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Studies

Agricultural Development in a Changing Climate

Increasing resilience to climate change and economic shocks in crop production

*Susanne Neubert
Michael Kömm
Axel Krumsiek
Annika Schulte
Nadine Tatge
Lea Zeppenfeld*

Agricultural development in a changing climate
in Zambia

German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE)

The German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE) is a multidisciplinary research, consultancy and training institute for Germany's bilateral and for multilateral development co-operation. On the basis of independent research, it acts as consultant to public institutions in Germany and abroad on current issues of co-operation between developed and developing countries. Through its 9-months training course, the German Development Institute prepares German and European University graduates for a career in the field of development policy.

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The views expressed in this study are the sole responsibility of the authors.

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Abstract

In spite of abundant water and land resources, Zambia's agricultural sector is still underdeveloped and has yet to achieve food security. In fact, there are some very large economic and socio-demographic constraints, which hampered agricultural development in the past, but which still persist because of political and market failures. Today's situation is such that the productivity in the sector is very low, markets are underdeveloped, soil fertility is decreasing and agricultural farming systems are one sided. Especially the situation of smallholders is at stake. In addition to this, external drivers, such as climate change and economic shocks, are posing increasingly significant challenges to this sector. Policies have to become more effective and suitable adaptation policies and measures are to be put in place, in order to eventually achieve pro poor development in Zambia.

This study develops, on an empirical basis, policy suggestions for pro poor agricultural development including measures to increase resilience towards external shocks. What is necessary for Zambia to start with is the development of a common spirit at all levels, starting in government and the ministry itself. Continuous and reliable investments into agriculture are necessary, strong commitments should be made and decisions should be based on sound data. A further key action for the sector would be to more clearly orient it towards regional strategies and opportunities, as Comprehensive Africa Agriculture Development Programme (CAADP) and Common Market of Eastern and Southern Africa (COMESA) are offering.

In addition to several cross cutting policies concerning funding, organisation, capacity development and marketing including contract farming, six specific measures are outlined in multi-level-charts in this study: *Firstly*, introducing the e-voucher system and a better distribution of draught animal power are highlighted as the basis for pro-poor development. *Secondly*, scaling up conservation agriculture as well as diversification in crops and varieties are found to be essential in order to adapt to climate change and fluctuating prices. *Thirdly*, irrigation and improved warehouse systems would increase buffer capacity, if carefully planned and prepared. However, since there were already several attempts in Zambia to introduce some of these measures, this study takes into account the reasons for failures in the past, and develops suggestions on how measures could be implemented in a holistic way, channelling them through the private sector and following a multi-level-approach.

Abbreviations

ACP	Agriculture Commercial Programme
ACF	Agricultural Consultative Forum
AfDB	African Development Bank
AFE	Action for Enterprise
ADP	Agricultural Development Programme
ADP	Animal Draught Power
APAARI	Asia Pacific Association of Agricultural Research
APRM	African Peer Review Mechanism
ASCA	Accumulating Savings and Credits Association
ASIP	Agriculture Sector Investment Programme
ASP	Agricultural Support Programme
AU	African Union
BCI	Better Cotton Initiative
BBC	British Broadcasting Corporation
BMGF	Bill and Melinda Gates Foundation
CA	Conservation Agriculture
CAADP	Comprehensive Africa Agriculture Development Programme
CAZ	Cotton Association of Zambia
CBO	Community Based Organisation
CCFU	Climate Change Facilitation Unit
CDP	Cooperative Development Policy
CEEC	Civil Economic Empowerment Commission
CEEPA	Centre for Environmental Economics and Policy in Africa
CF	Conservation Farmers
CFU	Conservation Farmers Unit
CmiA	Cotton made in Africa

COMESA	Common Market of Eastern and Southern Africa
COMPACI	Competitive African Cotton Initiative
CP	Cooperating Partner
CSP	Country Strategy Paper
CSPR	Civil Society for Poverty Reduction
CTPD	Centre for Trade Policy and Development
DACO	District Agricultural Coordinator
Danida	Danish International Development Agency
DCC	Development Coordination Committee
DCU	District Cooperative Union
DED	German Development Service (Deutscher Entwicklungsdienst)
DEG	German Investment and Development Company (Deutsche Investitions- und Entwicklungsgesellschaft mbH)
DFID	United Kingdom Department for International Development
DMMU	Disaster Management and Mitigation Unit
EAZ	Economic Association of Zambia
EU	European Union
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organisation
FEWS NET	Famine Early Warning Systems Network
FISP	Farmer Input Support Programme
FNDP	Fifth National Development Plan
FRA	Food Reserve Agency
FS	Food Security
FSI	Food Security Index
FSP	Fertiliser Support Programme
FSRP	Zambia Food Security Research Project
FT	Fairtrade

FT cotton	Fairtrade Cotton
GART	Golden Valley Agricultural Research Trust
GDC	German Development Cooperation
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GGCA	Global Gender and Climate Alliance
GHI	Global Hunger Index
GMO	Genetically Modified Organisms
GRZ	Government of the Republic of Zambia
GTZ	German Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit)
HDI	Human Development Index
HIPC	Highly Indebted Poor Country
HIV / AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
ICUN	International Union for Conservation of Nature
IDA	International Development Agency (World Bank)
IDE	International Development Enterprise
IDF	Irrigation Development Fund
IFAD	International Fund for Agricultural Development
IFOAM	International Federation of Organic Agriculture Movements
IFPRI	International Food Policy and Research Institute
ILO	International Labour Organisation
IMF	International Monetary Fund
INGO	International Non-Governmental Organisation
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IRDP	Institute for Rural Development Planning
IWRB	Integrated Water Resource Bill
IWRM	Integrated Water Resource Management

JASZ	Joint Assistance Strategy for Zambia
JCTR	Jesuit Centre for Theological Reflection
JICA	Japan International Cooperation Agency
KfW	KfW Development Bank (Kreditanstalt für Wiederaufbau)
LEISA	Low External Input Sustainable Agriculture
LDT	Livestock Development Trust
MACO	Zambian Ministry of Agriculture and Cooperatives
MAFF	Ministry of Agriculture Food and Fisheries
MATEP	Zambia Market Access, Trade and Enabling Policies Programme
MBT	Micro Bankers Trust
MDG	Millennium Development Goal
MDRI	Multilateral Debt Relief Initiative
MEWD	Ministry of Energy and Water Development
MFNP	Ministry of Finance and National Planning
MLF	Ministry of Livestock and Fisheries
MOFNP	Ministry of Finance and National Planning
MOJ	Ministry of Justice
MOL	Ministry of Lands
MTENR	Ministry of Tourism Environment and Natural Resources
M&E	Monitoring and Evaluation
NAIS	National Agricultural Information Services
NAMBOARD	National Agricultural Marketing Board
NAP	National Agricultural Policy
NAPA	National Adaptation Programme of Action
NAPSSFZ	National Association of Peasant and Small-Scale Farmers
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NIA	National Irrigation Authority

