.

The discrepancy between the intentions of the project outline on the one hand and the observed processes and effects in the field on the other hand, gave some indication as to how much impact the social processes within a development project have on its outcome. At project level, the study shows that the possibility to facilitate an open-ended process in the current system of research for development is limited. As the project itself is part of a structured reality, set requirements such as duration, budget and deliverables can jeopardize open innovation processes.

Keywords: participation, innovation system, innovation platform, farmer groups, water vulnerability, climate change

Kurzfassung

Diese Arbeit bezieht sich auf ein Projekt im Rahmen von Forschung für Entwicklung in Rakai, Uganda. Die der Arbeit zugrundeliegenden Daten wurden im Sommer 2013 bei einem Aufenthalt vor Ort in Uganda erhoben. Im Verlauf des WATERCAP Projekts wurden Schulungen mit Mitgliedern von LandwirtInnen-Gruppen durchgeführt, deren Zweck es war, deren Wassermanagement zu verbessern. Zu diesem Zweck erhielten einige der LandwirtInnen Auffangtanks für Regenwasser.

Ziel der Forschung der Autorin war es, konzeptionelle Prozesse und erwartete Effekte mit Beobachtungen vor Ort sowie Wahrnehmungen der LandwirtInnen und ProjektmitarbeiterInnen zu vergleichen. Dafür wurden qualitative Interviews mit AkteurInnen des Projekts durchgeführt. Diese Interviews ermöglichten einen Vergleich unterschiedlicher Ansichten der AkteurInnen und dadurch ein Verständnis für die Werte, die den Handlungen der AkteurInnen zugrunde lagen. Es wurde erforscht ob Prozesse partizipativ abliefen und wie sich das Projekt auf die Wasserhandhabung der Gemeinschaft auswirkte. Das Erkenntnisinteresse der Arbeit bestand darin ein Verständnis für die Komplexität und Mechanismen für Wandel zu entwickeln, die die Prozesse und Auswirkungen des Projekts beeinflussen.

Vor dem theoretischen Rahmen komplexer adaptiver Systeme (CAS) wertet die Arbeit die Entscheidungs- und kommunikativen Prozesse im Zusammenhang mit der Einführung der neuen Wassermanagement-Technologie aus. Die Ergebnisse belegen, dass der geplante Aufbau einer Innovationsplattform (IP) nicht ausreichend gelungen ist. In der Folge fehlten institutionalisierte Mechanismen als Grundlage für Entscheidungsfindungen und Kommunikation im Projekt. Die Partizipation insbesondere der LandwirtInnen wurde dadurch aufs Spiel gesetzt. Eine zu kurz greifende Beschreibung des zugrundeliegenden Konzepts und seiner Intentionen wie die Aspekte Partizipation und IP führte zu Missverständnissen während der Durchführung des Projekts. Die Verbindung zwischen einem Verantwortungsgefühl für das Projekt und der Teilhabe an Entscheidungsprozessen wurde in den Interviews deutlich, dabei war das Verantwortungsgefühl in der Gruppe mit größeren Einflussmöglichkeiten auf den Projektverlauf prägnant höher als in den Gruppen, die über Entscheidungen lediglich durch die Projektmitarbeiter unterrichtet wurden. Die Kommunikation zwischen den WATERCAP Akteuren wurde nicht systematisch gefördert

im Sinne von offiziellen Möglichkeiten zum Austausch um regelmäßig Erwartungen abzugleichen, Problematiken zu klären und die Projektabläufe transparent zu machen. Das Fehlen einer funktionierenden IP erschwerte ein effektiveres Monitoring, ein einheitliches gemeinsames Lernen und nachhaltige Entscheidungsprozesse, wie sie in der Konzeption für das Projekt vorgesehen waren.

Die beobachteten Ergebnisse des WATERCAP Projekts unterschieden sich von den im Projektplan beabsichtigten Zielen. Während eine Weiterentwicklung der kommerziellen Gemüseproduktion durch Bereitstellung der Wassertanks ein primäres Projektziel war, nutzten die LandwirtInnen die Verbesserung ihres Wassermanagements vorrangig um ihre Grundbedürfnisse zu stillen, wie leichteren Zugang zu Wasser und Ernährung. Aus dieser Beobachtung kann gelernt werden, wie wichtig die Identifikation erwünschter Effekte durch alle Beteiligten ist, um realistische Ziele unter Berücksichtigung der Bedürfnisse von Akteurinnen ist.

Die Abweichungen zwischen den Projektvorhaben auf der einen und den beobachteten Prozessen und Auswirkungen vor Ort auf der anderen Seite deuten an, wie stark die Resultate von Entwicklungsprojekten von sozialen Faktoren beeinflusst werden. Auf Projektebene zeigt die Studie, dass die Möglichkeiten zu ergebnisoffenen Prozessen im momentanen System von Forschung für Entwicklung begrenzt sind. Als Teil von Projekten beschränken Anforderungen wie zeitliche und budgetäre Beschränkung sowie geforderte Arbeitsergebnisse die Entfaltung offener Innovationsprozesse.

Schlagworte: Partizipation, Innovationssystem, Innovationsplattform, LandwirtInnen-Gruppen, Wasserverwundbarkeit, Klimawandel

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List of Acronyms

AIDS	Acquired Immunodeficiency Syndrome
AIS	Agricultural Innovation System
BOKU	University of Natural Resources and Life Sciences, Vienna
CAS	Complex Adaptive System
CM	Caritas MADDO
HIV	Human Immunodeficiency Virus
IP	Innovation Platform
NGO	Non-Governmental Organization
WM	WATERCAP Makerere

1. Introduction

This thesis assesses the social processes and effects of a research for development project in Rakai, Uganda. The project cooperated with farmer groups and included agricultural trainings and the construction of rainwater harvesting tanks. The overall aim of this research was to compare the initial conceptualization of processes and effects with an empirical assessment of project processes and outcomes, particularly in the farmer community. The study thus contributes to the understanding of complexity and change in a social system regarding the sustainable management of natural resources such as water.

Chapter two summarizes the broader context of the research. In this chapter, current challenges faced by Ugandan farmers especially due to climate change are discussed. Moreover, an overview on the literature concerned with participation in water projects is given. This outline is the basis for formulating the study's objectives and research questions.

Chapter three outlines the conceptual framework of the study and includes literature on concepts of complex adaptive as well as innovation systems, innovation platforms and participation. Based on a guide for reflexive monitoring and evaluation, an analytical framework for the empirical application of the theories is developed.

Chapter four comprises of the methods used for field research and data analysis. In this chapter, detailed descriptions of the study site and the project case are also given.

Chapter five presents the results and discussion regarding (1) the conceptualization of processes and effects and (2) regarding the empirical assessment of processes and outcomes. The first sub-chapter addresses decision making and communication processes, the second sub-chapter reports on project effects regarding water management, gardening and commercial production.

Chapter six contains the conclusions drawn from the study.

Overall, the research is a reflection on how water management can be improved in a socially accepted and sustainable manner in order to improve the livelihoods of smallholder farmers.

2. Development Challenge and Research Context

2.1 Development Challenge

Uganda is a landlocked country in East-Central Africa bordering Kenya, Tanzania, Rwanda, the Democratic Republic of Congo and South Sudan (CIA n.d.). About 45 percent of Uganda's land area is used as farmland with an average farm size of 2 to 3 hectares. In Uganda, there are 3 million farm households. 42 percent of the total land area is used as subsistence farmland, making subsistence farming based on family labor the main form of farming (UNDP 2007: 72, Alroe et al. 2006: 103).

Almost 40 percent of Uganda's gross domestic product (GDP) is generated by primary agricultural activities at or near the source of production and primary marketing. Cash crop production contributes 4 percent, food crop production about 25 percent, livestock rearing about 5 percent. Primary agricultural activities furthermore constitute 70-80 percent of export earnings, cover nearly all domestic food needs and supply most raw materials used in local industries (UNDP 2007: 73f).

However, in 2002/2003, approximately 42 percent of Uganda's rural population lived in absolute poverty (Walaga, Hauser 2005: 68) meaning that they live from less than 1,25 US\$ per day measured in purchasing-power parity (Gabler Wirtschaftslexikon n.d.). This underlines that the condition of Uganda's agricultural sector is not only crucial for the country's economy but also for the livelihoods of the 3 million farm households.

Among the main social and economic obstacles to the development of Uganda's agricultural sector are limited export markets, poor infrastructure and over-dependence on single food crops (Apuuli et al. 2000: 149). Furthermore, Uganda's subsistence farmers oftentimes lack access to credits, technical inputs or information on farming (Walaga, Hauser 2005: 67). This, in turn can lead to food shortages at certain times of the year due to low yields and small farm sizes. Meanwhile, the pressure on land is increasing due to the growing population that makes traditional practices like slash and burn or shifting cultivation impracticable. The result is an overuse of land which then leads to degraded soils and decreasing agricultural productivity which again threatens the food security of the farmers (ib.: 69f).

The major ecological threat to the health of Uganda's agricultural system in the next decades will be climate change. With changing seasons, unpredictable rainfall and resulting flooding and water shortages, farming becomes increasingly challenging (UNDP 2013: 8). Unreliability and variability in rainfall is one of the main obstacles to Uganda's agricultural development (Apuuli et al. 2000: 149). In addition to the ecological threat, climate change also "has the potential to exacerbate conflict, cause humanitarian crises, displace people, destroy livelihoods and set-back development and the fight against poverty" (UNDP 2013: 4). As a consequence, adaptation, defined as human responses to complex challenges, becomes increasingly necessary in, requiring adaptation both on technical and institutional levels (Leeuwis, Hall 2010: 5f).

So-called developing countries such as Uganda can be more vulnerable to climate change due to the high baseline temperatures, greater exposure to extreme weather events, the great economic role of agriculture and lack of funds compensating for damage and losses due to climate change (Fischer et al 2005: 2067). The adaptation of agricultural practices to climate change, for example by increasing the capacity to handle water stress, will be crucial for the food security and socio-economic development of the country.

2.2 Research Context and Justification

This research is concerned with is a sub-project of WATERCAP. The parental WATERCAP project was a cooperation among a Ugandan, a Kenyan and an Austrian university, coordinated by the African universities consortium RUFORUM. The aim of WATERCAP was to generate lessons from its sub-projects in Uganda and Kenya on decreasing farmers' water vulnerability related to climate change. The lessons were then intended to be integrated into universities' curricula.

Agriculture, and in particular the related challenge of a changing climate has played an increasing role in research for development in the past several years. The World Development Report 2008 described smallholder agricultural growth as an effective mechanism for poverty reduction. The report also stressed that the productivity of irrigated land is more than twice as high as the productivity of rainfed land. Hence, the continuous

access to water can be seen as crucial for improving agricultural strategies, especially due to unpredictable rainfall patterns emerging in the course of climate change (World Bank 2007: 6ff).

In development programs and projects working with farmers, participatory and demand-driven approaches as opposed to linear ‘transfer of technology’ have gained popularity and influence particularly since the 1990s. Viewing farmers as innovators whose knowledge is indispensable for projects intending long-term improvements of livelihoods has become mainstream since the ‘Farmer First movement’ (Ed.: Chambers 1989). This movement is “a loose and diverse coalition of people, networks and organizations committed to developing, promoting and sharing bottom-up, farmer-centred approaches to technology development for agriculture” (Scoones, Thompson 2009: 4). It is characteristic to participatory approaches that stakeholders from early stages of the project on are supposed to take ownership of the process, technology uptake and sustainability (Chambers 1983; Narayan 1995; Glenzer et al. 2011).

The Farmer Participatory Research promoted by the Farmer First movement was refined into people-centered Innovation and Learning from the 2000s on. This approach was an attempt towards a more holistic integration of agricultural research and development, not limiting its focus to farmers and technologies but seeing them as part of multi-stakeholder processes. Innovation in these networks is considered to require multi-level changes (Scoones, Thompson 2009: 6f).

The need for projects to be demand-driven, participatory and holistic equally applies to the domain of rural water supply. Although the idea of rainwater harvesting as a means to especially support small-scale rainfed agriculture in countries of the global south is not new, it has become evident that technical implementation alone does not ensure a profound and lasting change of water use. Thus, despite the positive impact rainwater harvesting techniques can have on agriculture, the rate of adoption is often low (cf.: Ngigi 2003). Because “[r]ural water supply interventions have historically suffered from high rates of failure” (Armstrong et al. n.d.), already in the 1990s a broad agreement emerged on the importance of water infrastructure projects being demand-driven as well as community-led (Armstrong et al n.d.).

Despite the growing body of literature on participation and an increasing evidence on its importance to meet the actualities and demands of farmers, the paradigm of top-down research and transfer of technology practices is still deeply rooted in many researchers' and practitioners' mindsets (Chambers 2009: xxii). In this context, the popularity of concepts such as participation and empowerment makes it increasingly difficult to tell apart participatory projects from the ones using the label only (cf. Pretty 1995; Scoones, Thompson 2009). It is crucial for the reflection of research for development projects to understand why participation, espoused in theory and project proposals, does not easily translate into according action or outcomes. Such an understanding could be developed by taking on an innovation system perspective, enabling to view stakeholders as part of a network and to identify structural constraints as well as constraints relating to individual interests and positions. It is in this context that the research for this thesis was conducted.

2.3 Objectives

2.3.1 General Objective

The thesis' general objective is to understand the social processes around the WATERCAP project in Rakai and its effects on water management practices in the community. The research contributes to project internal learning and generally to the understanding of challenges arising when concepts and plans are turned into action.

2.3.2 Specific Objectives and Research Questions

The thesis compares the project's conceptual outline with observed processes and effects. The comparison includes aspects of actors and their linkages, decision making processes, communication and power relations. The thesis is concerned with the question of participation as well as empowerment of the participating farmers and the effects the project had on water management in Bigando village, Rakai, Uganda.

The underlying assumptions behind the research were that

- Long-term behavioral change requires corresponding knowledge, capabilities and skills and not solely the implementation of a technology
- The long-term adaptation of new technologies within a social system requires participation of all stakeholders and compatible motivations regarding a project's processes and effects
- The apprehended ownership of decisions is related to the level of participation of the involved stakeholders in decision making processes

Based on the specific objectives and the assumptions the research questions read as follows:

How were project concepts regarding processes and effects translated into action within the WATERCAP project in Rakai, Uganda?

Hence the sub-questions are:

Q1: How do conceptualizations of decision making and communication differ from observed processes in the project?

Q2: How do conceptualizations of effects on water management, gardening and commercial production differ from observed effects in the project?

3. Conceptual Framework

3.1 Underlying Theories

The conceptual framework combines theories of complex systems, participation and empowerment of farmers which are applicable to the rural and agricultural setting of the parental project.

Both the Complex Adaptive System (CAS) and the Agricultural Innovation System (AIS) approaches understand change as a multi-factor, multi-actor and multi-level process (Spielman et al. 2009: 400). The AIS approach recognizes the importance of new knowledge for long-term behavioral change and includes all actors of a system in the analysis of innovation. Viewing agriculture as a complex system recognizes that linear knowledge or technology transfer cannot be sufficient and appropriate for a long-term adaptation of strategies in the agro-ecosystem.

For decades, linear approaches of technology transfer were the predominant model in agricultural development (Nederlof et al. 2011a: 7). Since technology and information transfer have often failed at improving the livelihoods of the so-called “beneficiaries”, alternative approaches that involve the perspectives, knowledge and needs of smallholder farmers are urgently needed.

In order to accommodate the complexity of the agro-ecosystem and social interactions within projects, a process-based systems approach was adopted for this study (comp. Spielman et al. 2009: 399f). The conceptual framework furthermore incorporates literature on innovation platforms (IPs) since the establishment of such a platform on site was the declared goal of the project proposal. The study refers largely to Nederlof et al. (2011a) regarding the theoretical justification and practical implementation of IPs. The study by Nederlof et al (2011a) was also central to the proposal of the parental project.

Considering the multi-actor character of AIS, the importance of participation becomes evident. Literature on participation and empowerment has stressed the importance of farmers’ participation both for their sense of ownership and the sustainability of projects. The ‘Reflexive Monitoring in Action’ guide by van Mierlo et al. (2010) structures the indicators into effects and processes (van Mierlo et al. 2010: 69).

Complex Adaptive Systems

Complex Adaptive Systems (CAS) are used both in natural and social sciences to understand the characteristics and dynamics of systems such as physical, ecological or socio-economic systems (Rammel et al. 2007: 10).

CAS posits that all components of a system are interconnected and that a system is more than the sum of its components. The continuous interchange of information and resources between the system's components shapes the behavior and learning of the system (Hall, Clark 2010: 9f; Holland 2006: 1). "Behavior patterns in this type of system often emerge from independent, spontaneous, or unintended processes that render conventional, mechanistic modes of analysis quite useless." (Spielman et al. 2009: 400) Thus, the approach views self-organizing systems as entities that act according to their own logic and in an evolutionary manner, meaning that they are in a constant process of change and do not behave in a linear way (Hall, Clark 2010: 9f; Spielman et al. 2009: 400). This 'evolving structure' of systems that adopt to problems in their surrounding make them difficult to understand or control (Holland 1992: 18).

Part of the system's evolution is the constant knowledge flow entering and modifying the system's behavior (Hall, Clark 2010: 11). The complexity of CAS is rooted in the interaction among the system's elements (Holden 2005: 654).

Approaches based on CAS have recently gained prominence in rural development, which Hall and Clark (2010: 24) designate as enabling "a new range of options for supporting innovation and change."

Agricultural Innovation Systems

Agricultural Innovation Systems can be considered a specific type of *Complex Adaptive Systems*, applying the concept to agricultural ecosystems. AIS conceptualizes innovation as being the result of interactive learning and networking among heterogeneous stakeholders of a social system with different sorts of experience and knowledge (Klerkx et al. 2010: 1; 9). An analysis of AIS first requires a definition of the term innovation. According to Spielman et al. (2009), an innovation means "successfully integrating a new idea or product into a process that includes technical, economic and social components." (Spielman et al. 2009: 400)

Hall et al. (2006) define an innovation system “as a network of organizations focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance.” (Hall et al. 2006: 16). AIS also comprise rules and norms as well as learning processes (Spielman et al. 2009: 399). Within such a system, innovation is characterized by a process and result of deliberation among different stakeholders (Klerkx et al. 2010: 2). Hence, the concept of AIS can be used to analyze the way knowledge is generated, exchanged and used by communities (Spielman et al. 2009: 399).

Having emerged in the 1980s and rooting in systems theory as well as evolutionary economics, the innovation system’s approach has later been adapted to the field of agriculture in so-called developing countries (Spielman 2005: 6). At the practical level, AIS represents a recent approach to further the development of agricultural innovation capacity. Earlier approaches to strengthen innovation capacity were the support of National Agricultural Research Systems (NARS) and the more recent approach of Agricultural Knowledge and Information Systems (AKIS). While NARS represented a conventional transfer of technology approach from science to farmers, AKIS’ focus was on technology adoption combined with innovation in the agricultural domain. Other than NARS and AKIS, AIS puts a strong focus on market integration and the strengthening of linkages among all stakeholders both in the public and private sector that relate to knowledge relevant to agriculture and attempts to integrate farmer knowledge with scientific knowledge (Hall 2009: 32f).

The AIS approach takes into account the interactions of various actors, learning processes, institutions, policies etc. involved in the sector (Spielman 2005: 10; Spielman et al. 2009: 399f). Innovations in the agricultural context are not reduced to technological change but include institutional change. Adaptability on an institutional level is seen as a way of supporting learning, innovation and interaction (Hall et al. 2006: 23). According to Nederlof et al. (2011a) “[t]he innovation systems approach has above all a developmental guiding agenda and stresses the process instead of the final product, given the fact that technological innovations are successful when the appropriate context is being provided for.” (Nederlof et al. 2011a: 12)

To create an environment that enables improved interaction among different stakeholders as anticipated in the AIS framework, the concept of innovation platforms has been developed. (Nederlof et al. 2011a: 14)

Innovation Platforms

Nederlof et al. (2011a) derive their definition of innovation platforms from the Forum for Agricultural Research in Africa (FARA), one of the institutions that established IPs in the African agricultural sector (Nederlof et al. 2011a: 7). IPs are a tool for interaction or “[...] a set of stakeholders bound together by their individual interests in a shared issue, challenge or opportunity, intending to improve livelihoods, enterprises and/or other interests.” (Nederlof et al. 2011a: 14) Although stakeholders can have different interests, they need to share an objective such as finding a solution for livelihood challenges through mutual action. The shared objective is supposed to be realistic, tangible and achievable and depends on the challenge, geographical level or sector around which an IP forms. Characteristics of IPs include participation and transparency which can be instrumental in “empowering their members to clearly express (and try to attain) their ideas and interests.” (Nederlof et al. 2011a: 16) IPs can furthermore be dynamic in regards to members and their roles as well as the IPs’ focus that can shift over time. Despite these dynamics IPs need rules for decision making and the management of conflicts. The specific design of IPs depends on the issues and opportunities that are encountered. National and international IPs tend to evolve around policy development and at the local level, IPs “tend to focus on improving practices through joint experimentation and linking of farmers to markets and other stakeholders.” (Nederlof et al. 2011a: 16)

Participation

There is no single definition of participation. Narayan (1995) points out that various definitions include the idea of power sharing and redistribution as well as increased control, benefits and knowledge for stakeholders by taking part in decision making (Narayan 1995: 7). Narayan herself defines participation as "a voluntary process by which people, including the disadvantaged (in income, gender, ethnicity, or education), influence or control the

decisions that affect them. The essence of participation is exercising voice and choice.” (Narayan 1995: 7) In the context of development projects, participation can be understood as the involvement of local people “in a development process leading to change” (Tufte, Mefalopulos 2009: 4). Participation occurs as community members take responsibility for the management of mutual problems by identifying those problems, followed by developing and implementing responsive actions (Zadeh, Ahmad 2010: 13).

