DESPITE GOOD INTENTIONS

An analysis of the (un)intentional effects of the Chanyanya irrigation project for rural smallholders in the Kafue district of Zambia

Lacey NE, Ninja

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Supervisor: Annelies Zoomers
Universiteit Utrecht
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Abstract

In the contemporary context of privatization of development, many development projects that make use of the private sector as agents of development, rather than states or international organizations, are currently blossoming. Typically, the goal of such projects is to favor both the development of the country in question, often focusing on a specific community, and furthermore benefit the private sector. The injection of private capital allows for ambitious projects that entail huge potential development opportunities for the intended beneficiaries.

This thesis examines such a project, which aims to provide smallholders in the Kafue district of Zambia with irrigation, whilst simultaneously yielding profit to the private sector through commercial farming activities. Smallholder access to irrigation is projected to yield many benefits within this district. These benefits include increased agricultural productivity and resilience to external shocks, thereby improving smallholders' livelihoods and allowing them to escape from the cycle of poverty in which they have found themselves trapped. However, previous studies have shown that projected benefits of irrigation are not always reflected in reality. Furthermore, it is expected that unintentional, adverse effects may arise, such as displacement and a decrease in access to land for local smallholders.

Smallholders that are examined in this research are categorized as followed. The first group comprises of the beneficiaries of the project, which are those smallholders who have been selected to gain access to irrigation. Another group comprises of those beneficiaries who were resettled, in order to yield space for commercial farming activities. Lastly, those excluded from the project and thereby excluded from access to irrigation, are examined. The various benefits and adverse effects within and between groups are compared. The goal of the research is to discern whether project is indeed an overall development opportunity for local smallholders, or whether adverse effects outweigh the experienced benefits.

Results of the research are based on twelve interviews and ninety-eight surveys held amongst all categories of smallholders. It is found that, though initial intentions may have been good, the project is lacking in many ways. The projected benefits of irrigation for smallholder beneficiaries have failed to manifest themselves sufficiently ten years after implementation of the project. Many smallholders find that adverse effects of the project effect their livelihoods negatively. This is most prominent within the group of smallholders who left their homes to allow for the implementation of the project. Exclusion of smallholders from the project may result in increased local inequality. Furthermore, the distribution of financial benefits is found to be unequally distributed, skewed towards the private sector.

It is strongly recommended that lessons learned from this project are exposed, to both contribute to literature examining land acquisition deals and irrigation projects, and to be integrated into policies surrounding this project and others of a similar nature.

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List of abbreviations

AAI	Agricultural Advisors International Limited
CIC	Chanyanya Infrastructure Company
CSCS	Chanyanya Smallholder Cooperative Society
DACO	District Agriculture Coordinating Officer
EAIF	Emerging Africa Infrastructure Fund
FAO	Food and Agriculture Organization of the United Nations
FMO	The Netherlands Development Finance Company
FRA	Food Reserve Agency
IFAD	International Fund for Agricultural Development
OEC	Observatory of Economic Complexity
PIDG	Private Infrastructure Development Group
PPP	Public-Private Partnership
UNCTAD	United Nations Conference on Trade and Development
UNPD	United Nations Development Program
WWF	World Wildlife Fund
ZLA	Zambia Land Alliance

Word count

22959

Introduction

For those who have traveled through various parts of Africa, the feeling of being overwhelmed by the sheer scale of expanses of beautiful and often unforgiving land, is an experience that is shared by many others. One can travel for often days, without meeting a single soul. Recent global events are, however, bringing about a noticeable change in this perception. The potential of African land has come to global attention. Within Zambia, studies have shown that the current agricultural practices do not exploit Zambian land to its full potential. In fact, UNCTAD (United Nations Conference on Trade and Development) reports that only 14% of arable land is currently being cultivated (UNCTAD, 2011). A transformation towards integral and efficient utilization of land is recognized to benefit the local population, the national economy, and international food security.

Underutilized land that is suitable for agricultural practices under irrigation is especially projected to transform the Zambian agricultural sector. Irrigation of land is expected to increase agricultural productivity enormously, allowing for the production of cheap food crops and the closing of agricultural yield gaps (UNCTAD, 2011; World Bank, 2013). This does not only entail high financial returns for those investors who provide irrigation infrastructures, but also potential regional and national development opportunities within developing countries. Within development literature, the projected benefits that can be derived from the irrigation of agricultural land are deemed to be of great importance in many different discussions concerning climate change, food security, poverty alleviation, and the United Nations' Sustainable Development Goals (SDG's). Gaining access to irrigation is forecast to benefit the poor through higher crop production and increased resilience to crop failures. By switching from subsistence farming, to high-value market-oriented production, food becomes available and affordable for the poor (Hussain & Hanjra, 2004). Climate change is expected to influence agricultural activities to great extent, whether these activities are conducted under rainfed or modern irrigation. The United Nations Food and Agriculture Organization (FAO) warns that the rural poor are among those who are to be disproportionally affected by the negative consequences associated with climate change, and that improved land and water management practices are fundamental in boosting overall resilience to climate change (Turral, Bruke, & Faurès, 2011). Irrigation investments are projected to aid this vulnerable group to this end.

The UN recognizes the importance of sound water management and specifically the implementation of irrigation investments to create sustainable futures for not only the rural poor, but on a global scale. This is reflected in sustainable development goal number six: clean water and sanitation. Within this goal, higher food production while using less water, for example by using irrigation, goes hand in hand with building resilience of smallholder communities to cope with floods and droughts (FAO, 2018). Practices of efficient irrigation in rural areas are likely to have a great impact on reducing water demand. Water management is a catalyst for economic growth that essentially combats poverty, and major water infrastructure developments, such as irrigation projects, can benefit both national and regional economies.

Despite the benefits that irrigation projects are projected to yield, experience shows that such projects may have unintentional consequences that have the potential to transform projected beneficiaries into victims. Irrigation projects have a tendency to increase income inequality within the targeted smallholder communities (Manero, 2017). This inequality is often found to be a result of the fact that allocation of water tends to be land-based: relative benefits to those with little or no land are expected to be small. Reallocation of water resources to provide irrigation typically results in winners and losers, as smallholders excluded from the project may find themselves also excluded from water rights. Smallholders downstream from the project with inadequate property rights and unequal social status are found to be vulnerable to this exclusion. In addition, irrigation projects involving changes in land use and ownership are subject to adverse effects recognized to be persistent in land acquisition deals. These include occurrences of displacement, lack of consultation, and loss of (access to) land, on which the livelihoods of smallholders are dependent (Chu, Young, Phiri, & Alliance, 2015., Hussain, 2007; Horne, 2011).

It is warned that investments aiming to increase agricultural productivity tend to benefit the wealthy, instead of the rural poor (De Fraiture, Molden, & Wichelns, 2010). Failures of irrigation investments to benefit the rural poor are often associated with management issues. It is essential for management to incorporate the functional inclusion of the poor, which entails, among other factors, the equitable access to land and an integrated water resource management (Hussain & Hanjra, 2004). Connor (2015), emphasizes that the implementation of irrigation infrastructure alone is not enough: there is a call to incorporate smaller-scale irrigation investments that encourage crop diversification, market access, and capacity development. Sensitivity to the local context is essential to ensure that the rural poor are able to count themselves as beneficiaries to local irrigation projects.

Within academic literature, the above mentioned adverse effects of irrigation projects have sparked discussions, essentially revolving around the following question: are irrigation projects a development opportunity for local smallholders, or do adverse, often unintentional, effects outweigh the benefits, thereby transforming intended beneficiaries into victims.

In this research, both intentional and unintentional effects of irrigation projects are examined, with attention to the consequences these have for the (non-)beneficiaries, such as displacement and decreased access to land. This is done by examining a specific project, that enjoys funding from the Dutch government, that has been implemented in the Kafue district of Zambia. Zambia is especially recognized to possess a huge amount of land that is considered 'underutilized'. Should it be subjected to irrigation, this land may have the potential to be many times more productive than in its current state (UNCTAD, 2011; World Bank, 2013). The project focusses on the poverty-stricken area of Chanyanya, which comprises of smallholder communities that typically practice subsistence farming. The project has been implemented by a private company by the name of InfraCo, that focusses on providing infrastructure in developing countries, and is funded by various international donors. Its goal is to empower local smallholders through regional development, by allowing smallholders to gain access to irrigation. The acquisition of land to this end entails the redistribution of land, previously

owned by local smallholders, to private farming companies. Irrigated garden plots are then allocated to the local smallholders. Furthermore, smallholders receive dividends derived from the profit made from the commercial farms' harvest, according to the amount of land they have surrendered to the project. Providing these communities with access to irrigation for their farmland is projected to, according to InfraCo's webpage on Chanyanya, increase household income, thereby giving smallholder children the opportunity of attending school, and improve food security, consequently empowering smallholders and facilitating their escape from poverty (InfraCo, n.d.). This 'theory of change', the transformation of poverty-stricken subsistence smallholders, to market-oriented farmers with sufficient, stable incomes, certainly seems to be a win-win situation, for both investor and smallholder. However, it is cautiously suggested that the consequences of the irrigation project are likely to be much larger than is assumed within the theory of change upon which it is based. Negative effects relating to income inequality and loss of land, found within literature, are drawn upon. The balanace between benefits and adverse effects of the Chanyanya irrigation project is the focus of this research, with attention to smallholders' access to land and smallholder displacement. Three groups of smallholders are examined: the beneficiaries of the project, those beneficiaries who have been displaced, and the non-beneficiaries, who have been excluded from participation within the project. The impact of the project is examined within and between these three groups of smallholders.

Scientific and developmental relevance

Land acquisition literature has focused very little on irrigation projects. Though much literature can be found on 'land-grabbing', research largely fails to specify on the implementation and evaluation of large-scale irrigation infrastructures, which often entail not only land acquisition, but also the redistribution of traditionally owned land amongst smallholders and private companies. There is a call for research that focuses specifically on this sub-sector, so that its characteristics and specificities are not ignored and lost within the broader context of 'land acquisition'. Furthermore, irrigation projects are primarily seen as a development opportunity for rural smallholders. The unintentional negative effects of these projects receive less attention. This research hopes to shed light on the less renowned consequences of irrigation projects, thereby creating a holistic analysis of the balance between benefits and adverse effects for all smallholders involved, whether beneficiary or not. Thus, the scientific relevance of the research is supported. Recommendations to be acted upon that are produced by this research, are of great developmental relevance. Knowledge gained through this research not only contributes to academic literature concerning irrigation projects, but can also be used in policies concerning projects with a similar nature, in order to ensure that benefits for local smallholders are maximized, and adverse effects are minimized. As the Dutch government is one of the various international donors who fund the project, recommendations deriving from lessons learned from this research may lead to improvement of the current project, and enhance the quality of future projects that may be invested in.

The knowledge gap on irrigation projects, and the balance between perceived benefits and adverse effects of irrigation projects, within the context of the underutilization of land in Zambia, all contribute to the importance of conducting a research that focusses on these topics.

Firstly, the main concepts and theories relating to the research are discussed within the theoretical framework. The second chapter deals with the research design and methodology. Thereafter, the results of the research are presented in the third chapter, which encompasses a review of the national and local framework in which the project takes place, and an analysis of the results with reference to the research questions. Lastly, chapters five and six contain discussion and conclusion, respectively. In these chapters, findings are placed within the broader context of academic theories, where after policy implications are given and conclusions are drawn.

1. Theoretical framework

The main theories and concepts underlying the research will be elaborated on in this section, in order to provide a thorough understanding of the theory in which this research is framed. Firstly, the process of acquiring land within Zambia and its relationship with land tenure security of smallholders is explained. Consequently, the concept of 'unused' or 'underutilized' land is presented. Thereafter, the privatization of development, in the form of public-private partnerships, is explained, after which the potential benefits and adverse effects of irrigation projects are examined. Lastly, the relevance of these concepts to the research at hand is explained.

1.1 Literature review

1.1.1 The process of land acquisition

The recognition of land investment as a development opportunity has led the Zambian government to adopt policy reforms that make Zambia attractive to investors. The 1995 Land Act was adopted, which eased restrictions on foreign investors and furthermore made the conversion from customary land to state land possible. As of now, all land is formally owned by the state, and can either be state land, which is titled, or customary land held in trust by traditional authorities. Customary rights are officially recognized in the Zambian constitution (Nolte, 2014). However, there is no mechanism in place for land use planning, and no land administration or registration systems. Land titling is reserved to state land (Horne, 2011). Agricultural activities are divided along the lines of these two different types of land: commercial agriculture is concentrated on state land, while smallholder agriculture is carried out in customary areas. The majority of the Zambian population relies on land in customary areas for their livelihoods, which is administered by chiefs (Nolte, 2014). For investors to acquire customary land, negotiations are made with the local chief, who consults the local community. A written or spoken contract is made upon agreement, - however, no legal regulations exist. Ultimately, customary land is converted into state land, with no going back. This state land is leased to the investor, who may increase the productivity of the land by means of modernizing farming techniques, such as the implementation of irrigation (Nolte, 2014). This manner of acquiring land has been found to be lacking in many ways, primarily by threatening the land tenure security of rural smallholders, and thereby implicitly their continued access to land and resilience to displacement. In the contemporary context of the privatization of development, and thereby the adoption of agricultural policy that favors agricultural development through corporate investments, possibly linking up to smallholders through outgrowers' systems, and increased land investment deals that concern intensive agro-industrial production involving large amounts of land and water, land tenure security for smallholders becomes paramount.

Lack of transparency and knowledge in civil society regarding land use planning and the arbitrary way in which chiefs allocate land to investors are common fold in the case of land investment deals. It is found that chiefs often sell their land for a fraction of its potential worth. There are considerable variations in the responsibility chiefs may feel for their people. Herein lies the uncertainty of land tenure security for smallholders: their security of land tenure

depends entirely on the accountability of their chief (Horne, 2011). Lack of consultation and 'informed consent' with regard to the local community are also found to be dominant factors in such deals. Although there are numerous requirements set out in laws and policies regarding the consultation of local people in the face of land investment, this is hardly ever carried out in practice. At the very most, consultation is interpreted in its very broadest meaning (German, Schoneveld, & Mwangi, 2011; Horne, 2011). Lastly, the incidence of displacement is a frequent consequence of land investment deals. Although displacement is not inherent to land investment, as argued by Chu (2013), empirical findings show that its occurrence is numerous and belligerent (Chu, Young, Phiri, & Alliance, 2015; Hussain, 2007). The non-existence of a resettlement policy in Zambia allows for incidences of resettlement, the compensation package and the success of resettlement processes to be dependent on the initiative shown by the investor.

Several factors are found in the literature that influence land tenure security, which is interpreted as continued access to land without incidences of displacement or eviction. Women are found to enjoy less land tenure security than men, as it is men who own land, which women have access to through their husbands (Chilembo, 2004). They are therefore more vulnerable to loss of land. It is also found that farmers with leases and titles enjoy higher productivity. In turn, higher productivity of a smallholder farm results in enhanced land tenure security (Smith, 2004). In relation to this, people with lower income tend to suffer more from land insecurity (Van Asperen, 2011). When examining the effect of land redistribution, as a consequence of irrigation projects, on displacement and access to land, these factors should be taken into account.

1.1.2 'Unused Land', agricultural productivity and irrigation

As mentioned before, much of Zambian land is considered not to make use of its agricultural potential, and is therefore considered unused or underutilized (Nolte, 2014; World Bank, 2013; Chu, 2013). Indeed, UNCTAD (United Nations Conference on Trade and Development) reports that only 14% of arable land is currently being cultivated (UNCTAD, 2011). For this reason, agricultural investment is considered beneficial to Zambian national development. The prevalence of both African governments and development funding agencies labeling land in such a way demonstrates a clear presumption in favor of seeking private investment in agriculture (Woodhouse, 2012). It has even been observed that governments largely focus on the promotion of private investment, rather than the development of the smallholder sector (Veldwisch, Beekman & Bolding, 2013). Although there are clear benefits of increasing agricultural production, such as the before mentioned economic development, employment opportunities, and export diversification, literature shows that the concept of 'unused' land may be presumptuous.

It is argued that existing land uses and claims go unrecognized because land users are marginalized from formal land rights and access to the law and institutions (Cotula, Vermeulen, Leonard & Keeley, 2009). There is no widely accepted definition of the term 'unused'. Indeed, unused land is said to be the physical absence of use or the absence of significant use and thus

users, where the land is regarded as being definitively arable. This creates a problem: smallholders are most definitely less productive than large-scale commercial farms. However, this does not constitute that smallholder land is indeed unused. In a study conducted in Mozambique, it was found that land and water use by communities tends to remain invisible and is hence not considered when assessing and issuing new land and water applications (Veldwisch et al., 2013). In line with this, Exner et al (2015) state that unused land refers to a state-bureaucratic narrative, which excludes user groups deemed irrelevant for national development. Therefore, the problem that arises is whether rural smallholders should be replaced by more productive agricultural practices. A discussion is noted by Dwivedi (2002). In some cases, it is argued that the need for development is greater than the needs of rural smallholders. This is, however, opposed by other scholars, who emphasize that development should not favor a minority of the elite, but rather the majority of the poor.

In order to enhance productivity, the introduction of modern farming in rural Africa has been a long-standing strategy. In arid areas such as the Sudan and the Sahel, modernization involved resettling farmers within areas served by large-scale irrigation infrastructure. The production of maize, for example, in southern Africa is estimated to increase hugely when all available land is irrigated (Fischer et al, 2002). Note here, that 'available land' remains an unspecified term. This great increase emphasizes the role of water management in agricultural production. However, Woodhouse (2012) argues that *informal* irrigation strategies, devised by farmers, are not recognized in official statistics:

'*The dispersal of water management investments among small-scale units, their often seasonal nature, and their deployment of techniques unfamiliar to those trained to see water management only in terms of formal irrigation projects, means that they are not easily visible to administrative and planning agencies.*' (p 10.)

