AgWater Solutions Project
Case Study

Smallholder Outgrowers in Irrigated Agriculture in Zambia

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The AWM Project
The AgWater Solutions project was implemented in five countries in Africa and two states in India between 2008 and 2012. The objective of the project was to identify investment options and opportunities in agricultural water management with the greatest potential to improve incomes and food security for poor farmers, and to develop tools and recommendations for stakeholders in the sector including policymakers, investors, NGOs and small-scale farmers.

The leading implementing institutions were the International Water Management Institute (IWMI), the Stockholm Environment Institute (SEI), the Food and Agriculture Organization of the United Nations (FAO), the International Food Policy Research Institute (IFPRI), International Development Enterprises (iDE) and CH2MHill.

For more information on the project or detailed reports please visit the project website http://awm-solutions.iwmi.org/home-page.aspx or contact the AgWater Solutions Project Secretariat AWMSolutons@cgiar.org.

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EXECUTIVE SUMMARY

Evidence of policy support for outgrowers in irrigated agriculture can be seen from the Fifth National Development Plan (FNDP 2008-2010) that focuses on "economic infrastructure and human resources development." The government has passed a Public-Private Partnerships Bill focusing on developing agriculture as a business along with a model of inclusive agriculture development that puts emphasis on core agriculture constraints.

One of the agriculture water management solutions concerns outgrower schemes that link smallholder farmers to commercial markets. The whole concept of outgrowing revolves around mobilizing idle assets such as land, family labor and water, abundantly owned by smallholders in Zambia, and combining them with scarce assets such as finance, technical expertise and entrepreneurship, usually owned by the outgrower promoters, to forge a powerful win-win enterprise for both sides.

Typically, provision of input financing, output markets, extension advice, management services, processing and packaging, transportation and water are provided on credit, allowing costs to be recouped at the point of sale. Outgrower schemes therefore, address the key constraints that bedevil smallholder agriculture.

This paper presents a comparative analysis of four case studies of outgrower schemes based on water as one of the key inputs for irrigation. After presenting a descriptive analysis of each model, the paper presents a comparative analysis of the four outgrower schemes as suitable models for enhancing smallholders' access to water and markets and provides an analysis of which model works best, where and who benefits, is it replicable at large-scale and how can donors support and promote this?

Based on the four case studies, there is a general understanding that outgrower schemes do increase farmer incomes and contribute significantly to livelihoods. The extent to which water is incorporated in the package of outgrower inputs adds more costs but this is adequately compensated by higher returns, higher productivity and stabilized income.

The analysis shows that the COMACO model is the best performing model on an aggregate level due to its scalability, gender equity and contributions to livelihoods, although its net return per farmer is low. These returns may be improved through promotion of more simple low cost irrigation technology. The Dunavant model follows closely because of its wide coverage of outgrowers and ease of implementation facilitated by reliable distributors. The Kaleya and Nega models rank lowest because their low scalability and low gender equity.

Scalability: It has been shown that all outgrower schemes are scalable to varying extents determined by investment costs of water and mobilization. The Community Markets for Conservation (COMACO) model is highly scalable with total farm households approaching 200,000 nationwide. The Dunavant distributor model is also highly scalable with potential to approach more than 350,000 households countrywide. Both models have reached one of the hardest-to-reach populations in Zambia: the rural poor. But the average returns to farmers are low, averaging USD 1,000-1,500 per annum. The Kaleya and Nega Nega models are limited in scalability due to their capital intensive and expensive irrigation technology. Average investment cost is USD 14,500 per hectare or USD 54,878 per household. The crop

establishment cost is between USD 3,000-5,000 per hectare. Within a limited area, they are scalable. But considering the returns per farmer and contribution to the economy, the model has a payback period of 4-5 years and quickly moves the beneficiary from USD 300 to USD 5,000 net income per annum.

Contribution to Livelihoods: All four schemes scored highly on this criterion. Outgrower schemes have a high likelihood to contribute to smallholder's livelihoods. The Nega Nega scheme and Kaleya have the highest likelihood because they allow for amount and diversity of income. The COMACO and Dunavant models have a moderate effect on livelihoods. In all cases, the direct impact on poverty is high because of the sudden rise and stability in income from cash crops and reliable markets.

Gender and Equity: The most gender friendly model is COMACO, due to deliberate targeting of women and the promotion of gender friendly crop enterprises. The sugar schemes at Kaleya and Nega Nega have low gender participation because of land ownership and self selection of farmers. Gender equity in the Dunavant Cotton outgrowing model is moderate, as cotton is widely considered to be a male crop. Although schemes tend to self-select better-off male farmers, which may increase income disparity in a community, examples show that women farmers can successfully participate, particularly when they have been targeted by donors or receive support from NGOs. The participation of youth is highest under Dunavant and COMACO models.

Ease of Implementation: Probably because of the back-up of experienced private sector promoters, the ease of implementation for all the outgrower schemes is high. The Nega Nega and Kaleya schemes are concentrated in one area, and have high returns which allows for the mobilization of private capital. The COMACO and Dunavant models have outgrowers scattered over a wide area involving thousands of stallholders, which makes monitoring expensive.

In considering promotion options for outgrower schemes in irrigation, promoters should support models that are within their resource envelope, consider adding water and irrigation to the inputs package and deliberately target vulnerable but viable groups of smallholders.

Based on the analysis, the best practices concerning outgrowers in water management include:

- How growers are selected, mobilized into groups and facilitated;
- How commodities and their combinations are selected;
- Extent of vertically integrated services provided across the value chain;
- Operational contracts and codes of behavior in practice;
- How the inputs are packaged and supplied and whether water is a component;
- How technical and agribusiness extension services are provided;
- Location of farmers in relation to markets;
- Pricing mechanisms and alternative markets;
- Facilitatory and regulatory role of donors, NGOs and government;

The sustainable and viable engagement of smallholder farmers as outgrowers by commercial ventures can be achieved if the above conditions are met. Outgrower schemes can also be successfully implemented in isolated areas with difficult access. Financial sustainability and performance for both outgrowers and promoters depends on effective links to markets and the range of value chain services packaged. Schemes that have adopted vertical integration across the value chain, combining production, processing and marketing seem to work best. Smallholders may not necessarily achieve a successful commercial venture. Idle resources (land, labor) can be mobilized and successfully combined with scarce resources (capital and entrepreneurship) to forge a successful outgrower relationship. But considering the issues related to pricing and benefit sharing between the promoters and outgrowers, more public investments in regulatory and arbitration institutions are required.

The core success factors in outgrowing are the provision of or elimination of as many critical constraints in the value chain as possible. This may involve one or more promoters such as the involvement of micro-finance institutions. But in most cases, the core promoter takes on the responsibility to provide the whole package of services.

Farmers should be concentrated to form a critical mass and should be linked to a defined market nearby. Farmers with a common vision are recruited and trained for a common purpose. The higher the scalability, the lower the investment and operational cost per farmer, and the lower is the net income per beneficiary. Addition of water as an input raises the profitability and impact of the outgrower scheme for the beneficiaries. The extent of and type of water management applied raises operational costs, but correspondingly raises and stabilizes income returns to the outgrowers.

There is no single model that best suits all situations. In Zambia, outgrower schemes have proved adaptable to a diversified range of commodities: flowers, vegetables, poultry, pig raising, dairy, honey, barley, and sorghum. Even though public investment is desirable to stimulate successful outgrowing, subsidizing operational costs should be avoided and the necessary links to management consultants and finance service providers should be encouraged.

Abbreviations

AfDB	African Development Bank
AWM	Agricultural Water Management
BBZ	Barclays Bank (BBZ)
CDC	Commonwealth Development Co-operation
CGA	Cane Growers Agreement
COMACO	Community Markets for Conservation
CPA	Cane Purchase Agreement
CTC	Conservation Trading Centre
DBZ	Development Bank of Zambia
EU	European Union
FAO	Food and Agriculture Organisation
FASAZ	Farming Systems Association of Zambia
FNDP	Fifth National Development Plan
FNDP	Fifth National Development Plan
GMA	Game Management Areas
IDE	International Development Enterprises
IFPRI	International Food Policy Research Institute
IWMI	International Water Management Institute
KASCOL	Kaleya Smallholders Company Limited
KASFA	Kaleya Smallholder Farmers Association
LUP	Land Use Plan
MACO	Ministry of Agriculture and Cooperatives
MAWAUSA	Manyonyo Water Users Association
MCGA	Mazabuka Cane growers association
MFNP	Ministry of Finance and National Planning
NIP	National Irrigation Plan
NSE	Nakambala Sugar Estate
OPPAZ	Organic Producers and Packagers Association of Zambia
PG	Producer Group
PPP	Public-Private Partnerships
PTP	Poacher Transformation Program
SEI	Stockholm Environmental Institute
WCS	Wildlife Conservation Society
ZATAC	Zambia Agribusiness and Technical Assistance Company
ZNFU	Zambia National Farmers Union

1. Introduction

1.1 Background

The International Water Management Institute (IWMI) has been implementing an Agricultural Water Management (AWM) Solutions Project that aims to identify innovative solutions to unlock the productive potential of smallholder farmers through investments in water. Other partners in the project are the International Development Enterprises (IDE), the Food and Agriculture Organisation (FAO), Stockholm Environmental Institute (SEI), the International Food Policy Research Institute (IFPRI) and CH2MHill. The project is implemented in five African countries, including Zambia, and two Indian states. In Zambia the project collaborates with the Farming Systems Association of Zambia (FASAZ).

One of the solutions the project has identified concerns outgrower schemes, which link smallholder farmers to commercial markets and provide support for water, inputs, and training. In joint ventures, assets are shared, in particular land. Both outgrower schemes and joint ventures may benefit from public sector investments and subsidies in the cost of infrastructure and services to facilitate a win-win relationship between large-scale commercial enterprises and smallholder farmers. The experiences, nature and outcomes of applying irrigation and water management in outgrower schemes in Zambia are analyzed in this paper.

1.2 Policy context

"*My desire is to create a true rainbow nation where both large and small-scale, whites and blacks will work together in harmony and oneness in developing our country's agricultural sector. I pledge to provide equal support to all farmers. My government fully appreciates the need to develop both the small and large-scale farmers into a viable commercial agricultural community because this the only way our agriculture sector will be competitive in the region*". **(President Rupiah B. Banda's speech to the Annual Congress of the Zambia National Farmers Union (ZNFU) in 2009)**

Going by the policy pronouncements in major government documents, there seems to be no shortage of political will for support to irrigated agriculture and how smallholder farmers can be mobilized to benefit. The Fifth National Development Plan (FNDP) is organized around the theme of "broad-based wealth and job creation through citizen participation and technological advancement", and focuses on "economic infrastructure and human resources development."

The agricultural policy places top priority on "irrigation development and support", with the objective to "promote a well regulated and profitable irrigation sub-sector that is attractive to both the public and private sectors" and to develop socially desirable and economically viable irrigation schemes. The National Irrigation Strategy has a model for inclusive agriculture development (Figure 1). Zambian Policy on outgrowers and irrigation underpinned by:

- Economic infrastructure and human resources development
- Public-private partnerships
- Inclusive agriculture development

- Focus on core agriculture constraints
- Business approach to farming

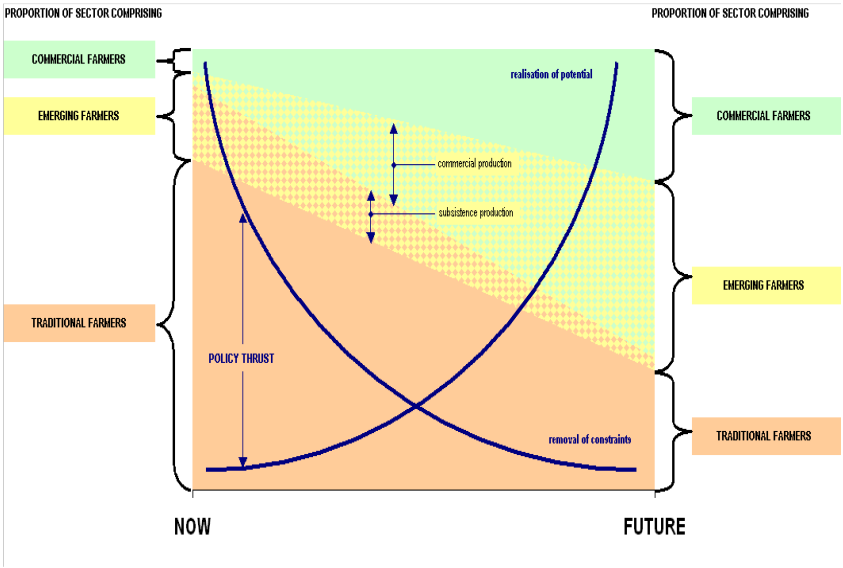


Figure 1. Inclusive agriculture development (Source: Irrigation Policy and Strategy, 2004)

The National Irrigation Plan (NIP) has been tailored to resolve agriculture sector constraints: 1) finance and investment; 2) institutional and social; 3) market linkages, and 4) policy and legal.