NIP	National Indicative Programme
NIP	National Irrigation Policy and Plan
NNGO	Northern Non-Governmental Organisations
NSA	Non-state Actor
NWA	National Water Authority
OECD	Organisation of Economic Cooperation and Development
OPPAZ	Organic Producers and Processors Association of Zambia
PACO	Provincial Agricultural Coordinator
PAM	Programme Against Malnutrition
PBA	Programme Based Approach
PCU	Provincial Cooperative Union
PPP	Public Private Partnership
PREM	Poverty Reduction and Environmental Management
PROFIT	Production, Finance and Technology Programme, Project funded by USAID
PRP	Poverty Reduction Programme
PRSP	Poverty Reduction Strategy Paper
RAMB	Rural Agricultural Marketing Boards
RDC	Recurrent Departmental Charges
RER	Real Exchange Rates
ROSCA	Rotating Savings and Credits Association
SA	Sustainable Agriculture
SADC	Southern African Development Community
SADFSP	Support to Agriculture Diversification and Food Security Programme
SAG	Sector Advisory Group
SAP	Structural Adjustment Programme
SCCI	Seed Control and Certification Institute
SIDA	Swedish International Development Cooperation Agency
SIP	Sector Investment Programme

SLM	Sustainable Land Management
SNDP	Sixth National Development Plan
SRES	Special Report on Emission Scenarios
ToT	Trainings of Trainers
UNCTAD	United Nations Commission on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNZA	University of Zambia
USAID	United States Agency for International Development
USD	United States Dollar
WBGU	German Advisory Council on Global Change
WDR	World Development Report
WFP	World Food Programme
WHO	World Health Organisation
WRI	World Resources Institute
WUA	Water Users Association
ZAATAC	Zambia Agriculture and Agribusiness Technical Assistance Centre
ZAMACE	Zambia Agricultural Commodity Exchange
ZAMSEED	Zambia Seed Company
ZANACO	Zambia National Commercial Bank
ZARI	Zambian Agricultural Research Institute
ZCF	Zambia Cooperative Federation
ZCGA	Zambia Coffee Growers' Association
ZCSD	Zambia Council for Social Development
ZCTU	Zambia Congress of Trade Union
ZEGA	Zambia Export Growers' Association
ZMD	Zambia Meteorological Department
ZMK	Zambian kwacha, currency of Zambia (1.00 US\$ was equivalent to 4,683.00 ZMK in 2010)

ZNFU	Zambian National Farmers' Union
ZVAC	Zambian Vulnerability Assessment Committee
ZWA	Zambian Women in Agriculture

Summary

Despite abundant water and land resources, Zambia's agricultural sector is underdeveloped and has yet to achieve food security. In fact, there are some very large economic and socio-demographical constraints that hamper agricultural development, but which can only still persist as a result of political failures during the last decades. The sector's present situation is characterised by low productivity, underdeveloped markets, decreasing soil fertility, as well as poor agricultural farming systems. The situation of smallholders (but also of emergent farmers) is particularly precarious. In addition to these internal problems, external drivers, such as climate change and economic shocks are already playing a significant role, and they will become increasingly important in the future. Effective policies, adaptation strategies and measures are to be put in place in order to achieve pro poor development in Zambia.

Concept, methodology and empirical basis of the study

This study analyses the agricultural sector in Zambia under changing climatic and economic conditions, asking how the situation in this sector evolved and which policies and measures could turn it into a positive development. By giving answers to these questions, it focuses not only on taking stock of results (what), but also on the way things can be done (how), taking into account past actions and future challenges. The study focuses on smallholders and emergent farmers, because they make up the vast majority of farmers in Zambia and at the same time are the poorest and the least resilient groups in society.

The concept of resilience constitutes the theoretical framework of the study. It is defined as increasing the buffer capacity, the degree of organisation and the adaptive capacity. Resilience describes the ability of a system to withstand (external) disturbances and to be able to adapt to and transform them. Based on a scientific understanding of these three components and empirical data, policies and measures of adaptation were identified. The analysis recognises different levels of interventions and their relevant actors. The chosen multi-level-

approach systematically integrates the micro-, meso- and macro-level. Building on that, six strategies for measures were suggested. During a workshop with the *Ministry of Agriculture and Cooperatives* (MACO) these results were confirmed. A second validation loop was undertaken during a workshop with experts from the private sector, research institutes, donors and NGOs. Both workshops were part of the research approach to put together common policy recommendations.

The study combines a literature review with a broad empirical analysis based on semi-structured interviews and three case studies. To that end, 88 interviews were conducted with partners from six relevant actor groups. These were government institutions and extension officers, farmers' representatives, research institutes, experts from the private sector, NGOs as well as international cooperation and consultancy representatives. Apart from these expert interviews, 9 focus group surveys were conducted with more than 160 small-scale and emergent farmers, covering six districts in North-Western, Central and Southern Province. Typical cases/locations were highlighted and analysed according to the widest possible variation in "climate conditions", "farming systems", "vulnerability to external shocks" and "potential for agricultural development".

Problems and solutions for the agricultural sector in Zambia

Firstly, the internal factors, which hamper agricultural development are explained. Secondly, the effects of the two relevant external factors climate change and economic shocks are analysed. It is shown how roles, tasks and policies of different actors could be improved. Finally, policies and measures are described, which can make Zambia's agriculture more resilient and at the same time raise productivity for the majority of farmers. A combination of tested measures has been assembled for each case study region, in order to meet the particular needs and challenges of the regions. All measures combine into a unique package for the Zambian context. Furthermore, they are structured along a multi-level approach that will ensure a holistic solution to the complex particularities of the Zambian agricultural sector.

Part I: Internal Drivers

Zambia as a mineral rich economy, the historical burden and policy failure

Although Zambia is an economy dependent on mineral exports, which displays the symptoms of Dutch disease, this can only partly explain the underdevelopment of the agricultural sector, and is also not a fundamental barrier for its development in the future. Since colonial times Zambia's economy has been relying on copper exports, and – as is typical for mineral rich countries – it has developed very unequally, with a rich elite in urban centres and a very poor population in rural areas. As most financial resources were transferred into the mineral sector in the past, the development of agriculture has always lagged behind and agricultural exports and inputs were always rather expensive. Zambia would need to put special policies in place to pass on some of its wealth from copper to the agricultural sector, as happened in mineral rich Chile and Botswana.