It is estimated that there is two million hectares of informal irrigation, alongside six million hectares of formal irrigation in Sub Saharan Africa (Woodhouse, 2012). In Mozambique, farmers' agency is reflected in informal furrow irrigation systems, which provide sufficient water to manage their crops (Veldwisch, Beekman & Bolding, 2013). The agency of rural farmers is not to be underestimated – the assumption that large-scale investment would permit 'access to land and water', should be considered place specific, without assuming the local community to be a latent, homogenous group.

In summary, land that does not meet its agricultural potential is considered 'unused'. Redistribution of land to stakeholders that provide increased productivity is therefore a strategy adopted by the Zambian government. However, literature shows that rural smallholder productivity is often overlooked. This constitutes that land and water use prior to land investment deals, that are made on the basis of land being unused, should be thoroughly analyzed, in order to establish whether the land is indeed unused.

1.1.3 Public-private partnerships

The increase in land acquisition deals has coincided with a recent change in the understanding of the very premise of development. Privatization of development has become a popular, neoliberal strategy that has received much attention from academics. It entails a transition towards private companies becoming agents of development, rather than states and international organizations (Lyons & Westoby, 2014). Many irrigation investments, including the project focused on within this research, function within a public-private partnership (PPP) framework, which is a reflection on the phenomenon of 'privatization of development'. This is due to the fact that short-term financial returns cannot be predicted: infrastructure providers are, unlike other sectors, very much exposed to market and commodity risks. Therefore, to ensure returns on their investment, public sector resources are called upon (World Bank Group, 2017). Within developing countries, public financial resources can be hard to come by. Other resources are called upon, which may come from NGOs or international organizations such as the World Bank. Partnerships can in this way become complicated, with many actors with varying wishes influencing many different stakeholders. Typical relationships within irrigation partnerships are commercial farmers acting as private irrigation operators, who give smallholders in the area the option of becoming outgrowers to the commercial farm. The intricate matrix of smallholders, commercial farms, public resources and international donors is a true breeding ground for dispute and conflict. Legal issues that arise in PPPs for irrigation are most commonly disputes over land ownership, due to the earlier mentioned customary land tenure systems, the level of water extraction and the roles of the different actors within a partnership (World Bank Group, 2017). On occasion, private companies within these partnerships have implemented irrigated contract farming at the expense of local smallholders (Veldwisch et al., 2013). The complexity of providing an irrigation system that will benefit all those involved is not to be underestimated. For this reason, it is of importance that irrigation projects are to be analyzed in terms of to whose favor the scales may tip.

1.1.4 Irrigation as a development strategy

Irrigation has formerly been used as a popular strategy to promote development and remains a poverty reduction tool to this day (Lipton, Litchfield & Faurès, 2003). Irrigation has been known to benefit the poor through higher crop production and increased resilience to crop failures (Hussain & Hanjra, 2004). In addition, irrigation is a catalyst for national economic growth and the increase in productivity may transform inefficient agricultural sectors into a global breadbasket (FAO, 2018; Chu, 2013). This is made apparent by the fact that about 19% of the agricultural area worldwide is irrigated and sustains 40% of the global food production (Rulli, Saviori, & D'Odorico, 2013). In light of the project examined within this research, exactly such benefits are expected. The project developer, InfraCo, incorporates the projected benefits of irrigation that are found in literature into a scheme that aims to develop the smallholder sector, implicitly contributing to national development and international food security, while securing financial returns to the private sector through patient capital. InfraCo claims that, through enhancing income and food security, educational opportunities arise, and smallholders are empowered in such a way that they are no longer trapped in a cycle of poverty (InfraCo, n.d.). This transformation can be shown as a 'theory of change'. Theories of change

are a tool used by development scholars, in which assumptions of how an intervention should work and how it is expected to influence change, are enveloped. By examining literature and the structure of the specific irrigation project at hand, the change expected by the initiators of the project and the benefits for local smallholders that literature has revealed, have been schematically illustrated within the model depicted in figure 1.

Figure 1: Theory of change

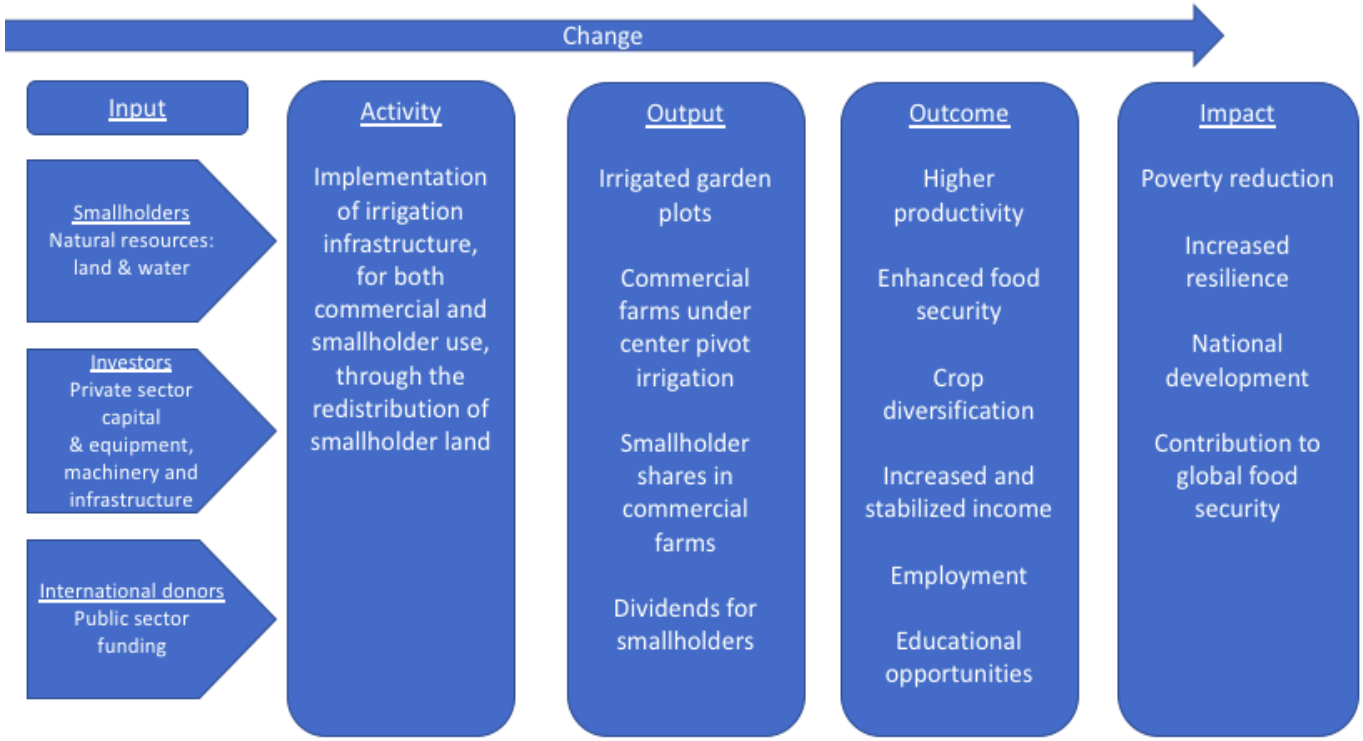


Figure 1 emphasizes the need for the implementation of the project, as the benefits are so transformative that there is little reason to doubt its success. However, as mentioned before, literature also shows unintentional outcomes and impacts of irrigation projects, which are not always of a positive nature. The wonderful simplicity of this model does not invite caution to negative consequences.

Apart from earlier mentioned negative effects concerning land redistribution, it is found that mismanagement of the irrigation project may lead to exclusion of rural smallholders. Such projects are also found to enhance income inequality between smallholders, which is further exacerbated by disparities concerning access to land and water resources (Manero, 2017; Hussain & Hanjra, 2004). Furthermore, investments aiming to increase agricultural productivity tend to benefit the wealthy, instead of the rural poor (De Fraiture et al., 2010). This again points towards a potential skewed distribution of profit. Lastly, negative impacts on health, as a consequence of waterborne diseases, and environment, due to waterlogging and salinity, are persistently present in irrigation schemes (Hussain & Hanjra, 2004).

Exclusion and inequality are key factors to be examined. It is expected that not all participants within the project are in fact beneficiaries. It is thereby called into question to what degree the project has achieved its goal and thereby replicated the theory of change, and to what degree it

has contributed to exclusion and inequality. Assumptions within the theory of change do not necessarily translate to reality. Assumptions are therefore to be investigated, and the subtleties of local reality adhered to.

1.1.5 Relevance to the research

The Chanyanya irrigation project connects in depth with these major issues involved in the redistribution of land and its use for irrigational purposes. It is of great importance to analyze the process of land acquisition in this specific case, as literature forewarns that Zambian policies fall short when considering the protection of the land security of rural smallholders. The redistribution of land in Chanyanya, in order to empower rural smallholders, must guard against threatening smallholders' land tenure security. Furthermore, the project was implemented on the assumption that access to irrigation will encourage greater productivity of local smallholders, and is thereby an example of smallholder land being observed as underutilized. In addition, greater productivity is assumed to enhance local development, although adverse effects of irrigation projects are not to be underestimated. Assumptions should remain simply that: assumptions. Only by investigating whether assumptions in this specific case reflect reality, can the real effect of the project be analyzed. Lastly, the public-private partnership structure, which, in the case of the Chanyanya irrigation project, consists of a remarkably extensive web of different actors, should guard against the pitfalls inherent to such partnerships, as mentioned previously.

These issues encompass a range of subjects and disciplines other than international development. Agriculture, politics, business, and economics, amongst many other disciplines, all have their relevance in the project. By combining aspects of each discipline, the research has created a holistic analysis of the project, its implementation, and the effect it has had on the lives of rural smallholders.

2. Research design

The theoretical concepts in which this research is framed are used to form the basis of the research design. In this section, the conceptual framework and research questions that derive from the literature are made explicit. Thereafter, the selection process and the research method are explained, with attention to the strong and weak points of the selected methods. Lastly, a reflection on the research process is included, in which practical challenges and personal experiences are elaborated on.

2.1 Research questions

Findings from the theory are the basis for the established research questions. Issues found in literature mainly concern the balance between benefits and adverse effects of irrigation, the underutilization of land in Zambia, the balance between national and local development needs and the privatization of development with a focus on public-private partnerships. In this research, the perceived benefits of access the irrigation are put under scrutiny, thereby also examining unintentional (adverse) effects, such as displacement and reduced access to land, of the Chanyanya irrigation project for all involved smallholders. To this end, the involved smallholders are divided into three groups.

- **Beneficiaries**: Those smallholders who have been selected to participate in the project and therefore have access to irrigation
- **Resettled beneficiaries**: Those smallholders who have been selected to participate in the project, but were required to leave their homes
- **Non-beneficiaries**: Those smallholders who were not selected to participate in the project

The central research question, which encompasses all of these three groups, is as follows:

What is the balance between benefits and adverse effects of the Chanyanya irrigation project for rural smallholders in the Kafue district of Zambia?

The following sub-questions have been established, which are used to answer the research question holistically, and are additionally the basis from which hypotheses are deduced that are tested within the research.

1. What effect has the project had on land access for beneficiaries of the irrigation project?
2. How has displacement and the process of resettlement affected resettled beneficiaries?
3. Who emerge as main beneficiaries of the project?

In order to avoid confusion, the main beneficiaries within the third sub-question are defined as those stakeholders who gain the most benefit from the project. The term ‘beneficiaries’ in the first two questions is merely used to indicate a distinction between smallholders who have been selected as beneficiaries, and thereby participate in the project, and those who haven’t been selected.

2.2 Conceptual framework

Findings from the theoretical framework are presented in the conceptual framework, shown in figure 2, which depicts theoretical findings schematically. Hypotheses and constructs can be deduced from this, which are tested within the research. This conceptual framework combines the perceived benefits of the irrigation project, shown before in figure 1, with the adverse effects, related to the major themes discussed within the theoretical framework, that were found in literature.

Figure 2: Conceptual framework

Blue represents the neutral, e.g. the structure of the project and the factors that may, or may not, influence the output, outcome, and impact of the project. Green represents the positive effects that the project is expected to yield, as shown earlier in figure 1. Red represents unintentional consequences, that previous studies have shown to threaten the positive effects of the project. This conceptual model can hereby also be considered a 'theory of change', encompassing all possible consequences this specific intervention may have, whether intentional or not. All relationships between variables have been deduced from the literature. By combining the findings in the literature, a holistic diagram depicting all variables that influence the effect of the redistribution of land, as a consequence of irrigation projects, on displacement and land access for smallholders, is hereby presented.

2.3 Operationalization of variables

Terms, or variables, used within this research are defined in this section. This is to determine the meaning of each variable within the scope of this specific research and will prevent misinterpretations of findings. In addition, it is stipulated how these variables are measured within the research. All measurements of variables are incorporated within a combination of surveys and in-depth interviews used within the research. Operationalization of variables facilitates the answering of research questions by explicitly defined, measurable means.

Table 1: Operationalization of variables

Variable	*Definition*	*Source*	*Measured by*
Land access	The ability to use land and other natural resources (e.g., use rights for grazing, growing subsistence crops, gathering minor forestry products, etc.), to control the resources (e.g., control rights for making decisions on how the resources should be used, and for benefiting financially from the sale of crops, etc.), and to transfer rights to the land to take advantage of other opportunities (e.g., transfer rights for selling the land or using it as collateral for loans, conveying the land through intra-communal reallocations, transmitting the land to heirs through inheritance, etc.)	FAO, 2012	• Food security score • Income level • Possession of land documentation • Amount of land surrendered and residual land
Tenure security	People's ability to control and manage land, use it, dispose of its produce and engage in transactions, including transfers	IFAD, 2015	• Possession of land documentation • Perceived control over land • Amount of land surrendered and residual land
Land acquisition	Not only purchase of ownership rights, but also the acquisition of use rights, for instance through leases or concessions, whether short or long-term	Cotula, 2009	• Possession of land documentation • Changes in land use
Agricultural yield gap	The yield gap is generally defined as the difference between actual farmer yields and potential yield, whereby potential yield is the maximum yield that can be achieved in a given agro-ecological zone	Fermont, Van Asten, Tittonell, Van Wijk & Giller,2009	• Harvest per year (bags of 50 kg) • Main crop harvested
Informal irrigation	Schemes under local responsibility, controlled and operated by local people in response to their perceived needs. In many areas with potential, farmers have attempted to enhance food production by	FAO, 2012	• Manner of irrigating land that is not part of the project (e.g. bucket, furrow, modern, or no irrigation)

	introducing some form of irrigation, e.g. small earth dams, simple diversion structures and self-made conveyance canals, water harvesting, shallow groundwater abstraction. These schemes are often ad-hoc and therefore not included in "irrigated area". Also called initiated smallholder schemes.		
Food security	Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life	FAO, 2012	• Food security score • Amount of people fed in relation to the amount of available land
Land use	Land use is characterized by the arrangements, activities and inputs by people to produce, change or maintain a certain land cover type. Land use defined in this way establishes a direct link between land cover and the actions of people in their environment.	FAO, 2012	• Proportion of land that is used • Harvest per year (bags of 50 kg) • Main crop harvested • Use of irrigation
Free prior and informed consent	A legal norm that imposes duties and obligations on the States to actively secure the rights of indigenous peoples to effectively determine the outcome of decision-making that affects them and their lands	Carodenuto & Fobissie, 2015	• Awareness of need to surrender land • Manner of consultation • Agreements signed • Coherence between expectations and reality
Displacement	Forced population displacement caused by development or environmental projects is usually defined as occurring when people lose, through expropriation, either their house, or their land, or both simultaneously. They are compelled to yield the “right of way” to the project	Cernea, 2006	• Amount of people moved and why • Process of displacement • Coherence between expectations and reality

2.4 Methodology

The main body of the research consists of surveys and in-depth interviews held with the smallholders of Chanyanya. 98 surveys were conducted in total. 52 of these surveys were held with smallholders who have not been selected to participate in the irrigation project, while 46 surveys were held with smallholders who are beneficiaries of the project. The data collected from the first group, named hereon as 'non-beneficiaries', is used to provide an insight in the characteristics of the population of Chanyanya and serves as a backdrop that indicates the difference between beneficiaries and non-beneficiaries. The 46 surveys held with beneficiaries of the project is the main focus for analysis, as the effect of the project upon access to land and displacement is to be measured within this group. In addition, twelve in-depth interviews were held. Six of these interviews were held with those beneficiaries who have been resettled for the establishment of the project. The remaining six interviews were held with prominent members of the community of Chanyanya and those smallholders who have more intimate knowledge about the project. The methods used for the research are shown in table 2.