In the context of participation in agricultural development two schools of thought and practice can be identified. One approach views farmer participation as a means for improved efficiency, believing that participating people support and sustain the new technology or service that is to be implemented (Pretty 1995: 1251). This approach is at times referred to as the *project-based* or *institutional perspective* with the tool of participation helping to achieve “a pre-established goal defined by someone external to the community involved.” (Tufte, Mefalopulos 2009: 4) In the other approach, participation constitutes a right of people “in which the main aim is to initiate mobilization for collective action, empowerment and institution building.” (Pretty 1995: 1251) For this *social movement perspective* “participation itself can be a goal as an empowering process.” (Tufte, Mefalopulos 2009: 4)

In the history of agricultural development, participation has not always been a central concept. The Farmer First workshop (1987) summarized by Chambers et al. (1989) was a transdisciplinary collaboration of social and natural scientists addressing the role of farmers in development processes. It is considered “a key moment in the development of approaches to farmer participation in agricultural research and extension” (Scoones, Thompson 2009: 3). Farmer First was followed by two further workshops and publications on the same issue. The publications *Beyond Farmer First* (1994) and most recently *Farmer First Revisited* (2009) were both edited by Scoones and Thompson. Referring to specific current challenges and research insights, each work had different emphases yet all of them are examples of development research focusing on farmers, networks and mutual processes in innovation as opposed to linear transfer of technology approaches. The importance of farmer participation in agricultural development has in succession gained voice both in research and practice. Especially from the 1990s on concerns about dominant development

discourses and lacking participation of local stakeholders have been raised (Tufte, Mefalopulos 2009: 3).

In national as well as international development initiatives participation of local stakeholders in planning and implementation of projects has increasingly become a goal (Pretty 1995: 1251). Concerns have been raised that the frequent labelling of projects as participatory without corresponding implementation can dilute the meaning of the term (Pretty 1995: 1251; Leeuwis 2010: 932). In order to assess the nature of participation in detail, different typologies of participation have been developed.

Pretty (1995) describes seven types of participation: *manipulative participation*, *passive participation*, *participation by consultation*, *participation for material incentives*, *functional participation*, *interactive participation* and as the highest level *self-mobilization* (Pretty 1995: 1252).

A similar, yet more compact typology is offered by Tufte and Mefalopulos (2009), including four levels of participation. The levels range from *passive participation* of primary stakeholders over *participation by consultation* and *participation by collaboration* to *empowerment participation* (Tufte, Mefalopulos 2009: 6f). While interaction on the first two participation levels are strongly guided by external experts, collaborative and empowerment participation levels allow for higher influence of local stakeholders on processes. *Participation by collaboration* means that local stakeholders discuss objectives predetermined by external facilitators but it requires “an active involvement in the decision making process about how to achieve it.” (Tufte, Mefalopulos 2009: 7) Going a step further, *empowerment participation* includes all primary stakeholders in the decision making of desired goals. Here, “[o]wnership and control of the process rest in the hands of the primary stakeholders.” (Tufte, Mefalopulos 2009: 7)

Generally, the importance of participation of local stakeholders at early project stages regarding the emergence of ownership is increasingly acknowledged. It is argued that “with ownership in setting goals a sustained process with relevant outcomes and impact will be possible.” (Tufte, Mefalopulos 2009: 4). This, in turn, can lead to higher sustainability of projects (Glenzer et al. 2011: 97; Chambers 1983; Narayan 1995). Hence, shared ownership

of decision making processes is regarded as particularly important for the long-term success of projects (Bradley, Schneider 2004: 7).

Empowerment

High levels of participation require the empowerment of actors. Friis-Hansen and Duveskog (2012) define empowerment as an advanced form of participation with farmers “making their own decisions rather than adopting recommendations” (Friis-Hansen, Duveskog 2012: 414). This requires the existence, use and effectiveness of choice, including the power to shape social limits of a society (Friis-Hansen, Duveskog 2012: 418). Narayan (2005) supplies a similar definition: “[e]mpowerment is the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives.” (Narayan 2005: 5) Both definitions indicate that power relations between external experts or facilitators and people like farmers are crucial and often unbalanced. Hence, power is at the core of empowerment. We can reason with Sen (1997: 2) that “[i]f power means control, then empowerment therefore is the process of gaining control.” In the case of agricultural development initiatives, this process of gaining control would be in favor of farmers who often have little power in decision making. Yet, empowerment is not something that is done to a person. Rather, “people empower themselves.” (Sen 1997: 3) Nevertheless supportive environments for empowerment processes can be established (Sen 1997: 3).

In her work on *Empowerment as an Approach to Poverty* (1997), Sen compares the concepts of empowerment and participation. She argues that participation can both be a means for project efficiency or an aim in itself. Sen draws the conclusion that “[p]articipation is a weaker concept than empowerment, in that it is compatible with a multiplicity of conflicting ends.” (Sen 1997: 5) Consequently, participation can take place without the intent of empowering people when the limits of participation are confined by authorities (Sen 1997: 6).

Reflexive Monitoring in Action

Rooted in the recent approach of reflexive monitoring and evaluation (M&E), van Mierlo et al. (2010) have developed a 'guide for monitoring system innovation projects'. Their Reflexive Monitoring in Action (RMA) guide specifically addresses projects for sustainable development of regions or sectors (van Mierlo et al. 2010: 11). "The multiple ambitions of sustainable development imply that a single change is insufficient and that more is required than technological innovation alone." (van Mierlo et al. 2010: 35) The authors acknowledge the importance of reflection and learning for change processes and assimilate an innovation system perspective. Van Mierlo et al. (2010) describe RMA to be based on the constructivist notion claiming that there is not one reality but rather different interpretations of situations and phenomena from distinct perspectives, shaped through social interaction. RMA also recognizes that the views and goals of stakeholders can at times block necessary changes in institutional preconditions (van Mierlo et al. 2010: 37). RMA transparently takes a normative stance, as it "embraces clear norms for the projects that are to be monitored in terms of the long-term objective (i.e. sustainable development), the process (a common learning process) and the project approach (the creation of beneficial conditions)." (van Mierlo et al. 2010: 38) To support RMA-processes, the authors developed a number of tools such as an indicator set that enables structured reflection on system innovation projects. The indicator sets are derived from theories of learning and innovation processes grouped in process and effect indicators. Indicators on processes are concerned with leverage points that encourage mutual learning and institutional change. This includes: network development, interaction and system approach. Effect indicators include indicators for learning, acting and institutional change both at actor and network level. Process indicators are supposed to identify leverage points that can strengthen the learning and innovation process whereas effect indicators are concerned with the outcome of learning and innovation processes (van Mierlo et al. 2010: 69ff).

3.2 Application of the Theories

The theories mentioned are combined to analyze the social system around the WATERCAP project both on project and on farmer group level (table 1). The listed actors in the framework were anticipated in advance; generally this category was supposed to include all stakeholders, hence “all people who have an interest in the issue at hand” (Waters-Bayer et al. 2009: 146).

Based on the theoretical considerations, the project was examined regarding the aspect of processes (pre-conditions, behavior and structures) and effects (knowledge, capabilities, skills and behavior).

The horizontal division into conceptual and observed domains reflects the underlying research question which compared concept and implementation of the project.

Referring to Friis-Hansen and Duveskog (2012), the dimension of processes focuses on empowerment by analyzing ways of decision making and communication.

The effect domain refers to the intended and observed outcomes of the project.

Analytical Framework

Anticipated Actors	Sphere	Process	Effect
• Farmers • Makerere Staff • Project Interns • RUFORUM • BOKU • Caritas MADDO	Conceptual	• Decision Making • Communication • Conflicts related to Decision Making and Communication	• Water Management • Gardening and Trainings • Commercial Production
• Farmers • Makerere Staff • Project Interns • RUFORUM • BOKU • Caritas MADDO	Observed	• Decision Making • Communication • Conflicts related to Decision Making and Communication	• Water Management • Gardening and Trainings • Commercial Production

Table 1: Analytical framework- (own compilation, based on Friis-Hansen, Duveskog 2012, van Mierlo et al. 2010, Nederlof et al. 2011a)

4. Methods

4.1 Design

The thesis' epistemological interest in social processes and personal notions is about understanding social dynamics rather than verifying or falsifying theories with numbers which resulted in the use of qualitative approaches. One main reason for the decision on qualitative approaches was that qualitative research allows integrating differing perceptions of the various stakeholders in the analysis (Flick 2009: 16).

To avoid bias, *data triangulation*, *methodological triangulation* and *theory triangulation* were carried out (Flick 2009: 444). The function of the different triangulation types was to “involve purposively and systematically, persons, study groups, and local and temporal settings in the study” (Flick 2009: 444). Final workshops with the participating farmer groups served as a data triangulation step in which the preliminary findings were evaluated by the group members. The variety of methods described in the following complemented each other and achieved *between-method triangulation* (Flick 2009: 444). To “extend the possibilities for producing knowledge” (Flick 2009: 444) the thesis combined multiple theories in the conceptual framework, hence achieving *theory triangulation*.

The work was in compliance with the principles of qualitative social research according to Flick (2009) and Lamnek (2010). Lamnek states openness, research as communication, processual character of research and object, reflexivity of object and analysis, explication and flexibility as the guiding principles of qualitative research (Lamnek 2010: 19). Similarly Flick lists appropriateness of methods and theories, perspectives of participants and their diversity, reflexivity of the researcher and the research and variety of approaches and methods as the essential features of qualitative research (Flick 2009: 14).

4.2 Study Site and Project Case

4.2.1 Study Site

The project cooperated with farmer groups located nearby the Buyamba trading center in Ddwaniro sub-county, Kooki County in Rakai district. Rakai district is located in the southwestern part of central Uganda, west of Lake Victoria and covers an area of around 4000 square kilometers. The area of Ddwaniro sub-county is hilly which at times results in soil erosion (Rakai District Local Government 2010: 5f).

An estimated 96 percent of Rakai's population is rural and according to the 2002 Uganda Population and Housing Census, there were 400,806 people living in Rakai district at the time. In Ddwaniro sub-county there lived around 27,000 people in 2002 according to the census (Rakai District Local Government 2010: 9f).

According to the Ugandan Ministry of Water and Environment, the percentage of the Ugandan rural population having access to improved water supplies was around 65 percent in 2009 (Ministry of Water and Environment 2009: 74). Improved water sources comprise “protected springs, deep boreholes and shallow wells fitted with handpumps, rainwater harvesting facilities and piped water supplies” (Ministry of Water and Environment 2009: 73). While the average percentage regarding water access in Rakai was close to the national average with around 60 percent access to rural water supplies, in Ddwaniro sub-county an average of only thirteen percent of the population had access to improved water sources according to the ministry report (Ministry of Water and Environment 2009: 159). For large parts of the rural communities, the most commonly used water sources are still “open and unprotected ditches or dams prone to animal and human waste pollution” (DRT 2012: 4). Improved water sources are few and the distances to cover for fetching water are often large. The groundwater in the area is saline which affects water from boreholes and shallow wells.

The water provision to large parts of the population of Ddwaniro is threatened (DRT 2012: 4). Kooki county and hence also Ddwaniro sub-county regularly experience prolonged droughts in the dry seasons between January and March and July and September. Rainfalls peak around March to April, while minor rainfalls occur between October and November

(Rakai District Local Government 2010: 7ff). In the rainfed crop-livestock system of Rakai there are few commercial farmers and mainly smallholder and medium-scale farmers. The major crops are plantain, maize, beans, cassava and Irish and sweet potatoes (UNDP 2013: 21). Those crops function both as food and as cash crops (Rakai District Local Government 2010: 16). Rakai is situated in the so-called cattle corridor of Uganda and cattle farming is practiced by approximately twenty percent of the area's farmers (Haslwimmer n.d.).

Regarding climate change, government officials, farmers and development actors have reported an increase in weather changes such as erratic seasons, irregular rainfall, higher temperatures and more frequent and severe droughts, all of which complicates crop production of farmers (UNDP 2013: 22). Among the factors inhibiting adaptability are poverty and lacking human resources. Both factors are related to the high occurrence of HIV/AIDS in the area (UNDP 2013: 31; Rakai District Local Government 2010: 21).

With an HIV prevalence of 12 percent in Rakai in 2010 (UNDP 2013: 35), the number is much higher than the national average which lied between 6.4 and 8.4 percent in 2012 according to UNAIDS (2012). Because of the loss of labor and the financial burdens HIV/AIDS bring about for HIV-positive people as well as their families, the vulnerability of affected households to impacts of climate hazards is increased (UNDP 2013: 35).

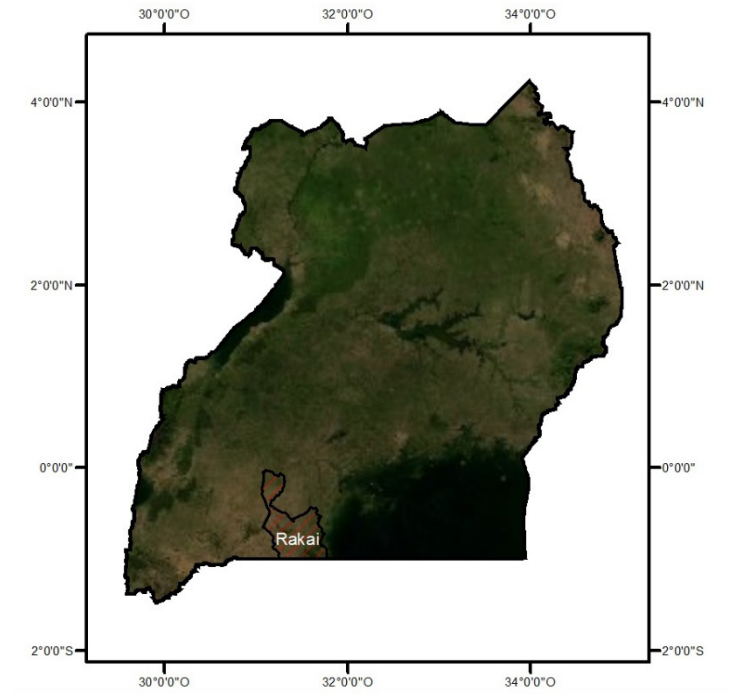


Figure 1: Rakai District in Uganda (Source: GADM 2013)



Figure 2: Ddwaniro Sub-county in Rakai District (Source: GADM 2013)

4.2.2 Project Case

The master thesis is part of the Master Student Class ‘Water& Innovation’ of the Centre for Development Research (University of Natural Resources and Life Sciences, Vienna).

It was written in the context of the WATERCAP project - *Strengthening Universities Capacities for Mitigating Climate Change Induced Water Vulnerabilities in East Africa* – which is part of the *Austrian Partnership Programme in Higher Education and Research for Development* - appear. Appear is a joint program of the *Austrian Agency for International Cooperation in Education and Research* (OeAD-GmbH) and the *Latin-America Institute* (LAI) that promotes partnerships between higher education institutions in Austria and core countries of Austrian Development Cooperation between 2010 and 2014 (appear 2013a).

The coordinating institution of the WATERCAP project is the *Regional Universities Forum for Capacity Building in Agriculture* (RUFORUM) The University of Natural Resources and Life Sciences (BOKU), Vienna, Makerere University (MAK) in Uganda and Egerton University (EU) in Kenya are the partner institutions.

The goal of this research cooperation is to improve the research practice of the universities involved to make them more applicable to farmers’ needs. The project argues that research at university level is oftentimes too technical and does not meet the actualities of the farmers who are increasingly faced with water shortages and unpredictable rainfall in the context of climate change (appear 2013b).

In Uganda, two sub-projects were established. They were supposed to function as innovation platforms connecting the project’s stakeholder. One site was in the district of Nakasongola and the other one in Rakai. In Nakasongola, a valley tank was de-silted and water pump was provided to water a trough for cattle. One master and one PhD student from Makerere as well as two master students from BOKU were conducting research on site in Nakasongola. In Rakai, one Ugandan master student and two master students from BOKU were on site.

The concrete WATERCAP sub-project that this thesis was focusing on is on rainwater harvesting in the villages of Bigando and Kijjuna, Ddwaniro sub-county in the south-western Ugandan district of Rakai. In the course of the project tanks were built to harvest rainwater that was supposed to be used to irrigate kitchen gardens (see figure 3). Twelve

families and one school were provided with water tanks. Besides the idea of introducing micro-irrigation as a mitigation strategy towards climate change, the commercial management of the gardens was also meant to increase production and generate income during the dry seasons (WM 3: pers. comm.). Each household with a water tank cultivated kitchen gardens with several patches. The number of patches per household ranged between three and twenty-seven, with the average being 14.9 patches. The average garden size is 49.9m² of which an average of 35.7m² was actually planted (Steurer 2014: forthcoming).

The WATERCAP project in Rakai took place in collaboration with the local non-governmental organization (NGO) Caritas MADDU. It was through a common donor that the contact between WATERCAP and Caritas MADDU was established. The local NGO, which has been active in the Masaka and Rakai region for decades, connected the WATERCAP team with two farmer groups that they have been cooperating with. Initially the WATERCAP Makerere staff started to work with two groups, in the following referred to as group 1 and group 2, with which the baseline surveys for the project and trainings were carried out. The trainings were held by the three interns of the project who stayed in Buyamba for a period of about 10 weeks in 2012, training the farmer groups on kitchen gardening, general agricultural practices related to water management and on bulk marketing. In mid-2013 two interns returned to the field to continue their trainings for some weeks.

With the exception of one farmer from group 1 and a secondary school, the first round of water tanks were allocated to six members of group 2. Later on the tank owners were asked to each select one other group member to work with on the kitchen gardens. This selection was supposed to be the base for a second round of tank allocations which at the time of the thesis' composition has not taken place though and according to members of staff from WATERCAP Makerere will probably not be implemented until the project finish in 2014.

While the project was already running, the WATERCAP Makerere staff decided to expand the project through the collaboration with a third group, in the following called group 3. In this group two members received water tanks in the first round and three members in the second round of tank constructions.

Figure four depicts the project environment of WATERCAP with emphasis on the sub-project in Rakai. The coordinating unit RUFORUM is connected with the three participating universities in Uganda, Kenya and Austria. The Ugandan implementing of Makerere staff stands in contact with stakeholders of the sub-projects in Rakai and Nakasongola. In Rakai, there are three farmer groups cooperating with WATERCAP Makerere staff. The units relevant for the Rakai sub-project are highlighted whereas the other units are shown in grey.



*Figure 3 WATERCAP rainwater harvesting tank
(photo: author 2013)*

Project Environment of WATERCAP with emphasis on Rakai

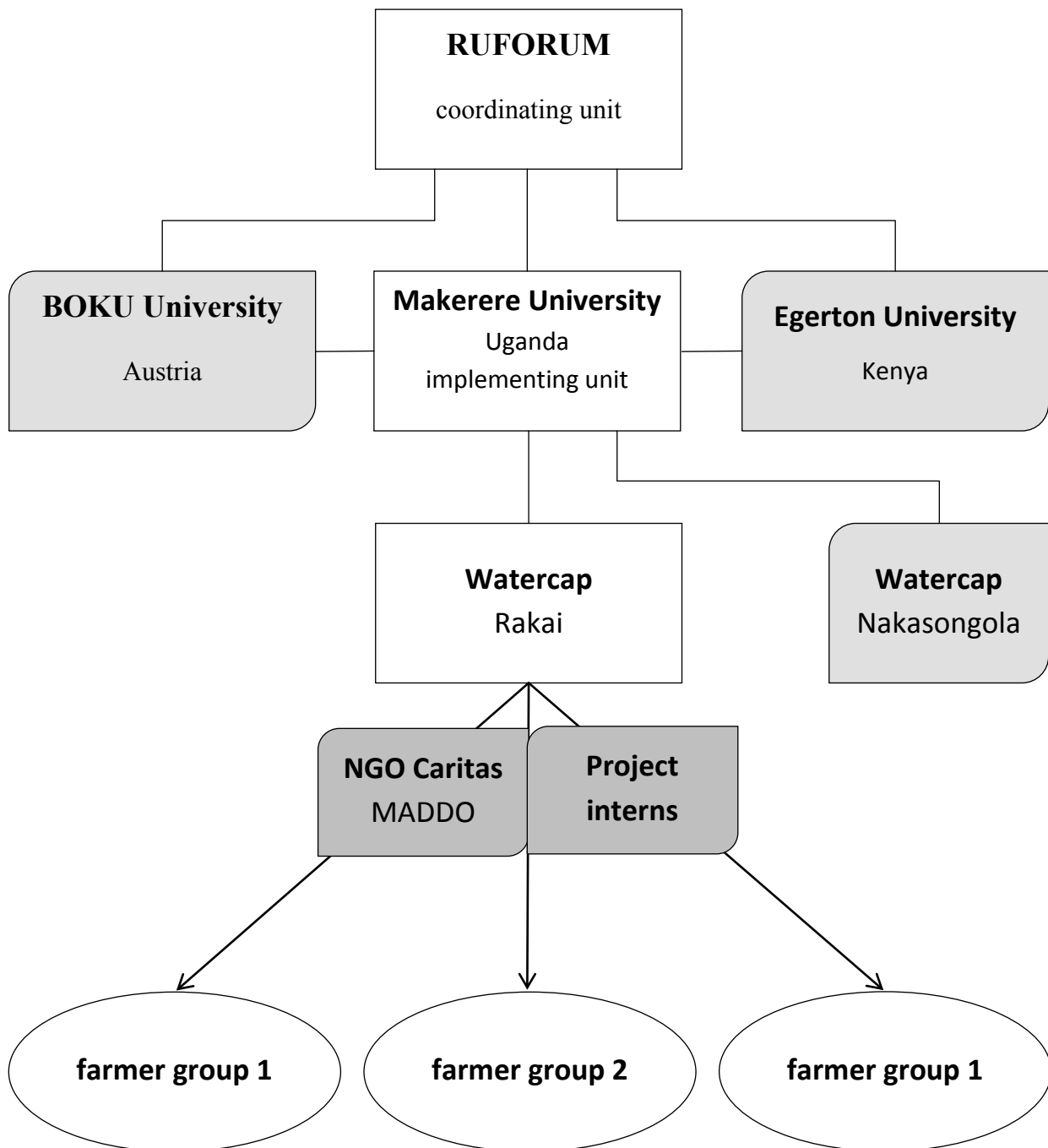


Figure 4: Project Environment of WATERCAP (own compilation based on stakeholder maps of interviewees)

4.3 Data collection

Sampling

The sampling took place in two steps. The first phase of case sampling applied to the selection of interview partners whereas the second phase – material sampling – meant a selection out of the total number of transcribed interviews (Flick 2009: 115).