Zambia carries a historical burden, which kept the sector from developing after independence. The first president Kenneth Kaunda established a socialist system based on state intervention in all sectors. The effects on the agricultural sector were government organised marketing structures for agricultural produce as well as provision of inputs and disease control/containment through livestock dips and vaccinations. Even though these provisions worked, they were also expensive due to huge transaction costs. This, together with shrinking copper prices, caused Zambia to rely more and more on outside funds, and in 1984 it was one of the most highly indebted countries in the world.

When President Chiluba took office in 1991, he followed the International Monetary Fund (IMF) and the World Bank recommendations and cut back all public spending, leaving smallholders completely blank. Because the cutbacks were sudden, e.g. for extension services, and the vacuum was not filled by the private sector as it was intended, crop and livestock productivity decreased and farmers were impoverished dramatically. In principle, these constellations have not changed, even until now. Though rational policies such as the Fifth

National Development Plan (FNDP) were elaborated during the following presidencies of Levy Mwanawasa and Rupiah Banda, they did not change every-day practice very much, because they were never fully implemented.

Actors, policy and market failure in the agricultural sector

There are many actors in the agricultural sector, but some important ones need to improve their organisation. The *Ministry of Agriculture and Cooperatives* (MACO) receives relatively low and fluctuating budgets from the government, which makes it unable to adequately finance and staff its administrative structures in the provinces and districts. The *Zambian National Farmers' Union* (ZNFU) is an active union but it is somewhat overextended, as it represents all farmers, ranging from the commercial to small-scale farmers. These farmers' interests are partly contradictory, and since commercial farmers have more bargaining power, smallholder's stakes are often not well-represented. In order to raise their bargaining power, new cooperatives could play an important role. But they are suffering because of bad experiences and a very low organisational capacity of farmers.

The most important and expensive agricultural policies failed to achieve poverty reduction, even though they focused on poor smallholders. In Zambia, as in many African countries, fertiliser subsidies are common. Subsidies in Zambia were provided and then abolished in the past, but re-established in the Fertiliser Support Programme (FSP) under President Mwanawasa in 2002. Including allocations to the Food Reserve Agency, these subsidies consumed on average around 60 percent of the annual agricultural budget between 2000 and 2008, and in 2009 even 75 percent were allocated for this purpose. Nevertheless, all these expenditures failed to reduce poverty. There are several reasons for this. First, *poor targeting*, which means that mostly better-off farmers benefited; second, *side-selling*, due to the fact that many farmers are in urgent need of cash; and third, *late delivery* of the fertilisers, which makes their application inefficient. Finally, the quantities delivered are insufficient, which forces farmers to spread a smaller amount of fertiliser over a larger area.

Even though MACO is well aware of all the problems connected to the FSP, it is not yet ready for change. In recent years, the FSP was heavily criticised by the *Agricultural Consultative Forum* (ACF), the *Zambian National Farmers Union* (ZNFU) including the *Conservation Farmers Unit* (CFU) and by donors for all of the deficiencies mentioned above. Recently the programme was reformed slightly, and renamed *Farmer Input Support Programme* (FISP). Though FISP has a widened approach and includes inputs other than fertiliser and crops other than maize, the way of channelling inputs through cooperatives has not significantly changed and many of the before mentioned problems are not addressed. So a further step is necessary to improve the targeting towards the poor and to make it more efficient.

Since subsidies and price policies were always concentrated on maize, maize was and continues to also be grown in regions that are not suitable to it. This single-crop dominated policy has its roots in colonial times, and was then in the interest of the urban population and the upper class, who profited from the mining sector and who wanted food to be inexpensive. But for the farmers, this policy was counter-productive, as farming systems remained or degraded into simple maize mono-cultures, thus production risks increased and together with poor and plough-based soil management, soil degradation started.

Zambia's markets are underdeveloped, because population density and domestic purchasing power are low and overseas markets are facing high transport costs. But there is considerable potential to tap regional markets, in particular in COMESA countries. With respect to its domestic market, Zambia has opportunities for the successful marketing of maize, if export bureaucracies are eased and export bans are not imposed, so that producers can be sure that production surpluses can be sold across borders. Other crops, and in particular those of higher value, should to be sold mostly to the more dynamic regional markets. Since Zambia is surrounded by eight neighbours, some of whose purchasing power is on the increase, it should take advantage of this and try to tap these growing markets. Zambia is landlocked, i.e. overseas exports are expensive, but nevertheless there are some agricultural products with potential, of which cotton is the

most important to smallholders. In general, Zambia should diversify its supply to regional and overseas markets to all crops, and in the long run try to revive its own processing/industrial capacities (value chain), so that losses due to currency appreciation or global competition, cannot damage the whole sub-sector.

Unequal gender roles and HIV/Aids as internal constraints

There is a dualism of formal and informal patterns of participation of women in Zambia. On the one hand, Zambian law grants women equal rights of participation, and empirical data also shows that women's participation in community based decision making processes is on the increase. On the other hand, however, when it comes to issues such as access to land and extension services, women are still disadvantaged in the interaction with public institutions, which is not in accordance to the legal concept of equal opportunities: Despite having formal equal rights, women are confronted with a number of inequalities, such as reduced access to education, credits and suitable technologies, resulting in a higher prevalence of poverty among women in Zambia.

HIV/Aids slow down agricultural development and needs to be addressed in agricultural reforms. Zambian agriculture is particularly prone to loss of yields when the fields are left unattended in case of sickness of the producers. HIV/Aids prevalence rates are about 14 percent, and a key factor in the lack of workforce that limits agricultural production. In many cases, children are heads of households because of HIV/Aids, and it is even more difficult for them to access inputs and credits than for adult farmers. Women are occupied with caring for sick family members and orphans and cannot work on the fields. Measures are needed that ease the work burden of those affected, such as using animal traction and/or irrigation technologies. Civil society organisations are making attempts to meet this challenge by promoting the use of less labour intensive production technologies, but also by organising the care for family members and/or orphans, so that agricultural productivity of female farmers can be raised. However, a coherent government strategy for the agricultural sector that provides a clear directive, also for extension officers, is still lacking.

Part II: External Drivers

Evidence and impacts of climate change

The effects of climate change are measurable in Zambia and are felt by all farmers. This applies for extreme weather events such as droughts, storms, floods and cold snaps as well as for gradual shifts in rainfall patterns and sometimes temperatures. These latter more gradual changes are given more emphasis in this study, because they were more pronounced and mentioned much more often by farmers, also offering more opportunities for effective adaptation measures within the agricultural sector, which is the main focus here.

Extreme weather events are on the increase, and according to the Government of the Republic of Zambia (GRZ) there have been two drought years, two flood years and only two normal condition years between 2000 and 2007. In addition to a high number of direct casualties (especially from floods), these events already have caused huge harvest losses for farmers in some areas. According to the Zambian Vulnerability Assessment Committee, some 1.2 million people depended on food relief following the drought in 2004/05, whereas the number of people affected by floods in 2006/07 amounted to 1.4 million people. Suitable adaptation measures within the agricultural sector are for example moving fields away from river banks and low lying areas to nearby higher ground, or improving the production systems. All these measures are addressed below. On the other hand, extreme events address migration policies, and the development of effective early warning and emergency systems, areas which go beyond the concept of this study.