Table 2: Research methods

Total	***Sample***	***Characteristics***	***Selection method***	***Methods of obtaining information***
Participants in the irrigation project (N=126)	Beneficiaries surveyed (N=46)	Those who have surrendered land for the project in order to gain access to irrigation	Random selection from garden plots	Surveys & open questions
	Beneficiaries interviewed of whom resettled (N=6)	Those participants who have been resettled to make space for the center pivots	Selected from initial survey pool	In-depth interviewing
	Beneficiaries interviewed classified as key informants (N=6)	Those participants who hold prominent positions within the community or have in-depth information about the project	Selected from initial survey pool	In-depth interviewing
Non-participants (N≈13000)	Non-beneficiaries surveyed (N=52)	Smallholders of Chanyanya	Random walk and quota method	Surveys & open questions

2.4.1 Methods of selection

Selection of villages

The group of non-beneficiaries was selected from the various villages of Chanyanya. Selection of villages was based on the conscious choice of focusing only on the main villages of Chanyanya, as indicated by the chief headman, namely: Tukunka, Mashikili, Demu, Bonanza, Magoba, Maindo, Habour, Jeremiah, and Mukata. As Chanyanya lies on the banks of the Kafue river, some villages were excluded due to the fact that most of the population are fishermen, of whom it is irrelevant to include within the research. Villages found to be inaccessible, due to distance and poorly kept roads, were also excluded. The remaining villages were Tukunka, Mashikili, Demu, Bonanza, and Magoba.

Selection of research-participants

Non-beneficiaries participating in the research were selected from the remaining villages (5) by visiting every second house on the left, starting from a randomly selected point, until the required quota of participants (≈10) per village was met, or when the pool of suitable participants from each village was found to be depleted. This is referred to as the 'random walk and quota' method. This is a non-probability method. It is preferable to use probability methods, as non-probability survey estimates have a risk of being biased (Turner, 2003). The amount of participants from each village is shown in table 3.

Table 3. Research participants per village

Village (N=5)	***Research participants (non-beneficiary) (N=52)***	***Research participants (beneficiary) (N=46)***
Mashikili	16	30
Magoba	14	0
Tukunka	8	12
Demu	8	2
Bonanza	6	2

Selection of beneficiaries to participate in the research (N=46) was done by a random selection from the irrigated garden plots, provided to them by the project, on which they work daily. Garden plots were firstly mapped, after which two participants were selected from every other plot. Over the course of four weeks, all of the selected plots were systematically visited. Beneficiaries indicated to be from different villages, though the overall majority was from the village of Mashikili, also shown in table 3.

Those smallholders who do not identify as farmers, and those who have not been resident of Chanyanya for more than ten years are excluded from the survey. The reason for this is that the surveys measure the difference in land access before and after the project, which commenced ten years ago. As the focus of the research lies on smallholder farmers, those whose main income does not stem from farming cannot be included.

2.4.2 Data collection

Preliminary research

Prior to the main research, a literature review was conducted, which is shown in the theoretical framework. From this first phase, information is obtained concerning main concepts and theories related to the research. These are placed within the national and local context in which the research is framed. This allows for the establishing of research questions, deduced from the incorporation of the research into the literature. The main body of the research is designed to examine those concepts found within the literature research in relation to the project in Chanyanya.

Exploratory research

Interviews were held with informants that could provide overall information about the project and the local context. Informants were further used to get in touch with officials who were needed to request permission to conduct the research. The Zambia Land Alliance, the ex-minister of both land, and livestock & fisheries, a researcher who had previously conducted a study on displacement in Chanyanya, and a consultant who worked for the WWF in the area of Chanyanya, all consented to interviews. These interviews firstly allowed for permission to conduct the research to be obtained from the mayor, the district councilor, the development officer, and the headman. Furthermore, information concerning the project and local context provided insights into specific phenomena that require extra attention during the research process. Interviews were also held with people who had lived in the area of Chanyanya, which provided information concerning the traditional practices and way of life within Chanyanya.

Main research

The following phase concerned that of the surveys and interviews held with the smallholders of Chanyanya. The surveys consist of both quantitative and qualitative data, both of which are recorded and used for analysis. The data that is collected in this sample is used to map the overall effect of the project, and all factors related to the nature of irrigation projects as found in literature, such as consultation, food and water security, the possession of land documents, and so forth. The balance between benefits and adverse effects is thereby aspired to be uncovered. In-depth interviews were held with those smallholders selected from the initial pool of surveys. Selection is based on those smallholders who are deemed to be most relevant to answering the research questions, the most prominent of whom being smallholders who have been resettled. In-depth interviews enable respondents to elaborate on their experiences and therefore provide a more holistic picture of both the development of the project and its current standing.

2.4.3 Data analysis

Surveys

Surveys were completed on the spot by the researcher. Answers to open questions, or additional comments made by smallholders were noted within surveys. Collected quantitative data was implemented into the software program SPSS. This program allows for the statistical analysis for said data. Qualitative data derived from the surveys was written up within a key word file.

Interviews

Field notes were taken during interviews, which were expounded on directly after the interviews. As the number of interviews was limited, no software was used to analyze the data. Data was rather implemented in a key word file, from which relevant discourse is described and quotes are derived.

Data presentation

Results are discussed in relation to each research question. Quantitative and qualitative data is presented collectively. The two types of collected data can thereby complement each other. Relevant quantitative findings are preferably presented within tables and figures. Qualitative data is shown in the form of quotes. Information concerning the person the quote is derived from is given to inform the reader about the characteristics of the person in question, whilst also guarding the anonymity of the research participants.

2.5 Reflection on the research process

This section is devised to reflect upon possible shortcomings and opportunities for improvement within the research and further describes the researcher's own experiences, including the challenges and opportunities that were experienced during the process of research.

2.5.1 Validity and reliability

Due to the relatively small sample size of surveys, reliability of statistical tests is limited, and reaching statistical significance is impeded. Results should be interpreted as indications, rather than undisputable truths. However, this does not entail that results should not be taken seriously. Findings gained from descriptive statistics form a substantial wealth of information, from which conclusions can be drawn concerning smallholders' access to land and all variables related to this. Furthermore, both the qualitative aspect of the surveys and the in-depth interviews, substantiate the quantitative findings. For future research, it is advisable that a higher number of surveys are conducted, and more in-depth interviews are administered. In addition, methods of selection could be randomized, should resources be available to map all villages, prior to embarking on surveys.

There is no registration of the population Chanyanya of Chanyanya's villages. Satellite imagery was also very limited. Time constraints restricted the research from mapping the villages on own initiative. These combined factors made probability methods of sampling the non-beneficiary group very difficult, which is why the random walk method was applied. Non-probability methods are known to be less reliable (Turner, 2003). It is therefore possible that, were the surveys conducted within the villages repeated, results may differ slightly. Those selected from the garden plots were randomly selected by probability methods. This group is likely to be more reliable, as respondents were approached at different times of the day, whereby two respondents were selected from every other plot. It is furthermore suspected that saturation point was nearly achieved, as it became increasingly difficult to recruit respondents who had not already participated in the survey.

The surveys were assessed and adapted by key-informants, who were firstly informed in detail about exactly what was measured by each item. In addition, contacts who have living experience in Chanyanya further assessed the survey. Lastly, the survey was further adapted after conducting ten 'test' surveys in the field. Validity of the survey is therefore deemed good.

Notwithstanding, there are several factors may have caused bias in the research. Firstly, the research is biased towards females, who are overly represented, due to the fact that men rarely work in the field. Furthermore, some villages were fully or partially excluded due to inaccessibility and are therefore underrepresented in the sample. Mashikili is one of the central villages, with ample transport to other villages, and connections to Lusaka and Kafue. For this reason, Mashikili is a hub of economic activity. Most beneficiaries indicated to come from Mashikili, as seen in table 3. This has made the groups of beneficiaries and non-beneficiaries unsuitable for comparison, as beneficiaries are, on average, at a socio-economic advantage.

The (cultural) positionality of the researcher also influences the results, which is further exacerbated by the sensitive nature of some questions. Questions on income or land conflicts may not be answered entirely truthfully, and therefore distort results. Furthermore, when asking questions concerning events that have taken place years prior to the interview, one should be sensitive to the 'memory bias', or 'recall bias', entailing that respondents are likely to overly associate events in the past with present well-being. The use of a translator also influences results. Much time was spent with the translator, in order to ensure full clarity on each of the questions asked, with the help of a local, highly educated contact who has extensive knowledge of both English and the local language. However, the translator also has his own positionality and may interpret questions and answers differently to what is actually intended, thereby influencing the results of the research. Bias caused by lack of input from stakeholders other than smallholders is elaborated on in the next section.

It should be noted that results are based almost exclusively upon the perceptions of smallholders. Statements made by individual smallholders may not always reflect reality and explanations concerning the structure of the project may not always be factual. Each story has two sides. Other stakeholders, InfraCo in particular, have not told their side of the story and their own perceptions are thereby underrepresented within this research. This may entail that discrepancies between smallholders' reality and other stakeholders' realities are numerous. For future research, it is advised that interviews with other stakeholders are incorporated into analyses. InfraCo did not consent to an interview for this particular research.

2.5.2 Own experiences

When preparing for the research, it was assumed that much would be different from what is expected. However, the degree of difference, the challenges faced, but also the opportunities unique to the research area, were found to be of unforeseen magnitude.

Opportunities

In the first days of the research, it was astounding to notice the degree to which success in Zambia is determined by the people you know. When speaking to locals, it seems that one is never more than two people away from the contact that is needed. Within days, the first interviews, that were connected more intricately to the project than was dared to hope for, had already been conducted. Furthermore, the Zambian people are welcoming, and have helped out in all situations, whether related to the research or not. Partnering with a local NGO, although the NGO in question has little to do with the project, provided further contacts, let alone accommodation and company.

Challenges

The first, and most difficult challenge, was the issue of transport. There is very little public transport to the villages, which usually only run on market days. The road to the village is very poorly kept. This means that even though the villages are only roughly thirty kilometers away from the accommodation in Kafue, traveling there takes between one and a half and two hours. Hitchhiking was attempted for the first week. However, hitchhiking is time-consuming, and one has a high risk of becoming stranded. In Chanyanya itself, there is no accommodation. In the end, a motorbike was acquired. The motorbike was found to be the best mode of transport on the roads. However, the roads leading to some of the more remote villages were inaccessible, even on a motorbike. For this reason, there was no other option but to exclude them.

The second challenge faced was the researchers' own cultural positionality. Some respondents were very wary of what was to be done with the data collected, as reflected in the following quote: *"Maybe you will find that we don't farm enough, and the government or NGO's will try to take our land and shift us".* 'Muzungus', white people, are rarely seen in the villages of Chanyanya, and when they are seen, they are either investors or researchers. Having a local translator mitigated this effect slightly. However, much effort had to be made to assure locals that they are not in danger of being shifted, or having their lands taken from them. Also prominent was, as one respondent put it: '*Lots of muzungus have come to ask questions, but they never come back, and nothing changes'*. This was confronting, as in this case, the situation of those respondents on who the research is dependent, shall not be helped directly or in any near future. In addition to how the researcher is perceived by the locals, cultural positionality also influences how the researcher perceives the locals. The researcher may overestimate the suffering of smallholders, as their way of life is unknown to a researcher from the West. On the other hand, the researcher may romanticize the situation, for the same reason. Unfamiliarity with local context may cause positive enchantment with the way of life.

In addition, it is very difficult to know whether a respondent feels comfortable and answers questions honestly, especially when there is a need for a translator. Time and effort was made to make each respondent as much at ease a possible. However, it remains unclear to what extent this is accomplished.

Concerning other logistics, the fact that the research area consisted of many more villages than first thought, called for adaption of the methods. Random sampling, as mentioned before, was challenged by the large area and population. Furthermore, although the pilot project is named 'the Chanyanya irrigation project' and the expansion project 'the Chiansi irrigation project', both are situated in the same area, contrary to what was first thought. This constitutes that assessing Chiansi in the last weeks of the research, as first planned, was no longer relevant. The project does not expand into Chiansi, but rather entails more pivots being added to the commercial farming area. Although plans were forced to be adapted, this allowed for more extensive research in Chanyanya.

Lastly, the researcher was forced to abandon the research a month early. This limited the number of interviews with smallholders and other stakeholders, which were hoped to further illuminate the effect the project has had on rural smallholders and the view of external parties and stakeholders on the Chanyanya irrigation project. Early discontinuation of the research results in a less holistic examination of the project.

3. Results

This chapter presents the findings from the research in relation to the previously established research questions. Firstly however, the national, regional, and local framework in which the project is situated is examined. Thereafter, more information is given concerning the Chanyanya irrigation project itself and the characteristics of the Chanyanya smallholders. Results concerning research questions on land access, displacement, and main beneficiaries are then examined. Thereafter, it is analyzed whether projected benefits of irrigation for smallholders have indeed manifested and to what degree other, unintentional consequences for smallholders have come to pass. Implications of the findings from the Chanyanya irrigation project for the expansion of the project, dubbed the Chiansi irrigation project, are elaborated on. Lastly, a summary of the findings is given.

3.1. Regional thematic framework

3.1.1 National framework

Located in Central Africa, Zambia is a landlocked state comprising of a population of 16,5 million people, headed by the democratically chosen Mr. Edgar Chagwa Lungu. Although politically stable, Zambia is defined by its high poverty rates. With a GNI of 3,79, it is considered a medium income economy, although the poverty headcount ratio consists of 60,5% at of the national poverty line (UNDP, n.d.). Poverty is predominant in rural areas, as seen in Chanyanya. In 2010 the moderate poverty rate in rural areas was 74%, more than double the urban poverty rate of 35% (World Bank, 2012). Zambia scores 0.579 on the Human Development Index, and is therefore classified as a country of medium human development (UNDP, n.d.).

The economy in Zambia is propped up by its export of copper, 75% of its total exports (OEC, 2016). This makes the economy vulnerable to fluctuations in global copper prices, as seen in 2015, when low copper prices meant that the economic growth was its lowest since 1998. A consequence of this is an increase in inflation, peaking at 9.45% in 2015. The Zambian government has, as a reaction to this, set diversification of the economy as a goal in its 2017 National Development Plan, in order to mitigate Zambia's vulnerability to changes in global copper prices (World Bank, 2017). Another important part of the Zambian economy consists of foreign direct investment, which has shown a great upwards trend since 1995, amounting to more than three trillion US dollars in 2007 (World Bank, n.d). A specific type of foreign investment concerns that of land acquisition deals.

The Land Act of 1995 demonstrates Zambia's interest in foreign land investment. The Act liberalized land administration in Zambia, making it attractive to investors. Currently, 27 transnational land-deals have been concluded in Zambia, almost all concerning agricultural investments. These deals add up to a total of 389774 hectares. This land is either sold or leased to foreign investors. In the case of Zambia, investing countries are diverse, ranging from China to Russia, and from Zimbabwe & South-Africa to European countries (Land Matrix, 2016). The scale of land deals has inspired political action. In March 2017, president Lungu instructed the Minister of Land and Natural Resources to come up with a revised land act, and policies

which will ensure that land is protected for the future generations, reflecting concerns about landless citizens and illegal land deals (Lusaka Times, 2017a). The revised land act is yet to be presented.

A revised land act could protect the land tenure security of the predominance of people working in agriculture, currently 54,8% of the population (World Bank, 2017). However, while wanting to protect their land, frequent incidences of drought have led to food insecurity for many of these people, and many are known to be dependent on the government for food resources during dry seasons (Chilembo, 2004). Land acquisition deals, especially those that would provide an irrigation infrastructure such as is the case in Chanyanya, may be a solution for those who are dependent on agriculture for their livelihoods.

Agriculture and irrigation

Agriculture contributes to about 20% of Zambian GDP (FAO, 2014). This number is likely to have the potential to increase drastically, as this contribution fluctuates due to most farmers' dependence on unpredictable seasonal rainfall, instead of stable modern irrigation methods. In fact, less than 30% of land suitable for irrigation has been developed (FAO, 2014). This contributes to the large agricultural yield gap found within Zambia. The most commonly harvested crop, maize, is estimated to have a yield gap of nine to ten tons per harvested hectares (Global Yield Gap Atlas, n.d.) The closing of yield gaps through irrigation is a huge opportunity for Zambia's agricultural sector.

Access to irrigation is dominated by large commercial farms. Smallholders struggle to finance start-up costs and often lean towards illegal lenders to provide them with irrigation infrastructure. NGOs and Monetary Financial Institutions (MFIs) play increasingly large roles in providing smallholders with irrigation in order to allow for the development of the smallholder sector, as well as the private sector. For this reason, suppliers of irrigation equipment seek partnerships with various donors. However, 63% of the Zambian population remains excluded from financial services (FAO, 2014). Public-private partnerships, such as the one examined in this research, provide opportunities for the smallholder sector to overcome the barriers of high start-up costs.

Despite these efforts, various factors constrain the development of crop irrigation. The FAO (2014) lists these as lack of the aforementioned access to finance, high transportation costs (of both produce and equipment), lack of farmer knowledge in both agronomic skills and finance skills, and lacking land tenure security. When devising strategies for providing irrigation to smallholders, all these factors are to be adhered to in order to be successful.

Currently, there are at least fourteen major irrigation projects in Zambia which are donor funded. Donors are typically the World Bank, the African Development Bank, or various international governments (FAO, 2014). The number of irrigation schemes under public-private partnerships or other forms of investment is likely to be much higher.

The Zambian government is actively promoting the use of irrigation and look increasingly towards the private sector for investment. This is reflected in the current national agricultural policy, which emphasizes the role of the private sector and the role of modern farming techniques in the development of the agricultural sector (Zambia Ministry of Agriculture, n.d.). It is expected that the impact of this policy shall become more and more clear in coming years.

3.1.2 Regional and local framework

The fact that investment in land, and specifically the implementation of irrigation, is commonly seen as a development opportunity, has attracted attention from international organizations, NGOs, and foreign aid budgets. In 2008, the irrigation project that is the focus of this research was implemented in the region of Chanyanya, Kafue district, in the South of the Lusaka province. The location of Chanyanya and the villages it encompasses is shown in figure 3.