The FNDP targets increased expenditures on infrastructure development, including irrigation, and identifies public-private partnerships as an important mechanism to realize optimum investments. A public-private partnerships bill was enacted in 2009, while the Ministry of Agriculture and Cooperatives (MACO) is exploring various options and strategies for public-private partnerships that involve the participation of smallholder farmers (MACO, 2004).

The predicament is that even with such a sound policy and strategic policy base, Zambia seems to lack sustainable institutional mechanisms for the profitable management and use of irrigation infrastructure for the benefit of different farmer groups and the economy at large. Most irrigation schemes and farms in Zambia are operating below their economic potential due to a range of constraints such as poor rainfall distribution, unreliable and costly energy and poor access to long-term financing.

Outgrowing is increasingly seen as a sustainable way to empower smallholders economically while addressing their production constraints. The facilitator role of government is recognized as being infrastructure development and maintenance, macro-economic stabilization, provision of research services and ensuring transparency in the sector through sound business conduct and ethics.

1.3 What are outgrower schemes?

The adoption of a business approach to farming[1] has improved the perception of outgrower schemes as models for forging mutually inclusive and productive partnerships between organized smallholders, commercial farmers and agribusiness. Inclusiveness refers to the equitable sharing of benefits between stakeholders and their emerging business partners, and ensuring their adequate representation in the governance of the schemes. Smallholders engage in a contract relationship with the promoters and receive agribusiness support services packaged in various ways.

Government and financing agencies find this arrangement socially acceptable and may be more readily available to subsidize certain costs such as large-scale water infrastructure, mobilization, research and extension. Such support may be mobilized through various scenarios rooted in the concept of inclusiveness: i) government constructs and manages public infrastructure with management outsourced to promoter; ii) public-private partnership with government financing and owning the public infrastructure, and a professional non-profit irrigation entity responsible for scheme operation and maintenance and service delivery to smallholders; and iii) integrated irrigation and farming operation managed in relation with the private sector.

Typically, provision of input financing, output markets, extension advice, management services, processing and packaging, transportation and water are provided on credit, allowing costs to be recouped at the time of selling. Outgrower schemes therefore address the key constraints that bedevil smallholder agriculture (Figure 2). The contracting company provides these services to smallholder farmers with a primary interest in the pooled volume of products for the purpose of processing and marketing.

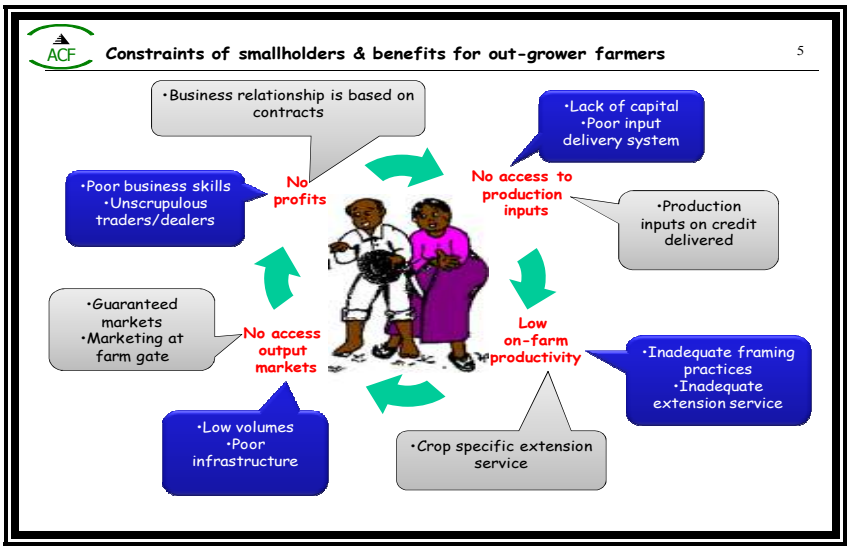


Figure 2. Constraints of smallholders addressed by outgrower schemes (Source: Klaus Droppelmann & Masiye Nawiko, undated)

1 Programs such as Economic Expansion in Outlying Areas (EEOA), Agriculture Support Programme (ASP), PROFIT, Market Access Trade & Enabling Policies (MATEP), Agri-Business Forum, Community Markets for Conservation (COMACO),

Outgrowing has historical significance in Zambia dating back to the 1970s. Notable outgrower schemes have included paprika (Cheetah Zambia), cotton (Dunavant Cotton), export vegetables (York Farm), tobacco (Tombwe Processing), coffee (Coffee Growers Association), sugar (Zambia Sugar Plc), mixed crops (COMACO), pigs (Master Pork), dairy (ZATAC), poultry (Hybrid Poultry Farm) and organic products (OPPAZ).

As a scalable model for poverty reduction, outgrower schemes are constrained by self selection of relatively well off male farmers. They are often restricted to more accessible areas, and a high possibility of contract default exists, especially in the presence of a strong parallel market for the primary commodity being promoted. Contracts may be defaulted if the promoter fails to deliver the right quality and quantity of inputs or services on time, or if they arbitrarily raise standards; as well as willful default by farmers. The absence of a strong legal system in Zambia and weak insurance services create considerable risk for companies entering into contract with smallholder farmers. The need for appropriate regulatory frameworks for arbitration cannot be over-emphasised.

2. FOUR CASE STUDIES OF OUTGROWER MODELS IN ZAMBIA

A comparative characterization and analysis of selected case studies of models of outgrower schemes based on water as one of the key inputs for irrigation in Zambia is made. These include COMACO, KASCOL, Nega Nega and Dunavant. In this chapter, a descriptive analysis of each model is made. In chapter 3, we undertake a comparative analysis of the four outgrower schemes as models for enhancing smallholders' access to water and markets and analyze which model works best, where and who benefits, is it replicable on a large-scale and how can donors support and promote this?

For each of the four case studies, the following aspects are described:

Project concept and structure: Initiative and initiators; feasibility assessment process; actors/parties and their configuration/contractual relationships/reporting structures: smallholders (M/F; relative wealth class) individual and internal organization and external contacts e.g., with ZNFU; loan provider; grants provider; water infrastructure provider; other facilities provider; operational loan and inputs provider; farm management; buyer/processor of produce; enforcement of contractual arrangements; arbitration processes; conflict resolution. Who decides about crop choice and use of income; who bears which risks? What are the incentives for higher productivity and sharing of income?

Technical design, outcomes and impacts: Cultivation: operational loans; provision of plowing facilities, fertilizer, pesticides, other services; labor and recruitment arrangements, employment generation, harvest yields, transport; water: history, water source and availability; technical design; capital investments and loans (repayment conditions) of new infrastructure and rehabilitations; current and future ownership; operation and use requirements (crops, options for diversification, seasons, small plots/consolidated centralized); costs of operation (energy/other cash and labor/employment generation).

Institutional impact: Linkages, farmer organizations, meetings, negotiations, arbitration and conflict resolution.

Financial and economic analysis: Use of harvest; market developments; sale and price; gross and net income; productivity returns, use of income for loan repayment; management costs; dividends; others.

Social impact (men, women, youth): Land: history, resettlement, customary – formal titling (gender), consolidation, compensation for lost land, costs/loans (repayment conditions) membership of smallholders' organization (gender); ownership/lease arrangements; change in value of the land.

2.1 COMACO - Community Markets for Conservation

2.1.1 Background

In Zambia's Luangwa Valley, one of Africa's great wildlife ecosystems and sanctuaries, the black rhinoceros went extinct in less than a decade between the late 1970's and early 1980's. The elephant population was similarly almost halved in the same period by people who lived around the park and sought income from the illegal hunting of wild animals. Lured and motivated by illegal markets, the hungry people around the valley used snares and locally manufactured guns to maim, injure and kill wild animals as a substitute or complement to low performing subsistence farming. Outgrower schemes in the area promoted cotton and tobacco, two land use systems that encouraged the widespread use of chemical pesticides and indiscriminate land clearing, leading to widespread deforestation and water pollution.

To reverse these negative trends, to improve livelihoods, and to harness good markets using environmentally sustainable production practices, the Wildlife Conservation Society (WCS) pioneered Community Markets for Conservation (COMACO), a limited-by-guarantee company that helps rural communities become more aware of their natural environment, and to plan their own future around selected markets for crops that leave their land in a richer state.

2.1.2 Concepts and objectives

COMACO and its partners initiated sustainable land management and production systems and provided facilities equipped with trading and processing capacity. Rural producers benefit from COMACO through a Conservation Trading Centre (CTC) and Trading Depots by joining a registered producer group. A primary condition is that members learn improved farming skills and adopt by-laws that restrain them from using environmentally destructive practices. The community develops a Land Use Plan (LUP), which is a requirement under the COMACO model, and pledges to implement it in return for improved markets and trading services.

The COMACO CTC is a contract farming promoter serving 200-300 outgrowers in its catchment area. The Trading Depots serve as trading hubs where producer group members market and receive direct payment for their produce, as well as price bonuses for conservation compliance. They also serve as community centers for providing training in appropriate livelihood skills and coordinating relevant information about market opportunities guided by improved land use practices and production technologies. The CTC Board members ensure the CTC operates sustainably and transparently in meeting its objectives. The Producer Group Cooperatives are represented on the Board and therefore ensure that outgrowers are shareholders in the CTC. The Board is assisted in day-to-day management by a team of professional managers and technical staff who manage the marketing, trading, processing and training activities to contribute to the three objectives of COMACO.

Poverty reduction: Ensure most of the selected poor, food insecure families achieve a sustainable production of diverse commodities that support food security and increase income and reduce risks of natural resource degradation.

Job creation: Supplement government and other private sector efforts in reducing unemployment through increased opportunities of self-employment from direct trade in farm-based and natural resource-based commodities.

Sustainability: Reduce CTC's dependency on donor support for its operational costs and become fully self-financing within five years of a CTC's establishment. COMACO provides inputs and assists farmers who want to sink wells and access irrigation equipment through loans. The producers manage their crops in the field and sell them to COMACO through the Trading Depot. They also provide training in various skills. The farmers have their land held under a traditional usufruct system to contribute together with their family labor. Their key obligation and commitment is to abide by sustainable natural resource management practices .The CTC rewards farmers for their products, offering preferential prices and bonuses based on compliance with sustainable management practices.

2.1.3 Design

The Lundazi Regional Office was established in 2002. It is located more than 800 km east of Lusaka. It is the largest of four regional offices. The operational areas for the Lundazi Regional Office lie in the Musalangu, Lumimba and parts of Munyamadzi Game Management Areas (GMA) and fall under the chiefs Chikwa, Chifunda, Kazembe, Chitungulu,

Nabwalya, Magodi, Zumwanda, Chikomeni and Mwasemphangwe. The office has one CTC and 14 satellite Trading Depots.

The Lundazi CTC has matured as a limited liability profit making company (Figure 3) hat supports more than 20,000 outgrowers. Although the producer cooperatives hold shares in the CTC and are entitled to dividends, the CTC has not yet declared any dividends. In the absence of dividends, the producer's main benefit is from premium prices offered for their commodities. The Board and Producer Groups meet regularly and have developed a capacity for negotiation, arbitration and conflict resolution. COMACO has become increasingly self-financing.