Longer or shorter rainy seasons in the northern or southern parts of the country, respectively, are the main changes perceived by farmers in the case studies. This is confirmed by meteorological observation, which indicates that rainfall patterns in Zambia have changed significantly since the late 1980s. In the south, the critical threshold is almost reached, with only 130 days left for planting maize. This is insufficient for most varieties except ones maturing early, which mostly have smaller yields. In the north, on the other hand, longer rainfalls often cause the maize crop to rot in the fields, which is then aban-

done by farmers before harvesting. Planting varieties maturing late can resolve this problem, but the seeds are much more expensive than conventional ones. In addition to shifts in varieties, crop species diversification is necessary. Further measures are named below.

All in all, expected gradual changes in rainfall patterns and temperatures are mostly negative for Zambian agriculture. However, depending on the location and the changes in rainfall patterns over time, they can also sometimes increase net incomes for farmers. As Zambia has plenty of water resources and is situated on a high plateau, its starting position in water and temperatures is relatively favourable, i.e. optimum growth temperatures for most crop species and varieties are yet to be reached. Whether these opportunities can in turn be used to boost productivity (at least for the near future) depends on whether and what adaptation measures are put in place.

A National Adaptation Programme of Action (NAPA) was written in September 2007 to tackle problems posed by climate change, but the suggested projects are not very comprehensive and have mostly not been implemented. One reason could be that the NAPA was written by the Climate Change Facilitation Unit (CCFU) headed by the Zambian Ministry of Tourism, which has no real competence in agricultural issues. For instance, for the drought-prone Zone I, the NAPA proposed measures related to irrigation, without giving more details about how to implement these and the challenges linked to this innovation, such as the organisation of water usage groups among farmers. Thus, these suggestions remain quite theoretical. In fact, this may be one reason, why only one of the many projects suggested in the NAPA is currently in the inception phase. However, in the Sixth National Development Plan, which is currently being drafted, policies and impacts of climate change will be given high priority. Some of the measures outlined here might be included in the agricultural chapters.

Evidence and impacts of economic shocks

In the past few years, the Zambian economy faced a variety of substantial external economic shocks¹ with wide ranging impacts on the agricultural sector. In 2005/2006 appreciation of the Zambian kwacha caused a rise in export prices which mostly affected smallholder crops such as cotton and tobacco. A second shock was the food crisis which its high food prices, unaffordable for most Zambian including smallholders who are net-consumers. Thirdly, the global financial crisis led to falling tax revenues, causing low investments in the agricultural sector and eventually led to a depreciation of the kwacha. In general, the effects of the financial crisis, and also of the appreciation of the kwacha on agriculture would have been more pronounced, if the sector was more developed. The indirect effects of the financial market on small-scale farmers were limited, because they did not have access to finance even before. However, large-scale farmers felt the credit crunch, which resulted in a further reduction of the area under cultivation. At the micro level, economic shocks are evident and perceived mostly through fluctuations of the price of produce.

In theory, the Dutch disease and the financial crisis should have also resulted in decreasing prices for fuel and imports, but this phenomenon did not occur in Zambia, prices remained high. Food and fuel as well as input prices tend to always stay high, i.e. they hardly go down again once an increase has taken place. Thus, the disadvantages of an economic downturn often affect farmers, whereas the benefits mostly fail to show. Effects on wages and labour from economic shocks are not as pronounced in Zambia as they should be according to the theory. Interlinkages between the mining and agricultural labour markets are somewhat weaker than expected. With regard to suitable policy responses to the financial crisis, the effects on Zambia were trivialised by the government at first, but finally accepted. In January 2009 a plan was developed on how to handle the crisis. However, the government never released the plan, and thus the implementation of these strategies also failed.

1 The term“external economic shock“ is used here as synonym for „external financial shocks“, which are caused by price or currency fluctuations.

In order to better buffer economic fluctuations in future, smart policies and measures at the macro level are required. According to the mainstream literature and the experience from Chile and Botswana, the most important and effective adaptation measures to Dutch disease are the creation of wealth, smoothing and development funds in order to stabilise the currency. In addition to that, a diversification of the export markets and of the range of produce has proven to be effective. Here, supply markets should spread out, in particular to COMESA members.

The IMF plays an important role by providing countries with macroeconomic policy advice on how to better prepare for shocks, and how to respond once a crisis hits. Currently the range of measures to prepare for shocks varies considerably. A systematic focus on surveillance and the design of Fund-supported programmes could help countries prepare for downturns more effectively. In the aftermath of a crisis, the Fund could help countries select the best policy responses. It is also important to make policies more transparent to the population (as this creates incentives for fair revenue spending), but at the same time make decisions more understandable in case they coincide with temporary common disadvantages.

Part III: Findings from case studies, and recommendations

Resilience at farm level

There is a lack of basic infrastructure and capacities in all provinces and for every farm, which makes it very difficult to succeed as a smallholder. In general, access to markets, credits and technologies is restricted, labour force is lacking and the soil, crop and water management is generally poor. Surprisingly, constraints in **buffer capacity** are similarly prevalent in all provinces. Differences between the provinces get less pronounced away from the main roads and into the bush. Infrastructure and communication decrease, infrastructure and communication networks break down easily in the provinces, so that communities, which are just 20 kilometres away from Lusaka have the same problems as those in more remote areas.

The degree of organisation amongst farmers is very low in all provinces. Most of the farmers are frustrated and simply struggling for themselves. The degree of organisation must be strengthened in order to develop agriculture. Small-scale farmers usually neither form groups to articulate their interests, they don't store or transport produce together, nor do they form groups in order to save money or apply for credit. Farmers do not know about forming water user associations, e.g. in order to irrigate their fields. As they say themselves, they rarely exchange ideas or help each other. Some women's groups are the exception, and if ever there are working savings groups in communities, these are always run by women. All farmers report from bad experiences with cooperatives, such as corruption and being neglected, being disadvantaged in distribution of fertilisers and others. The idea of cooperatives deteriorated and left individual farmers behind being completely frustrated. Only after having relieved cooperatives from the FISP through the adoption of the e-voucher system as it is described in the study, organisational capacity development can start again.