Figure 3: Chanyanya location

In the rural areas of the Lusaka province, 60,8% of people work in agriculture (Central Statistical Office, 2010). This group largely represents smallholder farmers. Mainly maize is cultivated upon agricultural land: more than fifty-thousand hectares is in use for this one crop in Lusaka province alone. Maize yields in Lusaka province were 2,17 MT/Ha in 2017, which is slightly above the national average of 2,12 MT/Ha (Central Statistical Office, 2017). However, the yield gap in this region remains wide, especially in the poorest, most rural areas. Chanyanya is a prime example of such an area.

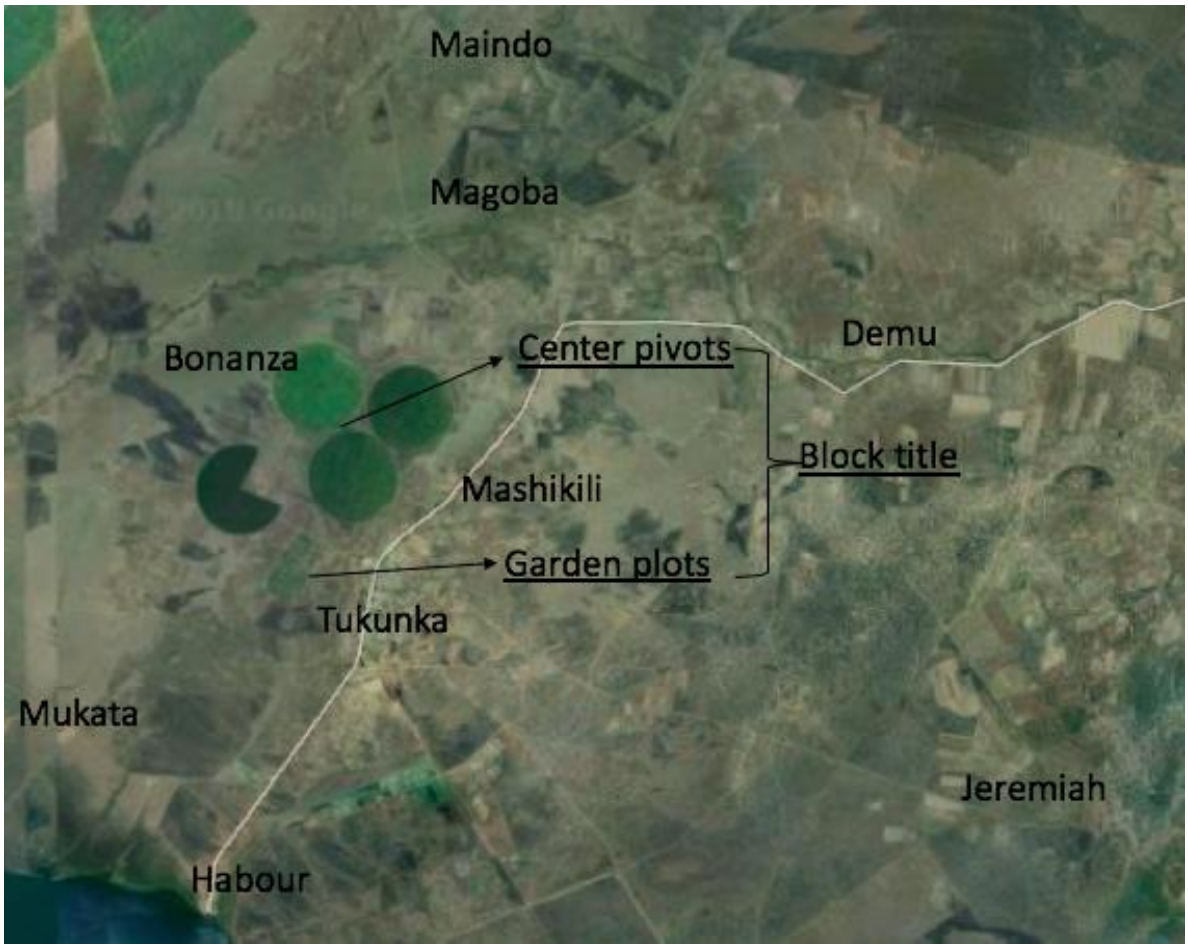
The villages of Chanyanya are plagued by unpredictable rainfall. Residents live under the poverty line and are said to be, at times, reliant on food aid. Chanyanya lies in the Kafue district, which has a poverty headcount ratio of 60.5% (Simfukwe, 2012). Main household activities in the Kafue district are subsistence crop farming and fishing. Sugar cane is cropped on the northern bank of the Kafue river. Simfukwe et al (2012), found that 48% of smallholders practice rain fed agriculture, of which maize is the main priority crop, followed by potatoes. It

is noted that in the case of maize, yield is low (0.8 MT/Ha) compared with the potential yield (5.4 MT/Ha) (Malambo, 2011). The main method of irrigation was found to be manual irrigation, which involves the use of buckets. Modern irrigation methods, such as center pivot irrigation, is only adopted by 2,9% of the farmers. Water use is mainly reserved for fishing; livestock plays a less important role (Simfukwe et al, 2012). Malambo (2011), whilst conducting a research focusing on the Chanyanya wetlands, found that although the dominant activity in the region is agriculture (both small-scale and commercial), indigenous people are cattle keepers by tradition. Fishing also holds a prominent position in livelihoods. In addition, the proximity to Lusaka and Kafue has offered the Chanyanya communities an opportunity to participate in market activity and trade, thereby diversifying their sources of income.

3.1.3 Own findings - Chanyanya

The area of Chanyanya consists of several villages that make up the ward that is Chanyanya. These villages all fall under the authority of the local headman of Chanyanya. The headman in turn answers to the chieftainess, who governs the entire district in which Chanyanya is located. The most prominent villages are depicted in figure 10: Tukunka, Mashikili, Demu, Bonanza, Magoba, Maindo, Habour, Jeremiah, and Mukata. Figure 4 also shows the center pivots and garden plots that make up the block title that is the Chanyanya irrigation project.

Figure 4: Map of Chanyanya



According to records of the Chanyanya clinic, a total of 13000 people lived in Chanyanya in 2017. The population of the villages individually is unknown. Surveys held with non-beneficiaries, with the goal to obtain information concerning the local context, have revealed several characteristics of the Chanyanya smallholders. Most of the interviewed smallholders report to identify as members of the Tonga tribe. Surveys show that the population of smallholder farmers that was interviewed is made up for a large part of subsistence farmers (56%). These farmers cultivate maize as their main crop (92%) and harvest an average of 39 fifty-kg bags of maize yearly. Interestingly, 27% of non-beneficiaries indicate that they irrigate their farmland themselves, by methods of bucket, furrow, or modern irrigation. 10% have access to modern irrigation methods not tied to the Chanyanya irrigation project. Lastly, smallholders report to possess an average of 4,2 hectares of land, upon which 9,5 people are estimated to be dependent for their supply of food and income.

These figures reflect the 'status quo' in Chanyanya. Results are derived from 52 smallholders who have not been selected to participate in the Chanyanya irrigation project. Therefore, this description of the Chanyanya population serves as a baseline for findings within the group selected as beneficiaries of the irrigation project.

Relevance to the research

Both the national and local framework in which the Chanyanya irrigation project is set, relate to great extent with the main concepts presented in the theoretical framework. Zambian national policies show a predisposition towards foreign land investment. Undoubtedly, the national economy could benefit hugely from such deals. However, there is a fragile balance between national and local interests, which, when disturbed, may have radical consequences for smallholders. The Chanyanya irrigation project aims to combine both national and local interest. This, however, is no mean feat. When examining the local context, it is evident that much can be improved in Chanyanya. Locals live in poverty and are dependent on agriculture for their survival. The Chanyanya irrigation project, when implemented correctly, may have the potential for smallholders to diversify their crop production and enhance their resilience to external shocks, such as drought. The research aims to examine the aforementioned issues from agricultural, political, developmental and economic angles, resulting in an analysis that combines both national and local interests.

3.2 Project design

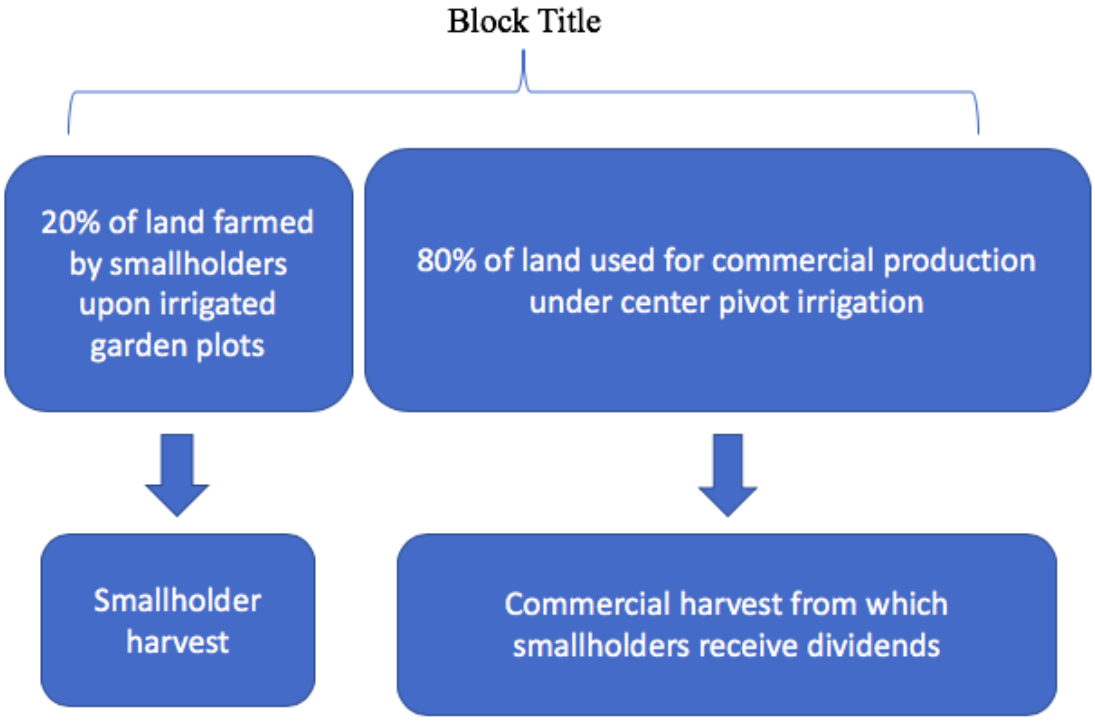
The irrigation project at hand was implemented in 2008 by a private company by the name of InfraCo, established by the Private Infrastructure Development Group (PIDG), which mobilizes private sector investment into infrastructure within developing countries with a goal to boost economic growth and combat poverty. The project was initiated by the smallholder farmers of Chanyanya, who approached their district councilor with a request for aid concerning increasing floods and droughts that plague the area of Chanyanya. Through several governmental organizations, InfraCo was approached.

The Chanyanya irrigation project consists of five center pivots of 37 hectares each, upon which commercial farmers produce irrigated market crops. This land is leased from 126 smallholders, who have been selected to participate in the project. The land these 126 smallholders have surrendered to the project was previously cultivated by the smallholders themselves. The selection of smallholders is essentially linked to the land sites that are attractive to the investor. Farms owned by smallholders that fall under the area upon which center pivots are placed and are of sufficient quality, are included in the project. These smallholders' individual plots were consolidated into a single block title, which has been developed by the project with bulk water and irrigation infrastructure installed, after which land is redistributed between smallholders and commercial farms.

In addition to the commercial farms, the project includes 126 garden plots within the block title, one plot for each participating smallholder. These plots are provided with year-round irrigation, made possible by the irrigation infrastructure put in place by InfraCo and the water provided by the Kafue river, upon which banks Chanyanya is located. These plots are expected to enhance resilience to droughts and to allow for smallholders to diversify their harvests towards higher-value crops. Furthermore, the 126 smallholders who have leased their land to the project receive dividends from the commercial farms. The amount received depends on the commercial farms' harvest and upon the amount and quality of land surrendered by the smallholder. This entails that those smallholders who surrender a large quantity of land to the project receive more dividends than those who have leased a smaller section of land, or only a proportion of their land. Those who have only surrendered a proportion of their land are typically those whose land only partly falls under the center pivot area (i.e. farms situated on the edge of the pivot circle). In addition to short-term benefits smallholders derive from their garden plots and dividends, a long-term goal of the project is that, once investors' expenditures have been repaid by the profit made from commercial harvest, ownership of the commercial farms (CIC) will be transferred to the smallholders (CSCS).

The use of the entire block title is depicted schematically in figure 5.

Figure 5: Distribution of land under block title



Of the 126 participants, twenty-one smallholder households' homes were situated upon the area where the center pivots currently stand. These smallholders, whose homes could not remain upon this land due to the project, were resettled to other areas by InfraCo.

The Chanyanya irrigation project is structured as a public-private partnership (PPP). This entails that, next to the injection of private capital by InfraCo, public resources are called upon in order to finance the project. The different actors and stakeholders of the Chanyanya irrigation project are listed below:

- The Chanyanya Infrastructure Company (CIC), consisting of commercials farms that produce commercial crops under center-pivot irrigation
- The Chanyanya Smallholder Cooperative Society (CSCS), holding 20% equity shares in CIC, consisting of smallholders who have surrendered their land to CIC
- InfraCo Africa, holding 80% equity shares in CIC
- The (public) funders of the InfraCo project in Chanyanya: The Netherlands Development Finance Company (FMO), the Lundin foundation, the Emerging Africa Infrastructure Fund (EAIF), and EleQtra, all of which provide capital in exchange for 5% income notes

Funding of InfraCo itself is provided by the governments of the UK, the Netherlands, Switzerland, and Austria.

The irrigation infrastructures that are already in place are shown in the following figures. Figure 6 shows one of the five center pivots. Figure 7 depicts the extraction of water for irrigational purposes. Figure 8 shows the infrastructure which smallholders can make use of to irrigate their garden plots. Finally, figure 9 shows smallholder use of irrigation infrastructures. All photo's within this document have been taken by the author, unless explicitly stated otherwise.

Figure 6: Center pivot

Figure 7.Water extraction

Figure 8. Smallholder irrigation infrastructure

Figure 9: Smallholder irrigation

The Chanyanya irrigation project aims to expand further into the 'Chiansi irrigation project'. Smallholders have already been approached and committed their land to the expansion project, construction work of which is expected to start in 2018. This will be elaborated upon in later sections, but is necessary to be mentioned, as many smallholders refer to it during interviews and surveys.

3.3 Expected results

As mentioned within the theoretical framework, irrigation is expected to yield many benefits on both a local and national level. The Chanyanya project is projected to foremostly empower local smallholders, or in other words, the selected beneficiaries. This is to be done through increased smallholder income due to employment and dividends, and improved access to markets. Poverty reduction is one of the most prominent goals portrayed by the project. Access to irrigation also creates opportunities to produce higher-value market crops, that can continue to be produced even when the area is affected by droughts. Apart from increased resilience to external shocks, such as droughts, irrigation thereby improves utilization of land and water resources. If implemented perfectly, the project is expected to yield these benefits for local smallholders. However, perfect implementation is, obviously, rarely achieved in any project. It is also expected that unintended phenomena are also likely to occur. Literature warns for increased income inequality between smallholders (Manero, 2017). Those smallholders who are not selected to participate in the project, non-beneficiaries, will not enjoy potential benefits. Non-beneficiaries also generally have farms that are situated on lower quality land than those 126 smallholders who have been selected. A smallholder who was not selected as beneficiary complains: "*InfraCo only wants good land. They have forsaken me, because my land wasn't good enough"*. The project is therefore expected to widen the fissure between beneficiaries and non-beneficiaries. Furthermore, investments aiming to increase agricultural productivity are found to benefit the wealthy disproportionately, excluding the poor (De Fraiture et al., 2010). As the project essentially involves commercial farming with the goal of creating profit, the distribution of (financial) benefits may be more in favor of the private sector and national development, than smallholders. Discrepancies between national development needs and local development needs are only likely to increase this (Exner et al., 2015). Inequality is thereby expected not only to occur between smallholders, but also between smallholders and investors.

The following sections are devised to examine both intentional and unintentional outcomes of the project, within the scope of the established research questions.

3.4 Access to land for beneficiaries

The effect that the redistribution of land in order to form a block title, consisting of both commercial farms and smallholder plots, has had upon beneficiaries' access to land is examined in this section.

Land access is defined as the ability to use land and other natural resources, to control the resources, and to transfer rights to the land to take advantage of other opportunities (FAO, 2012). 46 of the 126 participating smallholders were interviewed with the goal of ascertaining in what way, and to what degree their access to land has been affected by the project. Each aspect of land access is examined separately.

3.4.1 Ability to use land and natural resources

The 46 surveyed smallholders currently possess a mean average of 2,36 hectares of land. On average, 5,14 hectares of land was surrendered by smallholders to the project in order for the

block title to be created. Twelve smallholders have surrendered all of their land to the project and thus only have access to their garden plot. These twelve smallholders are those whose previous land is situated in the middle of the center pivot. The garden plots that they have been provided which comprise of 0,0625 hectares. A picture of these garden plots is shown in figure 10. Although irrigated, the size of these gardens is significantly less than the land surrendered: proportionately 82,24 times smaller. This decrease has affected the livelihoods of smallholders, as one of these twelve smallholders states: '*The garden plot is too small to sustain my family'.* First and foremostly, smallholders perceive the decrease of land available on which they can cultivate crops to affect their food security. This indicates a lack of access to natural resources. Another smallholder, who was resettled by InfraCo states: *"People are now renting land, because they have not been left with enough land to sustain their families. The plot is too small to live off. People need enough land left to them after surrendering".* These claims from smallholders are substantiated by an interview held with a researcher previously employed by the Zambia Land Alliance. This interviewee conducted a research on displacement in Chanyanya in 2015, and states: *'625 square meters is too small for smallholders to sustain their livelihoods'.* Families in Chanyanya are large and become ever larger. On average, surveys show that 10,3 people depend on one plot. Smallholders do not find the garden plots to be sufficiently large to feed this amount of people.