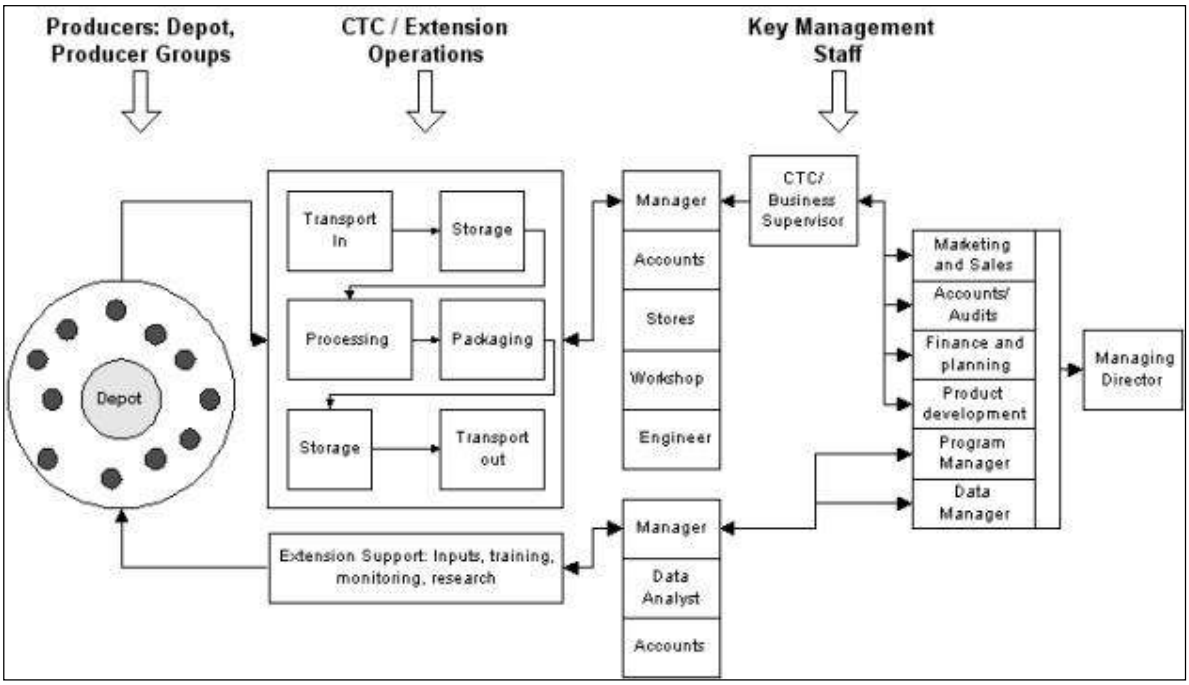


Figure 3. COMACO Structure

2.1.4 Impact of COMACO

Technical impact

COMACO outgrowers have learned improved farming skills in conservation farming, smallholder irrigation, composting, improved seed varieties, beekeeping, input loans, and output marketing to increase food production and attain self sufficiency in food. Simple adjustments in land use practices, like crop rotation, conservation farming, composting, and animal husbandry, have led to significant reductions in land conflicts.

Conservation farming reduces the incidence of bushfires, increases crop yields and improves the fertility of soils. In 2006, about 73% of 7,375 farm plots inspected were found compliant with conservation farming guidelines. Conservation farming is a zero-tillage technique that

uses small depressions (potholes) for each planting station in which an individual plant is grown and to which the farmer applies home-produced compost fertilizer just before planting. Conservation farming suppresses weed growth and increases moisture retention with a liberal covering of last season's crop residues spread between the rows of planting stations. In addition to returning nutrients to the soil, productive use of crop residues discourages the practice of burning, a practice which may contribute to soil degradation as well as increased occurrence of bush fires that impact surrounding wildlife habitats and watershed resources. Small-scale irrigation is encouraged through conservation farming, buckets and watering canes, treadle pumps, and drawing water from shallow wells and streams.

Initially, maize seed was provided as an incentive to encourage adoption of conservation farming through a World Food Program (WFP) Food for Better Farming Initiative from 2001 to 2006. A cumulative total of 49,401 households received CF training during this period. Conservation farming compliance has remained consistent ever since, averaging 60 percent (30-75% range). Data collected in 2005/6 confirms that CF with composting has raised average maize yields to 4.8t/ha compared to 4.4t/ha CF without composting and 3.6t/ha in traditional farming in Lundazi and Chama Districts. Since maize seed variety contributes to yield, a comparison of yields for local maize and improved maize seed varieties suggested that improved seed varieties contributed to yield increases ranging from 4.0% to 6.1% over local varieties. COMACO has also succeeded in persuading farmers to shift from growing pesticide-based crops like cotton and tobacco to low labor, low input crops like rice, groundnuts and soybeans.

Commercial and financial impact: *Its Wild!* products

Financial Viability of CTC

Most of the products COMACO currently markets are agricultural commodities, such as polished rice, peanut butter, roasted groundnuts, and soybean-based food products. The choice of commodities is made through the LUP and market opportunities available. ***It's Wild!*** **is COMACO's** brand name for products, pesticide free and organically produced for meeting high consumer standards. The main commodities produced are mostly low input crops.

Figure 4. **Seed to shelf supply chain management**

From seed to shelf, COMACO manages the entire supply chain on behalf of producers. The COMACO network of trading depots in remote rural areas has ensured that poor and marginalized farmers can have their products processed, packaged and reach the shelves of up-market shops like Shoprite in Lusaka.

Although COMACO seeks to help poor people, it must operate as a viable and competitive business. Commercial viability and sustainability is essential. Balancing social and environmental needs with commercial viability is however a tricky undertaking, and this has delayed the attainment of profitability. To partially offset and overcome the high variable and fixed costs, grants and other appropriate forms of financing of CTC start-up costs have been used (Figure 5). The experience of the Lundazi CTC shows that it takes about 4 to 5 years to attain full operational maturity. A profit and loss statement for Lundazi CTC showed a significant improvement in net revenue gains (Table 3).

Commercialization of Commodities

Soybean products include high energy protein mix, soy milk and soy crunchies. Between 2005 and 2006, soybean production among COMACO farmers in Lundazi increased 34 percent from 74,249kg to 99,638kg. Soybeans contributed 79% to the gross profit of Lundazi CTC in 2006.


Figure 5. Soybean processing plant and commodity transportation trucks.

Table 1. Profit and loss account for Lundazi CTC (2004-2006)

Commodity	Unit	2004	2005	2006
Soybeans (% change)				34.19
Production(kg)	kg	-	74,249	99,638
Gross Revenue	Zkw	-	90,263,328	1,008,635,474
Total Costs	Zkw	-	81,290,364	561,720,334
Profit	Zkw	-	8,972,964	446,915,140
Honey (% change)				646.48
Production(kg)	kg	750	1,009	7,532
Gross Revenue	Zkw	741,000	5,946,000	66,748,584
Total Costs	Zkw	1,500,000	3,074,590	44,453,659
Profit	Zkw	(759,000)	2,871,410	22,294,925
Rice (%change)				118.97
Production(kg)	kg	147,729	154,797	338,959
Gross Revenue	Zkw	154,377,320	155,873,700	724,616,086
Total Costs	Zkw	154,542,691	169,489,320	713,340,116
Profit	Zkw	(165,371)	(13,615,620)	11,275,970
Groundnuts (%change)				1,088.53
Production(kg)	kg	19,531	3,399	40,398
Gross Revenue	Zkw	35,669,750	2,676,000	348,048,701
Total Costs	Zkw	23,269,885	4,134,086	259,787,647
Profit	Zkw	12,399,865	(1,458,086)	88,261,054
Total for Lundazi CTC				
Gross Revenue	Zkw	190,788,070	254,759,028	2,148,048,845
Total variable Costs	Zkw	179,312,576	257,988,360	1,579,301,756
Total Fixed Costs	Zkw	155,430,878	305,324,293	353,862,200
Gross Profit	Zkw	(143,955,384)	(308,553,625)	214,884,889

Chalimbana groundnuts are a nutritious, protein-rich groundnut grown by farmers throughout much of the Luangwa Valley. By adding value, COMACO hopes to increase its production for both home consumption, income generation, and promoting the use of a legume for crop rotation and improved soil management. Some of the peanut products found on supermarket shelves are: *Peanut Butter Crunchy, Peanut Butter Smooth, Roasted Peanuts and Plain Peanuts.* Between 2005 and 2006, groundnut production among COMACO farmers in Lundazi increased by 1,088 percent from 3,399 kg to 40,398 kg. Groundnut s were the second highest contributor to net earnings at 15%.

Chama rice, an exceptionally rich-tasting rice with a distinct aromatic flavor is a popular supermarket product. It is produced in rainfed paddies in Luangwa Valley and cultivated without fertilizers or pesticides. COMACO has more than doubled the value of Chama rice for local producers who earn additional bonuses when complying with conservation farming practices and abandoning the use of wire snares that kill wildlife. A variety of rice products, such as polished white rice and brown rice are packaged in various sizes. Between 2005 and 2006, rice production among COMACO farmers in Lundazi increased by 119 percent from 154,797 kg to 338,959 kg, but rice only contributed 2% to gross profit.

It's Wild! Registered COMACO producer groups produce honey entirely from wild, native tree species and manage their apiaries with firebreaks to prevent destructive fires and use modern bee hives to reduce tree destruction. COMACO has more than doubled the value of honey for local producers, giving increased incentives to managing forests for this cash crop rather than converting forests into charcoal for road side sales for urban markets. Between 2005 and 2006, honey production among COMACO farmers servicing Lundazi CTC increased by 646 percent from 1,009 kg to 7,532 kg, although the contribution to total net earnings only stood at 4%. The CTC bought and processed 2,018 kg in 2006. About 3,098 log hives and 595 bar hives were installed by 2006, involving 1,726 outgrowers of whom 479 were females.

The outgrowers have seen an improvement in the volume and value of their harvest, leading to improved incomes at household level. Premium prices and bonuses are on offer for outgrowers. Between 2005 and 2006, COMACO expenditures on commodity purchases increased from K 258 million to K 1,579 million, all the money going into farmers pockets. In 2006, the COMACO producer price for rice was K 1000/kg as compared to K 850/kg for rice on the open market.

Snarewear, made from more than 40,000 snares recovered from illegal hunters and poachers, includes necklaces, bracelets, anklets, earrings and decorative pieces. These items use snare wire and seeds from local trees as beads and are very popular among tourists and the local community as a model for conservation.

Social Impact

Land tenure in Lundazi is under traditional authority and there is good supply and access generally for both men and women. The youth, who tend to be involved in poaching and charcoal burning, have benefited under the COMACO outgrowing. Membership of women and youth in producer groups is quite high. Diversification of livelihood skills has increased (livestock husbandry, dry season gardening, carpentry, beekeeping, improved fisheries

management, etc.) among producer groups to increase opportunities for earning legal income without degrading natural resources in their area. Of the total 1,726 honey outgrowers in 2006, 479 were women (25%). Women are also actively involved in producer groups for crops.

Environmental Impact

Figure 6. Recovered guns and snares

COMACO has focused on farmers who are often the source of environmental degradation. A Poacher Transformation Program (PTP) has reduced snaring and poaching significantly. It is also evident that community behavior has changed in support of more sustainable natural resource management practices. Voluntary surrendering of snares and guns, reduction in poaching, adoption of conservation farming, shift in cropping patterns and reduced charcoal burning, and increased dependence on beekeeping are but some of the evidence. The snaring rate fell from about 58% in 2000 to around 5% in 2003. Between 2001 and 2005, a total of 25,288 snares were surrendered in COMACO core areas and 13,538 in extended areas. Some 800 illegal firearms were surrendered also. Compliant members are rewarded through premium prices and bonuses for their products.

2.1.5 National scalability of COMACO model

The COMACO program currently operates over large landscapes of Eastern and portions of Lusaka and Northern Provinces of Zambia. The coverage of the COMACO program is mainly around national parks and protected forest areas in the Luangwa Valley and Lower Zambezi basins. COMACO has set up four regional offices situated in Lundazi, Mambwe, Luangwa and Chama districts.

The Lundazi Regional Office was the first to be established with the inception of the COMACO program in 2002. It has a CTC and 14 satellite trading depots. The second largest office is situated in Mambwe District in Mfuwe. Mfuwe is a tourist destination in the country. The areas under this Regional Office are in the Lumimba, Lupande and Sandwe GMAs. The chiefdoms in these areas are Kakumbi, Nsefu, M'nkhanya, Malama, Mwanya, and Msoro. The CTC located at Masumba coordinates 8 producer trading depots. The Chama Regional Office caters to the Kambombo and Tembwe areas in West Musalangu GMA. A CTC has not yet been set up but the trading depot at Chama coordinates activities for the region.

The Feira Regional Office was established to extend COMACO interventions around the Lower Zambezi National Park and within the Rufunsa, Luano and West Petauke GMAs. The Feira office has set up a number of COMACO programs in Mburuma, Mphuka, Mphanshya, Nyalugwe, Shikabeta and Bunda Bunda chiefdoms. The CTC at Feira is still in its infancy and has largely depended on the Lundazi CTC for most of the necessary food processing. Six trading depots have been established in the project area to facilitate the provision of trading and extension services.