Adaptive capacity is not developed among farmers but is crucial for agricultural development. This is evidenced by various factors: a pronounced reliance on the state; having little say as an individual; lack of experience with other institutions or the private sector; no choice as a result of poverty; poor education; and maybe religiosity („it is God's plan“). All in all farmers and the rural population seem to have a very “pronounced ability to suffer”, which keeps them from complaining. Their self-esteem seems low, thus they mostly ask for more leadership and rarely for more participation. After having trained farmers in “Farming as a business” it would therefore be most important to give back farmers the decision making power in “what to grow when” and in “when to apply what”. Farmers should be empowered to increase common learning for instance via farm visits and – up to a certain degree – they could learn to use some corners of their own fields for experiments on themselves. For the whole of Zambia this spirit of creativity should be strengthened through political campaigns but also through fundamental reforms in the entire education systems.

Key findings from the provinces

In **North-Western Province**, key constraints are the *lack of labour force* and *leached soils*. The impact of this situation is that most families cannot cultivate enough land in order to achieve food security. It is therefore necessary to introduce *draught animal power* in order to be able to cultivate more land, and *the e-voucher system* to get access to lime and other inputs. Depending on the location (e.g. far from mines and the Congolese borders), farmers practise relatively diversified farming systems, but do not have access to markets or processing facilities. Therefore, incentives aiming at the involvement of the private sector would be a key measure in order to revitalise the processing facilities for such produce as pineapples and groundnuts. The trend towards a longer rainy season in this province can be coped with through farming systems based on cassava and planting late maturing varieties of maize. However, let it be stressed here that the production and distribution of affordable seeds from special seed farms is a key measure.

In the **Central Province** the major constraints are *low organisation*, *low adaptive capacity* and *low access to credits*. Though the endowments in every regard are the best here, farmers need capacity development to utilise their opportunities. Groups of farmers should aim to achieve more *bargaining power* towards companies in contract farming arrangements, while at the same time agreeing on effective measures to stop side-selling, which is otherwise harmful to both farmers and companies. Since contract farming arrangements are in principle very suitable for smallholders, they should not only be maintained, but further improved, also with support of donors, as done by the Competitive African Cotton Initiative / Cotton made in Africa (COM-PACI/CmiA). The communication with cotton companies can only be improved through better organisation of farmers in new or improved cooperatives or associations. In addition to that, farmers need to learn *how to organise* themselves, also in terms of credit and/or saving groups. If they manage to repay credits as groups, they should get the chance to apply for more relevant credits on an individual basis within contract farming arrangements.

In the **Southern Province**, *weak infrastructure*, climate change towards *drier climates* and *animal diseases* are key challenges. *Veterinary services*, *diversification* and *irrigation* as well as *conservation agriculture* are key measures to overcome the worst of it. Thus, extension services should be better staffed by competent employees, and extension systems improved. Farmers must build more capacities in animal husbandry, health and fisheries, and in conservation agriculture and crop growing methods. In particular crop varieties more tolerant to drought should be grown here, in more diversified systems which can withstand dry spells. Early maturing varieties of maize are the most suitable here to cope with shorter rainy seasons. Close to rivers, irrigation schemes and rice farming can be profitable. A very important issue to learn here is the organisation in water and river water user groups, but it is also essential to build up regional markets with the support of higher level organisations/administration and the private sector.

Mainstreaming adaptation and agricultural development

Achieving better access to funding, improved capacity development and extension services as well as improved cooperatives and farmers' organisation are crucial for the successful implementation of all measures and their sustainability. Better funding for the sector can be achieved, when the scope of lending institutions is extended and these institutions no longer ask for collateral, but for a reliable business plan which then has to be rigorously followed by the farmers themselves. Farmers on the other hand have to increase their capacity to understand "farming as business", and they should strengthen their ability to take responsibility. In this study there are good examples what approaches exist and how both sides can be supported by donors to bridge gaps and to nurse this process.

If the e-voucher system is put in place and fertilisers are channelled through the private sector, co-operatives will have the chance to create a new vision and mission for themselves, and develop into business entities which actually support farmers. They could for instance serve as a link to the government, providing extension services and training, information and transport to markets, and help to bulk produce and to sell to the Food Reserve Agency (FRA) or other pur-

chasers. Private banks, NGOs or for example the *Zambia Agriculture and Agribusiness Technical Assistance Centre* could step in to provide grants to cooperatives in order to bridge economic bottlenecks.

In Zambia, capacity development is crucial at all levels. At the **macro-level**, MACO needs to build capacities, particularly among their extension staff. They require more skills to instruct trainers, provide field and farmer training as well as demonstration and field day skills. At the **meso-level**, farmer organisations require technical, managerial and agri-business skills, among others through funding of research institutions. Small and medium sized enterprises require capacity building to improve processing, packaging, storage and general market orientation. At the **micro-level**, farmers need training in all skills, and most of all in business-orientation concerning crop management, post harvest loss control, soil conservation and more. They have to include the application of new technologies for building up resilience towards climate change and economic shocks. A particularly crucial point is the creation of and support to networks, i.e. for water user associations, improved processing or marketing reasons, as outlined further in the multi-level charts in this study.

Adaptation policies and measures for climate change and economic shocks: conclusions

A package of adaptation measures have been recommended to Zambia, from which six measures have been outlined in multi-level-charts in this study.

The introduction of the **e-voucher system** and the 20–30% coverage of **draught animal power** throughout the country are most essential actions in order to raise productivity and give the sector the chance of pro-poor development. Key challenge in the case of the e-voucher system is political decision making, which is in progress, but not yet finished. In case of draught animal power, the access to and a successful design of credit schemes are the most important challenges.

Irrigation is one of the most important measures that needs to gain more independence of unreliable rainfall, i.e. adapt to climate change. Especially the precondition of a higher degree in organisation is diffi-

cult to achieve, but certainly worth the effort at all levels, as outlined in detail in the study.

As **Conservation agriculture** increases productivity as well as the capacity of the soil for water and nutrient retention, it is a very effective measure to increase food security, income and resilience to climate change, i.e. heavy rains or dry spells. However, the marketing problem has to be resolved. In order to assist farmers in adopting innovations, donors and NGOs, in addition to MACO, should support farmers to make it through the first 2-3 years after adoption, until yields and routines develop as expected.

Diversification is a measure to adapt to climate change, but it also helps to smooth out production and marketing risks as well as impacts of economic shocks. It is possible to cope with longer or shorter rainy seasons through variety diversification, as stated above, while crop diversification can raise and spread income, even out labour peaks, increase soil fertility and enrich the nutrition status. Key challenges are, however, a higher demand of management skills, and the costs for and availability of seeds.

One specific measure to adapt to economic shocks, in particular fluctuating produce prices, is the improvement of the **warehouse system**. Storage at the community and district level provide both proper storage facilities for farmers in times of low market prices and help farmers in improving their marketing opportunity by increasing their bargaining power towards grain traders through lower transaction costs (particularly transport). Thus farmers can achieve higher incomes. At district levels, farmers can stock their produce for a certain fee, and have the opportunity to sell the produce at any point in time. The warehouse operator uses the stored produce as collateral. This approach consequently reduces the pressure on farmers to sell their produce in times of low market prices.