Figure 10: InfraCo garden plots

All 46 smallholders were asked to indicate their level of food security before participation in the project, and their level of food security now. Smallholders have been grouped into three

different categories, according to the amount of land upon which they can still cultivate crops: those with no land other than their garden plot, those with one hectare or less, and those with more than one hectare. Food security is measured by asking participants to rate their food security between 1 and 5, 1 being *I do not always have enough food available, and am sometimes dependent on food aid* and 5 being *I always have enough food available, and I sell food on the market.* The food security score of these smallholders is depicted in table 4.

Table 4. Food security

Smallholder food security	**Food security 2018**	**Food security 2007**
No other land (N=12)	3,33	3,33
1 hectare or less of other land (N=17)	3,41	3,76
More than 1 hectare of land (N=17)	4,05	3,84
Total sample (N=46)	3,65	3,69

Although the differences between groups concerning food security are not significant, these numbers do indicate that those in possession of more than one hectare enjoy a higher level of food security. Concerning the differences between before and after implementation of the project, those who are left with more than one hectare of land have seen a slight increase in food security. However, this is not reflected in other groups. Those left with 1 hectare or less have even experienced a slight decrease in food security. When examining the whole sample, it is found that the project has not improved smallholders' perceived food security. Food security of the total sample of 46 smallholders has not seen much change between 2007 (3,69) and 2018 (3,65). The food security score (3,65) of the total sample lies between 'neutral' and 'enough to sustain the family'.

When asked to rate their level water security, participating smallholders are more positive. 68,8% of respondents indicate that they currently have enough water for their agricultural activities. The mean found is 3,92, meaning that the average water situation of a smallholder lies between 'neutral' and 'enough, but more needed for higher productivity'. This is an increase from what smallholders indicated to be their water situation before the project started, which had a mean of 2,65.

Although smallholders perceive themselves as having a low food security, which has not been improved by the project, access to natural resources, in this case water, seems to have been positively affected by the project. However, the structure of the project entails that smallholders rely on external management for their access to water, as they receive irrigation twice daily for two hours. This is controlled by CIC, rather than the smallholders.

3.4.2 Ability to transfer rights

The last component of land access is the ability of smallholders to transfer rights to the land. All smallholders whose land falls under the center pivot were required to surrender the

documentation of their land, either titles or leases, to InfraCo. This is done in order for the block title to be formed. However, this entails that smallholders are not in possession of any legal document that may substantiate claims of land ownership. The lack of documents impedes land access by denying smallholders the chance to transfer rights to the land. Although smallholders have committed themselves to the project, their lack of control over their land, due to the loss of their documents, leaves them vulnerable and at mercy to the decisions made by the investor. There is concern within the group of beneficiaries that, should the original owner of a garden plot pass away, lack of documentation will prevent their wives and children from having access to the garden plot and dividends. Control over the land leased to the project by the original beneficiary is feared to be lost entirely.

For the expansion project, the Chiansi irrigation project, similar problems are found concerning land documentation. Smallholders that are to participate have also surrendered their titles and leases to InfraCo. Among these smallholders is the headman of Chanyanya, deputy to the chieftainess. The headman claims: *"We have given them all our papers, and now we are trying to reclaim them, InfraCo won't even answer our letters"*.

From these findings, it may be concluded that access to land has decreased on several levels. Overall ability to use land has decreased quantitively, when examining decrease in hectarage. Though the ability to use water as a natural resource has been positively affected by the project, this has not increased food security. This is expected to relate to the decreased hectarage, as seen before, when examining the relationship between food security and land size. During in-depth interviews, smallholders confirm this by continuously claiming that their plot is simply too small to sustain their families. Lastly, the lack of land documents not only impedes smallholders' ability to control their land, but also hampers smallholder agency. Investors hold land documents, entailing that smallholders have no means to legally substantiate claims to their lands, and thereby skewing the power relationship between smallholder and investor.

3.5 Resettled beneficiaries

From the total of 21 households that were resettled, 17% of the total 126 participants in the project, twelve of those who participated in the surveys were found to have been resettled. Six of these smallholders consented to in-depth interviews. These interviews lasted approximately 30 to 90 minutes. Interviews were held according to a semi-structured interview guide, which encompassed questions concerning the structure of the irrigation project, the process of resettlement, smallholders new situation concerning land and income, consultation, and land documentation.

Displacement is defined by the World Bank as: *the process by which development projects cause people to lose land or access to resources. This may result in residential dislocation, loss of income, or other adverse impacts.* Resettlement is defined by the World Bank as: *the process by which those adversely affected are assisted in their efforts to improve, or at least to restore, their incomes and living standards* (World Bank Group, n.d.). Both displacement and resettlement are examined.

3.5.1 Displacement

The resettled smallholders are those whose homes and farms are located within the block title. All of those interviewed had been relocated from Bonanza to Mashikili (see figure 10). Resettlement was required in order for irrigation infrastructure to be constructed for use by the commercial farms. In many cases, resettled smallholders' farms fell entirely under the area of the block title. As a result, these smallholders are overrepresented within the group of smallholders that have no, or very little land left to them after the start of the project. In this way, smallholders experience both residential dislocation and loss of assets such as land and income.

A distinction is made as to whether displacement is voluntary or involuntary. Wilmsen & Wang (2015) states that resettlement is voluntary if the affected population has the choice to remain, but involuntary if this is not an option. Displacement is only voluntary if free, prior, and informed consent is given, full disclosure of all resettlement information is provided and each affected person has the right to refuse resettlement without having to fear adverse consequences. In the case of Chanyanya, smallholders report that several meetings had been held between the project developers and the local community. It is also said that both 'white outsiders' and locals visited the houses of all beneficiaries. One of these locals, who cooperated with the project developers, says: *"It was very difficult to convince people to shift, but we managed to convince them in the end".* On the other hand, resettled smallholders state repeatedly: "*We were talked to nicely, however, the result is not as it was expected"* and *"We were informed nicely, but InfraCo does not fulfill its promises".* When asking about the content of these conversations, smallholders answer vaguely: *"They said something good will be given".* All beneficiaries, whether displaced or not, claim to have signed an agreement concerning the redistribution of their land, though none could produce a copy. From interviews with beneficiaries, *informed* consent is not demonstrated, though not disproven. The headman of Chanyanya states: "*InfraCo just said they had come to help".* The fact that no smallholders have a copy of the agreement made is worrying, as smallholders can thus not prove that they have not received what was agreed upon, should this be necessary. Lastly, a practical problem concerning the structure of the block title should be addressed. Should a smallholder's residence be situated in the middle of a piece of land upon which a center pivot is planned to be located, it seems unlikely that, should the smallholder in question choose to remain, the pivot will simply be placed somewhere else. The smallholder in question is likely to fear adverse consequences in the case of remaining. Such situations have not come to the forefront, but should be anticipated by the project developers. It is unclear whether displacement in Chanyanya has complied in full with the requirements of *voluntary* displacement.

Notwithstanding, whether voluntary or involuntary, displacement in Chanyanya entails loss of residence and thereby loss of social assets, and loss of land, resulting in loss of economic assets. The efforts of the project to counter these adverse effects are discussed in the following section.

3.5.2 Resettlement

Of those interviewed, all claim to have been promised a four-roomed house, a good plot, pumps from which water could be attained, and sufficient compensation. In reality, all of the resettled received a two-roomed house, no pumps, a plot of land and a one-off compensation of 1500 Kwacha (150 US dollars). An example of a house built for the resettled group of smallholders is shown in figure 11. Respondents claim that they now have difficulty in attaining water for drinking and cooking purposes, as they now have to walk to wells that are claimed to be a significant distance away from their houses. Most importantly, the plot of land they have received, upon which their houses are built, is located on waterlogged land. Waterlogging is evident from the visits to these smallholders and is recognized as a significant problem by those resettled. One respondent, a 50 year-old woman states: "*Where we used to stay was better. This land is flooded, we can't grow maize here".* This respondent also offers that her house is vulnerable to flooding during rainy season. Another of those interviewed, a 52 year-old female, goes further to say: *"We are staying, because there is nothing we can do. We can't go back."* All six of the resettled smallholders who were interviewed are unanimous in saying that their current situation is a disappointment and does not meet the standards of living they have had previously.

Figure 11: Resettlement house

The problems that have arisen, relating to the waterlogged land upon which smallholders are resettled, go against national and international resettlement policies and guidelines. Although guidelines and policies all differ slightly from one another, are all in agreement on one specific requirement of resettlement: that living conditions of those resettlement should be an

improvement, or at least of the same standard, to the to pre-displacement levels or levels prevailing prior to the beginning of the project implementation, whichever is higher. Furthermore, adequate compensation and sufficient consultation are to be implemented (Vanclay, 2017; World Bank, 2001). It is evident that the location of the houses built for resettled smallholders are not up to this standard, as stated by resettled smallholders: *"The company is not helping: our situation now is worse than it was before",*

The fact that the plot around the house is unsuitable for cultivation also affects the livelihoods of smallholders. Smallholders tend to use these plots to cultivate maize, either for own consumption or for commercial purposes. As most of those resettled have surrendered all of their land to the project, these smallholders are especially dependent on the area around their houses for sustenance and income. Three of those interviewed claim that the decrease of both quantity and quality of land has a direct link with the fact that they are now unable to afford their children's' school fees.

In an interview held with a participant who is to be resettled for the Chiansi expansion project, fears of meeting the same fate as the Chanyanya resettled are obvious. The 61 year-old woman states: *"If I am indeed shifted, I don't think I will survive".* This smallholder is part of a larger group of smallholders that are investigating options to disassociate themselves from the expansion project completely, despite having already committed their land.

The interviews have revealed that resettlement has failed to be of a sufficient standard and has not managed to compensate smallholders adequately for their loss in assets. What is more, this failure has jeopardized the confidence in a good outcome for smallholders that are to participate in the Chiansi expansion project.

3.6 Main beneficiaries

It is now examined which parties have gained the most benefit from the project. The Chanyanya irrigation project is primarily depicted as a development opportunity for local smallholders. However, smallholders who's land is not deemed fit for the project are not selected to participate and are excluded from benefits. This risks increased inequality between smallholder groups. It must also be observed that the PPP structure of the project entails that private investors expect to receive preferably high returns on their investment. Thus, the distribution of benefits between smallholders and private investor is examined. Furthermore, unintentional adverse effects of the project have a marked effect on determining who emerges as main beneficiary, as many of these effects may affect smallholders' livelihoods negatively. The balance between adverse effects and benefits for all smallholders is therefore examined in order to judge who gains most benefit from the project.

3.6.1 Inequality between smallholders

Firstly, when conducting surveys, it was found that not all smallholders that have access to a garden plot are in fact the intended beneficiaries of the project. One smallholder claimed to own three garden plots, without having surrendered any land. Three smallholders received land

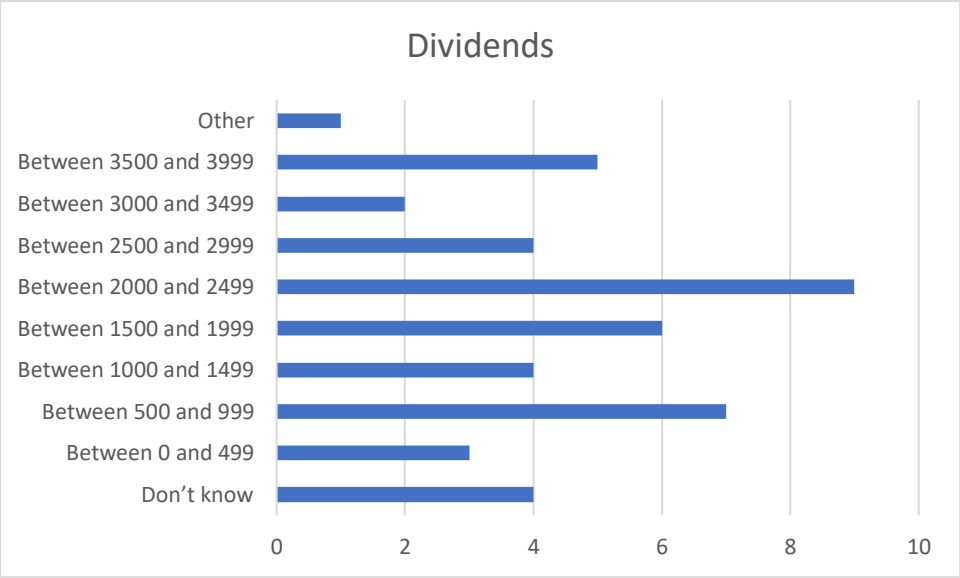
from the cooperative, five were renting gardens either from the original owner of the garden plot or from the cooperative, and two had received their garden plots from family members. Thus, these smallholders reap some of the benefits of the project, without having made the sacrifices that other smallholders were required to make. Smallholders are reluctant to elaborate on how this has come to pass. It is suspected that internal politics play a role in this. In any case, this indicates inequality between beneficiaries.

In addition, the nature of the irrigation project requires the inclusion of some, and exclusion of others. One village in Chanyanya has benefitted disproportionally from the project, compared to other villages. This is because the location of the block title is closest to this one village, namely Mashikili. Those living in or near Mashikili were more likely to be selected for the project, simply because their land is located in the block title area. From the total of 46 participants, 64,6% indicated to be from Mashikili. Thus, other villages are largely excluded from the projected benefits of the irrigation project. This implicitly contributes to inequality between the villages of Chanyanya and thereby also between beneficiaries and non-beneficiaries.

3.6.2 Inequality between smallholder and investor

Concerning the distribution of financial benefits, dividends received by beneficiaries are examined. As mentioned before, dividends depend the commercial farms' harvest and the quality and quantity of land surrendered by the smallholder. In this way, the amount of received dividend varies widely between smallholders. On average, smallholders claim to receive between 1500 and 1999 Kwacha every 6 months. The distribution of the amount of dividends over participating smallholders is depicted in figure 12.

Figure 12: Received dividends



To put this figure into perspective, average monthly household expenditure of small scale agricultural households is estimated at 698 Kwacha (Central Statistical Office, 2015). This

means that, to cover monthly costs solely from dividends, households should receive almost 4200 Kwacha every six months, 2,4 times the amount that is received on average now.
In addition, school fees of secondary school children at the Chanyanya secondary school are 700 Kwacha per year. Should a household receive an average of 3000 Kwacha per year, on the lower side of the total average, almost a quarter of received dividend goes to one school-going child. As families are large, this proportion may easily rise drastically. One interviewee states: '*We receive 2000 kwacha every 6 months, but this is not enough to send our children to school'.*

Smallholders constantly claim that they are not receiving a fair amount of dividend. One of the resettled smallholders states: *"Compared to the tons harvested, what we get is peanuts. I now have trouble feeding my family, a problem that I didn't have before".* Another claims that she used to sell her own harvest for a larger profit than she receives in dividends: *"We are suffering".* One resettlement smallholder states that he used to harvest 200 bags of maize from five hectares, and that the profit made from this is more than he is now receiving in dividends: *"I now cannot pay my children's school fees".*

Indeed, surveys reveal that the smallholders of Chanyanya harvest a yearly average of 21 bags of maize per hectare, excluding ten outliners (i.e. extreme cases), and excluding those who have no other land or do not harvest maize. The FRA (Food Reserve Agency) has set the price of one fifty-kg bag of maize at 60 Kwacha in 2017 (Lusaka Times, 2017b). This indicates that smallholders are able to sell maize for 1260 Kwacha from one hectare, on a yearly basis. 5,14 hectares were surrendered to the irrigation project on average. Should smallholders still be able to use this land, selling maize could provide them with almost 6500 Kwacha per year. Although the cost of production is not subtracted from this amount, this is almost twice the amount that smallholders are receiving in dividends. Commercial farms are expected to yield a far greater productivity than smallholder farms, and higher productivity is often the primary reason for using irrigation. This, strikingly, is not reflected in dividends. *"I am not getting enough, I need help"* says one resettled smallholder.

This finding shows that the distribution of the profit made by the commercial farms does not favor the smallholders. Interviewed smallholders wonder aloud about this distribution. As put by the headman of Chanyanya: *'Nobody knows who is receiving money, or where it is going'.* It is hoped that, in future, other stakeholders may be able to shed some light on this matter. For now however, it is clear that received dividends are simply too low to sustain households, and that smallholders, in this respect, are not intended as main beneficiaries. Inequality between smallholders and other stakeholders concerning financial benefits is evident.

It is stated by various smallholders that the Chanyanya smallholder cooperative is jointly responsible for distributing dividends. This is described as 'dubious' by the headman of Chanyanya. According to him, there are 'dictators' within the cooperative. Though no judgement can be made on the validity of these claims, it has been seen before that the cooperative allocates garden plots in an arbitrary way, sometimes regardless of whether smallholders are participants in the irrigation project or not. It is possible that the cooperative may not distribute dividends entirely evenly.