COMACO has also been extended to Serenje, Mpika and Chinsali Districts of northern Zambia with NORAD support. The Royal Norwegian Embassy has the largest donor investment in Zambia's wildlife sector and has also contributed heavily to the agriculture sector. Recognizing the potential synergy between conservation and agriculture that COMACO could bring to rural communities living outside national parks, the Royal Norwegian Embassy provided a major grant in 2006 to WCS and a collaborating local NGO partner, Program Against Malnutrition. These funds support the testing of the COMACO model and will help build the foundation for COMACOs future expansion in Zambia.

2.2 Kaleya smallholder scheme

2.2.1 Background

The establishment of Kaleya and other outgrower sugar schemes were based on Zambia Sugar's expansion program at Nakambala Sugar Estate (NSE). The Zambia Sugar Plc is the biggest producer and processor of sugar in Zambia. The estate, factory and refinery plants are situated in Mazabuka town, 130 km south of Lusaka. The investment was set up in the early 1970's with a World Bank loan with a government majority shareholding. Illovo bought Zambia Sugar Plc in 2001. Zambia Sugar exports its sugar to the European Union under a preferential sugar export treaty, SADC and COMESA countries as well as for local consumption in Zambia. Apart from white sugar fortified with Vitamin A, the operation also produces high value downstream products that include furfural, furfryl alcohol, agriguard, biomass sugar, 2.3 pentaneddione, ethyl alcohol and lactulose. The company is listed on the Lusaka Stock Exchange (LuSE) and employs over 5,100 permanent workers and about 3,400 seasonal workers during periods of peak operation. Some 22,000 people live at Nakambala Estate and depend on the industry for their livelihoods. A major area of concern to NSE was that while it was rapidly expanding, the smallholder farmers in surrounding communities faced sluggish or declining agricultural productivity and income. In 1980, therefore, NSE piloted a smallholder expansion project at Kaleya to supplement its sugar cane output.

Following on the successes of the Kaleya pilot, another expansion program by NSE in 2007 targeted expanded total annual refined sugar production capacity from 260,000 mt to 450,000 mt through a USD 224million investment from 2008-2011. This involved expanding the milling capacity to over 200,000 mt as well as the estate land by 3,000 hectares to bring it to a total of 17,000. Cane production would peak at 3.25 million tonnes by 2011 from the current 0.8 million tonnes.

Zambia Sugar Plc has realized the tremendous opportunities that lay in outgrower links with private commercial farms and smallholder farmer groups. Private commercial farms now

supply about 2,085 ha of sugar. Smallholder farmer outgrower links with Zambia Sugar were facilitated through the government's willingness to invest in public water and infrastructure.

Kaleya Smallholder Company (CDC) is the oldest among the smallholder groups, supplying about 2,156 ha of cane, of which 1,070 ha is grown by 161 smallholders and the remainder is run as an estate by KASCOL. New smallholder outgrower operations are expected to supply raw materials by 2011 at Manyonyo (550 ha by AfDB-Finland) and Magobbo (600 ha by EU). The management and business relationship between Zambia Sugar Plc and outgrowers is illustrated in Figure 11.

2.2.2 Concept and objectives

Kaleya Smallholders Company Limited was incorporated as a private limited Liability Company in 1981 with Zambia Sugar (ZS), Barclays Bank (BBZ), Commonwealth Development Co-operation (CDC), and Development Bank of Zambia (DBZ) Owning 25% share each. The first group of farmers was settled in 1983. By 1997, smallholder settlement reached a full growth of 164 farmers with an average of 4 ha each on a 14-year lease.

The farmers were collected from surrounding communities where they lived on less than one dollar a day. They were trained and provided with inputs and services. The farmers were also given 0.5 ha for residence with clean tap water and for growing subsistence crops. These smallholders established the Kaleya Smallholders Farmer Association (KSFA) that mediates in all issues pertaining to the farmers. The scheme has incorporated a core sugar cane estate combined with a smallholder initiative intended to contribute outgrower cane production to the surplus processing capacity to Zambia Sugar.

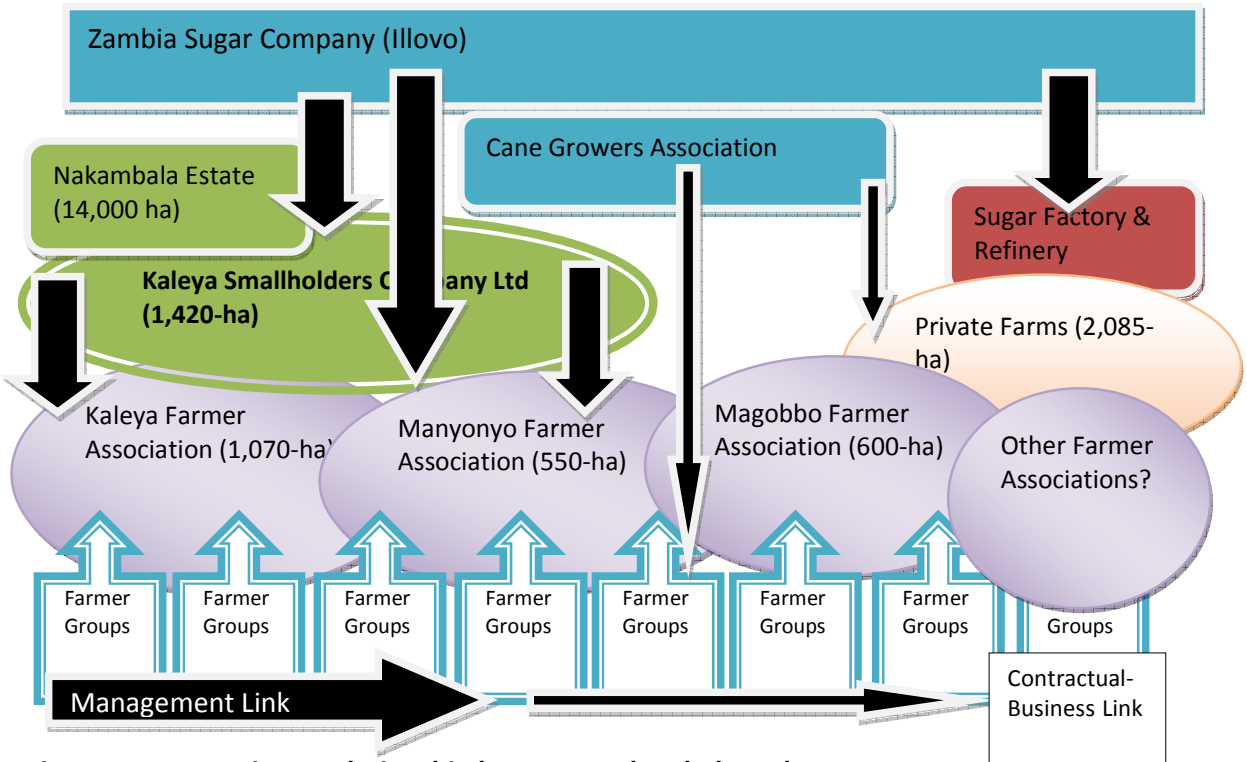


Figure 7. Business relationship between Nakambala and outgrowers

The main objective of the Kaleya Smallholder Company was to supply 200,000 mt of cane sugar annually to Nakambala and empower smallholders with income through a ready market. KASCOL supplies the smallholders with training and extension services, agricultural inputs and mechanical services, arranges cane harvesting and haulage and distributes irrigation water. The smallholders are responsible with family members for caring for the infield irrigation, weed control, fertilizer application and removal of diseased cane stalks.
KASCOL is currently managed through a Board of Directors where the Kaleya Smallholder Farmers Association (KSFA) is represented. A management team headed by the Estate Manager leads the company administration. KASFA has an elected management team to manage the farmer association. The total number of the executive committee is nine with a three year term. The level of participation from the women smallholders has been low over the years.

2.2.3 Design

KASCOL remains a pioneering example of smallholder empowerment. Of the 4,000 ha made available, 1,430 ha is a nucleus estate while 1,070 ha is under smallholders, with the balance of land being occupied by infrastructure support, housing and other services for employees and undeveloped land. Each outgrower has 6.0-7.5 ha under a 14 year lease.

Training and extension services, agricultural inputs and mechanical services, arrangements for cane harvesting and haulage and distribution of irrigation water is managed by KASCOL on behalf of outgrowers. Family members care for the infield irrigation, weed control, fertilizer application and removal of diseased cane stalks.

Water is bought from Nakambala Sugar Estates and is conveyed through a pipeline to KASCOL. Nakambala supplies water to KASCOL, pumped through a pipeline, canal to six night storage reservoirs from the Kafue River. KASCOL has its own water right of up to 1,600m^3 per day from Kafue River, but is not exploiting due to high infrastructure costs entailed in laying its own conveyance system. Kaleya draws a maximum of 13,000m^3 per day during peak periods. The water is siphoned from tertiary canals into the fields for flood irrigation.

An average farm of 6.5 ha per farmer, requires 52 tonnes of sugar cane seed for crop establishment. About 2.0mt of basal fertilizer about 1.3mt of top dress fertilizer is required. The initial capital investment for infrastructure and crop establishment was mainly financed by CDC, AfDB, DBZ and Barclays Bank at about 15,000,000 British Pounds.

The farmer is only allowed to grow 100% sugar cane using the irrigation water. The farmers grow other crops and keep livestock in the villages from which they originate. They also grow a few crops on their residential plot.

Farmers have to sign a Cane Growers Agreement (CGA) that binds them to certain norms of behavior and standard. A Cane Purchase Agreement (CPA) negotiated between Zambia Sugar Company and the Cane Growers Association allows the sale of sugar and defines the pricing mechanism. Sugar cane grown by smallholders is all collected by KASCOL, bulked with the estate cane and sold to Zambia Sugar under a single CPA. The CPA is negotiated from time to time between KASCOL and Mazabuka Cane growers association (MCGA).

Individual farmers are not contractually linked to a buyer, processor, water provider, government financiers, or grant donors. The estate and smallholders are regarded as one grower. Payments are made to a smallholder 14 days after the mill month end in which the smallholder has delivered his cane.

The pricing mechanism for cane and the distribution of benefits to outgrowers has evolved over time from the Full Cane Price enforced initially to a 43% - 57% Cane Split Agreement and is still in force.

2.2.4 Outcome and impact

Institutional Impact

KASCOL structures, systems and performance show that the entity continues to perform adequately, has management systems that are appropriate to the organization's functions and has sufficient and adequately qualified and experienced staff to perform to required standards.

As an institutional model for outgrowing, there is no doubt that KASCOL remains a pioneering example of smallholder empowerment. The operation has remained viable and well managed, delivering its mandate effectively. The Board, KASCOL and KASFA have worked well as a cohesive team and met production and empowerment targets. KASCOL outgrowers have prospered through KASFA save for a few talking points on pricing. KASCOL has sub-contracted KSFA for cane cutting services so that they raise more money for the association.

KASCOL provides the extension services. The extension workers have a degree of authority over the growers. The KASFA is registered as a **fair-trade** organization as an outgrowing initiative so as to protect the smallholder producers against exploitation and promote their product by putting a premium on the export markets. However, poor explanation of this arrangement, though commendable, has led to false hopes who may not fully understand the technical complexities of the issues at hand. This may lead to further confusion and suspicion.

Technical Impact

The 4,000 ha farm has been successfully opened for 1,430 ha of nucleus estate and 1,070 ha under outgrower farmers. KASCOL has consistently supplied around 200,000mt of cane sugar to Nakambala with each outgrower managing 6.0-7.5 ha. Training and extension services, agricultural inputs and mechanical services, arrangements for cane harvesting and haulage and distribution of irrigation water is managed by KASCOL. Family members care for the infield irrigation, weed control, fertilizer application and removal of diseased cane stalks. The average yield is 110-115t/ha. Farmer's management of fertilizers, water and labor remains poor in some cases, leading to low average yield. But the smallholder yield has consistently remained higher (115t/ha) than that from KASCO fields. This is attributed to the fact that smallholders were apportioned the best pieces of land. The average smallholder yields compare quite well with those obtaining at Nakambala Sugar Estates.

Nakambala Sugar Estates sells water through its water conveyance system. Kaleya has its own water right of up to 1,600m^3 per day from Kafue River, but has opted to buy from Nakambala because of high infrastructure costs entailed in laying its own pumping system. Kaleya draws a maximum of 13,000m^3 per day during peak periods. Nakambala supplies water to Kaleya, pumped through a pipeline, canal to six night storage reservoirs from the Kafue River. The water is pumped from the Kafue River to water channels, to pump stations, to primary canals, secondary canals and through tertiary canals from which it is siphoned into the fields for flood irrigation.