Last but not least the further development of contract farming in order to foster cash crop growing is also key. Since cotton can be grown without irrigation in relatively dry areas this is the most important cash crop for small scale farmers. The need here is to strengthen farmers' organizational skills and their negotiation power towards companies within

their arrangements. Since the Cotton Board became operational in 2009, the Cotton Act of 2005 can be enforced now. The establishment of a smooth fund in order to buffer price fluctuations and the reduction of side buying by un-contracting cotton companies are the two major challenges. Since realization takes time, donor programmes as COMPACI must keep stamina.

To conclude

Agricultural development and measures for adapting to climate change and economic downturns have to be linked, if they are expected to foster both adaptation to shocks and agricultural development per se. Policies and measures to foster agricultural development must take the reality into account, which in the case of Zambia, might be very basic, e.g. food storage or animal traction. Nevertheless, these developments cannot be left out or taken as a given. In fact, there is no way to achieve food security or agricultural development without these measures. This is why in this study the “how” of achieving these developments is worked out in more detail than the “what to do”.

Economic shocks and climate change are combined in this study and suggested measures overlap to a great extent. Adaptation measures to climate change and economic shocks are very much overlapping and complement each other very well. This is most obvious at the micro-level of conservation farming and crop diversification, which strengthen the buffer capacity of soils or cropping systems and also buffer input price fluctuations or economic production risks. Whereas at the meso-level, improving the warehouse systems seems to be core, at the national level the generation of wealth, smoothing and/or development funds is to be seriously discussed in order to buffer and partly to avoid both economic shocks caused by currency appreciation or depreciation and shocks through droughts and floods, such as losses in harvests. Secondly, transparency in the utilisation of revenues, a better tax system within the mining sector and the transfer of revenues to reinvest into the agricultural sector, are crucial for both areas of climate and economic shocks.

The selection of the most crucial adaptation measures was based on criteria such as relevance and effectiveness in order to achieve their goals. In addition to that, all suggestions are based on a reality check, i.e. they are retrieved from current debates and concepts in Zambia, at national or farm level as well as within the donor and NGO community. Detailed implementation plans for the measures of variety and crop diversification, e-voucher system, conservation agriculture, animal draught power, warehouse systems and irrigation were developed. No further prioritisation is possible according to pertinent considerations. This is so, as the successful introduction of each measure depends on one or several of the others, so that only the parallel combination of all of these seems to be promising.

As a principle, and whenever possible, suggested measures should be channelled through the private sector. This can be only achieved when the environment the private sector needs in order to develop, is enabled through governmental commitments and a suitable legal framework. Donors and NGOs should then support this process first and foremost with soft measures, such as capacity development, in building up public-private-partnerships and trust among stakeholders, but also by financial support. These can be areas such as road and water infrastructure, but also by supporting the private sector to take on tasks, which they might feel go beyond their responsibility. This could be following up on given credits, the capacity development and training for farmers and/or bridging the gap between affordable and profitable interest rates.

Now is the time to scale up the suggested measures for the whole country. If there is still experience missing, valuable knowledge is also available from other, mostly neighbouring countries. In this regard, the CAADP should be adopted, as a way of exchanging experiences. Windows of opportunity which were offered by other regional entities, such as COMESA, should be opened.

1 Introduction

1.1 Background

Zambia enjoys significant advantages for agricultural production. In particular, these are vast untapped agricultural lands, more than adequate water resources, favourable climate conditions and at least a few potential export markets in neighbouring countries (Mulemba 2009b). But despite of these resource endowments, Zambia has yet to achieve food security and according to the Food Security Index (FSI), it belongs to the 15 countries of the highest risk worldwide. In fact, there are some enormous socio-demographical and economic constraints that have hampered agricultural development in Zambia to this day, but which in fact only still persist because of political failures. In addition to these internal constraints, there are external drivers, such as climate change and economic shocks, which are already playing a significant role at present, but which will become increasingly important in the future. Effective policies and adaptation strategies and measures are to be put in place to better cope with internal and external constraints, and to achieve pro poor development in Zambia.

The evidence for the underdevelopment of the agricultural sector can be described as follows: *Firstly*, the productivity of agriculture is very low: Due to under-population in rural areas and the high prevalence of HIV/Aids, there is a lack of rural labour force. But there is also a very low degree of mechanisation, farming is mostly reliant on axe and hoe alone, and also there are inadequate agricultural management methods. Soil fertility is declining, because of insufficient and inadequate application of fertilisers and a lack of conservation methods. This, again, is due to high fertiliser prices, wrong incentives and the lack of knowledge. In consequence, in order to achieve food security a household today has to cultivate a larger surface of land than the family can manage by only using hand tools, since draught animals are unaffordable. Though abundant land and water is available, more than half of the smallholder households in some regions are not food secure.

Secondly, the rural agricultural markets are extremely underdeveloped. This is partly due to the low population density, the high incidence of poverty and short life expectancy, which means that there is only a limited and stagnant purchasing power, which hinders the development of markets. The access to markets is also very limited. Thus, even when smallholders produce an agri-

cultural surplus, it is very difficult for them to sell their produce. Bad rural road conditions and a lack in means of transport make it difficult to reach markets. This is why many smallholders sell their produce to “briefcase traders”, who come to their fields buying the produce at very low prices. A different picture is emerging in the Copperbelt, along the railway and around Lusaka. Mostly commercial farmers settled here, who have the means and knowledge to produce what the urban and wealthier population consumes.

Thirdly, the agricultural production systems of smallholders are risky. This is mainly because of low crop and variety diversification and the overall focus on maize. Mono crop based farming systems are still practised in many places, because fertilisers and other inputs used to be subsidised for use on maize only. Since farmers also grow maize in soils and under climatic conditions that are not suitable for it, yields are often very low and crop failure is frequent, in particular, if compounded by effects of climate change or fluctuating prices.

Although the farmers themselves can at least partly influence this evidence, there are deeper political reasons, which led to this situation. These reasons again are a complicated mixture out of a historical burden, politico-economic forces, wrong political responses and setting up misleading incentives. The politico-economic background, which will be analysed further in this study, can be briefly outlined as follows:

In the past, during colonial and then the socialist era under the first president Kenneth Kaunda, but partly also under the following presidents, the agricultural sector as characterised by thorough state interference into pricing, managing and marketing of mostly maize growing, which thus developed into the staple food of Zambia. This interference distorted the markets and kept the private sector from getting involved, for instance supplying inputs, or buying or processing the agricultural produce. Under the pressure of IMF, the next president Frederic Chiluba then suddenly, and through abrupt policy changes, created liberalised markets, in part by at once cutting back almost all governmental services for smallholders. It was intended that the private sector could fill this gap, but this did not happen, as framework conditions were not attractive for them. As a consequence, crop and livestock productivity fell. Until now, these conditions have not changed fundamentally, and so still cause today’s underdevelopment of the agricultural sector as a whole.