3.6.3 Benefits of irrigation for beneficiaries

It has been established that, due to a skewed distribution of dividends, smallholders are not the main beneficiaries of the project in this sense. In this section, it is explored whether other benefits that can be derived from irrigation may outweigh this imbalance and therefore still prove beneficiaries to indeed gain most benefits from the project. Concerning the effect of the project itself, it is analyzed whether the projected benefits of irrigation have indeed manifested themselves in Chanyanya and whether other, unintentional effects have come to pass. One of those benefits has already been discussed, namely food security. Unintentional effects of the project have also already been discussed: displacement, (income)inequality, and decreased land access. This section examines the remaining projected benefits of irrigation that smallholders are expected to experience.

Crop diversification and increased resilience

Crop diversification is projected, both in literature and by the project, to be an essential way in which smallholders may profit from irrigation. The main crops cultivated by beneficiaries and non-beneficiaries are examined in order to examine whether diversification has indeed taken place. Surveys show that crop diversification is more common in the group of beneficiaries, although the cultivation of maize still outstrips other crops by a long shot. 27,1% of beneficiaries claims that their main crop has changed from maize to sweet potato leaves. Only 9,6% of non-beneficiaries claims that maize is not their main crop. It is likely that irrigation has catalyzed the shift towards sweet potato leaves, as these crops are mainly cultivated upon the garden plots.

Crop diversification contributes to smallholders' resilience to the failure of the maize harvest as a result of drought, as income can be derived from other crops due to the increased water security that the project has yielded.

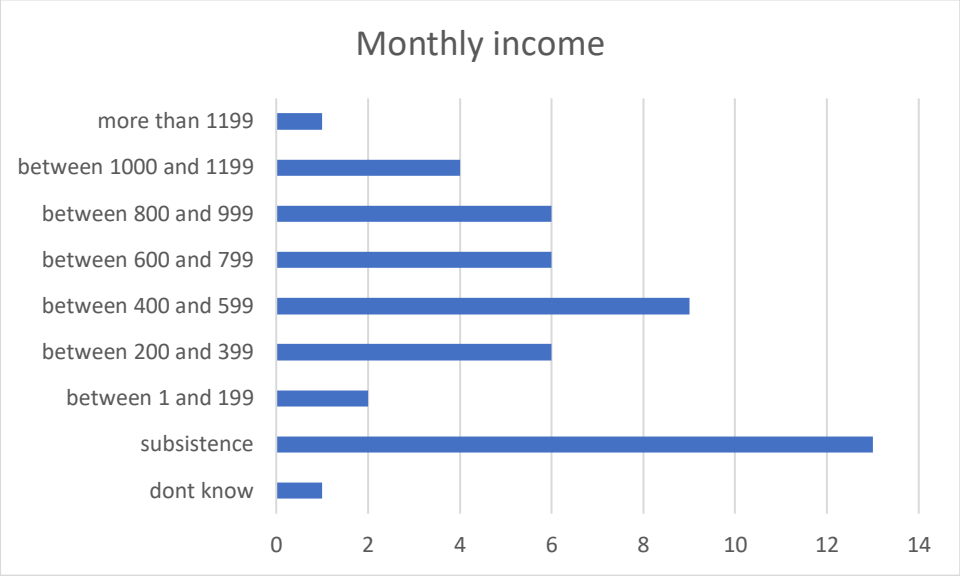
Employment

Although stated clearly by the project's initiators that the project has catalyzed local employment, none of the smallholders, whether beneficiary or non-beneficiary, have found employment either directly or indirectly linked to the project. Several smallholders state that local employment was promised, but has not come to pass. One female beneficiary says: "*Infraco promised employment, but what was promised was not given, outsiders came instead".* Many more smallholders confess their indignation at this.

Stabilized and higher income leading to poverty reduction

All beneficiaries were asked to indicate their monthly income. The average smallholder indicated that their income lies between 1 and 199 Kwacha per month. The distribution of monthly income between beneficiaries is shown in figure 13.

Figure 13: Monthly income



Whether beneficiaries income has become higher due to the project is unknown. However, average income remains low. Many times lower in fact, than the average monthly household expenditure of small-scale agricultural households, estimated at 698 Kwacha by the Zambian central statistical office. Beneficiaries remain under national and international poverty lines. Though the project may have improved their situation and stabilized income through the regular payment of dividends, it has not nearly had the effect necessary to allow for the smallholders of Chanyanya to escape from poverty. Interestingly, when income categories are divided according to land possession, it does not point towards more land correlating with more income, as shown in table 5.

Table 5: Monthly income

Smallholder monthly income	**Income 2018**
No other land (N=12)	3,4
1 hectare or less of other land (N=17)	4,0
More than 1 hectare of land (N=17)	3,2
Total sample (N=46)	3,6

This may show that dividends are more essential to beneficiaries' income than their own land is. This correlates with the fact that land is mostly used for the purposes of subsistence farming, rather than as an economic asset from which profit can be derived. As seen when examining smallholders' access to land, more land does seem to influence food security. This is an interesting insight into the livelihoods of smallholders in Chanyanya: farming land is first and foremostly utilized to feed households, while income generation comes second. Table 4 indicates this to be largely independent of the amount of land available to smallholders. This finding requires further research to be confirmed. Notwithstanding, the irrigation project has

not yet allowed for the escape from poverty that was hoped for. As mentioned before, income is in many cases not even sufficient to provide children with secondary education. *"I still can't afford my children's school fees"* says one resettled smallholder.

Increased productivity and efficient utilization of land

Underutilization of land is something the Zambian government has been critiqued for repeatedly. The former minister of lands, who oversaw the initiation of the project, concedes to this, describing the farmland in Chanyanya in a preliminary interview as 'grossly underutilized'. Providing this farmland with modern irrigation is expected to boost productivity and thereby using arable land to its full potential.

Smallholders' access to irrigation is limited to their garden plots. Although these plots may allow for year-round higher production, plots are extremely small. To put their size into perspective, plots span 625 square meters (0,0625 hectares), whilst the average football field spans more than 7000 square meters (0,7 hectares). It is therefore not deemed likely that higher productivity upon this piece of land will have a great impact on the livelihoods of beneficiaries. In addition, one smallholder claims: *"Transport to Lusaka or Kafue, where many farmers sell their produce, is also a problem, as it is too expensive. The dividends received are too little to cover these costs"*. The problem indicated here is that, even in the case of increased produce or the cultivation of market-oriented cash crops, smallholders have difficulty selling their produce and therefore are still unable to enjoy heightened profit.

The commercial farms within the block title however, that farm five areas of 37 hectares each, are very much likely to yield a high produce and utilize the land to its full potential. However, it is unclear how this should benefit smallholders (as examined before, dividends are low and employment non-existent). Profit of this increased productivity is mostly experienced by the national economy and international investors. This loops back to the discussion noted in the beginning of this paper: is the need for development greater than the needs of rural smallholders, or does this kind of development wrongly favor a minority of the elite, rather than the majority of the poor.

3.6.4 Concluding analysis of benefits

The conceptual framework shows the potential positive and negative effects the Chanyanya irrigation project may have. This research focusses solely of the effect the project has had on rural smallholders in Chanyanya. To this end, it is examined which of the projected benefits have indeed come to pass as shown in the conceptual framework, and which have not. More importantly, it is analyzed what unintentional effects the project has had on rural smallholders.

The results of this research do not point towards enhanced food security, although there is slight crop diversification. The benefits derived from higher land productivity are skewed towards the investors, as is the distribution of profit that derives from this productivity. Consequentially, monthly income of smallholders remains under national and international poverty lines. Local employment is non-existent and smallholders claim that they are unable to pay for their

children's school fees, entailing that increased educational opportunities have not been achieved. There is no obvious poverty reduction. The selective nature of the project excludes many smallholders in Chanyanya from potential benefits. Thereby, an unintentional effect of the project may be an increase in income inequality between the beneficiaries and non-beneficiaries. However, as income has not increased, this inequality may prove to be negligible. For the reasons noted here, it is concluded that the Chanyanya irrigation project is much more beneficial to national development and the private sector investors, than it is towards rural smallholders. Should ownership of the commercial farms be transferred to the smallholders once stakeholders' investments are recouped, as is the long-term goal of the project, this imbalance may be mitigated. However, smallholders are in the dark as to when this should happen and are dissatisfied by the lack of information: *"I think InfraCo keeps breaking equipment to say that the loan has not been repaid"* says one prominent member of the community.

The model shown within the conceptual framework is adapted to reflect the findings of the research. The updated version is shown in figure 14.

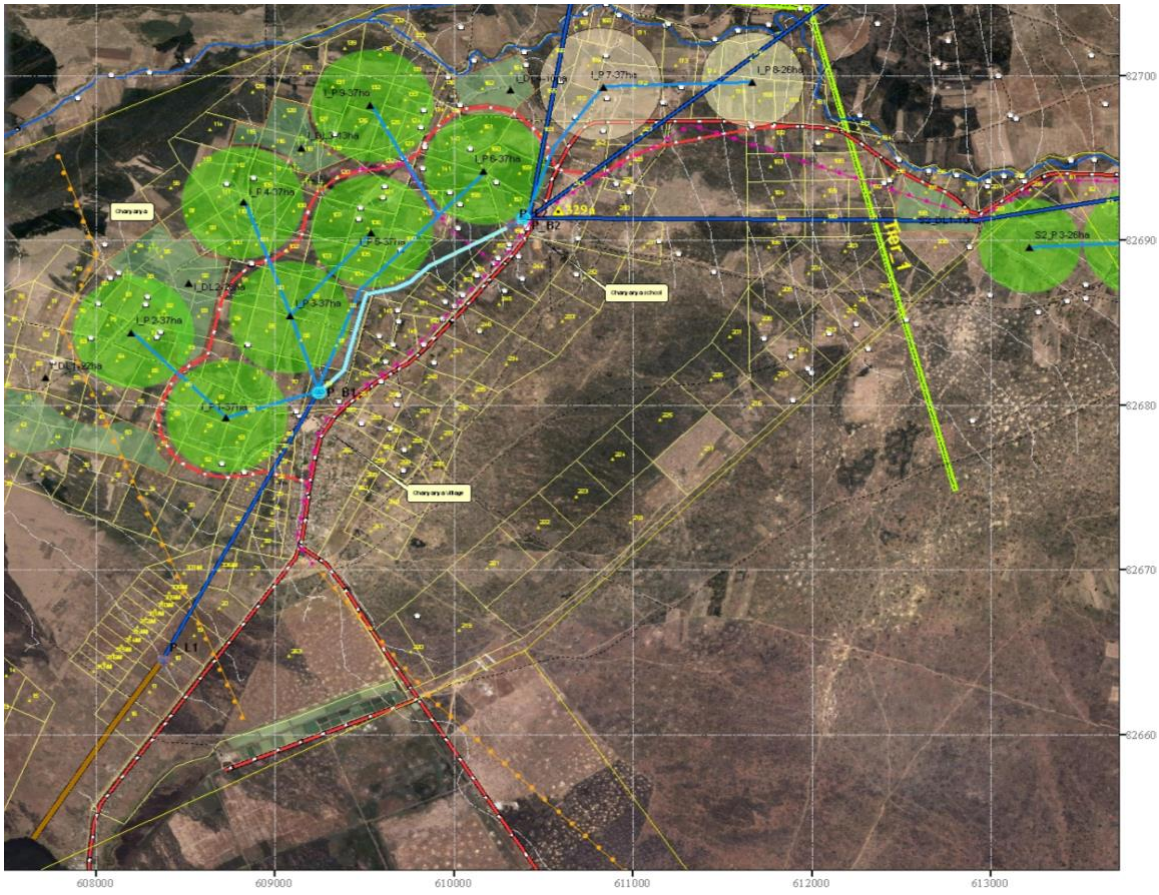
Figure 14: Updated theory of change

3.7 The Chiansi expansion project

The current irrigation project aims to expand further into the 'Chiansi irrigation project'. Construction work of this project is expected to start in 2018. The Chanyanya irrigation project is essentially a pilot project to the Chiansi project and functions to test the concept of providing irrigation with the goal to improve smallholders' livelihoods. Center pivots are to be added to the existing center pivots. When completed, the Chiansi project is to span 2,500 irrigated hectares, of which 1,250 hectares are to be used by smallholders. Up to 650 smallholders are expected to be included in the expansion project, a great increase from the 126 smallholders included in the Chanyanya project. The Chiansi project, just as the Chanyanya project, is structured within a PPP framework. Stakeholders within this framework collectively finance the estimated total cost of 30 million US dollars.

The plans for the Chiansi project are shown in figure 15. Within this illustration, the center pivots that are to be added to the original pivots are shown.

Figure 15: Chiansi expansion project



Source: InfraCo (2010.)

Local smallholders have been approached for the Chiansi project. Selected beneficiaries have already agreed to the arrangement. This entails that their land is committed to the project and is expected to be redistributed from 2018 onwards.

Although this research focusses on the Chanyanya irrigation project, the Chiansi project is closely related and findings are not only strictly confined within the Chanyanya project. Furthermore, findings from Chanyanya can have many implications for the Chiansi project. Shortcomings of the Chanyanya irrigation project are also likely to manifest themselves in Chiansi project. As the Chiansi project is to be on a much larger scale, the impact of adverse effects on smallholder livelihoods are likely to be more severe and more numerous. It is therefore of great importance to examine the lessons learnt from the Chanyanya irrigation project. Overall success of the Chiansi project is dependent on acting on, and countering the adverse effects of the Chanyanya irrigation project for all groups of smallholders. This entails ensuring sufficient access to land for beneficiaries, adequate resettlement for displaced smallholders and mitigating inequality between beneficiaries and non-beneficiaries. Lessons learnt from the Chanyanya project have the potential to, apart from avoiding adverse effects, maximize benefits smallholders are able to derive from irrigation. However, it may be too late. Smallholders projected to participate within the expansion project have lost faith in a positive outcome, due to the adverse effects of the Chanyanya irrigation project. This group is attempting to withdraw from the Chiansi project.

3.7.1 The domino effect: smallholder withdrawal

Dissatisfaction with the Chanyanya project is reflected in meetings held between smallholders who are to participate in the Chiansi expansion project. The meetings are held to discuss problems experienced in the Chanyanya project. Essentially, a group of 150 smallholders has organized itself, with the goal to withdraw themselves from the commitments they have already made towards to expansion project. One smallholder from this group states: *"We are now in the process of backing out of the expansion project, because we see the suffering of others who have surrendered their land".* Another smallholder agrees: *"Smallholders are refusing the expansion of the project, because they see it is not going well".* Minutes of meetings were obtained as a result of a meeting with the headman of Chanyanya. The smallholders' main reasons for withdrawal from the project are summarized below. These are based on the adverse effects experienced in the Chanyanya project, but are feared by smallholders to persist within the Chiansi project.

1. Broken promises, including:
- Electricity for those who have been shifted
- Good drinking water from taps
- 25% of the produce per hectare of surrendered land
- Money for community development
- Land to farm on

2. Offers and titles have been grabbed from plot owners

3. Orphans and widows are dependent on land for their survival and to pay school fees, - one household can contain many wives and children
4. Unclear payment percentage
5. Inability to cultivate own land, the profit of which is thrice of what is derived from the project
6. Overcrowding
7. Disrespect to the founding members

The group concludes this summary by stating the following:

> *"Due to the above reasons, we are strongly refusing to be shifted and to surrender our lands. We are requesting to be given back our offers. If our request will be given we will thank you very much"*

Many of the statements made in this summary of meetings adhere to the findings of this research and show that smallholders do not consider themselves as benefitting sufficiently from the project. Some smallholders even claim that they are suffering from the project, as stated by one woman who says to be part of the 'resisting group': *"There is nothing beneficial about the project"*. The headman of Chanyanya is of the same mind: *"InfraCo has added to the problems, caused hunger, and has broken many of its own promises".* It is essential to address the problems identified by smallholders; not only to improve the effect the Chanyanya or future Chiansi project has on their livelihoods, but also to minimize the danger that resisting smallholders may jeopardize the success of the expansion project.

3.8 Summary of findings

Many different variables were measured in order to establish the results presented in this section. It was found that those beneficiaries left with little or no land after their participation in the project suffer from more food insecurity. This is especially evident in those who were resettled. It is also evident that the dividends beneficiaries receive are insufficient to combat this food insecurity. Monthly income remains below poverty lines. The resettlement process following the displacement of 21 households has shown to be seriously lacking. Lastly, smallholders have no copies of the agreements made with the project developers and have furthermore surrendered the documentation of their land to the project. Both leave smallholders in a precarious legal position. These issues must be addressed in relation to the Chiansi expansion project, in order for the project to be an overall success and for smallholders to be able to exploit this development opportunity to its fullest. At this time, smallholders to participate in the Chiansi project are doubtful that the project is in their best interests.

Though the issues listed here are considered the main issues that have come to the forefront in this chapter, several more aspects related to the research questions have been investigated. The variables measured that had relevant results for the research are shown in table 6.