The farmer is only allowed to grow 100% sugar cane using the irrigation water. The farmers discuss with the extension officers and come up with a choice of which cane variety they want to plant. The Company bears most of the risks. The incentives and motivation for higher productivity are high incomes.

However, using rain water the farmers also grow other field crops as rain fed crops but this is a very small percentage. Such fields are located away from the sugar fields. For an average farm of 6.5 ha per farmer, the sugar cane seed rate is 8 tonnes per hectare, so 52 tonnes of establishment seed is required. About 39x50kg bags of basal fertilizer is also required, in addition to 28x50kg bags of top dress fertilizer.

Commercial and Financial Impact

KASCOL sells 200,000mt of cane sugar to the Zambia Sugar Company for processing into refined sugar and other products. The terms of the sale are determined by a **Cane Purchase Agreement (CPA)** negotiated between Zambia Sugar Company and the Cane Growers Association (Kaleya and private farms). The sugar cane grown by smallholders is all collected by KASCOL, bulked with the estate cane and sold to Zambia Sugar under a single CPA. The CPA is negotiated from time to time between KASCOL and Mazabuka Cane growers association (MCGA). Individual farmers are not contractually linked to a buyer, processor, water provider, government financiers, or grant donors. The individual farmers have contracts with the Company and then the Company mediates on their behalf. The estate and smallholders are regarded as one grower. Payments are made to a smallholder 14 days after the mill month end in which the smallholder has delivered his cane.

Each farmer earns a net income averaging K25-40 million a year (USD 6,200). This income is net of 57 percent deducted from gross revenue for input costs (fertilizer, water, electricity, chemicals) and services (tractors and machinery, credit, and technical advice) provided by KASCOL through KSFA. Kaleya pays the growers for standing cane, with the price related to Nakambala's production costs.

Social Impact

Currently, there are 160 members of KSFA, including 36 women, farming 1070 hectares. The proportion of females fluctuates depending on the succession of the farms. There is tremendous demand for land. KASCOL provides social services, such health clinics and a primary school, recreation facilities. Each outgrower is settled on a 0.65 ha plot with good housing facilities developed by the farmers. Most houses are electrified through a loan scheme. There are a lot of positive social impacts of the scheme. The outgrowers economic and social status has been raised due to high income levels. They have managed to send their children to good schools, built reasonably good houses and other upward social

mobility signs. The men are the ones that have benefited most. The decision on the use of income is made by the farmer. Some farmers engage their family members in making such decisions.

Migration is a factor in Nakambala and Kaleya associated with the spread of HIV. There is a high seasonal inflow of migrant labor and relatively high income levels that attract visitors. Although Nakambala Sugar Estate is a rural area, a lot of migration and movement takes place. Many truck drivers pass through Mazabuka daily on their way to urban areas give rise to prostitution and high incidence of STDs. Polygamy is also quite widespread in Mazabuka combined with other cultural and sexual practices, and traditional "sexual cleansing" contribute to the spread of HIV. The high volume of water in the reservoirs, canals and fields leads to cases of malaria and water-borne diseases. Frequent spraying mitigates for these negative environmental factors.

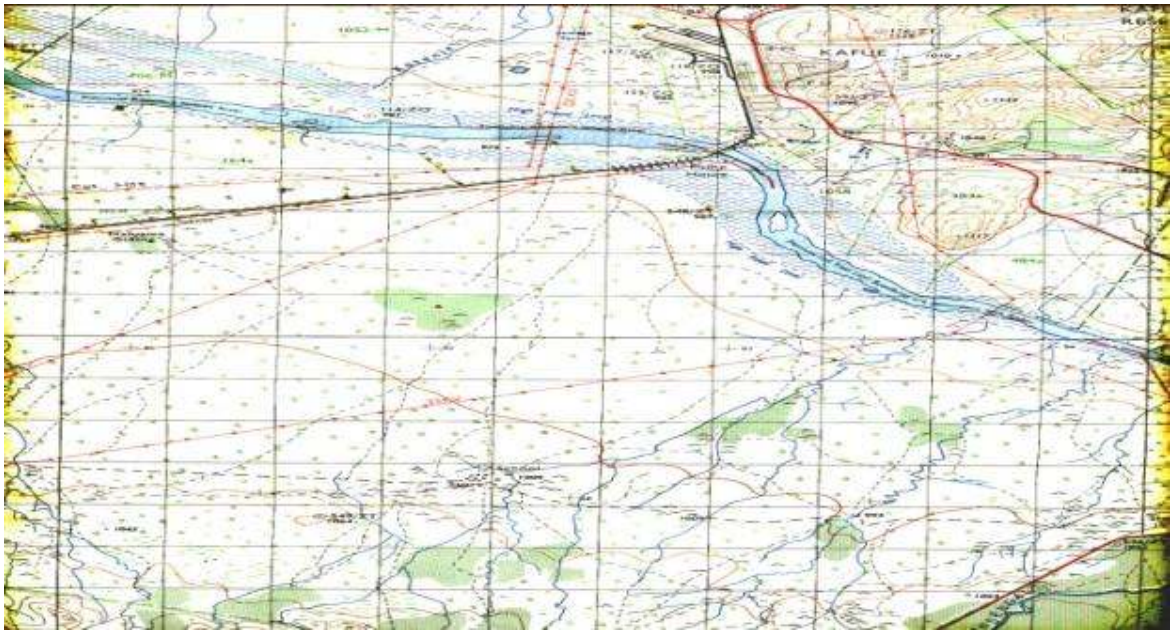
Environmental Impact

Flooding is also common in Mazabuka probably due to rising water table and poor drainage. The use of chemicals has also polluted water sources. Negative environmental impacts are being minimized by awareness programs on environmental issues by the Company and also fair-trade compliance on environmental protection. KASCOL enforces the contractual arrangements especially through the cane farmer's agreement. The Board has helped in arbitration processes by appointing consultants to look at specific issues and make recommendations.

2.2.5 National scalability of KASCOL model

The KASCOL model has generally worked well. There is potential for expansion of the scheme by an additional 250 ha but this is limited by lack of investment capital. KASCOL desires to utilize its water right by direct pumping of water from the Kafue River, but again high investment outlay costs prohibit this venture. KASCOL itself has suffered staff high turn-over that has affected the continuity of services. Demand from smallholder around Mazabuka has grown considerably, leading the Zambian government and traditional authorities to replicate it in other areas. New schemes are being developed at Manyonyo and Magobbo. KASCOL is negotiating with the Farmer Associations in these new schemes to provide management services. Following a rise in demand from other chiefs, plans have been developed for further expansion along the Kafue River south of Mazabuka, where non-contiguous 4 ha plots are currently being sold.

Nega Nega (Manyonyo) Irrigation Scheme



2.3.1 Background

The Nega Nega Settlement B Scheme (Manyonyo) of Mazabuka District has been established for more than 18 years. The settlers comprise of the resettled Tonga people while others came from urban areas. It comprises of 200 freehold plots of various sizes with a total area of about 2,000-ha. Some farmers have already obtained their title deeds. The average cultivated land is however 5.0ha. The area is drought prone with average annual rainfall of 700-800mm.

The project is located approximately 50 km north-east of Mazabuka on the Southern banks of the Kafue River at Nega Nega railway siding at coordinates latitude 15 degrees 47 minutes S and longitude 28 degrees 03 minutes E. The altitude is 980 m above sea level. A reasonable gravel road links the area to Mazabuka town and the Sugar Mill.

2.3.2 Concept and objectives

The Nega Nega Irrigation scheme model was originally meant to increase food security through better access of rainfed smallholders to irrigation, but has since been incorporated into the Nakambala Expansion scheme along the KASCOL model. About 40 percent of the freehold plots are under rainfed cultivation while the remainder is woodland and grazing land.

Currently, farmers are mostly engaged in rainfed maize production with below normal yields due to inconsistent weather patterns. Some farmers are engaged in rearing of cattle for beef and a small fraction of dairy cattle which give them milk for consumption and cash. Goats, and free range chickens are also kept for food. Donkeys are used mainly as farm power for cultivation and transport. A few small holders have established citrus orchards. Vegetables are produced on a very small scale by those farmers with gardens along the Kafue River banks.

The government with the support of the African Development Bank (AfDB) is constructing the scheme and members have formed formally registered as Manyonyo Water Users Association (MAWAUSA) with various levels of sub-committees and area associations, guided by a constitution. There are currently 184 farmer beneficiaries who have all completed an intensive community mobilization course. Over 90 percent of the farmers have indicated willingness to grow crops as out growers.

The area is subdivided into five zones for farmers and one zone for fishing camps. Each farming zone has a minimum of 32 farm holdings and a six member committee of democratically elected men and women. Two members from each zone are elected to represent their zone on the ten member executive committee MAWAUSA Committee. The organization has collaborative links with relevant Government Departments, Zambia Sugar Plc, National Farmers Union, Mazabuka Sugar Cane Growers Association and other supporting companies. Government has already provided a tractor valued at US15 200 as a soft loan. The tractor is currently available for hire to local farmers to plow their fields.

The members of the WUA have been trained in various aspects of scheme management, agronomy and business management. Irrigation and land husbandry staff from MACO have also been trained to backstop the farmers.

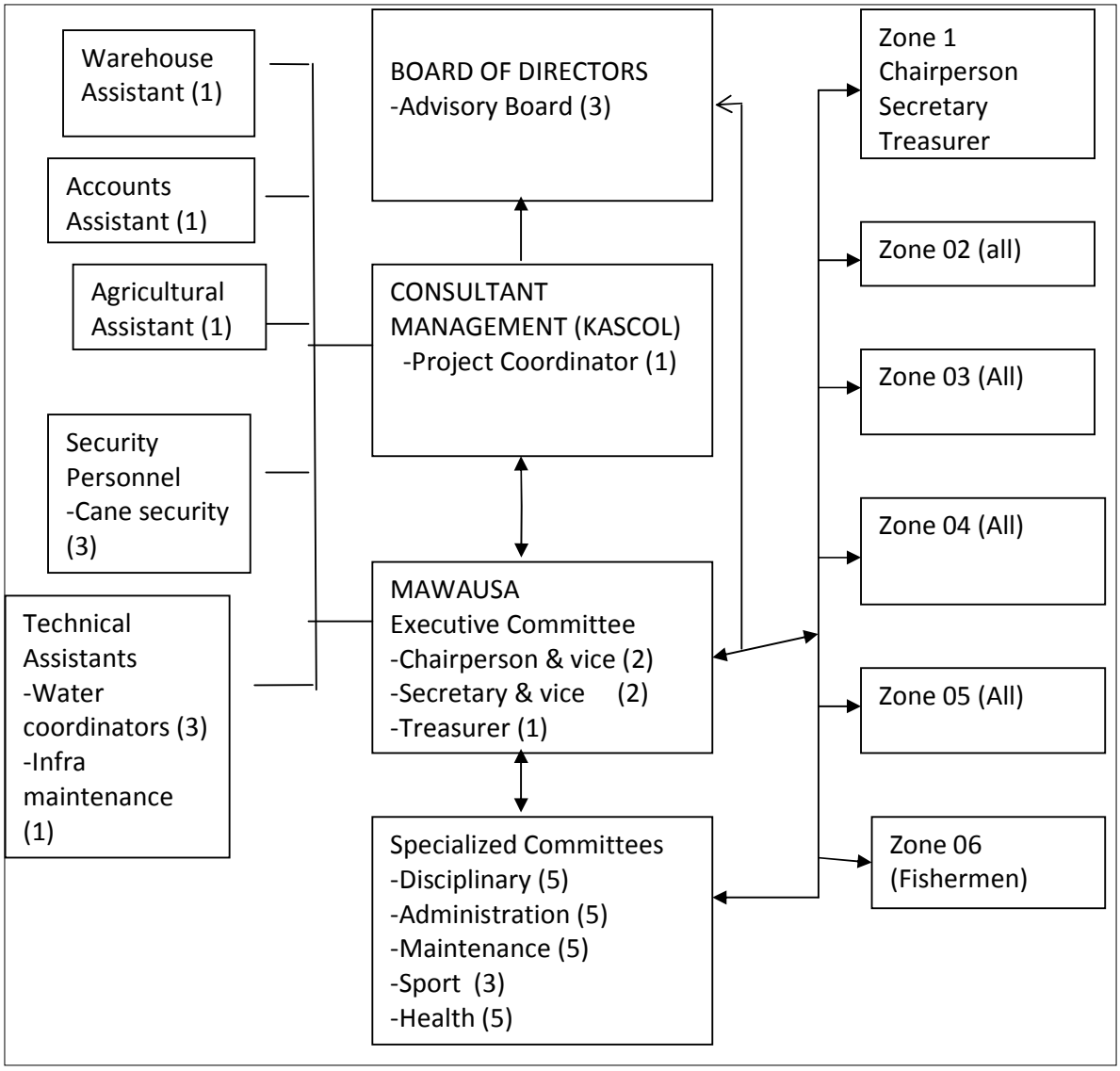


Figure 8. Farmer Water User Association Structure

Nega Nega irrigation infrastructure is being provided directly to the farmers. It will enable them to directly pump water from the Kafue River into the fields. An 80 ha set of contiguous blocks of sugar cane have been proposed to coordinate infrastructure and operational management. The fields will be super-imposed on existing farmer's land, many of them under title. Farmers may therefore grow other crops alongside sugar cane.