All tank recipients in two farmer groups as well as their partners were interviewed. Furthermore, interviews were carried out with all group members that were suggested to receive tanks as well as their partners. For these two groups, the full population was interviewed (Flick 2009: 117). The third group of interviews were with group members who had not received tanks in order to include contrasting perceptions into the research. Due to their larger number, they were selected randomly.

Additional interview partners were the WATERCAP project staff, including people from the planning unit at RUFORUM, the implementing unit at Makerere University, and a project employee of BOKU University. Moreover, the project interns and staff of Caritas MADDO, the organization that established the contact between WATERCAP and the farmer groups in Rakai, were interviewed.

Since the total number of 52 interviews exceeded the frame of the thesis, the collected material was also sampled. Interviews with representatives of each of the listed groups were analyzed until no new insights could be achieved through further interviews, implying that saturation had been achieved.

Tables 2 and 3: data gathering methods

Group	Number of Interviews
WATERCAP staff	6
WATERCAP interns	5
Tank owners	9
Suggested tank recipients	10
Partners of tank recipients and suggested recipients	9
Farmer group members w/out tanks	3
Farmers with self-financed water tank	4
Caritas MADDO staff	5
Teacher in charge of tank at primary school ¹	1

Table 2: Semi-structured interviews with project stakeholders (compiled by author)

Introductory workshop with farmer groups	2
Feedback workshop with farmer groups	2

Table 3: Observation of stakeholder interaction (compiled by author)

¹The WATERCAP project in Rakai also allocated a water harvesting tank to a secondary school in the area. The teacher in charge has been interviewed, yet the interest of the thesis is more on linkages between groups and institutions than on single cases. A suitable examination of the case of the school though would have required a number of interviews with various stakeholders on site, including students of the school. For several reasons – notably time issues and ethical concerns regarding interview work with children – such a broad research on the case of the school has not been carried out. Consequently, the school is not part of the further analysis.

Mapping

One of the methods let the people involved in the project draw maps picturing the stakeholders of the project and the relationships among them. The purpose of this was to verify the own research draft with the views of the stakeholders to make sure that all the important stakeholders were part of the research. Informal mapping is one tool of *Participatory Rural Appraisal*, an approach trying to assess the livelihood of rural populations and looking to find strategies to improve livelihoods in a joint manner. The idea behind the tools that include a variety of visual methods, suitable for working with illiterate people is “to enable rural people to share, enhance and analyze their knowledge of life and conditions, to plan and to act.” (Chambers 1994: 953).

Semi-structured interviews

Qualitative, semi-structured interviews were conducted with members of farmer groups in Rakai and key informants involved in the project. The interviews allowed for the assessment of the interviewees’ motivation and evaluation of the project in proper depth (FAO a, n.d.). Change in group dynamics through the new technology could also be assessed through the interviews. Semi-structured interviewed are based on the assumption that “the interviewed subjects’ viewpoints are more likely to be expressed in an openly designed interview situation than in a standardized interview or a questionnaire.” (Flick 2009: 159).

The first draft of interview questions was made prior to the visit of the site. Therefore, it was revised and continually complemented after the generation of the stakeholder maps and being tested in the field.

Participant observation

A further methodical component was participant observation throughout the research stay. In the form of a field diary, this allowed to make later use of own observations and to analyze observations and impressions as relevant data (Flick 2000: 16). Participant observation furthermore enables the documentation of phenomena that are not directly addressed by the interviewees in the conversations, e.g. since they might be sensitive

topics. As an advantage of longer stays in the field, participant observation allows for a processual approach towards the studied contexts. Further advantages are “methodological flexibility and appropriateness to the object under study” (Flick 2009: 231).

Feedback workshop

In a final step, workshops with the farmer groups participating in the project were held. On the one hand, this feedback step was included for ethical reasons so as to return the gathered information to the interviewees who provided both their time and energy to the research. On the other hand, the workshops helped to answer remaining questions both of the group members and of the researcher. In addition, the workshops gave helpful insights into the perceptions of the stakeholders because they allowed them to give feedback on the preliminary findings and make corrections on the said, allowing for “validating statements and views.” (Flick 2009: 197). The discussions from the workshops were documented and then integrated into the analysis.

Translation

The stakeholder mapping as well as the qualitative interviews and the feedback workshops were carried out with the help of a translator. The translator was given a thorough introduction into the thesis’ topic to understand the research context.

4.4 Data management

The stakeholder maps drawn by the stakeholders of the WATERCAP project were photographed. For means of standardization, all interviews with the stakeholders were recorded and transcribed to be replicable. The final workshop was documented and transcribed.

4.5 Data analysis

The qualitative content analysis of the transcribed interviews and the research diary followed the principles of Philipp Mayring's 'Qualitative Content Analysis' (2010). The method aims at systematically analyzing communication material such as transcribed interviews, newspaper articles or other publications for content, formal aspects as well as latent meaning (Mayring 2008: 468ff). For technical facilitation of the data analysis the computer program ATLAS/ti was used.

The coding of the data was carried out with a combination of deductive and inductive coding. Based on the interview guide and the hypotheses, codes were developed deductively. During the work with the data, the codes were refined and sub-categories were constructed according to inductive coding (Kuckartz 2012: 62). This method made it possible to work with the hypotheses and simultaneously allowed for specification of the codes according to the data during the analysis.

Ethical Considerations

Carrying out this research in an ethical manner first and foremost meant respect for the people I worked with, who made the research possible in the first place. This included seeing them as experts of their own lives and respecting their knowledge and statements accordingly (cf. Froschauer, Lueger 2003: 5). Another aspect of ethical research was the informed consent, meaning that "a potential participant freely and with full understanding of the research agrees to be part of the project." (Scheyvens et al. 2003: 142) Therefore, it has been of great importance to inform all interview partners about the background,

duration and purpose of the research and to ensure confidential treatment of the collected data. A further ethical aspect of the research was reciprocity, which was met by feeding back and discussing the gathered information and preliminary results in a final workshop. This workshop was an attempt to prevent the frequent mistake of researchers solely extracting information for their own purposes without the people they work with benefitting from the research in any way.

Abbreviations

For improved legibility, the abbreviation ‘CM’ is used for the local NGO Caritas MADDO. When referring to the implementing unit of the project composed of the involved staff from Makerere University, the abbreviation is ‘WM’ for WATERCAP Makerere. The project interns are referred to as ‘WM interns’.

In the interviews with the farmers, it was not always clear if the interviewees were referring to the Makerere staff or the project interns on site when speaking of the ‘people from WATERCAP’ or ‘people from Makerere’. Whenever mentioned by the interviewees, the difference between Makerere staff and interns is displayed. When a clear distinction was not made by the interviewee, the term ‘WATERCAP staff’ is used, possibly referring to the Makerere staff, the project interns, or both.

For reasons of anonymity, abbreviations are used when interviewees are directly quoted. For representatives of involved organizations, the organization’s name and a number for each interviewee are used. The interns are referred to in their function for the project and assigned numbers. The farmers are assigned to their respective group, so that e.g. farmer 4 from group 1 is quoted ‘G1 Farmer 4’.

Timeline

To enable a comprehensive overview of the events related to the WATERCAP project in Rakai, a timeline displays the most prominent processes and incidences relevant for the understanding of this thesis.

Timeline: WATERCAP Project, Rakai

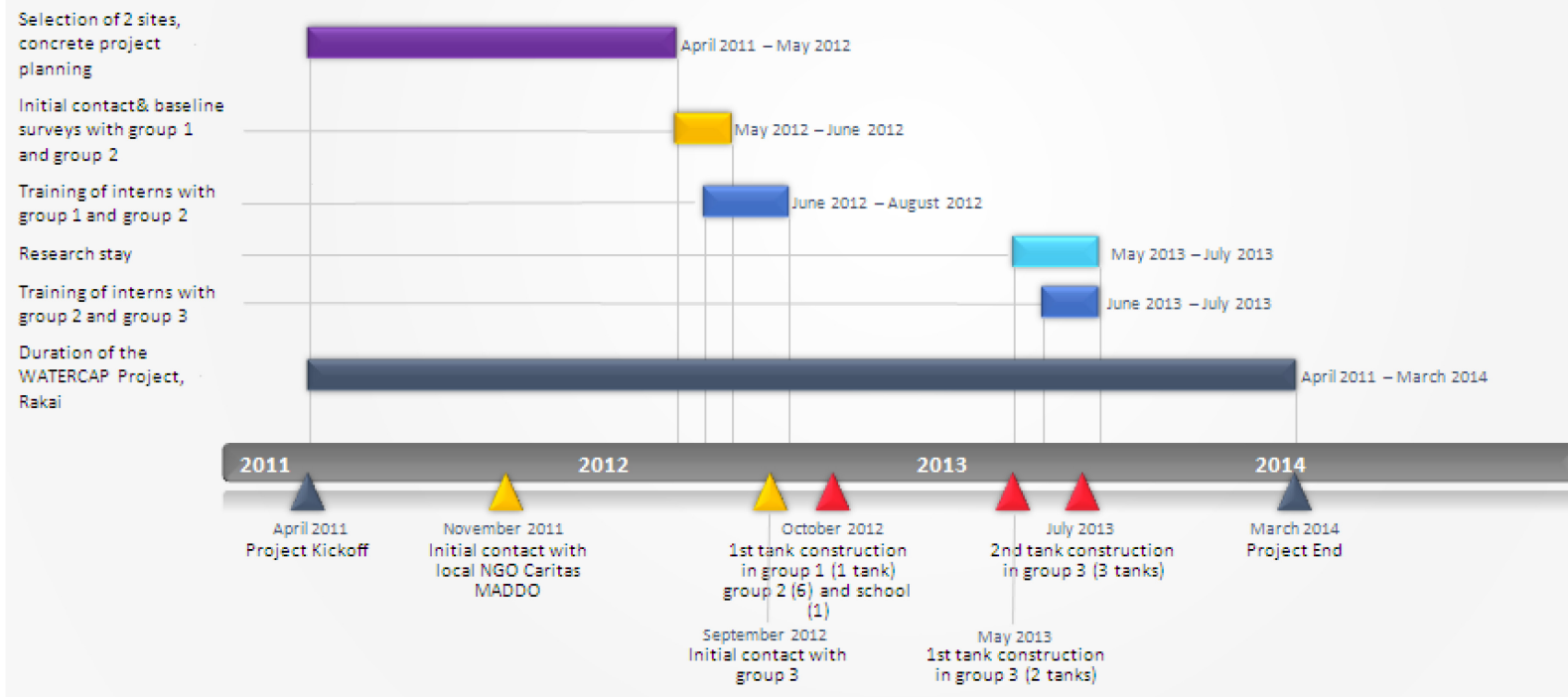


Figure 5: Timeline of Events (own compilation based on information from interviews)

5. Results and Discussion

Characteristics of Respondents

Out of the 52 interviews that were conducted, 41 were used for the analysis. The number is comprised of 27 interviews with farmers, five interviews with representatives of the project staff, five interviews with the project interns, and four with representatives of Caritas MADDO (CM).

Out of the interviewed smallholder farmers, nine had received WATERCAP tanks, seven had been suggested for a second tank distribution, two neither had a tank nor were suggested, four were in possession of a self-financed tank of CM, and five were partners of tank owners or suggested recipients. Twenty-one of the farmers were women and six were men, whereas four of the WATERCAP tank owners were male.

The interviewees' educational backgrounds ranged from no formal education up to higher education beyond secondary school, whereby the majority finished the level of primary 5 or higher. The average number of household members amounted to six to seven members with only two households having less than four members. Five of the farmer group members said to have non-farming related occupations. The vast majority referred to themselves as farmers, with some additionally rearing animals or pursuing other additional income-generating activities such as brewing or crafting.

The six interviewed project members of staff were comprised of two members of the coordinating unit RUFORUM, namely a project coordinator and a project assistant, one project employee from BOKU University and three of the implementing unit of Makerere staff. The Makerere staff were the project's principle investigator, the project engineer and a representative of the department of Agricultural Extension Education.

The project interns were in their fourth year of the bachelor program of Agriculture at Makerere University. Two of the three interns were interviewed twice during the research stay, resulting in a total number of five interviews. The four representatives of CM were interviewed in their functions as head of the department of water respectively agriculture, intern on site and a member of the extension staff.

5.1 Results and Discussion I: Processes

This chapter addresses the first research question of this thesis:

Q1: How do conceptualization of decision making and communication differ from observed processes in the project?

Main findings on Processes

- The anticipated establishment of an IP as a frame for decision-making and exchange among stakeholders could not be identified.
- The participation of farmers remained on a rather low level, leaving the decision-making power to the project staff.
- Regular exchange of information between stakeholders did not always take place, resulting in occasional misunderstandings.
- Lessons derived from the first project phase were put into practice, improving communication and establishing a more participatory decision-making mechanism in a group that joined the project at a later stage.

5.1.1 Decision Making

5.1.1.1 Decision Making – Conceptual

According to the project proposal, one goal was for all project partners to develop “a common vision on concepts and approaches to networking, partnerships and higher education research” (appear 2010: 18).

The proposal of the WATERCAP project contained plans for the establishment of innovation platforms (IPs) around the topic of decreasing farmers’ vulnerability in the face of climate change. The decision on the **specific implementation** including the selection of two sites in Uganda as well as the concrete activities of the sub-projects was left to the implementing staff of Makerere University (Boku 1). Regarding the **site selection**, the project proposal stated that the decision regarding territories was supposed to be based on the ability of a territory to house “a variety of key agricultural domains” (appear 2010: 15);

in the case of Rakai, this key agricultural domain was horticulture. Opting for a site was furthermore supposed to be based on existing initiatives to avoid duplication of technologies (Ruforum 1).

One of the planned activities of the project was the development and facilitation of innovation platforms for interaction of stakeholders. The selection of two sites to host the IPs was planned for month 4 of the project. By month 10, the project should have developed and agreed upon “an operational framework and principles for innovation platforms” (appear 2010: 15). The proposal’s concept of IPs saw change and innovation as being enabled among others by joint decision making.

The research carried out during the planning of the project was planned to be demand-driven, focusing on the farming communities’ needs “to ensure articulation and integration of demand for agricultural technologies” (appear 2010: 22). Besides deciding on the preferred **technology**, farmers were also supposed to be involved in deciding on the further course of the project. Accordingly, the proposal underlined the importance of **participatory approaches**:

All through participatory approaches have been adopted and will be used to maximize on stakeholder comparative advantages and encourage ownership in South and North [...] with balanced ownership between partners (appear 2010: 22).

The goal of increasing ownership of participating farmers while ensuring fair opportunities to benefit were also the reason why the WM staff planned to let the farmers decide on potential recipients of water tanks in a second round of selection in group 3. The farmers which were to receive tanks were supposed to function as a “nucleus around which other people actually learn and get motivated” (WM 2).

The next sub-chapter summarizes the empirical assessment of how decision making processes took place on different levels of the project in Rakai.

5.1.1.2 Decision Making and Participation – Observed

The project proposal was written in collaboration with a number of stakeholders of the paternal project including representatives from RUFORUM and the universities of Makerere, Egerton and BOKU. According to a project employee from BOKU University, the partners involved in the writing of the proposal differed from the personnel of the implementing unit in the Ugandan sub-projects.

The **decision on the site** of the sub-project was based on the collaboration of WM staff with the local NGO Caritas MADDU. Once the WM staff established the contact with CM, they asked for existing initiatives with farmer groups to build on. CM decided to introduce the project to farmer groups in Buyamba with whom they had been working with. CM based their selection of groups who were introduced to WM staff on the groups being hard-working, functioning and in an especially water-vulnerable area.

Because it's a natural shortage of water here, mainly in Ddwaniro sub-county in Rakai district. And mainly in the Bigando area. They have no natural water springs and the springs which are there is salty. So here there is a great acute of water in this area. Secondly these groups were so hard-working. So we wanted to start this Watercap as a pilot project mainly in [group 1] and [group 2] so that by the time when the Makerere people reach there like in [group 3], also [group 3] has an acute what? [water problem] But so this was how the groups were selected. (CM 1)

Following the suggestion by CM, WM staff started the collaboration with two groups, which were complemented, with a third group at a later stage of the project. In terms of an **innovation platform**, a member of WM staff explained that an IP had not yet been established in Rakai since they wanted farmers to do something innovative before inviting other potential stakeholders to interact with them. The interviewee expressed to be positive about an IP establishment in the final year of the project:

WM 2: So we wanted to first of all demonstrate there is something that farmers can do with harvesting water for their domestic and also agricultural production. And once we have that demonstrated then it's easy to bring on board other actors like people who would be buying their produce because now they'd be producing something. And then we can be able to bring on board the district leaders and the other NGOs that are operating in that area to look at what is really happening at that moment and explore how that can be scaled up or advanced. But this was the entry point that we don't get farmers to do something innovative then there's almost nothing around which we can organize an innovation platform. So that was our thinking. So this would be just like a

step towards the innovation platform but the platform itself is not there, is not yet there.

Interviewer: It's not there. Ok.

WM 2: It's not yet there. We were thinking that probably in our third year of implementation then we have something on the ground which we can bring other stakeholders now to see and discuss how that can work or can take it forward.

Interviewer: So it is still planned to create the platform?

WM 2: Yes, we still think we still can create a platform in this last year of our implementation. Because then we'd have something around which to create a platform. Otherwise it would be very difficult to just create a platform when there's almost nothing really to discuss and think about.

WM and CM staff as well as the majority of the farmers stated that the **decision on the technology** was made by the WM staff without the involvement of the farmers. Only two of the interviewed farmers reported of a meeting in which different potential water technologies were discussed among WM staff and farmers, resulting in the choice of water harvesting tanks due to the saline ground water. All other farmers that were interviewed stressed that they were not involved in the decision on the technology:

G2 Farmer 11: [...] the group people did not participate in deciding which facilities.

G2 Farmer 9: [...] there was no group discussion to decide on which kind of water facility they should have.

One group member emphasized that the decision on rainwater harvesting tanks was based on CM's experience in the region and would have been the same if the farmers had been involved:

MADDO had been in the area for quite a long time and they were running the water project. They had already surveyed and they saw that the right thing for us were water tanks. Possibly this is what they told the Makerere people and then the Makerere people came in with the water tank idea. That's what I think because we never sat as a group. Even if we had really sat as a group, still we would opt for water tanks because the water is saline. (G2 Farmer 13)

Besides continuing the trainings on kitchen gardens in the area started by CM, the WATERCAP project also used the existing technology of rainwater harvesting tanks as an

entry point and “made it bigger to be suitable for crop production and domestic use” (WM 1). The idea was that besides providing water for domestic use, the tanks would store water to irrigate kitchen gardens. The vegetable produce was intended to be used for home consumption and commercial selling. Integrating water holding capacities for domestic use in the tank planning was considered necessary for the project’s success because the farmers’ basic needs also had to be covered.

The cost calculations showed that the harvesting tanks would not have been affordable for many of the smallholder farmers. Accordingly, WM chose a different **mode of implementation** than the evolving loan model previously employed by CM to finance tanks. Instead of paying for the material and labor, the farmers were asked to excavate the pits for the tanks and to cater for the construction workers. Different members of WM staff named different reasons for this decision:

WM 2: And we thought we were basically supporting very poor farmers who would not actually be able to afford. Because if you looked at the other groups some of the farmers that had the capacity. Some of them have more than one tank because they are able to raise the money and construct the tank. But those that cannot raise that money would not be able to benefit from such technology.

WM 3: [...] we went to MADDU, they told us that they had a loan scheme. But we were skeptical to put money that we are responsible for into a scheme that we didn't know how it worked. [...] So when I came and discussed with [WM staff] about what MADDU was doing [WM staff] told me that we are responsible for this money. We cannot give money. RUFORUM has given us money. Then we give it to another agency. It didn't make sense. So for us when we went we looked at what they were doing and we said 'really, we should build on what they have already been doing'.

The project carried out tank allocations in two phases. At first, members of group 2 received tanks. Later on these tank owners were asked to individually select another group member. According to the group members, they were told by WM staff that the newly selected farmers would receive tanks in a second round of distribution. A WM staff said that the identification of other group members by the tank owners was meant as a collaboration on kitchen gardening without an intention of building further tanks in the group. Since the farmers spoke of a second round of selection in this context and expected a second tank allocation eventually, this expression of the ‘second round of selection’ is also

used in the thesis although a second tank allocation did not take place in group 2 up to the time of research. Yet in group 3 tanks were observed to be distributed in two phases.