Table 6: Variable-specific findings

Variable-specific findings	**Before implementation (N=46)**	**After implementation (N=46)**	**Non-beneficiaries (N=52)**	**Comments**
Land access	7,5 ha	2,4 ha	4,2 ha	A proportional decrease of 3,18. 26% of smallholders are left with no land other than their garden plot
Harvest	Unknown	51,2 fifty-kg bags of maize yearly (21 bags per hectare)	38,7 fifty-kg bags of maize yearly	Received dividends are almost twice as low as income smallholders may derive from their own harvest
Land use	Around three quarters of land in use	Around three quarters of land in use	Around three quarters of land in use	Underutilization is claimed to be due to lack of resources or flooding
Land conflict	Unknown	25,0% claim that there are land ownership conflicts	23,1% claim that there are land ownership conflicts	Uncertainty of land security is common in Chanyanya
Food security	3,69 (between 'neutral' and 'enough to sustain the family')	Decrease to 3,65 (between 'neutral' and 'enough to sustain the family')	2,90 (between 'rationing' and 'neutral')	Failure of the project to increase food security
Water security	2,65 (between 'intermittent, but not affecting' and 'neutral')	3,92 (between 'neutral' and 'enough, but more needed for higher productivity')	3,29 (between 'neutral' and 'enough, but more needed for higher productivity')	Increase of water security, however, this is suspected to only apply to the garden plots

Monthly income	Unknown	3,60 (between 1 and 199 Kwacha)	2,42 (subsistence farming)	Remains under national and international poverty lines
Dividends	NA	Between 1500 and 1999 Kwacha every 6 months	NA	Claimed not to be enough to sustain the family or pay school fees
Main crop	Maize	Maize (72,9% of participants) Sweet potato leaves (27,1%)	Maize (90,4%)	Slight diversification of crops
Manner of irrigation	Rainfed (97,9% of participants)	Rainfed (81,3% of participants)	Rainfed (73,1%)	Smallholders show the ability to irrigate crops in other ways themselves through their own agency
Land documentation	57,3% of participants in possession of titles or offers	No documentation	Some documentation (40,4%)	Documents have been claimed by InfraCo
Resettlement	NA	17% of participants	NA	Resettlement towards waterlogged areas, failure to meet minimum resettlement requirements
Consultation	NA	Unclear	NA	Participants claim that the results are not as they were promised. Smallholders do not possess copies of their agreement with InfraCo
Employment	NA	0	0	No local employment, despite promises to this end

4. Discussion

This section aims to place findings in a broader context. The relationship between the findings within this case, and within broader academic literature is discussed. In addition, policy implications that have been revealed by the results of the research are given.

4.1 The bigger picture

Before linking this particular project to general academic literature concerning irrigation projects, it should be noted that this project, as any other, has its own specificities and characteristics, and can by no means be portrayed as the standard form in which irrigation projects are implemented. Other researches specific to irrigation projects have outcomes highly different from those presented in this research. This is influenced by the entirely different nature of each project, and the various methods used to redistribute land for irrigational purposes. This is made evident in the research conducted by Veldwisch et al. (2013), in which the outcomes of three cases of irrigation projects and agricultural investment in Mozambique differ greatly. Neither can the effect the project has been found to have on the lives of rural smallholders be considered all-encompassing. Even within this research, the effect of the project varies between smallholders. To determine whether irrigation projects are 'good' or 'bad', is entirely meaningless. Each case is unique and should be treated this way. However, this research may be considered a piece of a very large puzzle. Each piece contributes to uncovering the bigger picture that is hidden from view.

The bigger picture concerns the balance between the benefits and the adverse effects of irrigation projects, and whether irrigation projects lead towards 'development'. More importantly, *who* experiences benefits, *who* experiences adverse effects, and *whose* development is aimed to be achieved by the project. A discussion noted within literature is drawn upon: that of whether the need for development is greater than the needs of rural smallholders or that development should not favor a minority of the elite, but rather the majority of the poor (Dwivendi, 2002). The results of the research correlate with this discussion in such a way that findings can be placed within this context.

4.2 The balance of the scales

Within this section, benefits and adverse effects are examined, with the goal to discern the position of the Chanyanya irrigation project in relation to the discussion concerning whose development should be prioritized, as noted by Dwivendi (2002).

4.2.1 Benefits

Findings from this research show that benefits are skewed towards national development and the private sector. Although access to irrigation has allowed for a slight crop diversification and may contribute to smallholder resilience to drought, financial returns have not been enjoyed by the smallholder community. Smallholder income remains under national and international poverty lines, and the dividends smallholder receive from their participation in the project are claimed to be less than smallholders are able to derive from cultivating land

themselves. Other projected benefits, such as increased food security and employment have not, at this time, revealed themselves. The benefits of increased productivity and the financial returns that result from this seem to be largely enjoyed by commercial stakeholders. This correlates with various studies that have been examined in the theoretical framework. Veldwisch et al. (2013) state that governments may largely focus on the promotion of private investment, rather than the development of the smallholder sector and that private companies within PPP's have, on occasion, implemented irrigated contract farming at the expense of local smallholders. De Fraiture et al. (2010) find that investments aiming to increase agricultural productivity tend to benefit the wealthy, instead of the rural poor, while Exner et al. (2015) warn for the exclusion of user groups deemed irrelevant for national development. Failures of irrigation investments to benefit the rural poor are often associated with mismanagement (Hussain & Hanjra, 2004). The fact that smallholders do not benefit sufficiently from the project may be unintentional. Should this be the case, management has a responsibility to counter this. The functional inclusion of the poor is deemed essential for success. This entails, according to Hussain & Hanjra (2004), the equitable access to land and an integrated water resource management. These points are both lacking within the project, as access to land is found to be largely decreased and water management is controlled solely by external actors. Should project management wish to improve the project, thereby including smallholders in benefits to greater extent, these two points are to be adhered to.

4.2.2 Adverse effects

When examining adverse effects, there is one group of smallholders who seem especially affected. Displaced smallholders complain of inadequate resettlement, decreased income and a corresponding inability to pay for children's school fees, and decreased food security. Not only have these adverse effects had an enormous impact on their livelihoods, they have also caused increased income inequality between smallholders, as warned for by Manero (2017). Many of the displaced have very little farming land left to them. As benefits of irrigation tend to be land-based, this entails that disparities concerning access to land and water resources have exacerbated income inequality (Hussain & Hanrja, 2004). The selective nature of the project, which is also land-based, must guard against the adverse effect of income inequality. This also goes for the group of non-beneficiaries, who are excluded from the project and the benefits that irrigation may provide them with, because their land is less desirable to the project.

In any case, adverse effects, such as displacement and decreased access to land, are numerous and belligerent within the Chanyanya irrigation project. For many beneficiaries, these adverse effects outweigh the benefits they experience from their access to irrigation.

4.2.3 Development

This analysis throws into sharp relief the discussion mentioned before, ultimately consolidating into the question: *Whose* development is achieved by the Chanyanya irrigation project? Irrigation projects are often portrayed as a development opportunity for smallholders and remain a poverty reduction tool to this day (Lipton et al., 2003). However, the findings of this project do not show that the development of the smallholder community is prioritized. On the

contrary, the scales repeatedly tip towards the favor of the private sector. The project may still contribute to national development through economic activity and infrastructure development. However, this project's aim was to empower smallholders and develop the poor, rather than to favor the elite. Investors must ask themselves when embarking on such development projects, *whose* development they are aiming to achieve. In the Chanyanya case, funding is likely to contribute to national development and the private sector, prioritizing this above the developmental needs of the smallholder community. This correlates with the warning of De Fraiture et al. (2010): investments aiming to increase agricultural productivity tend to benefit the wealthy, instead of the rural poor. Investors are free to choose this road, should they feel that the need for national development is greater than the needs of rural smallholders. However, this should be an informed decision, with full disclosure of the distribution of benefits and adverse effects.

The difficulties of implementing a project of this magnitude whilst adhering to the interests of all those involved, must not be underestimated. In a project of such complexity, interests of stakeholders are bound to clash. However, smallholders' quality of life is not to be lost within the intricate, delicately balanced web of stakeholders. The smallholder community is also by no means a homogenous group. The internal politics and social governance is rife with different opinions. One must, therefore, be cautious whose opinions are to be adhered to. It is imperative to continue to act in the interest of the entire community and not only in the interest of the community's most prominent members. Furthermore, the negative consequences experienced by smallholders should not be dismissed as inherent to such projects as in Chanyanya, and should not be considered subservient to the interests of other involved stakeholders.

4.3 Building trust

As mentioned before, this research has focused almost exclusively on the opinions and experiences of smallholders, which entails that results and conclusions are biased towards smallholders. Other stakeholders have not contributed. This may entail that results are based on one-sided opinions. Project management may contest findings. However, it is suspected that the perspective of smallholders outweighs that of other stakeholders for reasons explained below.

The goal of this research is to ascertain the positive and negative effects the project has had on rural smallholders. Qualitative findings show that smallholders have lost trust in a favorable outcome of the project and have thereby lost trust in project management. This loss of trust may have a great impact on the success and even the continuation of the project. Smallholders have become so distrustful that they are exploring options to withdraw their participation in the expansion project. Should smallholders remain averse to participation due to their distrust, attempts of project management to ensure overall success are meaningless unless smallholders' trust in the project is reassumed. Smallholders perspective on reality and other stakeholders' perspective on reality may differ. However, smallholder perspective is likely to influence the nature and degree of success of both the Chanyanya and the Chiansi project. Refusal of participation could result in involuntary displacement and involuntary redistribution of land. This jeopardizes the entire nature of the Chiansi project, which is portrayed as a development

opportunity for local smallholders. In another scenario, distrust may even result in discontinuation of the Chainsi project due to smallholder refusal. Therefore, smallholder perspective on the project should enjoy highest priority, whether or not it aligns with the perspective of project management. Rebuilding a relationship of trust is essential for the improvement of the Chanyanya irrigation project and for the success of the Chiansi expansion project. Improvement of the Chanyanya project is expected to increase the faith smallholders have in the expansion project and thereby ensure continued participation.

4.4 Policy implications

Findings and analyses of this research have unearthed the difficulties that the Chanyanya irrigation project is facing. Only when such difficulties have come to light, can their adverse effects be countered. The most efficient way of countering these effects is suggested to be by implementing several practical points of action. These points of action are of importance for both the improvement of the Chanyanya project and the livelihoods of beneficiaries, and the successful implementation of the Chiansi expansion project. It is feared that, should these policy implications be ignored, the adverse effects that have arisen in the Chanyanya project will be further exacerbated within the Chiansi expansion project. Thereby, livelihoods of many more beneficiaries and resettled smallholders could potentially be affected negatively, and the continuation of the project in the form of a development opportunity may be endangered.

Policy implications for investors include the following:

- The implementation of a transparent and fair distribution of dividends. This distribution should be publicly accessible, and especially accessible to smallholders
- Ensuring that smallholders are left with sufficient land to sustain their families
- Fair compensation and adequate resettlement for those households that are displaced
- Ensuring that smallholders are in possession of documentation of their rightful land
- Ensuring that smallholders receive a copy of agreements and contracts, and have given their demonstrable free, prior, and informed consent
- Sufficient consultation, as to narrow the gap between expectations and reality and to prevent misunderstandings
- ‘On the ground’, independent monitoring and evaluation of the project
- Continued conversation with the local community, thereby ensuring transparency and building trust
- Inclusion of the smallholders in project management, in order to ensure its success and achieve equitable power relations between smallholders and all stakeholders involved

Each policy implication combats certain symptoms. As with diseases, it is necessary to not just treat symptoms, but the underlying cause. These implications can all essentially be grouped into one overarching cause: lack of sensitivity to the local context, thereby failing to examine all possible consequences that may be experienced by smallholders and failing to combat negative consequences when they arise. The project has shown a lack of responsibility those who it is attempting to aid, but also to international donors who fund the project. It is strongly advised that responsibility is reassumed.

The overarching concepts discussed in this section, in combination with the results of the research, the policy implications and the answers to the research questions, have painted a clear picture of the effect the project has had on displacement and smallholders' access to land, and how it should be framed within academic discussions. This is elaborated on in the following section.

Conclusion

The conducted research examines the benefits and adverse effects of irrigation projects, with attention to (dis)continued access to land and displacement for rural smallholders. It focusses on a specific project, namely the Chanyanya irrigation project. This research has used various methods to discern the effect the project has had on smallholders' access to land and displacement, and to what extent smallholders benefit from the project. Discrepancies between projected benefits of irrigation for local smallholders, and the actual reality on the ground are investigated. The results of a combination of interviews and surveys conducted with local smallholders in the region of the project have been analyzed and combined to provide a comprehensive conclusion to this end. These interviews and surveys were conducted with beneficiary smallholders, resettled beneficiaries, and non-beneficiaries. By placing findings within broader theories and concepts, the research contributes to academic literature by narrowing the knowledge gap that exists concerning irrigation projects and the unintentional effects on smallholder livelihoods that accompany these projects. Policy recommendations stemming from the lessons learnt in Chanyanya have the potential not only to improve the Chanyanya project, but also to ensure that the Chiansi expansion project does not repeat previous mistakes.

Position within main concepts and theories

In the contemporary context of privatization of development and thereby national tendencies to achieve agricultural development through corporate investments, it is of utmost importance to consider the consequences for those who are most affected by such investments: rural smallholders. Literature warns that the smallholder sector is in fact a vulnerable group, that risks exclusion from projected benefits (De Fraiture et al., 2010). Furthermore, the incongruity between national development, thereby promoting private investment, and local development of the smallholder sector, is a problem faced by many African governments. The need for national development may exclude groups that are deemed irrelevant to this cause (Exner et al., 2015). Should investors wish to plunge themselves into the developmental maze, consisting of numerous actors and each with their own agenda, every wrong turn could be followed by an even longer and more complicated path towards their goal. It is essential that all paths are analyzed, with great sensitivity to the effects on both the smallholder sector and the political situation. Only then will good intentions transform into good results.

Major concepts, such as the privatization of development and discrepancies between national and local development needs, are found to be prominent in the Chanyanya irrigation project. Within these major concepts, the balance between benefits and adverse effects for smallholders varies, dependent on the goal and nature of each irrigation project. The research has examined this balance within the Chanyanya irrigation project. Zambia is known for its underutilization of arable land and its potential to become a global breadbasket, especially when this land is subjected to irrigation (Chu, 2013; Fischer et al., 2002). It is therefore perhaps unsurprising that the national agenda is biased towards private agricultural investment, that may boost productivity in a way the smallholder sector cannot hope to achieve. However, in the case of Chanyanya, the intention of the project is not only to catalyze national development, but also to assist the local community in breaking out of a cycle of poverty in which smallholders have

been trapped for generations. This is claimed by the project to be achieved through providing smallholders with access to irrigation, which is to allow for crop diversification, higher household income and its related increased food security and ability to provide smallholder children with an education, and local employment (InfraCo, n.d.).

The purpose of this research is to analyze whether these good intentions have indeed managed to maneuver their way through the intricate matrix of smallholders, commercial farms, public resources and international donors, and transformed themselves into a successful project. This research has focused mainly on weighing benefits and adverse effects for all local smallholders, whether beneficiary or not. It is examined whether the project has jeopardized beneficiaries' access to land, and what effect displacement has had on the livelihoods of displaced beneficiaries. In addition, it has been attempted to discern who the main beneficiaries of the project are. It is believed that the research conducted has answered these questions, and has provided a comprehensive answer to the central research question.

Central research question

The central research question, posed in previous chapters, can now be answered. The question posed is as followed: *What is the balance between benefits and adverse effects of the Chanyanya irrigation project for rural smallholders in the Kafue district of Zambia?*

For non-beneficiaries, results show that the selective nature of the project inherently results in a marked division between beneficiaries and non-beneficiaries. The quality and location of smallholder land are the two factors that access to irrigation is dependent on. Lower quality land and a less desirable location leads to exclusion. In this way, non-beneficiaries who are already at a disadvantage to beneficiaries, are excluded from the benefits of irrigation, although they have the same, or maybe more need of it than beneficiaries. However, as many benefits have not come to pass, and income of beneficiaries remains well under national and international poverty lines, (income) inequality between these groups may be negligible. Should the project follow suggested points of improvement, this situation may change. It is therefore deemed of great importance to monitor inequality throughout the development of the project.

For beneficiaries, results show that many of the projected benefits of irrigation have not come to pass. On the contrary, many beneficiaries are of the opinion that adverse effects play a much greater role. Beneficiaries' access to land has either seen a significant decrease, or even a discontinuation. This has resulted in a low food security for many beneficiaries. Furthermore, beneficiaries repeatedly report a decrease in their income, which culminates in the inability to afford their children's' school fees. This is attributed to the fact that the dividends beneficiaries receive from the project are insufficient to compensate for the income beneficiaries derived from the cultivation of land they have now surrendered to the project. Financial benefit from commercial farming under irrigation is skewed disproportionally towards the private sector. In addition, the ability of beneficiaries to control their land has been impeded by the fact that smallholders have surrendered their land documents and do not possess a copy of the agreements made with project management, leaving beneficiaries in a very weak position of

power. Access to irrigation has resulted in higher water security and slight crop diversification, which may result in a higher resilience to external shocks. This, however, remains to be seen. Employment, educational opportunities, increased income, and increased food security have not manifested themselves, and have therefore not been able to counter adverse effects. Poverty reduction and development of the smallholders sector are by no means evident in the Chanyanya irrigation project.

Resettled beneficiaries are the group who have been most affected by the project. Next to the experienced adverse effects mentioned in the previous paragraph, they have also lost not just their farms, but also their homes to the project. Although their homes were rebuilt in a different location, the resettlement process was found to be seriously lacking, and not up to the standards set out by the World Bank resettlement policy. Living conditions are not equal to pre-displacement levels. Compensation has not been sufficient for smallholders to rebuild their livelihoods. Neither have benefits of the project compensated for resettled beneficiaries' loss. This group of beneficiaries are those who unanimously agree that the project has had a marked negative effect on their lives. This not only concerns the loss of their homes, but also the loss of economic and social assets, which has jeopardized food security and income. Especially for this group, a transformation of the project is essential. Many resettled smallholders deem themselves to be suffering. Results of this research show that this is not an overstatement.