Even though during the following presidencies of Levy Mwanawasa and Rupiah Banda, sound and rational policy papers were put together, such as the Fifth National Development Plan (FNDP), this did not really change very much. In these papers the important role of agriculture is appreciated and the sector is labelled as the economic backbone of the country, but the policies suggested were never fully implemented, because – apart from possibly a lack of political will – they either stay too general or too abstract, or they are not problem and context specific enough.

However, there are some additional politico-economic reasons for the agricultural dilemma in Zambia. One of these reasons is that Zambia is a mineral-rich economy, i.e. one of the biggest copper exporters in the world. Thus, the country has developed some typical symptoms of economic Dutch disease. Dutch disease can occur, when high rent revenues flow into a country and other productive tradable sectors, such as agriculture or manufacturing cannot develop as a result. The reason is that all resources are then shifted from these sectors into the one rent giving, mineral sector. Typically, such economies grow unevenly, as also observed in Zambia, and since the revenues from mineral recourses mostly benefit the elites, the political will is often not very strong enough to change this situation, and to pass the wealth on to the productive sectors. Zambia shows all the symptoms of Dutch disease and in 2005/2006 the kwacha appreciated strongly against the dollar, because of rising copper prices. This again caused an increase in the price of agricultural exports and a decrease in price for agricultural imports, contributing to the dilemma. But Dutch disease and inappropriate Zambian policies for coping with it are again only one part of the problem, as explained in the following chapters.

Zambian agriculture is also affected by climate change, and as models indicate, these influences will certainly become even more distinct in the future. During the last decade a temperature rise was observed far above the global average, and in addition, most provinces suffer from a significant increase of droughts and flooding. These changes already impact negatively on Zambian agriculture. Moreover, a change in overall rainfall distribution patterns can be observed, and depending on the region, longer or shorter rainy seasons occur that result in poorer harvests when adaptation measures are not implemented.

To conclude, Zambia's agriculture offers some major advantages, but also many internal and external constraints. Though it would be possible through sound and reliable policies and careful management decisions to resolve these

problems, none were resolved by Zambian politicians so far. So the impoverishment of the rural population aggravated during the last decade until today, flanked by low and fluctuating agricultural budgets and a weak ministry at the macro level, which does not pay enough attention to these facts so far. Though comprehensive national goals concerning agricultural development and policies exist on paper, none are followed up in a stringent way.

1.2 Research question and objectives of this study

This study picks up the issue of agriculture under changing external and internal conditions, and shows potential ways to respond to these politico-economic, but also demographic and environmental framework conditions. Hence, the research question of this study is as follows: Which measures and policies can the agricultural sector² in Zambia take towards pro poor development, while at the same time increasing its resilience to climate change and economic shocks?

In this study, recommendations for policies, strategies and measures are formulated on how smallholder agriculture can develop more sustainable and better cope with climate change and economic shocks. Though some of the recommendations are developed mainly based on a literature review, such as those for the macro level, the majority of recommendations are drafted on the basis of empirical results following a multi-level approach (macro, meso and micro). They have been discussed and finalised during a workshop on April 22th, 2010 in collaboration with Zambian representatives from the Ministry of Agriculture and Cooperatives (MACO) and at a workshop on April 27th, 2010 with experts, NGO's, the private sector and donors. They may eventually feed into the Sixth National Development Plan (SNDP), which is currently under development.

In this study we try to learn from history, i.e. not suggest the same idea over and over again, hoping the outcome will be different. Therefore, based on long experience, one principle behind the suggested adaptation measures now is to channel them through the private sector. This can be either supported or backed by donors or by civil society, whereas the enabling framework has to be provided by the government. Without this, agricultural development cannot happen.

2 In this study only crop cultivation, together with animal draught power, will be considered. Livestock and fisheries are not taken into account.

1.3 Agricultural development: A promising way for getting out of poverty?

As agriculture in Zambia is the focus of this study, it is important to discuss beforehand the primary potentials and challenges of this sector in contributing to development. What makes us so sure, that agricultural development is the right way for pro-poor-growth and that this path would not again become a large failure at the bottom of a long list of such failures for the country? Only the analysis of the literature, taking into account experiences from other countries, will allow an objective appraisal of the agricultural sector with respect to the fundamental goals of improving food security and reducing poverty in Zambia.

Despite a profound “agro-pessimism” in parts of the international development community (Diao / Hazell / Resnick 2007, 1), economic theory and empirical studies show that agriculture can play a critical role in the overarching goal of poverty alleviation. There is a strong correlation between a varying set of factors – namely poverty, agriculture, food security and economic growth (WB 2008, 6).

Although the majority of the poor in Zambia work in the agricultural sector, it is these households that face the greatest food insecurity. The fight against hunger as an effect of and a cause for poverty should therefore be a top priority, as expressed in the first Millennium Development Goal. Enhancing agricultural productivity, and thus tackling hunger, seems to be the most logical option to reach that goal (WB 2008, 1).

But agriculture is more than a key to food security and a means of livelihood (Zimmermann et al. 2009, 34). By enhancing productivity in the agricultural sector, there are many synergetic effects that contribute directly and indirectly to a country’s economic performance (FAO / IFAD / WFP 2002, 10). This growth can also be pro-poor, if agriculture generates income opportunities, be it as an agricultural labourer or as a farmer, who is able to benefit from exports and/or opportunities on the domestic markets and belongs to the people in most need.

A stronger focus on agriculture is furthermore a way to reach diversification of the economy, particularly in mineral-rich countries that are extremely vulnerable to price fluctuations in global markets and where usually the mineral sector dominates historically. In Zambia it is shown that diversification away from copper remains crucial since the previous

dependence on copper has proven unsustainable for growth (Thurlow / Wobst 2004, 65; Diao / Hazell / Resnick 2007, 24). This is also true especially for obtaining pro poor growth. As is well known and as Lam / Wantchekon (2002, 2 ff.) also argue, resource abundance exacerbates income inequality between the general population and the political elites far more pronounced than growth in other productive tradable sectors does. This comes from both a direct and an indirect effect. The direct effect is due to the elites' control over the government that allows them to obtain a larger share of the resource rent. The indirect impact is due to the economic decline associated with Dutch disease, which also increases income inequality because the benefits from general growth are more evenly distributed than resource rents. But there is also another link, which leads to the same conclusion. Since windfall revenues only cause Dutch disease and eventually a decline of the economy as a whole when they are not absorbed properly, a reinvestment into agriculture can prevent this, as it is argued by Simumba (2008, 9 ff.) and Cali / te Velde (2007, 17 ff.). In fact the examples of Botswana and Chile showed that impacts of currency appreciation through resource rents can be largely avoided, if the windfall revenues are passed on to the general population, through partly reinvesting them in other productive sectors (dito).