The soils are suitable for furrow irrigation with good sugar cane yield potential. The climate at the site can be categorized as semi-arid. Rain falls mostly during the summer months of November to March and average annual rainfall is of the order of 706mm/annum. Peak growing conditions occur between November and February when temperature and radiation are at their maximum. The crop in Zambia accumulates as much as half of its annual growth during this five month period and as a result; potential yields can be heavily influenced by conditions during this period.

2.3.3 Scheme design

Figure 9. Nega Nega Pump House

The scheme is a 620 ha irrigation undertaking to benefit 164 farm families. The scheme will draw water from the Kafue River through a 2.1 km intake channel to the pumping station with six pumps. Water will be pumped through three pipelines, each delivering to a concrete lined reservoir. Water will flow by gravity from each reservoir through a series of primary, secondary and tertiary canals to serve three blocks of an irrigation scheme. The design is based on a crop water requirements of 2.92 l/s/ha. The requirement for sugar cane under flood irrigation is only 1.0 l/s/ha

The water source is the Kafue River. According to the 50 year hydrometeorological data obtained from Both Kafue polder and Zambia Sugar gauge stations, this river has never faced a constraint with water availability. Flows in the Kafue River range between 320m^3/sec to 190m^3/second. Water rights have been granted for Manyonyo amounting to 56,600m^3/day.

Zambia Sugar Plc has assured the WUA of a market quota of 520 ha of sugar and first planting is expected in the 2010 season. A parched irrigation model will allow farmers to plant cane in 4 ha plots each out of their existing 10 to 20 ha plots. The long-term mean potential yield for the area is estimated at 110.9 tonnes of cane per hectare per annum or 109 tonnes of cane per hectare at 11.8 months.

Each farmer will be required to sign an individual contract committing his/her piece of land for at least five years towards cane production. The remaining area may be used for other irrigated commercial crops such as bananas, vegetables, jatropha and green maize. Each farmer will plant an average of 4-5 ha with sugar as the primary crop. Some land will remain un-irrigated and is reserved for rainfed crops and grazing.

At the upper side of each field will be an earth lined feeder capable of handling 80 l/s for its entire length. Irrigation water will be siphoned out of the feeder canal into the furrows in

the same style as used in Nakambala, with 15 siphon pipes allocated to each feeder to laser leveled fields. Provision has been made for a main truck road, at least 5 m wide to allow for trucks to negotiate corners and by-pass one another.

Since the scheme design is quite complex with the primary commodity selected requiring high levels of technical and management skills, the WUA is negotiating a management contract with KASCOL.

As in KASCOL, all farmers will supply sugarcane to Zambia Sugar Company through the management firm that will in addition procure inputs, manage land preparation and planting, haul the cane, keep financial records and stock management, and maintain infrastructure on behalf of the WUA at a fee. The consultancy firm will source loan financing for the farmers. The cost of these services to the farmers will be deducted from the proceeds from cane sales. On their part, farmers will siphon water into the fields, weed, scout for diseases and pests, apply fertilizer and cut the cane.

2.3.4 Institutional impact

The area is subdivided into five subcenters or zones for farmers and one zone for fishing camps. Each farming zone has a minimum of 32 farm holdings and a six member committee of democratically elected men and women. Two members from each zone are elected to represent their zone on the executive MAWAUSA Committee. The committee of ten representatives, which forms the apex body of the organization, is referred to as the Monyonyo Water Users Association. The organization has links with government departments, Zambia Sugar Plc, National Farmers Union, Mazabuka Sugar Cane Growers Association and other supporting companies.

The members of the WUA have been mobilized, registered and trained in various aspects of scheme management, agronomy and business management. Irrigation and land husbandry staff from MACO have also been trained to backstop farmers. The operation and maintenance cost of the irrigation technology should not pose a serious challenge with a management contract with KASCOL. KASCOL is vastly experienced with established sources of finance and markets for equipment.

All farmers will be required to supply the crop to Zambia Sugar Company through a management consultancy firm (KASCOL) that will be required to perform the following tasks: input procurement and management, land preparation and land leveling, cane haulage, financial accounting and record keeping, stock management, infrastructural maintenance subcontracting and other business operations on behalf of the farmer. The consultancy firm is also assumed to take up the role of loan negotiations on behalf of the farmers. Fees for these services will be deducted from payments as the farmers start supplying cane to the factory. The farmer is required to carry out operations such as irrigation, weeding, scouting for diseases, fertilizer application, and cane cutting.

The farmers are in the process of drawing up a detailed business plan in consultation with major stakeholders to finance the bridging budget of USD 3,967,960 for establishment costs. Government has already provided a tractor valued at USD 15,200 as a soft loan. The tractor is currently available for hire to local farmers to plow their fields.

2.3.5 Technical Impact

The total net water demand for cane without rain at Nakambala amounts to 1,766 mm per annum (transpiration 1,490 and soil evaporation 276 mm). The average net irrigation requirement for cane amounts to 1,136 mm per annum. Assuming that flood irrigation at Manyonyo is 65% efficient, the annual water demand amounts to 1748 mm.

The water source is the Kafue River. According to 50 years of hydro-meteorological data obtained from Both Kafue polder and Zambia Sugar gauge stations, this river has never been a constraint as far as water availability is concerned. Flows in the Kafue range between 320 m^3/sec to 190 m^3/sec. New Water rights were granted for Manyonyo amounting to 56,600 m^3/day.

The long-term mean potential yield for the area is estimated using the computer crop model CANEGRO. At Monyonyo it is assumed that the crop is fully irrigated and radiation and temperature alone limit potential sugarcane production. This implies that irrigation is a well managed input and that water is not a yield limitation. A management factor of 66% was assumed and given a climatic potential of 168 TCHA according to the program, the yield of 110.9 TCHA can be expected. At 11.8 months this translates to a yield of 109 TCH.

2.3.6 Commercial and Financial Impact:

Sugar cane growing is a very profitable business if attention is paid to the details. The gross margins are three times higher than maize or wheat growing. This has made the sector attractive to private investment such as Nanga Farms MGM, Ghana and Kaleya Smallholder Company. The market for bananas is also not a problem as the adjacent commercial farmer has expressed willingness to market bananas on behalf of the outgrowers.

Farmers stand to earn a net income of between USD 4,000 to USD 5,000 per annum compared to the baseline level of USD 300. This should justify the high cost of infrastructure and crop establishment, operation and maintenance costs that result in average unit costs of USD 43,000 per farmer or USD 11,300 per hectare[2]. A significant increase in crop production is expected as a result of the expected increase in crop yield due to the use of improved seeds and access to water for irrigation which will allow farmers to cultivate their land at least two times a year. On the basis of the analysis undertaken for the scheme at full development, incremental crop production will be 60,000 mt of sugar cane[3], 1,000 tonnes of maize, and 5,200 tonnes of assorted vegetables.

An economic analysis was also undertaken to assess the economic viability of the project by calculating the economic internal rate of return (EIRR). The estimated EIRR is 29.7%. The market for maize and vegetables is readily available in Mazabuka, Lusaka and Livingstone.

The Manyonyo project will supply sugarcane to Zambia Sugar's mill at Nakambala Estate, an arrangement to be formalized by a sugarcane agreement. The Grower will undertake to grow and supply sugarcane to the mill and Zambia Sugar undertakes to purchase the sugarcane from the grower, produce and market the sugar and pay the grower in

2 The scheme will cost about USD 7 million to construct and bring into production 620 ha and involve 164 farmers.

3 Sugar quota of 520 ha at 115 mt/ha of sugar cane.

accordance with an agreed formula between the two parties. The cane price depends on the size of the crop, cane quality, sales volumes, price realization from various markets, currency exchange rates and marketing costs. The actual price for 2009/10 has been used as the base figure in the financial projections for the project. Manyonyo cane growers are obligated by joining the Cane Growers Association of Mazabuka and this body represents the interests of all the growers

2.3.7 Social Impact

Out of the current 164 farm families, about 28 are female headed households who have either lost their spouses or are single parents. The committee of 11 people constituting MAWAUSA includes four women.

The project will contribute significantly to food security and poverty reduction. A total of 1,650 farm families directly benefited from training in irrigated agriculture as well as credit management and marketing facilities. By targeting small-scale producers, out of whom 60% are women, the project will directly impact on women. According to available statistics, 45% of the total beneficiaries are expected to be women headed households. Women will be provided the opportunity to engage in other income generating activities (e.g. food processing machines) that will boost their economic independence.

The area is served with one primary school situated in the central part of the settlement. The school has seven classes and goes up to grade seven. A rural health center has just been constructed and is currently operational with financial support from Spiritual Pentecostal Missionary Church. The following social economic benefits are envisaged, including employment creation, contribution to increased household income, skill enhancement in society and business competition and efficiency.

2.3.8 Environmental Impact

An environmental impact assessment report for the Manyonyo Irrigation Scheme development cited the following notable mitigation measures; compensation of farmers who will be displaced from their current dwellings; and discharge into the natural water body will be mitigated through construction of stabilization ponds downstream of the main drainage canal. The project design is such that canals are passing right through the farmers boundaries implying that there will be minimal farmer displacements.

The project will promote environmentally friendly agricultural practices such as promotion of organic fertilizer; agro forestry practices (biological drains) integrated farming (fish, pigs, poultry) and other cultural farming practices. Farmers will be encouraged to grow other high value crops to compliment income from sugar cane on the soils leading to soil crop rotation of horticultural crops.

Training is offered in HIV/AIDS prevention and environmental aspects of irrigated agriculture and public health training to mitigate irrigation related diseases such as malaria, shistosomiasis, diarrhea, dysentery and episodically cholera as well as HIV/AIDS.

2.3.9 National Scalability of Nega Nega Model

The Manyonyo Water Users Association has demonstrated an impressive capacity to scale-up measures of outgrowers sourcing of contract farming in high value crop production such as sugar cane and banana production and integrated fish farming. The Association together with SIP are making ambitious plans to secure investment capital to support improved land preparation methods (land leveling) and other irrigation related activities Unlike KASCOL where the management company owns the land and Magobbo where the farmers have formed a trust and own the land in the name of a trust, in Manyonyo the scheme will continue to be owned by farmers themselves but they will have to surrender at least four hectares each for irrigation development. Key to the success of the project however, is outsourcing management aspects.

The Nega Nega model is capital intensive and expensive, costing about USD 9 million, or USD 14,516 per hectare or USD 54,878 per household in investment costs. Establishment costs can also cost between USD 3000-5000 per hectare, although these costs can be financed from banks. This means a limited scalability based on cost alone. However, considering the returns per farmer and the contribution to the economy, if the project contributes 60,000 mt of sugar annually it would generate about USD 2 million per year and therefore payback the investment in 4-5 years. This has been demonstrated by the KASCOL model and is further evidenced by increased demand for similar schemes in Mazabuka and other districts.

2.4 Dunavant cottton distributor scheme

2.4.1 Background

Prior to 1994, the Lint Company of Zambia (LINTCO) supplied Zambian cotton farmers requirements for cotton seed, pesticides, sprayers, bags and extension services and for buying seed cotton at a fixed price. Production remained stagnant with less than 40,000 producers because of inherent deficiencies in services. LINTCO was sold to LONRHO Cotton and Clark Cotton in 1994. LONRHO operated in the central and southern parts of Zambia while Clark Cotton was in the Eastern Province. An increased number of ginners, attracted by high world prices and good profits led to entry around 1997, but also stimulated increased incidences of pirate buying. This led to a major default crisis in 1999 and production and yield started to decline. Subsequently, LONRHO withdrew and sold its concern to Dunavant Zambia in 1999, while Clark Cotton was sold to Cargill Cotton in 1999.
In southern Africa, home to some of the world's most underexploited cotton grounds, and Zambia, holding 40 percent of the continent's water, Dunavant arrived in 1999 lured by privatization. The country has often produced over 170,000 tons of cotton, and this is estimated at best to be one-third of its actual potential.