Although WM had initially planned to **collaborate** with two farmer groups, after an initial baseline survey the WM staff decided to provide water tanks to one group only with one exception. WM staff named the worse situation regarding water availability in group 2 as the reason for this decision; some farmers in group 1 already owned water tanks from an earlier CM initiative providing. At a later stage, however, the WM staff decided to include a third group in the area which had already started kitchen gardening. Two members of this group 3 had also already excavated pits from earlier and never finalized projects. Considering the commitment of some members of group 3 to kitchen gardening, WM intended to provide them with water tanks to further improve their productivity.

The fact that two members of group 3 had excavated pits made the WM staff select them as the first tank recipients. In group 2, the **decision on who should receive a tank** was left to the WM interns although different views on this decision making process came up in the course of the interviews, especially among the farmers. A WM staff explained that the decision to let the interns select the tank recipients was meant as a capacity strengthening step:

You know because we thought this was a capacity strengthening project we wanted to give them that chance to build their own criteria on how to select farmers because these interns were in the [interruption through visitor], these interns worked in the community for about 10 weeks and we thought they knew the people best so we requested them to come out with the criteria of selecting people to get tanks. So they came out with the criteria and they used that criteria to rank the farmers who were supposed to get the tanks. (WM 3)

The selection criteria included farmers' maintenance of the gardens and their willingness to use the tank water for commercial vegetable production. Active participation in the farmer group as well as a strategic location enabling water sharing with other members were also considered by the interns. In addition, the size of a farmer's house was measured since a small roof would not provide sufficient water for the tank.

Activeness in the group. This participation could be shown up by the number of gardens you have, how you've been able to manage them. That even before the coming

of the tanks you were able to manage the gardens. [...] Then we'd look at the motivation. There are those who never had gardens but they are motivated to work. And then we'd look at the resources around the home. So if you had a small house or the house could not be able to handle the what? We couldn't utilize your house to put up the gutters perhaps you'd still move, you'd not be able to be a beneficiary. [...] Closeness to each other. Still you could be close but we look at the person who is easily accessible and who can easily give out. (Intern 2b)

Based on the developed criteria the project interns decided on seven farmers (and one school) that should receive water harvesting tanks. On the day when the selected group members were supposed to be informed on the tank allocation, a member of staff of CM who was on site with the WM staff and the WM interns directed the team to another farm than agreed upon and the person there was informed on receiving a tank before the interns were able to object. Since the number of seven tanks was fixed, one of the initially selected group members did not receive a tank. This initially selected group member somehow got to know of the events of that day, resulting in the person refusing demonstration visits from CM staff and boycotting group activities. In the following the project interns convinced the WM staff to allocate an additional tank to the initially selected person to restore ease within the group:

I think the interns, like the interns hadn't selected [farmer 5]. But then there was, I don't know whether you've met [CM staff], a community based facilitator. So when [CM staff] came [CM staff] just went to [farmer 5]'s place. And given what [farmer 5] does there is no way you cannot give [farmer 5] resource. So I think they just said 'let's construct [farmer 5's] tank'. But I think [farmer 5] was not on the list of the interns. So later the interns call me and tell me that [farmer 3] is very bitter. You know [farmer 3] used to treat them very well, give them food, welcome them and all that had stopped. So they told me that I told, and they told me [farmer 3] had been selected I just told them that 'you know people, I think to work well with the community just go ahead with [farmer 3] and construct the tank'. (WM 3)

In this case the WM employee enforced the interns' initial selection whereby in another case the WM staff overrode the interns' decision in favor of a farmer who according to the WM employee deserved a water tank:

I called them, I asked them that 'did you criteria include [farmer 10]?' They said 'no'. So because in my mind to me that was somebody that was already working well. Those two people I influenced. I jumped the criteria of the students. (WM 3)

After the first phase of selecting recipients in group 2 and 3, the WM staff decided to leave the **second round of selection** to the farmers. This took on different shapes in group 2 and group 3.

In group 2, the tank owners were asked to select another group member. It was not reconstructable which constructions the WM staff gave the tank owners regarding this selection. On the one hand, all group 2 members reported that this selection was done with the intention of identifying further tank owners. The assertions of WM staff on the other hand stressed that the aim of this selection of other group 2 members by the group's tank owners was to enable mutual learning on kitchen gardens. According to a member of staff of WM, it was a misconception that the selection on another group member made by the group's tank owners served a second round of tank allocation.

In group 3, where tanks were actually given out in two phases, the WM staff asked the farmers to collectively come up with selection criteria according to which three further tank recipients in group 3 should be chosen. In this case the decision-finding was left to the group with the condition that the selection criteria were in accordance with the project goals. This decision was based on lessons from the first round of selection and the wish to prevent conflict and create ownership:

We give you the opportunity to make the choice of who you think should benefit. Again that's trying to get away from us making the decision and putting the decision making responsibility to them because then they would not blame us 'oh for me I was not selected'. [...] We wanted now to try to start creating a little bit of more ownership of the whole thing with them so that they feel they are not just, they are not just beneficiaries but they also make decisions. (WM 2)

According to the WM staff, the opportunity given to group 3 to collectively select a second round of tank recipients was due to experience the staff made with group 2 in the course of the initial tank distribution. Group 3 joined the project at a later stage when consequences of the process in group 2 were already evident. Besides, the WM staff's regard for the groups played a role. The WM staff described group 2 as having internal issues whereas

group 3 was portrayed as functioning and well organized. This made the staff think group 3 would be capable of deciding collectively as opposed to group 2:

Interviewer: But in [group 2] it's done differently. There each of the tank owners has been asked to suggest a new recipient. So there the decision was not made by the group. How come?

WM 2: Yeah, because the other site [group 3] you know they were already organized in those groups. [...] That site the group [group 2], the groups are not that strong, you know, like the other site. So what my colleagues had suggested that we ask these people to recommend, you know, those that they think could also benefit because we were thinking if we get the third year funding then we would give a little bit more to others, you know?

The most frequent reasons the interview partners in group 2 stated for selecting another person whom they thought would benefit from a second round of tank allocation, were hard work, engagement with kitchen gardens, good cooperation and immediate vicinity of the selected person.

One farmer furthermore thought she was selected because of good hygiene at home. A factor observed in the field yet not mentioned by the interviewed farmers was family relation. Of the seven farmers in group 2 asked to select another member, three suggested a relative whereas one suggested a person from the same clan as herself. The possibility of tank owners basing their decision on kinship was something the WM team had even expected beforehand.

Because it has a problem that somebody would probably suggest close friends or relatives or whatever. But that one we wanted to see how that works because the intention that how do you expand this network and you know, cohesion within the community. [...] So the idea is that probably other people would be coming to learn from them and from those that come to learn from them they can be able to identify people who are strongly motivated to do something like that. But we'll see what they suggest because they may end up suggesting just their close friends or relatives, you know? (WM 2)

The selection criteria that were collectively developed in group 3 were active participation, cleanliness at home and having kitchen gardens. Based on the criteria three suggested

recipients were identified in a group meeting, with all interviewees from the group stating that by following the criteria the decision had not been difficult.

At the time of field research (summer 2013), the three suggested farmers of group 3 had already received the water tanks. In group 2, the process was not finalized and the suggested farmers were expecting to receive tanks. Regarding group 2, one WM staff said that the actual number of people receiving tanks would depend on the overall expenses of WATERCAP Uganda for the third project year:

WM 2: So I can imagine that probably the next round of beneficiaries would not be as many as those. But again we would do the assessment. Depending on the feel that we'll have we'll look at the people that are being proposed. We have to visit them, we have to find out a little bit more information about them before we decide.

Interviewer: And who exactly will make that decision?

WM 2: I think finally we will have to make the decision.

Another WM staff was of the opinion that group 2 has already received enough tanks and that the project focus should be shifted since the project goal of stimulating vegetable production through water harvesting was not met by the farmers:

WM 3: And in fact if results like are coming out, if the people are really not using the water for production - the project is meant to use this water for production - then I would rather support or expand people who are actually using the water for production.

Interviewer: So but was it still intended that some more people in [group 2] receive tanks?

WM 3: In fact, in fact to me [group 2] I think they have got enough tanks. [...] So because the project has other activities that have to be done, yeah.

Both interviewees stressed that as long as the third year project funding is not secured, little can be said about the number of future recipients except that the final decision on recipients would be made by the WM staff itself.

5.1.1.3 Decision Making and Participation – Discussion

Decision making within the project

The project proposal for the WATERCAP project was composed by a number of project partners from Uganda, Kenya and Austria with different backgrounds. As mentioned in the chapter on decision making, the proposal lacked a detailed definition of key terms such as ‘participation’ which could have hampered a common understanding on how processes should take place. In this context, the question arises what the frame is within which project proposals are written. Friis-Hansen and Duveskog (2012) for instance have pointed to the popularity of the concept of empowerment, often conceptually supported by donor agencies without being “an integrated part of agricultural programs and projects.” (Friis-Hansen, Duveskog 2012: 415) They argue that the implementation of components conceptualized by donors is left to institutions on the ground who might prioritize processes differently (Friis-Hansen, Duveskog 2012: 415). Without insinuating that this was necessarily the case with WATERCAP, the question about defining terms and norms should not be disregarded when examining project concepts. Time pressure and the need to convince donors with proposals is another component that should be considered in the analysis. Despite not directly observable in the implementation of projects, donors’ power in decision making is inherent to the system of development cooperation.

From their reflection on multi-stakeholder partnerships in research, Triomphe et al. (2009) came to the conclusion that donor agencies should customize their terms of reference and no longer predefine “how a project will operate or what outputs it will deliver, since these should only be designed and negotiated on the go among the partners, once the project has commenced.” (Triomphe et al. 2009: 163) Although considered an appropriate measure for mutual learning processes and non-linear evolutions, it is questionable if such flexibility on output designs is feasible in the current system of development projects. Pretty (1995) speaks of a dilemma for authorities who require people’s approval but also dread their participation because “they fear that this wider involvement is less controllable, less precise and so likely to slow down planning processes.” (Pretty 1995: 1251f) However, in order to receive funds, project proposals have to contain pre-defined goals and time schedules in line with the broader aims of donors. Slow and unpredictable participation processes

impede with the development of project proposals that have to contain pre-defined goals and time schedules in order to receive funds. This could be one explanation for differences between conceptualization and implementation of decision making processes in projects.

The decisions regarding the **concrete project design and site** were made in accordance with the project proposal: the WM staff planned the specific project implementation. They based the selection of the site on an earlier initiative by a local NGO, preventing duplication of technologies and initiatives and building on existing structures. The decision for the site in Rakai furthermore reflects the focus of the project on water-stressed regions and the agricultural domain of horticulture.

As per proposal, the project was supposed to establish an **innovation platform** to jointly explore development options and make decisions. The principles of an IP are described by Nederlof et al. (2011a: 7), whose work the proposal refers to: “Only through learning, collaboration and joint work – by putting many heads together to reflect and make decisions – can a platform promote innovation and make a change in people’s lives.” However, according to the empirical findings, deliberation and decision making regarding the course of the project remained largely with a core group of project staff. As such, and according to the assessment of a staff member, a ‘true’ IP process had not been established. The proposal had intended the IP establishment within the first year to function as a learning ground for the stakeholders. Although the WM staff 2 stated that an IP was planned to be set up in the final year of the project, the lack of an explicit mechanism for deliberation and decision making in Rakai may have complicated creating participation and ownership.

The decision on the technology did not re-assess the **needs and demands** by farmers, but took up and refined a water technology that was already in place through the local NGO Caritas MADDO. The interviewed farmers did not challenge this choice but welcomed the idea of rainwater harvesting structures. Taking the farmers’ appreciation as well as the problem of saline groundwater in Ddwaniro sub-county into consideration, further investing in rainwater harvesting strategies seems reasonable although the farmers were not participating in the project planning. Linking to the expertise and experience of a local

NGO can furthermore be seen as indirectly taking farmers' demands into account since these demands had been assessed as part of earlier CM activities.

Participation

Nederlof et al. (2011) use the innovation systems perspective as their analytical framework. They view participation as an integral part of innovation processes: "participation in deciding which technology to use is not enough. Rather active participation of the rural poor in the interactive learning process towards enhancing innovative capacities is key. Technology [...] is but one bottleneck in improving rural people's livelihoods." (Nederlof et al. 2011b: 9). From this perspective, participation goes far beyond the single decision on a technology, requiring the possibility for active participation of the local stakeholders. Following this line of argument, the decision on the technology to be used within WATERCAP in Rakai was not participatory since the farmers were not actively involved.

When assessing project processes using the **categorization of participatory processes** as developed by Tufte and Mefalopulos (2009), different levels of participation can be observed.

The proposal itself stated participation throughout the project implementation as a goal without providing a specific definition. Although "it is useful to clarify what perception of participation will guide the strategy conceptually" (Tufte, Mefalopulos 2009: 6), the proposal also contained little guidance on participatory decision making processes. It can be assumed that more than passive or consulting participation of farmers was planned because it is at the higher levels of participation that a sense of ownership of farmers is attainable. In the interviewees' portrayals of decision-making processes, it became evident that the decision to focus on water harvesting tanks was *consultative* insofar as the experiences of CM were considered in the decision-making. This included a direct consultation of the partner institution and an indirect consultation of the farmers whose needs and interests had already been assessed by CM. On the other hand the farmer groups were solely informed of the project aims, indicating the level of *passive participation*. This applies also to the first selection of tank recipients through the project interns, with the involved farmers solely "being informed about what is going to happen or has already

happened.” (Tufte, Mefalopulos 2009: 6). By asking the farmers to select further members themselves in the second phase, a shift towards *participation by consultation* took place. Still the choice to change the operational style as well as the final decision on the acceptance or denial of the farmers’ suggestions remained with the WM staff. As a consequence, the staff remained in power and control since this process kept “all the decision making power in the hands of external professionals who are under no obligation to incorporate stakeholders’ input.” (Tufte, Mefalopulos 2009: 6).

Following Friis-Hansen and Duveskog (2012) who describe empowerment as an advanced form of participation and a process of gaining control, empowerment was lacking in the observed project processes. Similarly, Narayan’s (1995) analysis of participation in 121 rural water supply projects in Africa, Asia and South America, came to the conclusion that both individual and community empowerment are promoted by participation (Narayan 1995: 2).

Having observed the participation levels in the project, it can be concluded that the participatory manner and balanced involvement of all stakeholders – as it was the vision of the proposal – was not fully achieved in the execution. Since participation and ownership are interwoven, the low level of participation in the course of the project is likely to have effects on the acceptance of decisions.

High levels of participation can give stakeholders “the opportunity to empower themselves and take ownership of the process” (Bradley, Schneider 2004: 14). In their study, Marks and Davis (2012) analyzed empirical data from surveys in Kenyan villages to answer whether household members feel ownership for previously piped water systems. Based on the hypothesis that sense of ownership is engendered by participatory planning by all stakeholders, the authors tested the association of sensed ownership with types of participation such as labor and financial contribution, decision making and direct usage of the water facilities. They confirmed that different types of participation had different impacts on households’ sense of ownership. In terms of involvement in decision making, the authors came to the conclusion that “households’ involvement in decisions about the level of service to be provided in their water project was a significant predictor of high sense of ownership” (Marks, Davis 2012: 1575). This study thus underlines the consensus

that participation enhances the sense of ownership of local stakeholders (Tufté, Mefalopulos 2009; Waters-Bayer et al. 2009). By implication, this also means that “the higher the level of control from the top, the weaker the sense of ownership and commitment by the local stakeholders.” (Tufté, Mefalopulos 2009: 19).

Discussing the level of participation in the WATERCAP project leads to the question of the farmers’ perceived ownership of processes: despite the second selection round being a declared attempt of the WM staff to create more ownership among the farmers, the achievement of this goal varied. Members of group 3 stated to view the decision on further tank recipients as their own which is contrasting to the statements of many group 2 members. When looking at the different decision making processes in group 2 and group 3, it became apparent that power to influence is crucial for a sense of ownership and long-term acceptance of a project: the mutual decision-finding in group 3 allowed all group members to have control and stake in decision making. In contrast, in group 2 the privilege of decision making was assigned to a few individuals. Various members of group 2 stressed that major project decisions concerning their groups had been made beyond their scope of influence. Members of group 3 on the other hand stressed that decision-making was made by the whole group and for this reason accepted by all members. Moreover, the spontaneous outcome of group 2’s final workshop with members formulating the wish to decide on upcoming recipients as a group instead of individually, can be interpreted as a self-determined initiative towards ownership on the further course of the project. In addition, it can be seen as a step of emancipation from the earlier decisions that the WM staff had made for them. The findings on decision-making processes support the **hypothesis that the ownership of decisions is related to the level of participation in the decision making processes**. The thesis is thus in accordance with a number of studies on stakeholder participation in the agricultural context of sub-Saharan Africa (SSA). Nyikahadzoi et al. (2012) for example, analyze three cases within the *Sub Saharan Africa Challenge Program* (SSA CP) involving innovation platforms around different agricultural domains. The authors came to the conclusion that the mode of participation and the technology adoption are interlinked. For the IP in which collaborative participation and a grass root structure were practiced, the technology was adopted more quickly and more likely to be sustained. Whereas in the IPs with consultative or limited consultative

stakeholder participation, the technology adoption took longer (Nyikahadzoi et al. 2012: 97). The authors concluded that a “grass root structure provides small holder farmers with the power to think and act as they wish and to exercise choices that can secure desired changes.” (Nyikahadzoi et al. 2012: 99). Consequently, high participation of the farmers led to ownership of the research agenda.

In the case analyzed for this study, the water harvesting technology per se was adopted by the farmers in Rakai. However, the water was often not used in the ways intended by the WM staff. This outcome will be discussed in detail in the chapter on water management. Reclaiming this crucial aspect of a farmer’s life can be seen as an indicator for the farmers’ limited ownership of the project decisions: a more participatory approach would likely have revealed contrasting interests at an earlier project stage and allowed for integrating them. Here, decision making and communication are intertwined since “communication should occur among all parties affected, ensuring all have similar opportunities to influence the outcome of the initiative” (Tufte, Mefalopulos 2009: 17). This was only partly the case in Rakai, resulting in discontent and limited ownership.

There are a number of potential reasons for rather low participation of the farmers involved, with the absence of an IP being one of them. Another reason could lie in the time- and resource-consuming characteristics of participatory processes. Participation is gradual, higher levels of participation thus “require time and the building of trust among parties involved.” (Nyikahadzoi et al. 2012: 99). Conceding high participation to local stakeholders also requires external facilitators to restrain themselves (Triomphe et al. 2009: 162). In this context, time and capacity limitations of stakeholders can be regarded as one constraint to high participation levels. The distance between the residence of project institutions and the participating farmer groups, as well as the project execution solely being one of the numerous duties of the involved institutions, have to be considered.

In addition, this chapter showed that the aims of the project, including, but not exclusively regarding decision making, have to be seen in the context of the proposal formation and the influence of development programs and power relations.

In order to improve ownership and sustainability of the project, clearly planned participation processes including opportunities for participatory monitoring and open learning would have been desirable.

5.1.2 Communication

5.1.2.1 Communication – Conceptual

A planned outcome of the project was the establishment and facilitation of two innovation platforms to enable mutual learning between the local government, the university, and farmers through interactive processes and joint learning. The innovation platforms were supposed to build the frame for communication among the different stakeholders and “mend broken links between research and training and actual development progress and the [sic.] recover the lost ground” (appear 2010: 11) by constituting “a forum in which people with common interest come together to discuss their challenges and then identify solutions which can be taken logical, institutional, social.” (Ruforum 2: 05/2013)

The proposal also referred to the necessity of efficient communication channels in order to prevent an overlap of activities of the different stakeholders. Therefore, “participatory development of activity work plans by all partners, periodic review of activities, and ensuring timely communication of events” (appear 2010: 20) were conceptualized.

The joint learning processes in the IP meant to derive lessons on sustainable water management, which should then be documented and fed into university curricula. By communicating learned lessons to a wider audience, the outreach of the project was planned to be expanded. This process of communication and mutual learning is among the core goals specified in the project proposal. The proposal further pointed out that frequently university curricula ignore realities farmers face; accordingly, and to improve the responsiveness of universities “they have to engage more with the community and other development actors to learn with them” (appear 2010: 9) because it is time to “learn from real life and contribute to problem solving” (appear 2010: 12).

5.1.2.2 Communication - Observed

Communication within the WATERCAP project consortium

Concerning the communication of the coordinating unit RUFORUM with other project stakeholders, the staff of RUFORUM stated that they got their information on the project in Rakai from the university project staff without being in direct contact with the community:

Interviewer: So are you as Ruforum connected with...

Ruforum 2: directly with the community?

Interviewer: With the community organization?

Ruforum 2: Only through Makerere. We do not want to get directly involved. Because Makerere is already a member. So there are certain networking principles that we bring together that Makerere then goes to implement.

Receiving their information on the processes on site indirectly, RUFORUM did not have detailed knowledge on certain procedures especially regarding the level of farmer participation in decision making:

Interviewer: So the decision on the type of technology was made by whom?

RUFORUM 2: By the community. It was a participatory process that as a result of this character the community then decides based on criteria and being facilitated by Makerere and the team to go through a set of options for addressing the water challenge and then they ended up with the choice of dams [WATERCAP Nakasongola] and water tanks [WATERCAP Rakai].