The balance between benefits and adverse effects of the project for local smallholders has been found to be tipping dangerously towards adverse effects, whether intentional or not. This is due to the fact that many benefits of the project have failed to manifest themselves and that adverse effects, especially related to land access and displacement, have influenced smallholder livelihoods to a much greater degree. However, this is not the only reason that the balance of the scales is disturbed. Power relationships between stakeholders and the consequences of these power relationships also play a great role.

Power relations and main beneficiaries

Power relations between smallholders on the one hand and project management on the other hand are not of a balanced nature. Firstly, the success of the project is dependent on the (financial) input from project management, who also have a large stake in the financial returns of the commercial farm. Smallholders livelihoods are dependent on actions taken by project management. This is evident in the fact that smallholders are dependent on project management to provide them with daily access to irrigation. Smallholders have surrendered their control over their natural resources. Smallholders have also surrendered their land documents to the project, leaving them with no official recognition of land ownership. On top of this, none of the beneficiaries could produce a copy of their agreements with project management. This adds to the threat of leaving smallholders powerless when negotiating their rights. Lack of documentation leaves smallholders with very little legal leg to stand on, and impedes their ability to make use of their own agency.

Furthermore, when examining the distribution of financial benefits, it seems that project management reaps a disproportionate amount of benefit. The structure of the project entails

that smallholders are to receive dividends from the commercial farm (the CIC), according to the amount harvested and the amount of surrendered land. It has been found that the dividends received by smallholders are inconsistent with the great productivity that one would expect from a commercial farm. In fact, many farmers claim that, when farming land themselves, they would easily exceed the amount of dividend that is received. This has been found to be true in the results of the surveys, which reveal that smallholders are able to sell their yearly harvest for almost twice the amount of money they receive in dividends. The distribution of profit is unclear, but the proportion of profit enjoyed by smallholders is deemed to be unfitting to the sacrifices that they have made.

Overall, the Chanyanya irrigation project is likely to be most beneficial towards national development and the private sector, while adverse effects are experienced solely by the smallholder community. This is in aligns with earlier mentioned main concepts and theories. National and local development needs are not in sync and the discrepancies between the two have left smallholders at a disadvantage, which is further exacerbated by the unequal power relations between smallholders and project management.

Chiansi

As the Chanyanya irrigation project essentially functions as a pilot project to the much larger expansion project, the Chiansi irrigation project, it is of utmost importance to examine the implications that the results of this research have for the Chiansi project. It has been found that the Chanyanya irrigation project has many shortcomings, and that beneficiaries of the Chiansi project are steadily losing trust in a positive outcome of the project as a result of these shortcomings. This loss of trust has culminated towards the refusal of various smallholders to participate in the Chiansi expansion project. In order for the successful completion of the project, it is of great importance to restore this trust, by means of the suggested policy implications, which encompass transparency, adequate consultation, continued conversation with the community, and the inclusion of smallholders in project management. It is feared that, should these suggestions not be adhered to, adverse effects found within the Chanyanya project will manifest themselves to even greater extent in the Chiansi project. This jeopardizes the entire nature of the project and endangers its aim to be a ‘development opportunity’ for the rural poor. Only when the balance between benefits and adverse effects for smallholders leans towards benefits, and smallholder trust in the project is restored, can the Chiansi irrigation project transform into the development opportunity for the smallholders of Chanyanya that it was intended to be.

Endings notes

It is concluded that irrigation projects are no neutral ‘solution’ to poverty experienced by smallholders. The findings of the research imply that there is a responsibility of the involved actors to re-evaluate the project. This responsibility should concern the effect the project has had upon the smallholder community, but also towards funders of the project. Policy implications involve the tackling of pitfalls and weak points of the project, by means elaborated on in the previous section, to ensure that benefits outweigh adverse effects for all smallholders. Success of the project also depends on the continued funding from international donors, from

whom it is expected that funding should only continue if these difficulties are resolved. Re-evaluation of stakeholders' power relations and interests in the project is necessary. Should all these things be achieved, it could entail that smallholders are able to break out of the cycle of poverty in which they are now trapped. It is hoped that this research contributes to the chances of this happening.

It is also hoped that this research contributes to the body of literature concerning irrigation projects. Spreading of knowledge and experience ensures that lessons learned from such projects as the Chanyanya irrigation project can be enveloped into both the scientific community, and in other projects that are of a similar nature. Chanyanya shows that the projected benefits of irrigation do not come to pass without considerable effort and that adverse effects are all the more easy to arise. It is believed that this research has contributed to narrowing the knowledge gap on the specificities of land acquisition deals that incorporate irrigation infrastructures, and has shed light on the consequences, intentional or unintentional, that irrigation projects may have. However, it is not as easy as dividing irrigation projects into 'good' and 'bad'. Projects should rather be evaluated to contribute to existing knowledge, to ensure that, in future, the quality of such projects is further enhanced.

As said before, this research is only one piece of an extremely large and complicated puzzle. Many more pieces are hoped to be produced in the future, in order to ensure that, when all are put together, the bigger picture is found that was previously hidden from view. In order for this to happen, it is emphasized that future research should focus on engagement with the local community, to discern potential threats or opportunities of irrigation projects. It is therefore essential to be 'on the ground', conversing with local farmers, rather than to make use of a 'top-down' approach, that focusses on project management. It is however acknowledged that, next to the fact that all stakeholders should ethically be given the opportunity to tell their side of the story, interviews with all groups of stakeholders would paint a more holistic and reliable picture of reality than done within this research.

The Chanyanya irrigation project faces serious obstacles to be overcome, despite the good intentions of many participating parties. Overcoming these obstacles is to be done not somewhere in the vague future, but now. However, as said by a local smallholder in the quote below, it is not believed that the essentially good nature of the project cannot overcome these issues.

"The project is one hundred percent right; the problem is putting it in a good manner"

- A local smallholder of Chanyanya

It is fair to say that good intentions do not always ensure good implementation. For overall success of the Chanyanya irrigation project to be achieved, it is essential to examine the ripple effect such projects may have on the lives of rural smallholders. Despite good intentions, this project is facing many difficulties that will have to be resolved with utmost sensitivity to the local context.

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Appendixes

Appendix A: Survey

We would like to ask you some questions concerning your water situation. You shall remain completely anonymous, so you are free to speak your mind. Your name is only asked for follow-up at a later time, after which your name will be erased. This will last approximately 20 minutes. Please feel free to ask questions, should the questions be unclear. The results of the research will be used to have a better understanding of your local situation. Do I have your permission to use you answers to use in the research?

First, we are going to ask you some general questions

1. Survey number:
2. Name:
3. How long have you been living in Chanyanya?
   (**If less than 10 years, do not continue)**
4. Sex:
5. Phone number:
6. Age:
7. Tribe:
8. Nationality:
9. Social status, (for example: headman, commercial farmer, smallholder farmer):
10. Member of Chanyanya smallholder cooperative society?
    (Yes/No)

I will now ask you some questions about your access to food and water

11. How do you irrigate your land plots now?

	Garden plot	**Other land**
Rain fed		
Bucket		
Furrow		
Modern		
Other…		

12. How did you irrigate your land 10 years ago?
    Rain fed
    Bucket
    Furrow
    Modern
    Other…

13. How much of your plot do/did you use for the purpose of income, food and living, now and 10 years ago?

	Now	**10 years ago**
Almost nothing		
Around a quarter		
Around half		
Around three quarters		
All of it		

14. Is your garden plot irrigated by modern methods throughout the year, including during dry season?
    - □ Yes, always
    - □ Yes, almost always
    - □ Neutral/no opinion
    - □ No, in dry season I have little access
    - □ No, in dry season I have no access

15. Which of the following statements best describe your water situation now, and 10 years ago?

Water situation	**Now**	**Before**
I always have water available, and it is enough for the needs of my agricultural activities		
I always have enough water available, but if I had more water I would be able to grow my agricultural activities faster		
Neutral/No opinion		
I have intermittent water supply, but this does not affect my agricultural activities		
I have intermittent water supply, which does affect my agricultural activities		

16. Which of the following statements best describe your food situation now, and 10 years ago?

Food situation	**Now**	**Before**
I always have enough food available, and I sell food on the market		
I always have enough food available to sustain my household		
Neutral/No opinion		
I do not always have enough food available, and sometimes have to ration		
I do not always have enough food available, and am sometimes dependent on food aid		

We shall now ask you some questions about the various agricultural investments that have been made in your area of living

Informed consent

17. Were you aware that you had to surrender part of your land, for the purpose of irrigation, *before* the such projects started?
    - □ Yes
    - □ Yes, but in reality, it was less than expected
    - □ Neutral/No opinion

□ Yes, but in reality, it was more than expected

□ No

18. Were you consulted by anyone about the reduction of the size of your land for the purpose of agricultural investment? If yes – by who?

□ Yes, by ….

□ No

19. Did you give permission? If so, how (written/spoken) and to whom?

□ Yes, spoken, to …

□ Yes, written, to …

□ No

I would now like to ask you some questions about the location of your residence/your area of living

Movements

20. Have you moved the location of your residence in the last 10 years? Why?

□ Yes, because…

□ No

21. Have other households moved the location of their residence in the last 10 years? If so, why, and how many households has this affected?

□ Yes, …

□ No

22. What are the different types of land documents that inhabitants from this village possess currently and 10 years ago?

	Now	**Before**
Land title		
Land certificate		
Administrative certificate		
Rental lease		
Residence permit		
Confirmation / Certification of the village		
Written contract between the parties		
Offers		
No document		

Unknown		

23. Have there been any difficulties in determining land ownership within the last ten years? If so, please indicate:
    Why?
    How many?
    Between who?
    □ Yes, ….

    □ No

24. Has land been converted for agricultural purposes, that is of emotional value, for example, burial grounds, in the past 10 years? Please elaborate
    □ Yes, …

    □ No

I am now going to ask you some questions on payment and compensation

Dividends

25. Have you received money or other forms of compensation, for participation in agricultural investments? If yes, please indicate
- How much
- Why
- From who

□ Yes, …

□ No

26. Have you paid money for participation in agricultural investments? If yes, please indicate
- How much
- Why
- To who

□ Yes, ….

□ No

27. Are you in debt, due to your participation in agricultural investments, if yes, please indicate
- How much
- Why
- To who

□ Yes, …

□ No

28. Are you employed in any way by commercial farms or any other organization within agricultural investments? Please elaborate

□ Yes, …

□ No **(do not continue to 29)**

29. Please indicate how much you agree to the following statement: "*My employment within agricultural investment projects has improved my livelihood"*

Strongly agree	
Agree	
Neutral	
Disagree	
Strongly disagree	

Please explain your answer:

Closing questions

30. Main income source:

31. Total income per month

0-99Zkw (Subsistence)	
100-199Zkw	
200-299Zkw	
300-399Zkw	
400-499Zkw	
500-599Zkw	
600-699Zkw	
700+Zkw	

32. Harvest per year:

33. Size of farm plots now
Garden:
Other lands:

34. Amount of land surrendered for the purpose of irrigation:

35. Number of people fed by current farm plot:

36. Main crop farmed on own plot:

37. Village:

Appendix B: Interview guide

We would like to ask you some questions concerning your experiences with the irrigation project. You shall remain completely anonymous, so you are free to speak your mind. This interview will last approximately 30 minutes, though it may run longer. Please feel free to ask questions, should the questions be unclear. The results of the research will be used to have a better understanding of your local situation. Do I have your permission to use you answers to use in the research?

Details of respondent

- Name
- Age
- Sex
- Social status
- Involvement within project

Key questions

1. Could you tell me something about the structure of the project?

2. Could you tell me about your experiences, related to the project?

3. If applicable: How do you feel about the resettlement?

4. Do you feel you have enough land and income to sustain your family?

5. What were you promised? Do you believe you were given enough information?

6. Do you feel secure about your land ownership? How does this relate to traditional and state land?

7. Are you in possession of the documentation of your land, or of agreements between yourself and InfraCo?

8. Is there anything more you would like to add, or any other information you think I should know?

Prompts

- Could you give me an example?
- Can you tell me more about this?
- Can you tell me why you feel this way?

Appendix C: Qualitative data surveys

-1 Scared that government may sell his land. ‘people in Chanyanya are not interested in land documents’ ‘land quarrel between the chief and the government, but don’t write that down’. ‘don’t tell the government!’
1. Taken land, now trouble with food supply. 25% dividends promised, receive less
2. ‘infraco is halfway there’. 11: has a pump. 12: lack of labour. 13: 2x2hours daily in dry season, not enough. ‘machines will be owned by cooperative’. 19: ‘big boss from government took land because it was unused, after proving it was used, farmers were made to pay for costs he made’. 24: ‘infraco agreed to spare graveyards’
3. 25: some do receive money, some dont
4.
5. 18: told she would receive 20 million K
6. 11: pump. 30: business too
7. 13: ‘if I had a pump, I would use all my land’
8. Resettled, new home not to satisfaction, water is too far away. Chairman: ‘the people are suffering’
9. Information lacking: ‘something good will be given’
10.
11. Boardmember CSCS
12.
13. Consulted by a ‘white outsider’
14. ‘too much water!’
15. Used to use all land because of livestock
16. Landconflict?
17.
18.
19.
20. Taking infraco to court. Did not surrender land because it was rejected by infraco as it was waterlogged. Pipe does however pass through his land, and receives no dividends although this was promised. Used to be the CSCS watchman (committee member). Fishing
21.
22. Resettled by infraco, no happy. ‘unfulfilled promises’. Doesn’t know amount of dividends
23. Renting the garden from other farmer
24. Resettled, no satisfied with house. No document for garden
25.
26. Livestock used all of the land.
27. Livestock used all of the land. ‘infraco used to give land if you could manage it, without asking you to surrender land in return’.
28.
29. Uses half because of changed rain pattern. Surrendered land title to infraco
30. Rents from infraco. 23: ‘headman was selling land without informing the owner’
31. Plot is too small. It is unfair, people who didn’t surrender land are also given land
32. Son is a member, doesn’t know much
33.
34. Chief sold her land without telling her
35.
36. Tells us you receive 200/ha

37. + groundnuts
38.
39. Not enough rain. I refused Infraco due to land uncertainty. Kafue sugar cane
40. Outsiders bought het land without owner knowing.
41. Still in process of surrender
42. Has furrow. Floods. Half land is waterlogged
43. Happy with new house
44. Lots of researchers have can to ask questions, but they never come back. Im too old to manage big land. Garden is too small for foodsecurity
45. Garden was given! By cooperative
46. Renting garden.
47.
48. More vegetables
49.
50. Waterlogged land. Infraco promised employment was promised but not given, outsiders came instead. Too much water! More people shifted from Bonanza than remained. Landtitles protected smallholders from outsiders. Burial site is now cultivated by infraco (half)
51. Grandfather owns plot. Infraco pump broke down.
52. Was given land by cooperative, as the owner had left
53. Given by father (no surrender)
54. Has wells. Unfulfilled promises. Said they would grow different crops than the locals grow, but they didn't. the garden is too small (surrendered all land.). Papers are needed to protect smallholders from outsiders.
55. Used to have livestock. Counselors want our land
56. Land use: dry season half, rain season all. Tomato farming
57.
58. Rents farmland from farmer. Has a borehole
59. Receives water from cooperative. Landuse depends on livestock & resources. Land was given to him by the headman, after which the headman gave it to the cooperative.
60. Receives water from cooperative
61. Landuse: has no help. Used to have livestock
62. Landuse: husband passed
63.
64. Fears that surveys will be used against them. "maybe you think we don't farm enough, and NGO's will come and shift us" . "someone wanted to shift us, but the council provided papers". 'Climate change is making the rains bad'.
65.
66. "rains were better before, climate change". "Headman and chief protected us from government and investors"
67. Chief and residents stopped Kafue Sugar from taking our land.
68.
69. Kafue Sugar does not pay enough, therefore need agriculture. Contracts are always temporary.
70.
71.
72. Chief and residents stopped Kafue Sugar from taking our land.
73. 3 month contract at Kafue Sugar
74. Drought.
75. Land use: lack of equipment. Floods and droughts. Is also a mechanic

76. Bought modern irrigation themselves, but wells go dry in dry season.
77. Rents farmland.
78.
79. ‘Infraco is not paying us enough’
80. ‘more than half of bonanza left
81. Bad rains.
82. No farmland, so shifted
83.
84.
85.
86. Renting garden from the cooperative
87.
88. Rents garden from owner, rents other farmland too
89. Grandfather surrendered land, then gave garden to her.
90.
91.
92.
93. Surrendered all her land, and is now renting extra farmland
94. Surrendered 4 ha, but the money was too little to sustain the family, so we are now trying to quit. Infraco no longer paying them. Broken promises
95. Alone. Renting garden
96. Given garden by cooperative. Used to share his on land.
Flood problems. Taking Infraco to court due to not receiving dividends
97.
98.
99. Livestock & lack of resources
100. ‘I think Infraco is helping us’

Appendix D: In-depth interview log

Number	Age	Gender	Social status	Comments
R1	34	Male	Claimed 'chairman of security' in Chanyanya	Nephew to headman
R2	63	Male	Member of initial committee for CSCS	Involved in court case
R3	50	Female	Resettled smallholder	
R4	88	Male	Resettled smallholder	
R5	67	Male	Member of initial committee for CSCS	Involved in court case
R6	52	Female	Resettled smallholder	
R7	52	Male	Resettled smallholder	
R8	40	Male	Resettled smallholder	
R9	60	Male	Resettled smallholder	
R10	42	Male	Smallholder	Son of committee member
R11	61	Female	Smallholder to be resettled	Member of refusing smallholders
R12	Interview with headman			