Dunavant soon realized that Zambia was a costly venture, with the cotton industry in shambles, rising default rates on seed loans and falling cotton yields. In response, Dunavant implemented a distributor system, and later the YIELD program, which had proven successful for the company in Uganda.

2.4.2 Concept and objectives

Cotton has become a major success story in smallholder commercialization in Zambia with a rising number of producers, production and export earnings. Between 1999 and 2005, the

number of smallholder cotton farmers with an average of 1.3 ha each grew from 40,000 to nearly 280,000 tonnes. But the average productivity remained unchanged, with smallholder yields lingering between 15% to 50% of the potential of rainfed commercial varieties.

Average yields of seed cotton have stayed below 900 kg per hectare, and lint yields have surpassed 300 kg/ha in only three years between 1982-83 and 2005-06**,** significantly below the world average of 730 kg lint/ha. The entry of multiple players, attracted by rising world prices around 1997 led to the complexity of the credit default due to side-selling that threatened the very foundation of the industry. Some innovative solutions were urgently required.

The Dunavant distributor model was an innovation targeted at improving and ensuring credit repayment and the industry's economic viability. Later, Dunavant Zambia Ltd, promoted better production practices through better knowledge and skills to improve yields through the Yield Improvement Through Empowerment, Learning and Discipline Program (YIELD). Cotton is predominantly rainfed, but a strong campaign to promote conservation agriculture qualified it as a water management beneficiary crop. A key component of the training was on conservation farming.

2.4.3 Design

The Dunavant distributor model provides a package of inputs consisting of seed; micronutrients and pesticides; some extension services; and most importantly, an assured procurement price for the seed cotton produced, not directly to farmers but through distributors. The System has involved 1,400 individual distributors in farming communities, (not company employees), who receive inputs from Dunavant and provide them to farmers, making their own business decisions and judgments about which and how many farmers to work with.

Instead of using an army of staffers to distribute cotton seed and train farmers, Dunavant recruited a network of independent distributors, mostly cotton farmers themselves, who were responsible for drafting other farmers and loaning them cotton seed. When a drafted farmer sells his cotton to Dunavant, for which he receives the market price minus the value of the seed loan, the distributor receives a commission of from 5 to 7.5% of the crop value. The outcome was that distributors became entrepreneurs. Each of the over 180,000 subsistence farmers have been provided with a green bucket containing cotton seed, fertilizer, pesticide and a pesticide sprayer worth about USD 75 total as loans through the distributors.

Conservation farming training has become an important component of the package in recent years. CF is a water and nutrient management solution in which rainwater is conserved in-situ and used by a crop for a prolonged period. The key principle is to restore and maintain the fertility of the land in the 12% surface area and associated root zone occupied by the planted crop. Two systems have been promoted based on oxen and hand hoe.

The Dunavant distributors have provided a basis for its operations as well as a channel used by other development partners wishing to render micro-finance services to communities.

Dunavant has also used the network to render social development services such as HIV awareness.

Over 3,100 demonstration plots scattered across cotton growing areas were established in 2005-06 under the YIELD program. They were planted early, weeded about three times, scouted for pests 7 times and sprayed with insecticides 6 times over the season. On average, each lead farmer mobilized and trained 14 collaborating farmers and the total number of farmers who received training was just over 40,000.

2.4.4 Outcomes and Impact

Institutional Impact

Dunavant has remained the dominant player in the market promoting cotton outgrowing and ginning. It has maintained over 1,400 distributors. This channel has often been used by other development partners wishing to render micro-finance services to communities. Dunavant has rendered other rural and social development services such as HIV awareness through the system.

Technical Impact

The combination of the YIELD and distributor system focusing yield improvements exceeded yield increments above 100% for farmers who adopted the YIELD guidelines. A majority of farmers who previously obtained less than 600 kg/ha moved into the “better” and then “committed” farmer yield categories and improved their profits.

To grow cotton in Zambia, Dunavant has had to become a micro-financer and annually provided over 180,000 subsistence farmers with a green bucket containing cotton seed, fertilizer, pesticide and a pesticide sprayer worth about USD 75 total as loans through the distributors. Dunavant also encouraged training of its farmers in conservation farming.

Figure 10. Conservation farming demonstration.

CF has been integrated into the YIELD program as a water and nutrient management solution. Rainwater is conserved in-situ and utilized by a crop for a prolonged period. The key principle is to restore and maintain the fertility of the land in the 12% surface area and associated root zone. Two systems can be identified based on oxen and hand hoe. Cotton has benefited from CF.

Over 3,100 demonstration plots scattered across cotton growing areas were established in 2005-06 under the YIELD program. They were planted early, weeded 3 times, scouted for pests 7 times and sprayed with insecticides 6 times over the season. On average, each lead farmer mobilized and trained 14 collaborating farmers and the total number of farmers who received training was just over 40,000.

The average seed cotton yields for lead farmers was 1,413 kg/ha and of collaborating farmers 788 kg/ha. These yields were 163% and 46% higher than those for non-participating farmers whose average yield was only 538 kg/ha. The improved yields translated into gross margin gains for the lead farmers and collaborating farmers of 253% and 60% respectively when compared to those of non-program farmers. The cost benefit ratios for farmers successfully trained (1:2.9 for Lead farmers and 1:2.5 for collaborating farmers) are an indication of the excellent overall performance of the program.

Commercial and financial impact

Zambia's economic reforms stimulated private sector led growth in the cotton sector and made it a great success in many ways, with rising production trends, yield trends, prices paid to farmers and quality improvement. The Dunavant innovations played a key role. Dunavant's distributor system contributed to a rebounding of the nation's cotton sector, with production tripling from 2000 to 2008 and the loan repayment rate increasing from 65 percent to over 90 percent. This was achieved through 1,400 entrepreneurs who rendered business services to over a quarter of Zambia's farm population annually.

By 2003-4, Dunavant had assumed a dominant share of the cotton market with 66 percent followed by Clark Cotton (24%), Continental (5.2%), Mulungushi Textiles (4.6%) and others (1%), of the 172,000 mt produced (Figure 14). Since then, the cotton industry in Zambia has maintained one of the biggest and most successful smallholder outgrower networks involving over 280,000 smallholder cotton farmers (about 25% of farm households) in various regions of Zambia.

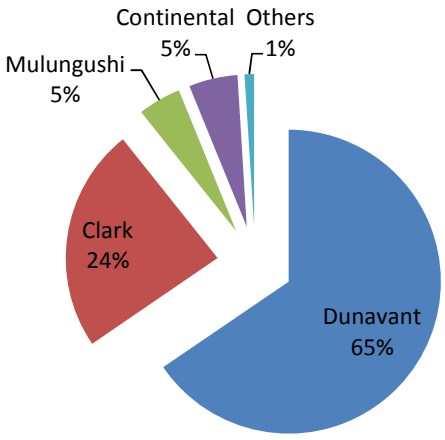


Figure 71. Cotton market Share - 2003/4

Improvements in quality led to export price relative to Index A rising from par in the late 1990s to a 4-5% premium in the early 2000s. Dunavant and Clark controlled polypropylene contamination through strict inspection and regulations.

Dunavant loaned USD 1.2 million to Zambian farmers in 2004-5. The average Zambian farmer, in turn, earned anywhere from a few dollars above their USD 75 loan to hundreds of dollars, depending on the crop size. In 2005, 91%of the farmers paid back loans by selling their cotton to the company.

Currency pressures in recent years have battered Dunavant and other lint businesses in Zambia. While the U.S. dollar has fallen in value due to soaring trade deficits, the Zambian kwacha has risen dramatically as a result of the increasing world price of copper, the country's largest export. Consequently, with the dollar buying fewer kwachas in 2006, Dunavant paid farmers about 30 percent less for cotton than it paid in previous years (case study 6). In consequence, more farmers started to sell their cotton to Dunavant's competitors, which offered the same price but allowed the farmers to forego repaying their USD 75 seed loan. Dunavant then altered its business model slightly by launching an expensive YIELD program to train its most loyal Zambian farmers to increase their cotton yields.

Social Impact

About 2.5 million people out of a total population of 10.5 million are directly dependent on the cotton industry for part of or their entire livelihood. Roughly one out of four smallholder farmers in Zambia relies on cotton. Marginal increases in yield have benefited farmers especially in years when prevailing world prices remain high. Many rural farmers have accumulated assets from cotton.

As Dunavant and other players spend millions to train and provide seed to thousands of small-scale farmers, and as farmers earn more money from cotton, HIV/AIDS has increased head and poses the greatest threat to cotton investments. Every farmer who dies of AIDS related illnesses means lost revenue and diminished returns. Dunavant has partnered with other players to distribute HIV/AIDS information and condoms and provide testing in some of the nation's most remote areas.

Environmental Impact

Cotton relies on heavy use of pesticides and chemicals to control weeds and pests. The YIELD program has trained farmers how to use these chemicals safely. With hundreds of thousands of green buckets containing cotton chemicals, environmental organizations have urged Dunavant to provide buckets with holes in the bottom so farmers will not use the green pail, which once contained pesticides, to carry water. Other players have argued for adoption of Bt. Cotton varieties that reduce the need for chemical application. The adoption of conservation farming is a mitigation practice widely promoted.

2.4.5 National scalability of Dunavant distributor model

In the distributor system, Dunavant has established a true best practice program that reaches one of the hardest-to-reach populations in Zambia: the rural poor. The challenges of scalability arise because world prices fluctuate so much, causing much conflict between

promoters and outgrowers and threatening industry viability. The returns to farmers are thus still low, partly attributed to low yields. Little progress has been made on developing new varieties, and Zambia continues to view genetic innovations with suspicion. With better purified local imported varieties, coupled with good farming practices, yields are able to rise. CDT has active varietal trials taking place and promising varieties are in the pipeline.
Scalability is also considered from the perspective whether growth can continue without more public sector support in policies and investments. Many lint companies have either withdrawn, folded up or are facing operational difficulties due to various policy related factors. There is a general view that stronger public/private partnerships are needed to ensure long-term growth.

The key policy issues determining viability and scalability of the distributor model relate to inflow of Bt cotton, management of the cotton sector (Cotton Board) and management of the Cotton Outgrower support funds. The need to balance competition, to discipline companies, spur innovation, and ensure equitable prices to farmers, and coordination, to avoid credit default crises and promote collective action for long-term investment in productivity and quality will continue to deserve support. The Agriculture Credit Act is aimed at partly resolving these issues.

3. OUTGROWING AND IRRIGATION MANAGEMENT: SYNTHESIS

3.1 Are outgrowers schemes a promising AWM solution?

Outgrower schemes do increase farmer incomes. Incorporating water solutions into the scheme adds more value by further raising productivity and stabilizing income. This section looks at the five schemes described above to provide an analytical understanding of the relative impact of each scheme type on outgrowers. The analytical variables described in Table 5 on the basis of four main criteria score on a scale of 0 to 3: where 0=No likelihood, 1 = low likelihood; 2 = high likelihood and 3= Highest likelihood. The scoring was done by the author based on the descriptive information in the case studies.

3.1.1 Outscalability

Analytical Variable	Kaleya Small Holder	Nega-Nega Irrigation Scheme	Dunavant Distributor	COMACO	Mean
C. Out-scalability:					
C1. How many farmers can benefit	1	1	3	3	2.0
C2. Public Investment cost incurred per farmer	1	1	3	3	2.0
C3. Emphasis on high value export crops	1	1	2	2	1.6
C4. Potential in outlying areas	1	1	3	3	2.0
Mean score	1.0	1.0	2.8	2.8	1.9

The aggregate score on outscalability is 1.9 indicating that most outgrower schemes are scalable

COMACO

The COMACO model is highly scalable with total farm households approaching 200,000 nationwide. It can thus bring aboard many farmer beneficiaries. The COMACO program currently operates over large area of Eastern Province and portions of Lusaka and Northern Province of Zambia. The coverage of the COMACO program is mainly around national parks and protected forest areas in the Luangwa Valley and Lower Zambezi Basin. COMACO has set up four regional offices situated in Lundazi, Mambwe, Luangwa and Chama districts.