Regarding the communication between RUFORUM and WM staff, the interviewees mentioned challenges that related to donor reporting. WM had assumed that RUFORUM had submitted the annual report for the year 2012 in time, which was not the case:

WM 2: But the latest communication I got from RUFORUM is they haven't submitted the annual report which we thought was submitted a long time ago and I mean that's not good for project reporting and I'm not sure, I don't know whether the donor is happy about that.

Interviewer: Ok. So the donor might end up not giving out?

WM 2: If the reports don't go in time and I don't know how satisfactory the reports are so the release of the year three funding would depend on the quality of the reports. So

that is a worry on our side because that's not our responsibility, it's a RUFORUM responsibility. And earlier I don't know we had been informed that the reports have been submitted but now, and now [coordinator] has left RUFORUM before submitting these reports and now a new person is coming in and [the new person] may not have good understanding of the project and finalizing these reports.

Communication with the project partner

The initial contact to the local NGO Caritas MADDO had been established through the WM staff. The CM employees had differing levels of information on the selection of tank recipients by the WM interns: one out of the five members of CM staff was able to describe the procedure of selection in the way it had taken place according to farmers and WM staff. That person was the intern of CM directly working with the WM interns on site. The other interviewees were unsure of the way the selection had been carried out, with one of them not being sure whether the farmers were obliged to pay for the tanks or not. Another CM employee concerned with the project, as well as a member of staff from Makerere were furthermore convinced that the group members had been involved in the first round of decision making, something that could not be confirmed through the other interviews. Additionally, the duration of the WATERCAP project in Rakai as well as the project goals for the upcoming time were not known to some of the CM staff:

Interviewer: Ok, and the project I think is ending next year.

CM 1: The water project?

Interviewer: WATERCAP, yes.

CM 1: WATERCAP? I don't know yet. I don't know whether it is ending because we thought the program could continue. I don't know when is ending because, yeah.

Furthermore, it became apparent that the WM staff had not known of the CM intern on site and the intern's close collaboration with the WM interns until this was unintentionally discovered:

CM 4: So WATERCAP since these ones [Caritas MADDO] came first they wanted to work together so then we were in collaboration with WATERCAP. So Doctor joined

us and we were working together. Unfortunately after some time Doctor realized that what I was doing is not actually what [Doctor] wanted and was so surprised.

Interviewer: [...] [Doctor] was not content? With what exactly?

CM 4: No, not really. Because [Doctor] never knew that time I was this site.

Generally, staff members of CM welcomed the cooperation with WATERCAP and stressed the mutual learning resulting from the communication processes among them:

[...] it was an opportunity also to have these professors coming down and we share the technologies and very good they first visited what we had done and I think it's from that that they were able to study the good part of it and the bad and they had good improved tanks when you compare with what we had, that were constructed. And I think it was a good, we had a share with those students which had come with. Although they were on an internship training but we eventually learned a lot together and we advised each other. (CM 3)

Communication with farmer groups

Regarding the communication between farmers and WATERCAP and Caritas MADDO staff, concerns were raised by the staff on the openness of the farmers. A WM member of staff believed that the tank owners would not tell the actual degree of water sharing since the water is supposed to be used for production and home consumption and not for distribution among the farmers. The interviewee hence concluded that water sharing behavior would have to be observed by the interns and the students on site. Moreover, an employee of CM assumed that the farmers had not communicated doubts towards the tank implementation mode in the forefront of the allocation:

The farmers were not open to us to tell us 'no' maybe resentments and the rest. (CM 2)

According to the interviewee, this evasive character of communication made resentments and worries among farmers evident only after the allocation of the tanks had been done.

Among the members especially of farmer groups 1 and 2 there was little awareness on **the difference between Caritas MADDO and the WATERCAP project**. Only a small minority reported of having been informed by the CM staff on the coming of the

WATERCAP project while the majority either referred to the ‘Makerere people’ without being familiar with the term ‘WATERCAP’ or perceived the WATERCAP project to be identical with Caritas MADDU. This resulted in many farmers thinking that the WATERCAP tanks were distributed by CM, leading to misunderstandings.

In **farmer group 1**, where the baseline survey and roof measurements for the design of the tanks had been carried out, farmers were expecting to receive water tanks and were surprised to see the tanks being built in another group instead. One member reported of a visit from the WM staff which was the reason for the interviewee to expect being allocated a tank because a member of staff had told the interviewee explicitly about the tank construction on site:

[Makerere staff] even showed me where the tank would be. [...] Based on what Doctor was doing and talking is the reason why I expected to get a tank. Because they measured, cited where the tank would be and then also told us this other run-off water maybe they would put another tank the other site to harvest the water which they would put in the vegetables. (G1 farmer 3)

Half of the interviewed members of group 1, including the chairperson, reported to have been informed that WATERCAP tanks had been allocated to group 2 rather than their own group due to the critical water supply situation in group 2, yet everybody interviewed in group 1 still expected the WATERCAP project to allocate tanks to their group at some point as the following quote shows:

Interviewer: So are you still hoping?

G1 Farmer 4: Yeah, I still want. I still want.

Interviewer: And in the group do they still expect that the project will give out tanks in this area?

G1 Farmer 4: They still hope.

It became apparent that **hope** was strongly related to WATERCAP’s initial cooperation with the group and the staff’s communication on the project’s plans for the group.

According to the WATERCAP team and farmers, a number of meetings with the WATERCAP team and members of **group 2** were held to discuss allocating water tanks to farmers and the progress on the water situation. Despite these general meetings, some of the project's processes were unknown to group members: farmers were unaware of who made the decision on the tank allocation and many of them, also people who received tanks themselves, could not recall the selection criteria. A group member stated that the tank construction had started, leaving the person puzzled as to how the decision had been made:

[...] and there was no explanation. (G2 Farmer 5)

Different members on the other hand reported that existing gardens had been the selection criterion for the tank allocation at the beginning of the project.

Yet, the farmer group had never been told about the exact process of selection as one of the interns stressed:

Interviewer: And when you told the farmers about who would be selected for the tanks how were the reactions?

Intern 3: Yeah, basically we never even told them. 'Cause this is something very sensitive everybody wants. So you can't say: we are going to give such and such. So we never told them but we made our list, we made our list basing on these criteria, we have this and this and this.

Similarly to group 1, the interns measured the farmers' rooftops in group 2 which was interpreted as a promise for a tank by the members:

Ok, when these people came in and took the measurements of the house I was really hoping that I was going to get a tank. (G2 Farmer 7)

The interns on the other hand, depicted the measuring differently, describing it as part of their job that needed no further explanation towards the farmers:

You [the farmers] don't need to ask us 'What are you doing?' because you know we are in your group, we are working with you and we are students, we are studying. So we didn't inform them exactly what we were doing perhaps. (Intern 2b)

Besides the roof measurements, many group members named direct communication of the WM staff as a reason for their hope to receive a tank. Stating that they had been told by the WM staff and interns that the tanks would be given out in phases, many group members were hopeful to still receive water tanks:

G2 Farmer 8: [...] the first time when people got the tanks of course others did not perceive it the right way but later on we were told that everyone would get so they're holding on to the hope that everyone would get the tank.

G2 Farmer 4: They grumbled but they were hopeful because we had been told right at the beginning that people would be given tanks but in different turns, phases. So much as they grumbled but they were hopeful their turn will come.

One project intern even portrayed the creation of hope by the interns as a strategic act to avoid conflicts within the group:

Basically we always left them with what we call the word of hope. Because the project is not a one-time thing how it was. So we told them: given that this is the first shift of people, the first batch of people to receive the next shift shall be those who have not got. So we have shifts. We looked at them as being in the next shift so to keep them half-hoping. So that there's no problem. (Intern 3)

A WM member of staff stated that the tank owners of group 2 had misunderstood the instruction of selecting another person. The chosen farmers would not receive water tanks but should solely cooperate with the tank owners on kitchen gardening:

But let me tell you I think in [group 2] I didn't want to disrupt you when you were there but I think they didn't get my instructions right. I told them 'select one farmer and teach this farmer how to do certain things that you were doing'. It's supposed like a scaling-out mechanism, ok? Where you've learned how to plant, in fact it was on the kitchen gardens. It's to teach what you've learned to another person. It's like a training of trainers, ok? But I think when the training began people automatically started thinking about tank recipients. And for me when I saw that they hadn't got me right then I just let it go like that. But the instructions that were given, and I talked to individuals, to the recipients that 'now you as a recipient of a tank get somebody who can come and learn from your garden and teach them how to plant this garden'. In fact we gave out, we gave them seeds to plant those seeds and show the rest of the people.

So I think their expectations either arose or the people didn't explain to them exactly what I had told them to do. Because it was just to multiply, to get other people learn more about kitchen gardens, yeah. (WM 3)

Communication within farmer groups

While some members of farmer groups said that the communication within the group had lessened after the WATERCAP project had reduced activities on site, others claimed that those farmers were not attending the meetings during which information was communicated.

Farmers agreed, however, that the second round of selecting tank recipients had never been communicated to the whole group. The tank owners reported to have been informed by the chairperson while some other members learned through informal conversations and still others never heard of it until the introductory workshop of this research during which the second selection phase was discussed:

[...] the second phase of selecting the tank people we didn't know about it as a group. [...] we came to know about the other enrollment, the second phase enrollment when we went to [group member]'s place. That's how I got to know. So there was also a recruiting of the second phase but as a group we didn't know about it. (G2 Farmer 1)

A further member again got to know of the selection of three group members only during the interview.

After the WM interns had gotten in contact with the chairperson of **group 3**, the chairperson called the members for a group meeting. In the meeting of the group and the WM staff, the WATERCAP project was introduced and one of the members of WM staff announced that two group members would receive water tanks in the course of the project. The group was furthermore asked about the number of gardens of the other group members:

But then did not tell us exactly what was going to happen. Then later on [WM staff] told us: you know what, I want you to select other three people to take up the tanks. But [WM staff] just asked: how many people have around ten gardens. So the other two people raised their hands. And [WM staff] did not comment about that. (G3 farmer 2)

In a second meeting, farmer group 3 was asked by the WM staff to develop own selection criteria for another three tank recipients. The identification of these suggested recipients was done in a joint group meeting with the result that all members were informed on the decision.

Like in farmer group 2, the members of group 3 stated to have been told by WM staff that the tanks would be distributed in sequent phases, upholding hope that has been expressed by a member in the initial group discussion when two rounds of tank recipients had already been decided on:

We were told that there will be another phase so we are hopeful that we will get other tanks. So there were no grievances. (Farmer during Introductory workshop group 3)

In the introductory workshop, the members of group 3 were also given an outlook for a cooperation beyond the scope of the WATERCAP project by the WM staff:

So I told them that we shall come, we look at their group and we assess it because I'm not the principle investigator. [...] There is money that is given to the group for participation. So if this group gets the opportunity which I'm really sure it's going to because I'm part of the teachers. So I was thinking that we could bring this money back to the group and then we request the group to do whatever they want to do with the money. So if we still want to continue building tanks we can use this money and select another participant to build a tank. It's a three years' project. So that is now the hope that is there but I now it's going to work because there is no such group that I've met here [...] So that is why I was telling them that if we work very well, when other projects come we can build on this [...] So sometimes I just come to energize them so that they know that this is not the end. We have other projects that can come and support us. (WM 3 during Introductory workshop group 3)

5.1.2.3 Communication – Discussion

The **proposal** referred very generally to the function of the established IP as a frame for **communication**. The concept also stressed the necessity of communicating with existing initiatives and that the lessons from the project were to be spread by being integrated into university curricula. Since the actual project implementation was left to the implementing unit, the proposal did not contain specific information on anticipated communication processes within the established IP and on the local level. The project staff of the

coordinating and implementing units commented on communication issues, arising from the way things had taken place, so communication was reflected on post hoc, not a priori. It is possible that the complexity of communication within the project was underestimated during the planning phase of the project.

Cooperation with existing initiatives

In terms of **building networks**, the goal to link the project with existing initiatives was achieved. Based on field case studies in Africa, Asia and Latin America, Leeuwis and Hall (2010) formulated communicative strategies in three areas they identified as essential in an innovation supporting infrastructure: *network building*, *supporting social learning* and *dealing with dynamics of power and conflicts*. In regards to the first process, WATERCAP did find out about an existing project to then “build on existing initiatives for change and the networks around these” (Leeuwis, Hall 2010: 26). Contact between “disconnected networks that may have compatible interests” (Leeuwis, Hall 2010: 26) such as farmers and traders, however, were not established in the course of the project.

At this point, it cannot be assessed if the project will succeed in spreading the lessons learned to a wider audience through the integration in curricula of participating universities.

Communication among the participating organizations

As the results have shown, the communication between the implementing staff and **partner institutions** was functioning well in some regards, and less so in others where partners proved to be only partially informed. Some CM members of staff were not completely aware of project processes. Representatives of the coordinating unit described communication processes among local institutions, farmers and representatives of WATERCAP in the project similar to the conceptual descriptions of the project proposal. These statements did not fully correspond with the evidence given by other interviewees, including staff of the implementing unit.

This suggests that the overall communication in the decentralized consortium was challenging, also because the coordinating unit received information only through the implementing unit. This is reflected in the experienced challenging process to submit annual reports.

Communication with farmer groups – trust and social learning

The suspicion of some staff members of CM and WM regarding the farmers' honesty concerning water sharing on one hand, and the resentments towards the project by farmers on the other hand, suggest they did not entirely trust each other. A lack of trust of course, influences the communication of partners. This matter raises the question whether regular exchange of positions and views among the stakeholders were facilitated enough.

According to the interviewees, there were a number of common meetings during the project's initial phase. However, meetings with all stakeholders allowing exchange of positions and expectations were not established as a routine. Triomphe et al. (2009), in a study comparing experiences of research carried out with local stakeholders, commented that "[c]ementing lasting partnerships depends heavily on **creating common ground and trust** among heterogeneous actors through recurrent negotiations around goals, values and perceptions." (Triomphe et al. 2009: 162). The provided evidence indicates that the project was not fully successful in establishing such trust among the stakeholders. It can be presumed that this was caused by only limited negotiations on goals, perceptions and values.

On the positive side, the positive effect on trust was directly visible when WM staff let group 3 decide on further tank recipients and implemented the decision. Although the WM staff could have changed the final tank allocation, the fact that the suggested farmers indeed received the tanks implies consent among the group and the WM staff on the goals of the project.

The exchange of different perspectives is important to create **social learning**, the second communicative strategy named by Leeuwis and Hall (2010) for the improvement of innovation processes. According to the authors, this category includes the exploration and communication of stakeholder perspectives, the use of visioning tools as well as scenario analysis to investigate and agree on possible futures, various activities supporting reflection and learning including the organization of "regular reflection on process dynamics and satisfaction with outcomes" (Leeuwis, Hall 2010: 26). Pretty (1995) considered this negotiation and testing of shared perceptions essential for mutual action (Pretty 1995: 1254).

In the case study on hand, the stakeholders in Rakai did not exchange their problems, values and aspirations regularly as suggested by Leeuwis and Hall (2010: 26). When difficulties and doubts were not made explicit, assumptions rather than direct communication contributed to challenging group processes. Moreover, conflicts arose from the circumstance that the stakeholders' expectations regarding outcomes and the underlying values were not explicitly deliberated on.

Communication with farmer groups – innovation platforms

The anticipated constitution of a forum allowing for communication and solution finding among multiple stakeholders was not fully achieved by WATERCAP. When comparing it with the concept of **innovation platforms**, the limited exchange among the project's stakeholders does not meet the standards typically set for IPs. Exchange in IPs aims at “direct and continuous interaction, communication and knowledge sharing among the IP actors” (Nyikahadzoi 2012: 93) as well as “quick and continuous feedback from end users (farmers) at all stages of research for development” (Nyikahadzoi 2012: 93). Since such immediacy of communication among all stakeholders was not in place, more comprehensive communication processes, mutual exchange of stakeholders' opinions, as well as values at the different project stages might have enabled more reflexive monitoring and action within the project.

Communication with farmer groups – differences among the groups

Regarding the communication of project representatives with farmer groups, the narratives and observations vary greatly. The observed differences could have a number of reasons: a possible explanation might be the different points in time at which the cooperation between the project and the groups started. The project staff gathered experiences on how to best manage the process and improved their strategies. This likely resulted in direct and clear communication with farmer group 3 which joined the process later, reflected by the awareness of project processes and the absence of rumors in group 3.

The fact that the roof measurements by the WM interns were interpreted as a commitment towards receiving a tank shows the impact of **non-verbal communication**, which is

acknowledged in the constructivist model of communication in which “physical actions are seen to have communicative implications as well” (Leeuwis, Aarts 2010: 4). From this perspective, it is essential to note that communication has “direct consequences to the (social and material) world” (Leeuwis, Aarts 2010: 4) which should be taken into account by actors in a communication process. This was not the case when the roofs of farmers were measured.

The findings of this chapter further suggest that the **group internal communication** differed among the farmer groups. In group 3, regular and frequent exchange among the members took place and decisions were communicated directly, not leaving room for rumors or other misunderstandings. In group 2 on the other hand farmers reported of a separation between those members who were informed and stood in contact with each other and those who were not part of this circle. Consequently they felt left out.

A recurring aspect related to communication among the project staff and the farmers is the **element of hope**. The farmers were told that the tank allocation would be done in successive phases, that assumption induced hope they would be included in the next step. Hope was maintained also among members of group 1 who were told that the project would focus on a group with a worse water situation. This confirms the notion that “the receivers’ **interpretation of a message** [is] usually quite different from that of the sender.” (Leeuwis, Arts 2010: 3). Going a step further, farmers may also have been unwilling to adjust their view, clinging to the hope for a tank as “an active and more or less purposeful maintaining of a difference in perception.” (Leeuwis, Aarts 2010: 3). This also relates to the assumption of van Mierlo et al. (2010: 37) that different interpretations of situations can be in place among stakeholders.

The discussion of communication processes within the WATERCAP project suggests that communication is crucial to the stakeholders’ expectations towards a project. Early and regular exchange among stakeholders not only potentially prevents later frustration and creates trust, but also enables communication and learning at equal level. Communication in this sense is essential for participation. Relating to van Mierlo et al (2010) who view communication processes as essential leverage points for learning and change, the lack of institutionalized communication structures might have impeded mutual learning and sustainable change.

This chapter has also demonstrated the complexity and immediate effect of communication. Communication takes place through actions that were interpreted differently by the observers than by those performing them. That communication is an act of interpretation became obvious in the interviews with farmers who remained hopeful to benefit from the project despite having been told differently. It furthermore became apparent that group-internal communication took place differently among the groups, impacting the impression farmers had of the project.

With communication taking place at various levels, it can never be planned or foreseen fully in a project outline. Yet, precisely because of this complexity, it is highly important to establish effective communication mechanisms that allow participants to communicate regularly as truly involved stakeholders. Such communication mechanisms could be hosted by an innovation platform as originally planned in the project proposal.

5.1.3 Conflicts related to Decision Making and Communication

5.1.3.1 Conflicts related to Decision Making and Communication – Conceptual

The project proposal did not contain information on the way conflicts arising in the course of the project should be prevented or dealt with. Some of the key conflicts that have arisen in the course of the project are summarized and discussed in the following.

5.1.3.2 Conflicts related to Decision Making and Communication -- Observed

Shift in cooperation with groups

The decision of CM to introduce WM staff to farmer groups in which CM had earlier started an initiative including the installation of water tanks created several challenges. The CM staff that had been working with farmer group 1 earlier also cooperated with the WM interns and Makerere staff, causing members of farmer group 1 to believe they would benefit from the WATERCAP project as well. After the baseline surveys had been carried out, the WM staff however decided to focus its work on farmer group 2. Having contributed to the project's research, members of group 1 did not understand this **shift in cooperation with groups**:

G1 Farmer 2: Ok, the training we did a lot of training but now the other thing which was supposed to follow of course was the tanks.

Interviewer: And are you still expecting the tanks?

G1 Farmer 2: We still hope that a chance will come.

Interviewer: And do you know of other reactions in the group towards the focus on [group 2]?

G1 Farmer 2: We're also still wondering why. We still also can't figure out why the research was done this site and then the tanks were given the other site.

A group member emphasized that despite currently not having a problem with WATERCAP, “it would be bad” (G1 Farmer 1) if the project decided not to return to work with his group at one point.

A member of staff of WM described the shift in group collaboration and the consequences as follows:

Initially actually even before we offered these tanks to these farmers there were a bit of tension between the farmers that were already working with Caritas MADD0 and these that we had identified. Because our intention was: ok let's build on what Caritas MADD0 has done. But then those groups that were already working with Caritas MADD0 thought we were still going to work exclusively with them. So and many of them had already benefitted but they still expected that we were going to work with them. And we said 'no, if you've already benefitted from a similar initiative it's not fair for us to come and still work with you instead of bringing on board other people'. So when we clarified that we are not necessarily restricted to working with those groups that were already working with MADD0 some of them felt well, that's not fair because we were introduced in the community by Caritas MADD0 so they thought we were packed by Caritas MADD0. (WM 2)

Effect on the existing initiative

Providing water tanks without requiring the farmers to contribute financially in an area where other farmers had paid for their tanks in the course of earlier initiatives was not well-taken by all members of farmer group 1. In retrospective, the issues that emerged from the two different modes of tank provision in close proximity were regarded as an oversight in communication between WM and CM as a staff of CM pointed out:

So in a nutshell, in a nutshell I think much as Watercap did us good I mean by bringing, I mean showing us a new approach to our project I think our engagement was too fast, was very fast. We should have made more intensive research and engagement to see how we could harmonize both approaches- our approach and the Watercap approach - and yeah, without creating a bit of conflicts. [...] And I think we should have compared notes at that level. Then move down in a sort of better organized way because we would have envisioned problems to come up because the 2 models are miles apart: free. Mh? The rest, the other one you have to, it's a commitment. (CM 2)

The staff of Caritas MADDO reported that some of the farmers of group 1 who had taken up a loan to construct a tank had been missing out on return payments after the WATERCAP project start. For the CM employees this was seen as an indicator of the farmers' discontent with the situation. A member of CM outlines the conflict as follows:

Interviewer: Is that something that has not been considered properly in the planning phase?

CM 3: No, we didn't. It was an oversight. For us we didn't know, didn't even look at that. We came to think about it quiet late.

Interviewer: And you said some groups failed to pay back the loans in time. Is [group 1] among those groups?

CM 3: Yeah, yeah, yeah, yeah. Yes. [...] Secondly these were free tanks whereas the other one was on loan. So farmers thought that there was double standards because for them they have to pay yet the other ones will not pay. So even at the end of the day payment of the loans was not, water loans to the families was hampered and people started failing, did not have the will to pay back. [...] Like now if somebody gives something like a donation like those tanks some people will feel bad about it although they may not come up openly. But from behavior you get to know that there is something wrong happening. Like now payment is an indicator of exactly what is happening in some people's minds. Because they are not paying because they are not capable. But after seeing that somebody got a gift, sort of a gift and whereas others had to work for these things heavily, yeah you see?

The decreased payment morale had wide-ranging effects on the CM project since the scheme relied on loans being paid back in order for the loan to rotate and enable other group members to make use of the loan. The issue of free versus paid tanks and the resulting difficulties in farmer group 1 was mentioned by the staff of WM and CM but not by the farmers. However, the members of farmer group 1 with self-financed tanks complained that the tanks WATERCAP provided were of a better quality than their own. Having a water holding capacity three times higher than the CM tanks and being

constructed with professional advice by the WATERCAP engineers, the WATERCAP tanks were perceived as superior to the CM tanks:

I don't know so much about the conditions the other site but most importantly the other tanks are bigger than these ones. So at least you can get enough water which can take you. So the other ones are better. [...] I am not content because the tank is small and secondly we also admire the other people. So I'm not content because the tank is small so the water is little and we really have to use it sparingly. And then secondly we admire the other people's vegetables and for us we can't sustain those vegetables. Then thirdly we can't catch all the water because it's too much. (G1 Farmer 3)

As a result of the comparison with the WATERCAP tanks, the owners of the self-financed tanks had become discontent with their own, stating that if given the chance they would not pay for them again.

Issues of transparency

Members of farmer group 2 expressed their dissatisfaction with the course of the first round of selecting tank recipients due to the perceived **non-transparency of decision making**. It was criticized that the maintenance of the vegetable gardens was said to be a selection criterion in the beginning, yet not apparent in the observed selection of tank recipients. As a consequence, some farmers who were engaged in kitchen gardening felt overlooked as the following statements show:

Interviewer: Were you aware of any reactions within the group when the people were selected to get a tank?

G2 Farmer 5: There was some complaints here and there. Some members were complaining that they were eligible people to own tanks but they were not given considerations.

G2 Farmer 1: Now in my own judgment people were, it was really an unfair kind of criteria they used in that if the criteria was number of gardens then it was an unfair judgment because some of us had better gardens than the recipients of the tanks.

The mentioned dissatisfaction within the group was linked to communication with the WM interns: first, many group members felt that the communicated selection criteria did not match the observed tank allocation. Second, farmers stressed that the interns had never

given an explanation for their final selection with the result that the selection was not explicable to them.

Farmer group reported of one member who left the group due to the discontent with the tank situation, yet the person itself stated to still be a member and was also observed attending group meetings during the research stay.

The dissatisfaction of some members and conflicts within the group were accompanied by a **decrease in group activities**. Four members of group 2 in particular stressed that group activities such as regular meetings or weekly collective work had reduced considerably. Two of the members who reported this had not been selected in both rounds. They emphasized that the behavior of the new tank owners had changed, as they would cooperate now only among each other rather than the entire group 2:

G2 Farmer 2: We used to work together but we no longer work together.

G2 Farmer 9: Before they received the tanks we always had Saturday activities, going to someone's home to do something for the activity. But ever since the tanks were brought in we are no longer doing these activities. So those joint activities would help us know exactly how someone feels about something. But now we no longer have that opportunity.

G2 Farmer 1: I don't really feel good about it. Because before when an opportunity would come in they would call everyone to come in. Now we're at the point where fruits are coming out so like a particular group is owning the fruits of the group. Now I'm also wondering why is it that at the moment when all of us are supposed to be together they don't call us to inform us what is happening.

Two members explicitly linked the problems within the group with the WATERCAP project and communication - both on the side of the WM staff and interns and within the group which becomes clear in the following statement:

[...] the origin of their difference is actually the tank. From the fact that we didn't know exactly how those people were selected, from that period, that was last year, no transparency has been going on. (G2 Farmer 2)

Another member linked the stop of group activities with the issue of group-internal communication:

[...] those people who received tanks kept quiet. They did not even inform any other group member what was happening and they did the work individually. So they didn't go back to the groups even to inform them they had received tanks. [...] ever since the tanks were distributed and constructed us as a whole group has never sat to know exactly how other people's opinions as a group. It could be an individual opinion that someone went out of the group. But it's not made even official that someone has gone out of the group or even to hear someone's reaction in the group. (G2 Farmer 9)

According to one of the project interns, the farmer group had also stated a change in leadership as a source of group internal issues:

And then basically they told us the leaders are no longer committed because they don't call for meetings. [...] So in their wisdom they said they need to, the leadership needs to be worked on. (Intern 1b)

After the project interns had become aware of the existence of conflicts in group 2 during their second training stay, they attempted to establish counter-measures in the form of trainings on group dynamics:

When we came back the group is no longer cohesive as it was. They're no longer working together [...] That's why we have been having those meetings every Thursday because we want those mistakes to be, we want them to get back together, get back to the way they were. That's why we've been having group, we have been mainly training on group dynamics basically. (Intern 1b)

The trainings were held towards the end of the research stay and the internship duration so that the effect of the sessions could not be assessed further.

Regarding farmer group 3, the WM staff shared the perception that the group faced internal conflicts already prior to the project start. A WM employee assumed that a collective decision on the second round of potential tank recipients would also have caused conflicts within the group:

WM 3: But I don't think it would have been any different if this [group 2] had selected. They would still have been very annoyed with each other.

Interviewer: As a group you mean?

WM 3: Yes. Because this group is already in disarray. [...]The group was already an annoyed group. So I think the bringing of the tanks just agitated it but that was the status quo.

The interviewee concluded that solving group internal conflicts was not a feasible task for the project:

We work with those who are willing to go and projects have a life span. So you cannot explain to people who are giving you money that we'll spend three years trying to solve conflicts. Can you buy that? We cannot. (WM 3)

5.1.3.3 Conflicts related to Decision Making and Communication – Discussion

Expectations towards the project

Conflicts resulted both from the actual communication and decision making within WATERCAP, particularly by creating **different expectations** towards the project's outcomes. A more carefully designed approach to communication and decision-making regarding the project's processes and purposes would have required an early examination of the expectations and needs of the farmers in regards to the technology and its mode of implementation. It can be assumed that this could have prevented misunderstandings and frustration among the stakeholders. This assessment is in line with the findings of Triomphe et al. (2009) on the creation of common ground in multi-stakeholder partnerships; they argued that research partner projects should not be predefine "how a project will operate or what outputs it will deliver, since these should only be designed and negotiated on the go among the partners, once the project has commenced." (Triomphe et al. 2009: 163) This is supported by Nyikahadzoi et al. (2012) who concluded from a number of studies that "[e]arly involvement of all stakeholders can make project objectives congruent with the needs of the participants." (Nyikahadzoi et al. 2012: 93) Especially with regards to the establishment of commercial vegetable production and market linkages, an **adaptation of the project objectives to the needs** of the farmers had not been made. Summing up, an exchange of perspectives and values, problems and hopes among stakeholders as part of a social learning process had not been facilitated (Leeuwis, Hall 2010: 26).

Effects on the existing initiative

The conflicts caused by the intervention providing tanks in a community where earlier initiatives had provided loans to buy tanks show that the project underestimated the need for careful assessment of the complex context of the project. Assessing the social network of the community and the project from an innovation system perspective could have enabled the project implementers to anticipate these challenges and take appropriate action.

General strategies to prevent and resolve conflicts

Developing strategies for **dealing with problems** in a change process is essential since “competing human values and interests in complex problem settings implies that efforts to change the status quo are likely to lead to tensions and conflicts” (Leeuwis, Hall 2010: 25). Strategies named by the authors in this category include to “[e]nsure regular communication with constituents to take them along in the process” (Leeuwis, Hall 2010: 26) and to “[w]ork towards process agreements” (Leeuwis, Hall 2010: 26). This perspective explains some of the conflicts in the project and implies that the emergence of conflicts is almost inevitable in a complex setting of various people with differing interests. As Triomphe et al. (2009) put it:

[...] research and innovation are not linear processes with discrete, well-planned phases and cycles. Rather, they result from how projects deal with tensions between stakeholders and how they generate the adjustments necessary to achieve success in problem-solving and generating knowledge. (Triomphe et al. 2009: 161)

This shows that expecting conflicts as well as having **strategies** in place **to address conflicts** when they arise by using transparent and regular communication is essential in research for development projects.

Regarding the selection of tank recipients, the project staff did not continuously **communicate the possible level of participation** to the involved farmers. As Bradley and Schneider (2004: 14) point out, it would have been essential “to clarify the level of participation that is intended or achievable. Otherwise there can be a clash of expectations

if stakeholders believe they have an opportunity to influence decisions when in reality they are only being consulted.”

Asymmetries between different stakeholders

Through the WM staff⁷ being in the position to make major decisions regarding the project and farmers merely being informed on processes, the existence of hierarchies or **asymmetries** becomes apparent. Asymmetries among stakeholders are manifold and can include knowledge and information, negotiation skills, resources and the capacity to take the initiative. Asymmetries furthermore have “a powerful effect on the functioning of partnerships.” (Triomphe et al. 2009: 162) Some theorists raise the concern that power imbalances can never be fully banned from participatory interventions since “even if the opportunities to speak are equal, the possibilities to make claims and criticize them are not.” (Leeuwis 2010: 940) Yet measures can be put in place to counteract asymmetries. Triomphe et al. (2009) demand researchers in partnerships to provide farmers with space to develop and carry out own suggestions, arguing that “[s]mallholder farmers and their organizations are frequently among the weakest members in a partnership and need special capacity-building to ensure that their concerns and proposals are effectively taken into account.” (Triomphe et al. 2009: 162) The examination of conflicts that arose in the course of the project supports the hypothesis that farmers were in a relatively weak position to influence project processes.

In summary, major conflicts related to project processes were linked either to imbalances influence, while mechanisms for conflict prevention and resolution were not clearly defined. Explicit approaches to include and align the expectations of all stakeholders could have been a measure to counteract conflicts. Complementing mechanisms for conflict management, clear guidelines and actions to ensure transparency could have mitigated a deepening of arising conflicts.

Again, these suggestions have to be considered within the structural limitations of a research for development project. Time pressure, distance between the project sites and the institutions as well as pre-defined deliverables make the facilitation of an open innovation process particularly challenging.

5.1.4 Looking back: Reflections on Processes by the Stakeholders

Many interview partners have uttered reflections on processes in the course of the interviews. Since the reflections are in one way or another related to the arisen conflicts described in the previous chapter, they are combined in this chapter. When possible to distinguish, it is indicated if the reflections rather refer to decision-making or communication.

Having criticized the misconception of personnel in group 1 that was brought about by the CM staff cooperating with the WATERCAP project, the chairperson suggested that the WATERCAP cooperation with group 1 should have continued, or the CM staff should have distanced themselves from the WATERCAP project to prevent such conflicts.

A member of CM's staff also referred to conflicting situations relating to the clash of the earlier tank project of CM with the newly coming WATERCAP project on site and pondered the **issue of locality**:

Could have been that these free tanks would have been maybe in another sub county. If they were to come back I would say let it be done a bit away from, start with a new area of Caritas MADDO where water, where this evolving fund component does not exist such that people come to get opportunity of harvesting water, saving these tanks.
(CM 3)

Some interviewees furthermore suggested a different **mode of implementation**. One idea here was that the farmers should make a bigger (financial) contribution towards the tanks to create a sense of ownership. This was suggested both by the chairperson of group 1, a staff member of CM and a WM intern:

So even that issue of the tanks even us were not supportive of those people getting. [...] We wanted them at least, maybe someone on top of digging the pit maybe at least they would have told them maybe it would be a responsibility to buy the gutters such that they feel the pinch, feel their pain. (Intern 1b)

The idea of financial contribution was also mentioned by an employee of CM who conceptually advanced the CM approach of a loan scheme when reflecting on

WATERCAP, arguing that this would give everyone the opportunity to benefit and furthermore broaden the scope of the project without interfering with previous projects:

We need to expand it. But maybe a new approach considering all these weak challenges we need to look for a new way of doing it. Because if we're going to give out tanks let it be an opportunity that everybody can benefit from. Let it be still a loan, maybe a subsidized loan and those people who will have received the tanks can give that money back to the group and the group gets a more, a bigger loan portfolio for cycling into their fellow members. I think then the matter would have been solved. It can, it can coexist with what we are doing. (CM 3)

Moreover, the decision on the **level of implementation** has been reflected on by part of the WM project staff with the conclusion that an implementation on household level for a community-wide water problem was not advantageous:

So we are realizing the problem is, the challenge is that we need to, we are learning actually from this implementation of this that when you're addressing a community development initiative the idea of looking at the household is probably not the best model. Because like there that challenge of water is a community problem, it's not just a household problem but we are looking at the household. We are doing all our planning and estimation based on the household but the water problem goes beyond the household. So some of these community related kind of initiatives looking at the household is probably not the best approach because it is a community-wide challenge and it can only be addressed at community level. (WM 2)

The interviewee concluded that – if done again – the project would rather foster **cooperation** with already commercially oriented farmer groups due to their greater potential for change and impact and high independence:

But if I was to do it now I would look more for groups like the other group of farmers who were commercially oriented and they have some source of water which they can use for irrigation and all they need is to improve that and I would look more for that kind of group, groups of people. [...] Because I think they have more potential to trigger change than these people with the tanks and they don't need a lot of support. (WM 2)

There was expressed dissatisfaction with the course of decision-finding in group 2 that also surfaced through the comparison with how things were decided upon in group 3. Concerning **decision making** processes the majority of group members believed that

[...] it is always good for any group, even to any other places that we are going to/ to allow the groups to make their own selections. (G2 Farmer 3)

In the final workshop, the members of group 2 reflected that the collective decision making mode of group 3 was superior to their own second phase selection by individuals because the practice of solely identifying neighbors created conflicts. Therefore, they decided that they would like to collectively pick the recipients of the second round of selection. This decision took place in the final meeting with the farmers without WM staff being present. At the time of research, the WM staff indicated that a further tank allocation to group 2 was uncertain, so it is not known if the group's decision lead to any consequences regarding tank allocations.

The suggestion of participatory mutual decision making instead of project staff or individual farmers deciding was also made by employees of CM and members of group 1:

I encourage a participatory kind of approach. If a service has been brought in to an organization like [group 1] it's supposed to be the group members to decide on who to take the service. That is what I encourage. (G1 Farmer 1)

A member of staff of WM on the other hand, was not content with the interns' selection of farmers and stated that the WM staff should have looked at the interns' decision in advance:

And when you look at the people that were left, the other people that are still doing their work, when you look at those old couple they're doing a better job than people that were selected. [...] So I think next time as a learning lesson maybe I should also have looked at the criteria that the interns set up. (WM 3)

A RUFORUM respondent reflected on the issue of the project's **limited scope** while everyone would like to benefit, stating that this conflicting state has not been considered in the prior project implementation:

[...] but it's always what happens in local communities that they want, everyone wants something. Now it's within the limits of the extension specialists to design strategies to mitigate that. If you know you're expected at least something should have been done. That is now experienced and we have to solve it in the process of implementation when we want something to happen. (RUFORUM 1)

Many interviewees criticized the non-transparency on the decision making of the WATERCAP team. Consequently, when reflecting on processes, clear **communication** was asked for, e.g. by an employee of CM. The employee suggested clear communication from beginning on regarding decision-making. Furthermore, ideally a mutual decision finding among the WATERCAP staff and the farmers should have been carried out as a prevention measure for conflicts:

Yeah, but I think because the communities, if you start right from the word 'go' with them and tell them your project concept, your project idea and you discuss they will come up with ideas because I mean I can appreciate, I, I, I, I, it's my feeling that if Makerere came up, the Watercap came up and say 'we only have 30 tanks', because I mean the project can't reach out to everybody. [...] Maybe it will be distribution of some kind which they have agreed upon. Then they will not complain. (CM 2)

One member of WM staff recommended that somebody should have stayed in the community for one year before the actual project start in order to fully understand group dynamics and act accordingly. Yet the interviewee stressed that such a practice – despite being desirable for the cooperation with communities – would be too time and resource consuming and unrealistic because it would not directly deliver tangible outcomes (WM 1).

5.2 Results and Discussion II: Effects

This chapter addresses the second research question of this thesis:

Q2: How do conceptualizations of effects on water management, gardening and commercial production differ from observed effects in the project?

Main findings on Effects

- The constructed tanks decreased farmers' water vulnerability.
- The amount of water used for irrigation was less than intended by the project; rather was it shared among farmers and used for domestic purposes.
- Tank owners reported of improved nutrition due to tanks and irrigation of gardens.
- Project interns trained farmers on organic agricultural practices and gardening. However, little sustainable change could be noted as only few farmers continued with these practices after the trainings finished.
- The water scarcity in the area proved to be a severe constraint to the intended commercial production.
- The project shifted its focus to a commercially orientated group in order to achieve the project's goal of enhancing commercial production.

5.2.1 Water Management

5.2.1.1 Water Management – Intended Effects

Efficient water use in smallholder agriculture contributing to “mitigation of climate change induced water vulnerability and uncertainty” was a declared goal of the project. Enhanced water utilization of smallholder farmers was expected to improve farmers' production of agricultural commodities (appear 2010: 9/11).

The proposal described appropriate techniques of water use as an urgent need for small-scale farmers, calling for “innovations based on integrated knowledge and practices including indigenous and scientific knowledge and practices as well as policy interventions.” (appear 2010: 11). The anticipated IP was planned to support stakeholders in identifying opportunities for innovation related to water resource management. Thus, the

communities should improve their capacity to respond to water uncertainties (appear 2010: 13).

In the case of the concrete project in Rakai, the idea of rainwater harvesting tanks was adopted from the CM initiative. The existing tank model was enhanced and enlarged with the intention that bigger tanks would provide sufficient water both for domestic use and for irrigation of the kitchen gardens:

Because we thought that by getting a bigger tank they're able to harvest more water and which is over and above what they need for domestic use and they can use the other water for production. (Makerere 2)

The water situation in Rakai is challenging for the farmers especially during the dry season. With this in mind, the implementing unit of the project intentionally planned tanks with greater water holding capacities than necessary for the project goal of vegetable production based on the assumption that

People need water at home, otherwise the project would fail altogether. (Makerere 1)

The irrigation of gardens particularly during the dry seasons was assumed to be an advantage for the tank owners in terms of commercial vegetable production:

Because when we were there we wanted them to use this fresh water which they carried to water the gardens specifically during the dry season such that during the dry season they can benefit from that market. Because there's a very good market during the dry season. So they can benefit from the market at high prices so they can get more income and improve their salaries. (Intern 2)

Although not a goal targeted by WM staff, the idea of tank owners sharing water for drinking with their neighbors was brought up by the project interns. Hence, an even distribution within the community was part of their considerations for the first round of tank allocations:

And that's why actually we distributed those tanks the way you see them. They are almost, some are well-distributed. Our idea was at least they should help, at least give out some little water to the neighborhood. Especially drinking water. They could

maybe not give the one for watering the vegetables but at least some drinking water to reduce on these diseases. (Intern 1b)

With a major part of the tank water being intended for the irrigation of the kitchen gardens, whose produce was supposed to be commercially sold, the intended effects of improved water management, kitchen gardening and marketing are closely interwoven.

5.2.1.2 Water Management – Observed Effects

The technology

All interviewed stakeholders stressed that rainwater harvesting tanks were a suitable technology for farmer households in the region due to the saline groundwater. Both wells and boreholes in the area yield saline water that is neither suitable for drinking nor for irrigation. Hence, the collection of run-off rainwater was welcomed:

There is the issue of salinity of the water. We constructed so many boreholes that have come out of use because of the salinity of the water. So alternatively instead of using the saline water we resorted to using the rainfall water. So the idea of the tanks now suited best in the area. (Farmer during Introductory workshop group 2)

CM members of staff stressed that the WATERCAP tanks were an improvement to the earlier tanks developed by CM:

CM 3: In the last 2 years we have had this cooperation and it was an opportunity also to have these professors coming down and we share the technologies and very good they first visited what we had done and I think it's from that that they were able to study the good part of it and the bad and they had good improved tanks when you compare with what we had, that were constructed.

WM 1: WATERCAP built on what was existing so the people building the tank walls are locals and have the necessary knowledge.