The Lundazi regional office was the first to be established with the inception of the COMACO program in 2002. It has a CTC and 14 satellite trading depots. The second largest office is situated in Mambwe District in Mfuwe and whose CTC at Masumba coordinates 8 producer trading depots.

The Feira regional office covers the Lower Zambezi National Park and surrounding GMAs. The CTC at Feira is still in its infancy and has largely depended on the Lundazi CTC for most of the necessary Food processing. Six trading depots have been established in the project area to facilitate the provision of trading and extension services.

COMACO has also been extended to Serenje, Mpika and Chinsali Districts of northern Zambia with NORAD support. The Royal Norwegian Embassy provided a major grant in 2006 to WCS and Program Against Malnutrition.

COMACO has truly become one of the largest experiments addressing the synergies between rural development and natural resource conservation in Africa today. It is showing that supply chain strategies that link added-value commodities to household adoption of preferred land use practices and farming methods can greatly help rural people become better guardians of their land. It is also reducing the cost of conservation and building new opportunities for ecosystem management across Africa's fragile landscapes.

KASCOL and Nega Nega Models

The capital intensive and expensive irrigation schemes at Kaleya and Nega Nega are unlikely to be scalable due to high investment costs. Their total farm households are less than 350.

The KASCOL model has generally worked very well. There is potential for expansion based on demand from smallholders around Mazabuka, leading the Zambian government and to replicate it in other areas. New schemes are being developed at Manyonyo and Magobbo through AfDB and EU support. To improve management in these new schemes, KASCOL is negotiating with farmer associations to provide management services.

The KASCOL model is empowering. It takes advantage of economies of scale and establishes a vertically integrated large-scale commercial operation through binding contracts and legal agreements. This leads to high levels of discipline and accountability.

The Manyonyo Water Users Association has demonstrated an impressive capacity to scale-up measures of outgrowers sourcing of contract farming in high value crop production such as sugar cane and banana production and integrated fish farming. The Association together with SIP are making ambitious plans to secure investment capital. Land ownership is a key

incentive at Manyonyo. Key to the success of the project is outsourcing management aspects.

The Nega Nega model is capital intensive and expensive, costing about USD 9 million, or USD 14,516 per hectare or USD 54,878 per household. Establishment costs can run between USD 3000-5000 per hectare. This means a limited scalability based on cost alone. However, considering the returns per farmer and the contribution to the economy, if the project contributes 60,000 mt of sugar annually alone it would generate USD 2million per year and therefore pay back the investiment in 4-5 years. This has been demonstrated by the KASCOL model and is further evidenced by increased demand for similar schemes in Mazabuka and other districts.

Dunavant distributor model

The Dunavant distributor model is highly scalable with potential to approach more than 350,000 households countrywide. In the distributor system, Dunavant has established a true best practice program that reaches one of the hardest-to-reach populations in Zambia: the rural poor. The challenges of scalability arise because world prices fluctuate so much, causing much conflict between promoters and outgrowers and threatening industry viability. The returns to farmers are thus still low, partly attributed to low yields. Little progress has been made on developing new varieties, and Zambia continues to view genetic innovations with suspicion. With better purified local imported varieties, coupled with good farming practices, yields are able to rise. The key policy issues determining viability and scalability of the distributor model relate to inflow of Bt cotton, management of the cotton sector (Cotton Board) and management of the Cotton Outgrower support funds. The Agriculture Credit Act is aimed at resolving these issues.

3.1.2 Contribution to smallholders' livelihoods

All four schemes scored an average of 2.4 points on this criterion, meaning that outgrower schemes have a high likelihood to contribute to smallholder's livelihoods. Nega Nega scheme (2.8) has the highest likelihood based on a design that allows superimposing the sugar fields in farmer's own land and leaving options for other commodities and enterprises. Kaleya (2.5) is second based on high net income returns. COMACO and Dunavant scored 2.3. These business models are targeted at smallholders but many are unlikely to reach the poorest farmers in communities because of self selection. Direct impact on poverty is high because of the sudden rise and stability in income from cash crops and reliable markets.

Analytical Variable	Kaleya Small Holder	Nega-Nega Irrigation Scheme	Dunavant Distributor	COMACO	Mean
A. Contribution to smallholders' livelihoods (3 Highest; 2 High; 1 Low: 0 None)					
A1. Likelihood to reach the poorest farmers	1	2	3	3	2.4
A2. Direct impact on poverty	3	3	2	2	2.4
A3. Impact on skills	3	3	2	2	2.4
A4. Average net Income per farmer per year	3	3	2	2	2.4
Mean Score	2.5	2.8	2.3	2.3	2.4

3.1.3 Gender and equity considerations

The aggregate score for the four schemes on gender equity is 1.9 and is reasonably high considering that average gender participation in Zambia is around 30 percent. The most gender friendly model is COMACO (2.8) probably due to deliberate targeting of women participants and the promotion of gender friendly crop enterprises. The sugar schemes at Kaleya and Nega Nega have low gender participation because of land ownership and self selection of farmers. Gender equity in cotton outgrowing is moderate. Although schemes tend to self-select better off male farmers, which may increase income disparity in a community, examples show that women farmers can successfully participate, particularly when they have been targeted by donors or received support from NGOs.

Analytical Variable	Kaleya Small Holder	Nega-Nega Irrigation Scheme	Dunavant Distributor	COMACO	Mean
B. Gender and equity considerations:					
B1. Female participation as outgrowers	1	1	2	2	1.6
B2. Youth participation as Outgrowers	1	1	2	3	1.8
B3. Level of female share in household income	2	2	2	3	2.2
B4. Emphasis of women crops	1	2	1	3	1.8
Mean Score	1.3	1.5	1.8	2.8	1.9

3.1.4 Ease of implementation

Analytical Variable	Kaleya Small Holder	Nega-Nega Irrigation Scheme	Dunavant Distributor	COMACO	Mean
D. Ease of implementation:					
D1. Ease of Mobilisation of private finance	3	3	2	1	2.2
D2. Overhead cost to Promoter	2	2	3	3	2.6
D3. Ease of Mobilisation and capacity building	3	3	2	2	2.4
D4. Ease of Support from NGO/Public sector	2	2	3	3	2.4
D5. Management complexity	1	1	2	2	1.6
Mean score	2.2	2.2	2.4	2.2	2.2

Probably because of the back-up of experienced private sector promoters, the ease of implementation for all the schemes is high at 2.2. It is easy to mobilize private capital in the Nega Nega and Kaleya schemes because of high potential profitability. By including the commercial sector, costs can be shared with public and donor funds to reduce risks. But donor investments in outgrowers schemes is targeted at development of common property infrastructure and capacity building and training.

3.1.5 Investment options for donors and the public sector

Analytical Variable	Kaleya Small Holder	Nega-Nega Irrigation Scheme	Dunavant Distributor	COMACO	Mean
Agregate Score	1.7	1.9	2.3	2.5	2.1

The analysis shows that based on aggregate scores, the COMACO (2.5) is the best performing model of outgrower empowerment due to its scalability, gender equity and contribution to livelihoods, even though its net return per farmer is low. These returns may be improved through promotion of more simple low cost irrigation technology. The Dunavant model (2.3) follows COMACO because of its wide coverage of outgrowers and ease of implementation facilitated by reliable distributors. Kaleya (1.7) and Nega Nega (1.9) are lowest because their scalability is diminished by high investment cost requirements and low gender equity due to self selection.

The promotion options available to donor promoters therefore are to support farmer outgrower schemes that are within their resource envelope, consider adding water and irrigation to the inputs package and deliberately targeting vulnerable but viable groups of smallholders.

3.2 Enhancement of smallholder access to water and markets

In considering promotion options for outgrower schemes in irrigation, promoters should support models that are within their resource envelope, consider adding water and irrigation to the inputs package and deliberately target vulnerable but viable groups of smallholders.

Based on the analysis, the elements in best practices concerning outgrowers in water management include:

- How growers are selected, mobilized into groups and facilitated;
- How commodities and their combination are selected;
- Extent of vertically integrated services provided across the value chain;
- Operational contracts and codes of behavior in practice;
- How the inputs are packaged and supplied and whether water is a component;
- How technical and agribusiness extension services are provided;
- Location of farmers in relation to markets;
- Pricing mechanisms and alternative markets;
- Facilitatory and regulatory role of donors, NGOs and government;

In summary, the analysis further shows that:

A sustainable and viable engagement of smallholder farmers as outgrowers by commercial ventures can be achieved if the above conditions are positively met. Outgrower schemes can also be successfully implemented in isolated areas with difficult access. Financial sustainability and performance for both outgrowers and the promoters depends on effective linkages to markets and the range of value chain services packaged. Schemes that have adopted vertical integration across the value chain, combining production, processing and marketing seem to work best. Smallholders may not necessarily bring down a successful commercial venture. Idle resources (land, labor) can be mobilized and successfully combined with scarce resources (capital and entrepreneurship) to forge a successful outgrower relationship. But considering the contentious issues related to pricing and benefit sharing between the promoter and outgrowers, more public investments in regulatory and arbitration institutions are required.

The core success factors in outgrowing are the provision of or elimination of as many critical constraints in the value chain as possible. This may involve one or more promoters such as the involvement of micro-finance institutions. But in most cases, the core promoter takes up the responsibility to provide the whole package of services.

Farmers should be concentrated to form a critical mass and should be linked to a defined market nearby. Farmers with a common vision are recruited and trained for a common purpose. The higher the scalability, the lower the investment and operational cost per farmer, and the lower is the net income per beneficiary. Addition of water as an input raises the profitability and impact of the outgrower scheme on the beneficiaries. The extent of and type of water management applied raises operational cost, but correspondingly raises and stabilizes income returns to the outgrowers.

There is no single model that best suits all situations. In Zambia, outgrower schemes have proved adaptable to a diversified range of commodities: flowers, vegetables, poultry, pig raising, dairy, honey, barley, and sorghum. Even though public investment is desirable to stimulate successful outgrowing, subsidizing operational costs should be avoided and links to management consultants and finance service providers should be encouraged.

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Annex 1. Summary of the outgrower case studies

Descriptive Variable	**Kaleya Small Holder**	**Nega Nega Irrigation Scheme**	**Dunavant Distributor**	**COMACO**
Region (ecological)	II	II	I/II	I/II
Type of operation	Outgrower	Outgrower	Outgrower	Outgrower
Outgrower promoter	KASCO	KASCO (negotiations)	Dunavant	WCS
Services provided	Inputs (seed, fertilizer, chemicals, water, equipment) transport, extension, processing & market	Inputs (seed, fertilizer, chemicals, water, equipment) transport, extension, processing & market	Inputs (seed, chemicals, CF pack), transport, extension & market	Inputs (seed, chemicals, CF pack), transport, extension, processing & market
Form in which income is received	Cash payment in bank dividend	Cash payment in bank	Cash payment	Cash payment Dividend
Nearest town	Mazabuka (3km)	Mazabuka (45km)	Scattered in rural areas	Scattered in rural areas
Available markets	Nakambala (Mazabuka)	Nakambala (Mazabuka)	Dunavant Side buyers	WCS/CTC Private traders
Stability of markets	Stable	Stable	Stable	Stable
Stability of produce prices	Fair	Fair	Unstable	Stable
Condition of access roads	Very good	Good	Poor	Poor
Irrigation water source	Kafue River (through Nakambala Sugar Estates)	Kafue River (Direct pumping)	Rainfed conservation farming	Rainfed, streams, wells conservation farming
Storage system	Night storage reservoir	Reservoir	None	None
Water abstraction method	Electrical pump	Electrical pump	CF	In-situ, manual pumps
Conveyance system	Pipelines then open canals	Canal, pipeline, canals	None	flooding
Application method	Siphon from canals and flooding	Siphon from canals and flooding	None	Flooding
Water cost (pumping and water charges)	High	High	None	None
Irrigated area (ha)	2,156	580	undefined	undefined
Number of farmers	160	164	>180,000	>40,000
Hectares per farmers	6.2-7.5	4.0-5.0	0.5-5.0	0.25-2.00
Main commodities	Sugar cane	Sugarcane vegetables	Cotton	Rice, soybeans, groundnuts, honey
Diversification into other commodities	Restricted from core fields: rainfed maize cattle	Restricted from core field: cattle, bananas rainfed maize	Unrestricted: livestock and maize, groundnuts	Unrestricted: livestock and maize, groundnuts