One member of staff of WM estimated that the tanks would work for over five years with the main risk being the stability of the plastic sheet holding the water. Some of the CM

tanks that had been installed earlier had been destroyed by termites that ate the wood of the structure. This issue of termites was also observed with a WATERCAP tank:

When I look at the wood that supports the tarpaulin it has been eaten by the termites. So I'm worried anything can happen. The wood might be weakened, it breaks in, water leaks. (G2 Farmer 3)

As mentioned in the chapter on decision making, the tanks were provided without financial contributions of the farmers under the supposition that the tanks were too expensive for them. In reply to the question if an investment in a water tank with the dimensions of the project tanks was affordable to small-scale farmers, a member of CM staff answered:

No, that's quite a fortune. When you talk of a million plus it's quite a fortune to most farmers. Farmers who would afford a million plus in rainwater harvesting would be quite big farmers with a big coffee farm. And don't forget there is the group dynamics. I mean women and children collect water. Men keep the money. So I mean working on the mindset of an individual that let us sell all the coffee this season to bring a tank such that the wife and the children are saved the drudgery of fetching water would take some decades of years to come to tell, you know? So this is still a very big challenge because this water, unless this water is for production and one can get realize an income straight. But if it is water, fresh water for drinking, most men don't get bothered because after all it's not their work. It's the work of somebody else and they may not look at it as a priority to make this enormous investment into such a facility. (CM 2)

Response to water uncertainties

In group 2, none of the members were in possession of a water tank prior to the project, hence depending on ponds as water sources:

These ones [Bigando A] there was not anyone who had any and they were getting water from some pond down here, very dirty water. (Intern 1a)

In the course of the dry season water sources would dry up, forcing farmers in the area to cover longer distances to fetch water:

We have a well up here. But when it dries up we go to a different sub-county. (G3 Farmer 4)

The majority of farmers whose water harvesting tanks had been in place for the duration of at least one dry season reported to be content with it, stressing that the tanks provided sufficient amounts of water:

Interviewer: So does [the water tank] provide enough water for irrigation and domestic use?

G2 Farmer 11: The water is enough. Considering the other season the water was good enough for domestic use and for irrigation to an extent that water was still in when it started raining.

Three other tank owners and their partners also stressed that the harvested water was enough to get them through the first dry season since the tank construction.

Other tanks were finished towards the end of the previous rainy season, which did not allow for an estimation on the sufficiency of water at the time of research.

Two tank owners reported of problems with the water tanks. One tank owner related the little water amounts in the tank despite heavy rainfalls to the small size of the rooftop. The other farmer had a broken tarpaulin in the tank, resulting in leaking of water and insufficient water amounts in the tank. Other tank owners expressed the concern that the tarpaulin might not be able to support large water amounts in the tank:

The tarpaulin possibly could have been left hanging somewhere. When the volumes increase, the volume is getting heavier than the tarpaulin can support. I really feel if more rain comes in it might get torn, that is my worry. (G2 Farmer 12)

Usage of water

The usage of the tank water for different purposes varied among the tank owners. The majority of tank owners said to use more water for irrigation than for domestic use. One of them stated to try covering domestic requirements with water from other sources so as to save the tank water for irrigation:

I use around 2 jerry cans² at home for water and 4 jerry cans for irrigation. But then it does not necessarily mean that I use only tank water to do the domestic activities. That

² Jerry cans are plastic cans commonly used in the area with a holding capacity of 20 liters.

man who's laying bricks there he has had someone to go to the well to fetch water. So I take the advantage of adding extra 2 jerry cans or 3 for home use, meaning that I'm sparing the water tank for any activity. So I don't often use the tank water for domestic use given the opportunity. So I leave it for only watering as per now. (G2 Farmer 13)

One of the farmers who reported to use more water for irrigation than domestic purposes raised the concern that the tank water might not be sufficient if constantly used for the irrigation of the gardens:

I'm worried about the irrigation water versus the domestic water. All throughout the period of the drought if I constantly irrigate the whole gardens I may not have enough water for other activities. Maybe if there is a way to know the right proportions- how many gardens should I have for the tank and the domestic water. (G2 Farmer 12)

Another farmer reported to use the water in equal amounts for the two purposes of domestic use and irrigation and one farmer said that the water used for domestic needs was more than that used for irrigation.

Observations by project staff and the author concerning the irrigation of the gardens did not fully confirm the statements of the farmers. Many gardens were not irrigated during the dry months of June and July. This observation was confirmed by members of staff of WM:

The project's initial idea will not be achieved. Using water on crops in that region maybe is a very big joke. (WM 1)

This observation also led to reflections on the project's initial idea of small-scale farmers engaging in commercial vegetable production considering the area's water situation:

Interviewer: Are they using the water from the tank for domestic use as well? Do they drink it?

Intern 1a: Yeah this one is automatic. They have to. But we insisted the water, much as they have to use it for domestic purposes they have to make sure they also use it for vegetable production. But as human beings of course you're not, if for instance if the water, because the water is majorly meant for irrigation during the water stress periods. So during the dry season if the water is running out of course as a human being you might give priority to life more than, but they are aware the water is meant for irrigating vegetables.

WM 2: And I think we may have had our theory not properly right. Because we thought that by getting a bigger tank they're able to harvest more water and which is over and above what they need for domestic use and they can use the other water for production. But it appears that theory doesn't work entirely in practice because water is such a precious commodity in that area that one would hardly think about watering a crop when actually even his neighbor does not have the water. And they would, we realized that probably they look at watering the crop as not being as valuable as you know, this water was too valuable for the crops. And first of all it's very clean water, actually fresh water and then that's what you want to give to the crops and then the people don't have enough.

These statements reflect the challenging water situation many people in the area face regarding water availability. The WM interns adapted the strategy accordingly to allow for sharing of water with neighbors and family:

G2 Farmer 3: People even come outside the villages to fetch water and they come with money but I always tell them: I can only give you water for free, I am not selling water, it's not a business, but I'm giving you strictly water for drinking.

G2 Farmer 13: Last season the tank was not full but the water was sufficient for me to go through. So I think it will be the same story, only that I have to take precautions on how much water now I give out. Because if I remain giving out that rate it may not be enough.

Interviewer: And to which people are you giving the water out? Is it group members only or also other people?

G2 Farmer 13: Even to the non-members.

Relating to water sharing there seemed to be differences among group 2 and group 3. In group 2, some tank owners assumed that some farmers would not freely ask for water

I'm just thinking that possibly some people are getting a bad hat in that they have, ok one or two whereby someone passes here when I can afford to give her water and goes to fetch very far to collect water from very far yet there's clean water here and she knows very well that she can be given. So I think there's maybe something like a bad hat. (G2 Farmer 11)

While some tank owners reported of instructions of the project staff to always share water, others said that some tank owners would not give out water to other farmers, wishing for clearer instructions on the topic of water sharing:

G2 Farmer 14: And the Watercap people told us we should never refuse to give people water otherwise we will have conflicts that will not be good which I'm also saying actually: the conflicts may not be friendly. So to avoid having conflicts with people you give them water.

G2 Farmer 4: [...] maybe there should have been more of orienting or training people, especially those who have the tanks about how to relate the water in there with their neighbors. Because some people have owned tanks and they cannot even give out any water to their neighbors. Maybe that could have been a bad idea. Maybe training, the group bringing in more training to orient people about what exactly is required of them as tank owners. [...] I'm also encouraging training people to share using the tank.

The degree of sharing varied among the tank owners and some instances of tank water being sold were reported of:

But the only thing I think like is it [farmer 9]? [farmer 9] I think felt uncomfortable going for the water having seen I think [farmer 14] sell part of the water. So for [farmer 9] I think felt like maybe they would charge so [farmer 9] never bothered. And then the other site they share. [...] Actually by virtue of being related. (Intern 1b)

The partner of one of the farmers suggested for the second tank allocation also expressed the intention of selling the tank water:

Originally I had the tank and I would get that water from the tank because I have a grocery shop that side, take the water, boil it and sell it. So from one jerry can of water I would earn 4000 Ugandan Shillings during the dry season. So if I have a lot of water that's an advantage to me that I would get more income because I will have 2 tanks. (G2 Farmer 6)

In group 3, the first two tanks had just been finished at the time of research so that an assessment on water sharing of these tanks was not possible. Yet one member stressed that water sharing among the group members was a common practice, expecting that this would also be practiced by the new tank owners:

If I don't have water because water is a problem I can go there and get. But that is on group basis [...] It's a consensus.[...] For example [farmer 5] had already a tank but we would go there as group members to get water for drinking. (G3 Farmer 6)

Benefits of the tank

All farmers with WATERCAP tanks expressed their appreciation of the tanks. Frequently, farmers mentioned that the tanks free them from the daily activity of fetching water from distant sources, an activity that is often the chore of women and children:

G2 Farmer 15: I have gotten release from the stress of fetching water because I would be maybe working but having that stress of running to fetch water and even worried of the children going to fetch water. But at least that is something the tank has relieved us of.

And I benefit- my children no longer go to the wells late in the night to fetch water. (Farmer during Introductory workshop group 2)

Improved performance of their children in school since they do not regularly fetch water anymore was also mentioned by one farmer:

But now the children no longer go to fetch the water, take the risk of fetching the water. Secondly they have all the time to sit down and read. They even have improved in their performance which is something good because they have time, nobody is chasing them: go and fetch water. The harassment of 'children do this, go fetch water' is no longer there. (G2 Farmer 3)

Other farmers pointed out that previous fights about the water situation in the household were reduced since the tank was constructed, leading to more harmony among partners:

G2 Farmer 7: At least that situation of crisis all the time is no longer there.

G2 Farmer 14: All those grudges are no longer in existence. So there's harmony in that there's less of fighting about the water anymore.

Improved hygiene was another mentioned benefit from the constant water supply through the tanks.

G2 Farmer 3: At times we would not even bath, we would not clean up properly because of the water shortage. But now we can do it easily because we have the water.

G2 Farmer 16: [...] before, the water we would always fetch was limited in that we would find ourselves not having to wash our clothes often. It was always a hassle telling someone 'go and fetch' because the 2 of us are elderly. So we would keep postponing like the washing business. One jerry can we would have, it would only be for maybe bathing. But now we feel free to get the water there. [...] So there is that ease in our lives.

5.2.1.3 Water Management – Discussion

Due to the long dry seasons and the saline ground water, Ddwaniro is already a water stressed area. In the face of climate change induced weather uncertainties, the water situation might worsen further in the future. Considering this challenge, all stakeholders agreed that the technology of rainwater harvesting tanks was appropriate. By improving farmers' water supply and indirectly also their nutrition, introducing the technology served the purpose of decreasing water vulnerability for those who received tanks. Furthermore, involving local workers in the construction of the tanks will enable people with the necessary financial capacity to replicate the technology without being part of the project.

Although the tanks were recognized as adequate water management tools, the observed water use differed from the use initially intended by WM. This may be due to the limited participation of users in defining the project agenda. Nyikahadzoi et al. (2012) observed that ownership of the research agenda was high among farmers in a project when the critical issues that were to be approached were identified by farmers themselves and other stakeholders were solely brought on board to jointly find solutions (Nyikahadzoi et al. 2012: 99). Adapting the use of the tanks and water can thus be interpreted as reclaiming control of the technology by sharing water instead of restricting the use to domestic purposes and irrigation. The research revealed that water is a precious and scarce resource for people, so much that households share when other community members' needs are not covered. This importance and scarcity of water in the area was underestimated in the planning phase of the project.

This observation on water demand and its impact on the project is in accordance with the reflections by Narayan (1995) on rural water supply projects. Having observed the degrees of local people's participation in different projects, Narayan came to the conclusion that "[a]s long as technology and service level are predetermined and inflexible, community

demand cannot be met, even if such demand has been assessed and aggregated.” (Narayan 1995: 71) Potential alternative technologies do have to resonate with the needs of a higher number of people in a community, which implies that the project should work with whole groups as opposed to individuals.

Again, defining technology pathways should ideally be made by communities themselves and not by an external researcher. The results by Steurer (2014: forthcoming) on the same project provide technical evidence helping to think of alternatives:

Steurer calculated the required rooftop size necessary to enable sufficient rainwater harvesting and a full tank at the beginning of the dry season based on rainfall data for the region and ongoing domestic water consumption. It was concluded that not all rooftops of the farmers' houses were large enough to allow for sufficient rainwater harvesting. Since the tanks themselves were also equipped with a roof it was recommended to catch rainwater from the tank roof in addition to the roof of the house. Provided a full tank at the beginning of the dry season, the tank's carrying capacity is sufficient to cover average domestic water needs and leave a surplus for irrigation throughout the dry season. It has to be noted though that the domestic water needs were accessed through farmer interrogation and varied widely among the households (Steurer 2014: forthcoming).

Based on this, a higher number of smaller tanks or jointly owned and used structures for water harvesting could be possible options. The benefit of smaller tanks would lie in their affordability: the WATERCAP tanks cost more than an average small-scale farmer in the region could afford. Smaller and cheaper tanks or joint structures that can be financed collectively could have an exemplary function. If tank owners improved their livelihoods by using tanks, this might inspire other farmers towards self-initiative. As a consequence, the effect of the project could be widened beyond its immediate participants, enabling more farmers to reduce their water vulnerability as it was the goal of the project.

The NGO Caritas MADDO had introduced small affordable tanks before WATERCAP with moderate success. Based on CM's experience the WM staff decided to implement improved, larger structures. Having the tank recipients' limited financial capacities in mind, the WM staff decided to pay for the tanks with project funds instead of starting a loan

scheme along the lines of CM. On these grounds resource poor farmers had the chance to benefit from a technology that they would not have been able to pay for. Therefore, for the farmers directly benefitting from the project the larger tanks and the underlying considerations were advantageous.

Calculations on the average price that is paid for one jerry can of water in the area during the dry season came to the conclusion that selling the tank water would be more profitable as well as less labor intensive for the tank owners than growing vegetables for marketing (Steurer 2014: forthcoming). Against this background, the question for sustainable water management strategies and the long-term impact in the communities arises. It could have been beneficial to adapt affordable water related technologies in a participatory process. Practitioners and researchers in the field of Participatory Technology Development and Participatory Innovation Development have made extensive experience in facilitating such a process, and their reflections provide specific guidelines. One example for such an approach is PROLINNOVA (PROmoting Local INNOVAtion in ecologically oriented agriculture and natural resource management). The partnership programme aims at identifying local innovations developed by farmers to then establish linkages between farmers, researchers and other stakeholders to bring about changes. This approach of Participatory Innovation Development (PID) enables new relationship structures between researchers and farmers because farmers are not reduced to be seen as “people who should receive and adopt technologies but rather as people with something valuable to offer” (Waters-Bayer et al. 2009: 145). WATERCAP differs widely from this approach since farmers appear to be viewed as traditional recipients of an externally determined technology instead of stakeholders with innovation capacity and valuable knowledge. The exploration of farmers’ ideas in cooperation with researchers and development agents in Rakai as practiced in PID (Waters-Bayer et al. 2009: 146) would have enabled a mutual identification of water technologies feasible for the farmers’ actualities. As this was not done, the idea behind the technology and its intended use were led by external project members instead of the farmers.

5.2.2 Gardening and Trainings

5.2.2.1 Gardening and Trainings – Intended Effects

Since the specific project design on site was left to the implementing unit, the proposal did not contain information on kitchen gardens. One aspect in the proposal broadly relating to the topic was food security of farmers threatened by climate change:

By and large climate change remains a global and local challenge to agricultural development and food security. Vulnerabilities faced by smallholder farmers are worsening each year threatening food security great. (appear 2010: 3)

The practice of kitchen gardening had already been introduced to the farmers by Caritas MADDO to improve their nutrition. Taking up this idea, WM provided larger water tanks that allowed for irrigation of the gardens also during the dry season:

They saw an entry, an entry point to their project which would build onto the water component bit to relate it to the production of the vegetables. It was somehow, actually initially they were talking of vegetables. So it was their, it was their idea of building on ours. [...] The challenge was there because our people were getting, were growing vegetables during the rainy season but come the dry season like this then the whole vegetable growing would go to zero and wait for the other cycle. (CM 2)

The vegetables were expected to improve farmers' nutrition throughout the year. Moreover, selling the produced vegetables should allow the farmers to generate additional income. The necessary knowledge on gardening as well as some other farm related practices was supposed to be taught in the course of trainings held by the project interns.

5.2.2.2 Gardening and Trainings - Observed Trainings

During their stay in the field in 2012 the WM interns engaged in trainings with the farmer groups. The trainings took place on a rotating basis on the farms of the group members and related to topics such as gardening, agricultural practices and group dynamics:

Intern 2b: We went there for, for training and the training and participatory work. We used to go for meetings with them, teach them on group dynamics, nutrition, several things. [...] So we worked with them in the gardens, showing them how to contra serve diseases, pests, identify particular things, pests and diseases, how to control them

Intern 1b: We had to train on coffee, we had to train on bananas, these 2 crops being the major crops that sustain them for income and for food security. The vegetables were to add income and also to improve on nutrition. So we had also to do some trainings on soil and water conservation. [...] Then we had to train them on soil, making simple manure, making others. [...] So we taught them how to make some organic fertilizers.

Almost all of the interviewed farmers said that they had participated in the trainings by the interns. Many of them stressed that the trainings had a positive impact on them since their gardens were improved and they enhanced their skills:

G2 Farmer 8: MADD0 had trained us about kitchen gardens originally. But we didn't care about it, we didn't implement it. [...] The interns came in later to encourage us to increase on our gardens.

G2 Farmer 4: I engaged with [interns] via training about what skills I never had in preparing these gardens and also hygiene at home.

In the course of the trainings the project also provided the farmer groups with seeds to support their gardening activities:

However we asked individual farmers, we made an assessment, that's what we call assessment modus. We made it: which crops would you wish to grow? They tell us: for me I want to grow this. We do not impose. It wasn't meant to say: grow this. [...] So farmers were telling us which plants they prefer. So that's what we came up with and we provided them with the seeds for those different vegetables that they requested for. But out of their consent. (Intern 3)

An issue that was raised by one of the interns was the sustainability of learning. According to the intern, the members of group 2 were actively participating in the trainings but did not continue with the practices afterwards:

So after, even during that time when we were around, after we taught them they were making those things anyway. [...] So they were doing those things. But after, when we left, they're no longer doing those things. [...] With the issue of water it is understandable but there are other things like manure making, crop planting, some other agric agronomic things. There are some things which they're not doing and yet we're teaching them small basic basic stuff. Not complicated stuff. And they're not doing them. (Intern 1b)

Related to training was the idea of the WM staff that the tank owners should train other group members on kitchen gardening.

WM 3: But the instructions that were given, and I talked to individuals, to the recipients that 'now you as a recipient of a tank get somebody who can come and learn from your garden and teach them how to plant this garden'. In fact we gave out, we gave them seeds to plant those seeds and show the rest of the people. So I think their expectations either arose or the people didn't explain to them exactly what I had told them to do. Because it was just to multiply, to get other people learn more about kitchen gardens, yeah.

G1 Farmer 5: Because [farmer 8] went for training, [farmer 8] was being trained by the students as they said. But [farmer 8] didn't care about putting up the gardens. [farmer 8] had the 1 or 2 of them. But when I chose [farmer 8] in my mind, but I knew this is one hard-working farmer whom I can influence into doing this and [farmer 8] will take up the project. So we went together and started making the little gardens.

Nutrition

With the tanks providing water throughout the dry season, the tank owners had the possibility to regularly irrigate their vegetable gardens. A number of farmers stressed that as a consequence, they had a constant supply of vegetables for home consumption:

G2 Farmer 3: Watercap has also enhanced our nutrition. Now the vegetables I have here are from last season which if it was the normal routine all those ones would have died during the sun. But that is a continuation of last season meaning that every meal I can afford to have a vegetable in there which is good for our nutrition.

G1 Farmer 6: The tank has even helped us. [...] There's no crying for hunger that me I don't have sauce today because we have that continuity of supply of sauce of vegetable. I'm grateful it provides drinking water and our relationship at home is really nice, it's good.

5.2.2.3 Gardening and Trainings - Discussion

Trainings

The trainings provided by interns to farmers on issues of gardening and organic agricultural practices can be seen as an attempt to respond to farmers' needs. Pretty (1995) stressed that many effective and resource-conserving agricultural practices developed by scientists on research stations are not adopted because the conditions on research stations are different from the ones farmers face (Pretty 1995: 1248). The circumstance that the project trainings were held locally on the farms of the group members suggests that they positively integrated farmers' realities.

The training component of the project can also be seen as part of an Innovation System approach that does not solely focus on the transfer of new 'hardware' but also includes organizational as well as institutional elements. In this case, the trainings would be an organizational element which refers to "new ways of organising groups, production and/or consumption" (Nederlof et al. 2011a: 13). This said, the question remains why few farmers maintained the practices after the end of the trainings. One explanation could be group-internal challenges, since the group experiencing the most conflicts discontinued the trained practices earlier. Moreover, the way communication and learning processes took place may have been rather linear, intending to 'build capacities' complementary to the technology transferred. If the training's content was fully determined by the interns or the WM staff, this could be a further potential reason for the decline in practices because "[d]espite the benefits of resource-conserving technologies, if they are imposed on farmers, then they will not be adopted widely." (Pretty 1995: 1248)

In a similar context, Friis-Hansen and Duveskog (2012) analyzed the relation between Farmer Field Schools (FFS) and empowerment and well-being of farmers. FFS entail regular meetings of farmers experimenting on plants, animals and other farm-related topics on farm site (Friis-Hansen, Duveskog 2012: 416). FFS are one way of engaging with agricultural knowledge and growth and are considered to be more effective than working with individual farmers (Friis-Hansen, Duveskog 2012: 415). The study's hypothesis was that processes of joint learning can lead to individual and collective transformation, hence empowering resource-poor communities and indirectly improving their well-being (Friis-

Hansen, Duveskog 2012: 415f). The authors drew the conclusion that agricultural development programs should focus more on empowerment of farmers than on technical solutions “in order to create an appropriate mix of technical and social advancement for a development process that is sustainable in nature.” (Friis-Hansen, Duveskog 2012: 414) Referring to Leeuwis (2004) and current extension thinking the authors described communication as a close cycle in which researchers, extension workers and farmers experiment, rather than exhibiting a unilateral communication flow (Friis-Hansen, Duveskog 2012: 415).

Considering that almost one year was passing between the initial field stays of the project and trainings of the farmers, a close communication cycle between interns and farmers might not have been in place. Considering the distance between Rakai and the project staff based in Kampala and the time and capacity limitations of the project, the findings raise the question whether joint learning is possible at all in a project such as WATERCAP.

The plan of the WM staff that the tank owners should share their knowledge on gardening with other farmers and train them, shifted the farmers’ role from recipients of knowledge and technology towards active stakeholders. Whether farmers take up this role as trainers remains to be seen. If the farmers continue the collaboration among themselves, this could result in impacts beyond the duration of the project and increase its outreach.

Nutrition

The WATERCAP proposal outlined the threat climate change poses for the food security of small-scale farmers. Constant access to vegetables and the improved nutrition this entails can be a step towards higher food security for rural households. Although the kitchen gardens were partially already in place through the earlier initiative of CM, the enhanced water availability through the WATERCAP tanks allowed the farmers to irrigate their gardens regularly and increase the vegetable harvest for home consumption. The results suggest that the project so far reached the goal of enabling farmers to grow vegetables also throughout the dry seasons, thus increasing the opportunity for improved nutrition and food security.

As the chapter on the project's effects has shown, the achieved effects varied widely from the intended goals. The observed effects were related to farmers' basic needs such as water access and nutrition whereas the concept aimed towards the more advanced output of commercial production and market linkages. One explanation for the difference already lies in this discrepancy: with basic needs not covered, other effects do not seem in compliance with the farmers' livelihoods. Something that can be learned from this assessment is the importance of stakeholders' mutual identification of effects in order to produce realistic outcomes and integrate the needs of stakeholders.

5.2.3 Commercial Production

5.2.3.1 Commercial Production – Intended Effects

One project aim was that the farmers provided with water tanks would sell vegetables from their kitchen gardens during times that usually do not allow for vegetable irrigation and harvesting due to a lack of water.

Initially there were two areas of focus when we were trying to introduce those backyard gardens or kitchen gardens. That one in the dry season there is a scarcity of vegetables because nobody is producing anyway. And we thought these farmers if they can produce even at that limited scale they would be able first of all to consume some of it for their own household nutrition but they would be able also to sell [...]. (WM 2)

The assumption behind the idea of commercial vegetable gardening was that the tank owners would regularly irrigate their gardens in order to produce sufficient vegetables of good quality. Vegetables were planned to be sold by bulk marketing through the group members in order to improve their bargaining power vis-à-vis buyers and to generate higher incomes:

Intern 3: Our idea was and how we told them to do is that if we say within a group there are 30 farmers. Then we say 15 you are growing cabbages. [...] But we encouraged uniformity in the kind of crops they are growing.

Interviewer: Does this secure higher prices?

Intern 3: Basically. Other than selling as an individual. Because an individual when a buyer comes and says: "ok, I'm buying you a cabbage at 400" then when he leaves this

place to go the other say the other one will say "mine is 700". You see there's a problem. There's a very big difference between the two prices. So what normally happens when you're selling as a group you set one price. We say the minimum price will be 500 for the cabbage so that the farmer benefits.

Anticipated components of the joint marketing scheme were mutual buying of seeds and the establishment of a common seedbed for each group in order to facilitate uniform planting of vegetables:

And then when they establish a common nursery bed and now they have the same technology they apply out there, they shall have uniform production. So if it's cabbage it will be uniform production because they have the same technology to produce the cabbage. (Intern 2a)

Once the uniform growing of vegetables would be established, the project planned on including buyers or traders in the project in order to advance the production:

So we wanted to first of all demonstrate there is something that farmers can do with harvesting water for their domestic and also agricultural production. And once we have that demonstrated then it's easy to bring on board other actors like people who would be buying their produce because now they'd be producing something. And then we can be able to bring on board the district leaders and the other NGOs that are operating in that area to look at what is really happening at that moment and explore how that can be scaled up or advanced. (WM 2)

5.2.3.2 Commercial Production – Observed Effects

Markets

Prior to the project the groups had either little or no experience with group marketing. Group 1 and 3 had attempted group marketing before but abandoned it again for different reasons:

Interviewer: Have they been market oriented before the start of the project?

Intern 1a: No. Largely no, although when we were working, when we were teaching about marketing, group marketing, collective marketing, especially in this group [group 3] they told us one time they tried but they abandoned it because they were disappointed by the traders. The traders told them they wanted some particular beans so they grew those beans as a crop. They harvested and the sorted them very well but when the traders came they gave them the same price like the other beans that were

being sold in the area. [...] So they saw no use of adopting the practice and they abandoned it. [...] But these ones [group 1] they told us some time back in the 90s they also tried it but I think there were some issues with the group. Trustworthiness and I think they abandoned it. [...] But these ones [group 2] they never tried it.

The opinions on the existence of markets and buyers for produce in the area were inconsistent. While a WM member of staff stressed that markets were in place even locally, an employee of the coordinating institution named a lack of markets as one problem of the project:

WM 2: [...] because the market was available even within the community itself.

RUFORUM 1: And the other challenge now is there's almost no market. Everyone is producing and then few people are buying.

One farmer remembered prior bad experiences with projects that made the farmers grow certain crops with the promise of markets that later turned out to not be in place:

Normally organizations come and they want to go through groups. [...] So with time as we move on the project people promised us 'we're going to do this'. They never come back. We put in a lot of efforts, we grow things, they promise us there are markets. We grow things, the market is not there, we waste our money, we waste our time. (G2 Farmer 1)

Group activities around commercial growing

The establishment of a common nursery bed for vegetable plants was not reported and could not be observed in groups 1 and 2. In group 3 on the other hand a common seedbed had been in place already prior to the project interaction.

As a group when we're doing gardening I'm the one who does the nursery bed. So I do that and every group member picks to go and take to their gardens. If we don't distribute the seeds, that's what I do. They all come and pick and take. According to how someone would also like to have that kind of vegetable. [...] So it will be by choice how you want it. (G3 Farmer 1)

In this group the construction of water tanks was seen as an opportunity to increase the supply of shared seeds:

I didn't have a problem with one of the group members having the tank because I knew those people would continue generating for us seeds. We have this activity in our group whereby someone who has seeds in the group tells us 'I have seeds' and we distribute amongst ourselves, those who do not have. [...] If that person has a tank we shall always have continuous supply of seeds and if I don't have greens in my house for my children I can always go and am given something to help my people. (G3 Farmer 6)

Some farmers reported of occasionally selling vegetables individually yet not through bulk marketing:

G3 Farmer 5: I have been selling even before. I have been selling all, all those

G2 Farmer 4: We plant differently- this one has this, this one has this. So time for marketing, someone markets on their own because the particular edible thing in my home is not what is in the other home.

Generally much of the produce from the gardens was used for home consumption as the previous chapter on gardening has also shown, leaving little quantities for sale:

Because I sell also but selling is not the big thing because I really have to make sure that at home I have enough food. But once in a while I sell. (G1 Farmer 2)

The marketing activities around vegetables from the kitchen gardens fell short of the project staff's expectations as this quote shows:

But then my other disappointment with that group is that there are things, we taught them very many things and there are things they are not doing. [...] So we even asked them why, another issue, another hot issue was on growing the vegetables because I think seeds were bought. Members collected money. Because before we left we taught them on collective marketing, group marketing. We want them to sell as a group such that they reduce on being cheated. So we asked them 'why are you not doing that?' (Intern 1b)

Against the background of the observation that many gardens were irrigated poorly during the dry season, the WM staff came to the conclusion that the project goal of members of the groups selling vegetables would not be achieved:

So these others we thought they would be able to produce some vegetables for also for sell but because of the issues around water that we were already realizing that it may not be a tangible outcome. Some few might manage to sell something but most of them the way I saw they were not giving these crops enough water. (WM 2)

One consequence of the low market engagement of the small scale farmers was that the project staff decided to increasingly cooperate with another group, namely a sub-group of group 3 that they provided with a water pump for large-scale irrigation. As mentioned in the chapter on conflicts the sub-group was already growing vegetables commercially and the WM staff expected the group to meet the project goal of commercial production:

So that's why when we came across the other group that was, the one that are using the pump now to do the irrigation. Where that's now a commercially oriented group because for them they were producing for the market, they were not really producing for just consumption. So that's the group that we were targeting like this one now since it's already commercially oriented, you know, with a little bit of support they would be able to improve a lot on incomes using what they can produce in the dry season when others are off the market. So what we need to do more with that group is to assist them to keep records so that they can be able to know how much they have been able to generate from their enterprises in this dry season. Because you saw that they were already planting when actually the dry season was setting in because they knew that with they have the water, now they have the pump, they will be able to produce when nobody else is producing. [...] So that's the group we are looking at in terms of advancing the commercial elements including marketing. (WM 2)

The explanation given for the shift in focus by one employee of WM was that the project goal of water for production had to be met with the budget:

It's not that you want to please the community but the money has to do what it was supposed to do. And in fact if results like are coming out, if the people are really not using the water for production - the project is meant to use this water for production - then I would rather support or expand people who are actually using the water for production. (WM 3)

5.2.3.3 Commercial Production - Discussion

While the WATERCAP project was solely concerned with one aspect of the farms, namely the kitchen gardens, the farms encompassed many more areas. Predominantly growing plantains on their fields, the farmers were in one way or another engaged in marketing parts of their harvest independently from the project.

Concerning commercial vegetable production and marketing, external constraints could easily be identified. As recognized by many stakeholders, the goal of commercial vegetable production was difficult to achieve considering the general water situation of the area. Moreover and due to their limited number and size, kitchen gardens mostly serve as a food source for households. Generally and in other contexts, selling surpluses is being practiced by many farmers with kitchen gardens, yet this is not the core purpose of such gardens (FAO b, n.d.).

At the time of field research, linkages between farmers and potential vegetable traders had not been established. This relates again to the challenges in establishing an innovation platform and the restricted communication among stakeholders. Cooperation of farmers, project staff and potential buyers from on the start of the project could have established a process to actually implement marketing activities. Nyikahadzoi et al. (2012) reflect on an IP around vegetable production in Malawi, which successfully linked buyers with smallholder farmers with subsistence vegetable gardens. The stakeholders of the IP identified constraints to commercial vegetable production: a lack of knowledge on buyers' vegetable preferences, a lack of stable markets and capital sources and a lack of irrigation related knowledge and skills threaten successful production and marketing. Their conclusion was that "individual effort was not sufficient to meet the identified vegetable demand." (Nyikahadzoi et al. 2012: 96) Accordingly, the involved NGO and extension workers trained the farmers on which vegetables were demanded by potential buyers and how to grow them all year in good quality; furthermore, the trainings supported farmers in finding consistent markets and the facilitators established links to micro-finance institutions. A major insight was the importance of an interconnection between research and training in order to sustain market linkages (Nyikahadzoi et al. 2012: 96).

Whereas such an approach does not guarantee satisfactory outcomes for all stakeholders, it allows for an early definition of realistic goals. Furthermore, direct contact between stakeholders can create commitment as potential outcomes become tangible.

In the case of WATERCAP, the objective to link smallholder farmers to commercial markets illustrates the challenges that can be caused by externally fixed objectives. Commercial production was a goal set by the implementing unit at the beginning of the project. When it became apparent that the goal would presumably not be accomplished by the initially participating farmers, the WM staff shifted their focus towards farmers who were likely to meet the anticipated aim. As a justification one WM staff pointed out that the project budget was envisaged for a certain purpose and the project staff was accountable for its adherence. While accountability and fixed regulations for project budgets reduced the flexibility of the intended project outcomes, the terms of reference of WATERCAP obviously allowed for adjustments regarding the implementation sites. The room for maneuver was thus primarily used to ensure that the set targets be met rather than adapting the project to the realities on site.

This raises questions about how participatory a research for development project is allowed to be once a proposal is approved by donors and the implementing individuals and institutions are strictly held accountable for achieving the set goals. The realities on site may have required to put emphasis on exploring alternative ways to reduce water vulnerability. This would have required a resource and time intensive process supported by flexible reporting and management arrangements.

5.2.4 Looking back: reflections on project outcomes by the stakeholders

At the time of research, the WM staff had come to the conclusion that commercial production might not have been a feasible goal considering the water situation of farmers in the area. The reaction of WM staff was to focus more on an already commercially operating group of farmers:

Yeah, well, if we were to do it again, you know, we still think it was a good idea to look at the smallholder farmers and thinking about the water harvesting which is an issue. But if I was to do it now I would look more for groups like the other group of

farmers who were commercially oriented and they have some source of water which they can use for irrigation and all they need is to improve that and I would look more for that kind of group, groups of people. (WM 2)

One rationale for the support of commercially oriented groups according to the interviewee was that the necessary investment from the project is less compared to the tank constructions, yet the indirect impact is expected to be higher through emerging jobs on the fields:

Because I think they have more potential to trigger change than these people with the tanks and they don't need a lot of support. By the way the support we've given them is much less than what we've given to those individual households. Because this is a group of farmers. There are quite a number of them in a group and all we have given them is a pump, one pump, which serves all of them. And then they are likely to actually produce a lot more with that than what we spent on these individual households. So I would look more for those kind of groups because the benefits are much more compared to the investment that you make because these are already commercially oriented farmers and all they need is a little assistance to do their job more efficiently and they will do it much better and benefit more. And they are likely also, because like if they grow those tomatoes they will also somehow employ other people in the community to come and pick the tomatoes when they are ready because they can't do everything. So the benefits are much wider than just the household. (WM 2)

While reflecting on what the project would do differently if given the chance, the interviewee stressed to be aware of the smallholder farmers of the groups being more in need of support than the already commercially oriented farmers:

But it is unfortunate that these ones, these households probably are more needy. They are more needy than the others, but you know when you look at the benefits compared to the investment it's probably more with those households. [...] But I'm looking at the others and we put in less money and we are benefitting more people and they are producing, they're likely to produce more and benefit more in terms of income. So I would look for at least more of that kind of group. And reduce, not abandon but reduce on the number of the households in that benefitting from tanks, yeah. (WM 2)

A CM member of staff reflected on the scope and sustainability of the project against the background of the high costs of tanks based on the model of WATERCAP, suggesting more affordable alternatives:

Because the structures, the structures themselves are a bit expensive. Not a bit because I think they cost 2.4 million. The Watercap tanks cost about 2.4 million whereas ours was 500. So either we explore as part of Watercap growth other tanker modules, I mean tanker designs which are not equally expensive. And maybe this is collecting strictly run-off water for irrigation. It's cheaper, collecting almost an equal amount of water, but for irrigation. Maybe there, maybe there people can grow the vegetables and get better incomes and start. But if we remain with the Watercap model tanker the way it looks I'm not sure (CM 2)

Concerning the topic of water sharing one farmer pointed out that clear guidelines would have been helpful to structure the behavior in the group in terms of sharing:

I'm maybe putting across an advice that maybe there should have been more of orienting or training people, especially those who have the tanks about how to relate the water in there with their neighbors. Because some people have owned tanks and they cannot even give out any water to their neighbors. Maybe that could have been a bad idea. [...] But I think maybe if they are trained maybe they would know the degree of giving out, what the importance of giving someone water to drink. I'm also encouraging training people to share using the tank. (G2 Farmer 4)

6. Conclusions

6.1 Research in- and outside of a project

The data that this thesis analyzed was conducted within the time of three months in the second year of a three-year project. Despite all efforts to gather as much information as possible on the context of the data, previous times and outlooks, the thesis has solely captured a snapshot in time. It is furthermore assumed that the way questions were phrased, topics approached, people encountered and findings interpreted were closely linked with the personal social and professional background of the researcher. Therefore, the thesis was written on the assumption that any data is constructed within the certain context of the researcher which has an impact on the outcomes (comp. Pretty 1995: 1249). Consequently, the knowledge that has been generated in the course of this thesis does not assert a claim for universal validity but rather has to be seen as operating within a current paradigm, hence being “just one of many ways of describing and analyzing the world” (Pretty 1995: 1250).

A challenge for this study was its integration with an ongoing project. This impacted the interview situations with the stakeholders, since some farmers were still hoping to benefit from the project and gave their answers accordingly. Despite efforts of stressing the ‘independent’ role as researchers, the author was frequently perceived as being WATERCAP project management staff. Accordingly, social desirability and positive depictions of personal actions as typical challenges in empirical social research were encountered and potentially influenced the results. In order to address this challenge, extensive triangulation of data was performed.

The research was also affected by the challenges that had evolved within the project. The expectations by farmers which were not fulfilled due to misunderstandings or a shift in project implementation made it demanding to maintain a neutral role. Interviewing a farmer who was supposed to or at least expected to receive a tank but did not eventually was particularly difficult, and may have revived unrealistic hopes.

Furthermore, the tight social network of a rural setting may have affected the reliability of data: since everybody knew each other, it seemed difficult for some of the interviewed people to answer questions on social aspects in the farmer groups and the community freely despite the assertion of confidentiality.

Another limitation of the research was the language barrier. Despite the excellent work of the translator it was obvious that meanings at times got lost in translation. It is demanding to guide a conversation when depending on a third person and at times unaware of what is being spoken. Furthermore, only parts of a conversation can be memorized and translated immediately which might have contributed to a loss of data.

6.2 Intentions compared to observed processes and effects: the case of WATERCAP in Rakai, Uganda

It was the overall goal of this thesis to develop an understanding of the social processes in the Rakai WATERCAP project and its effects on water management practices in the community. With this objective in mind, conceptual considerations and the observed implementation of the project were compared. The theoretical perspective of innovation in

Complex Adaptive Systems was used to reflect on participation in communication and decision making.

The results show that the planned establishment of an innovation platform had not been fully accomplished. As a consequence, institutionalized mechanisms for decision making and deliberation were not in place, making participation of especially farmers more difficult. Since concepts and mechanisms such as participation and IPs were not fully characterized, there was room for interpretation as well as misunderstanding in the course of project implementation.

The specific assessment of the decision making processes for the project showed that farmers' level of participation ranged from passive participation to participation by consultation. The data demonstrated that the ownership of a process was related to the participation in decision making, as ownership was stronger in the farmer group with opportunities to influence than in the group where most decisions were made by project staff. In terms of communication, the facilitation of formal exchange among stakeholders to adjust expectations, discuss challenges and be informed on processes was not systematically implemented. Again, institutionalizing a full IP could have allowed for more effective monitoring and mutual learning.

Commercial production and marketing had been a goal of the project staff, which was not compatible with the water vulnerability of farmers in the area. Adapting the intended water use, farmers shared the storage capacities of the tanks and thus re-claimed the technology for the purposes most relevant to them. Accordingly, this study underlines that successful innovation requires participation and alignment of motivations.

Resonating with diverse interests both at project and community level and within the community itself, the project also triggered internal competition and rivalry mainly through the allocation of the technology to individual households.

At project level, the study shows that the possibility to facilitate an open-ended process in the current system of research for development is limited. As the project itself is part of a structured reality, set requirements such as duration, budget and deliverables can jeopardize open innovation processes.

The discrepancy between conceptualization and implementation of the project does not imply that the project remained without impact. Findings on other effects showed that the project technology had improved farmers' livelihoods in terms of water accessibility and nutrition. However, the outreach of the project remained constrained due to a centering of resources on a number of individuals. Moreover, the implemented tanks were not affordable to be copied by other farmers in the area, so that the long-term propagation of the project's technology is doubtful.

In sum, the ownership of project processes and effects are crucial in order to maintain outcomes beyond a project's duration. Therefore, the further refinement and rigorous implementation of participatory multi-stakeholder processes is recommended to planners and actors in the development sector. This would require a joint understanding on the concept and strategies for its implementation from the beginning of a project.

In order to expand the outreach of projects and avoid community internal rivalry, it is also recommended to focus projects on jointly adapted technologies, integrating local knowledge and allowing for implementation by non-participants as well.

To turn these recommendations into practice, longer timeframes and flexibility would be needed in research for development projects. This emphasizes that the way towards supporting useful processes instead of demanding deliverables should be pursued with increasing momentum.

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Curriculum Vitae

Education

03/2009 until present	University of Vienna (Austria): International Development Main focus: Organic Agriculture, Social Ecology, Climate Change, Global Food System
08/2005 - 06/2006	High school year abroad, Sycamore/Illinois (USA)
09/1999 - 06/2008	St. Ursula Gymnasium, Aachen (Germany)

Language skills

Mother tongue	German
Other languages	English (fluent) Spanish (basics) Swahili (basics) French (basics)

Internships and practical experiences

05/2013 - 07/2013	Field research for diploma thesis in Rakai (Uganda)
07/2012	Participation in the 'International Training Course on Organic Agriculture' (Uganda) organized by the Centre for Development Research, University of Natural Resources and Life Sciences, Vienna
03/2012 - 06/2012	Tutor at the Centre for Development Research, University of Natural Resources and Life Sciences, Vienna
08/2011 - 09/2011	Internship at the animal shelter 'Animal Care Trust' in Mangalore (India)