By enhancing agricultural productivity, the state gets an opportunity to increase independence from food imports, still prevalent in many countries in Sub-Saharan Africa (Zimmermann et al. 2009, 36). Consequently, a country is less vulnerable to risks through external or political turmoil, while at the same time having to spend less on imports and eventually being able to reach food sovereignty (Byerlee / Diao / Jackson 2005, 32). Once food security is achieved, Zambia could even become an exporter of agricultural surplus on the regional market, such as to the Congo, Angola, Zimbabwe or others, and even South Africa.

The following report is divided into six parts. Chapter 2 presents the study design and methodology, where the analytical framework will explain the concept of resilience from a multilevel perspective, on which the majority of this study is based. Chapter 3 will give background information on in-country economic-political parameters. The agricultural systems are presented in chapter 4, together with farming methods, farming systems and the social dimensions of agriculture. Chapter 5 highlights the effects from the external drivers climate change and economic shocks and their impact on the agricultural sector. Chapter 6 presents the findings from the case studies, rec-

ommendations from the local to the national level, and finally presents the suggestions on the “what”s and “how”s of the suggested adaptation measures to increase resilience and to achieve agricultural development.

2 Study design and methodology

The following chapter concerns itself with the research focus and the applied methodology. It consists of two main parts: The first part explains the analytical framework and indicators of resilience. The second part outlines both the participatory approach that was chosen to collect and analyse the data and the sampling of case studies.

2.1 Analytical framework and indicators of resilience

The research study focuses on smallholders and emergent farmers, because they account for the most common farm types in Zambia and they are the most vulnerable and the least resilient within society. Their adaptation needs should be given the highest priority in order to improve their adaptive capacity and help overcome their marginalisation. That is, policies at national, and services at district and province level should be tailored to the needs of smallholders. Adger et al. (2006) (in Harmeling / Bals / Windfuhr 2007, 73) labelled such addressing of the poor “the fairness dimensions” of adaptation to climate change. This also applies to economic shocks. Since poverty levels of Zambian smallholders are so pronounced, the most innovative adaptation strategy is useless, if it has no positive and direct impact on the reality of people’s livelihoods. Those people who are affected most by climate change and economic shock s equally have a low capacity to adapt to the changing environmental and economic conditions, and adverse the effects of these external drivers. Accordingly, a multi-dimensional intervention is necessary that tackles both the problems of underdevelopment within the sector and the creation of resilience towards external shocks.

The successful, effective implementation of policies and measures that aim at pro-poor development in general, as well as adapting to climate change and economic shocks in particular, cannot be explained only through a vulnerability-based approach. It would imply a stronger focus on the *inability* of a system to cope with the adverse effects of external shocks. Therefore, a

resilience approach is chosen that takes into account the chances and opportunities that arise from increased resilience (Ifejika Speranza 2009, 3). At the same time, however, increasing resilience alone does not automatically result in better development of the agricultural sector. Instead, general development measures that address higher productivity and a more equal distribution of income are necessary to overcome the serious endogenous problems of the sector, and thus to achieve poverty reduction.

The key indicators for improved resilience are the strengthening of buffer capacity, achieving a higher degree of organisation and more adaptive capacity, whereas the key indicators for pro poor agricultural development are more equal distribution and increased productivity. In reality, these five indicators may influence one another and can partly overlap. Hence, a policy or measure may result in a higher degree of organisation, while also strengthening the buffer capacity of the individual or institution. Based on these indicators and a previous data collection, adaptation measures and policies were tailored accordingly to the Zambian context.

According to the scientific understanding the concept of resilience describes the ability of a system to withstand (internal and external) disturbances (see Ifejika Speranza, 2009, 1 and Berkes / Colding / Folke 2000; Carpenter 2001), and in the slightly modified definition also the ability to adapt and transform when faced with these disturbances. Resilience originated from research in ecology (Holling 1973), but has been constantly broadened to include research on human – nature interactions. Therefore, the concept of resilience in this study is applied to both social (defined as the socio-economic and socio-political spheres) and ecological systems (defined as the bio-physical sphere), including human – nature interactions. It acts on the assumption that individuals or institutions are able to anticipate and (re)act to perceived and real challenges of a changing economic or ecological environment (ADB / IFPRI 2009, 7). And it assumes that these reactions are timely and result in an ongoing adaptive learning process. At the same time, agriculture is considered to be a form of natural resource management, where social and ecological systems overlap. Their resilience – going beyond a mere technological concept – needs to be strengthened in order to sustain agriculture's function of satisfying basic needs, such as the production of crops (ADB / IFPRI 2009, 7).

Understanding pro-poor growth

In order to achieve more equal growth and poverty reduction in Zambia, as well as to account for the necessity of a simultaneous implementation of measures to tackle the endogenous problems of the Zambian agricultural sector, a pro-poor development perspective needs to be included in the analysis. Pro-poor development therefore relates to the farm level, where agricultural productivity and total production are very low and many small-holder farmers do not reach self sufficiency and remain food insecure. It comprises two main components that need to be strengthened, so that pro-poor development can be achieved:

- *National policies* need to address the situation of smallholders, who are the poorest and most vulnerable socio-economic group, more effectively. The Mid Term Review of the FNDP from 2006–2010 could only show a marginal reduction of poverty levels and even an upward trend in rural poverty. The average Gross Domestic Product (GDP) growth of 6.1% (2006–2008) has not translated into major changes in poverty. Despite a number of new policy initiatives³ and structural reforms the agricultural sector delivers a poor performance. Instead, growth has been oriented towards a few sectors that are capital intensive, and thus do not contribute significantly to the creation of employment (i.e. construction, mining, tourism, transport, communications) (GRZ 2009a). The upcoming Sixth National Development Plan, which is currently being drafted, is facing the same challenges as its predecessor and lacks concrete recommendations on how to overcome these difficulties.
- The *implementation of measures* that aim at pro-poor development of smallholders in Zambia, while simultaneously creating higher income and a reduction of workload. To achieve this, not only the overall agricultural production needs to be increased (a goal that is repeatedly part of the agricultural policy agenda under the label of increase of area under production), but also productivity. At the same time, however, effective poverty reduction can only be achieved if functioning, diversified, i.e. domestic, regional and overseas markets as well as processing facilities are being strengthened.

3 Among others, a revision of the legal framework governing the cooperative movement, draft Cooperative Development Policy (CDP), review of the Fisheries Act, Agricultural Marketing and Credit acts, formulation of Aquaculture Development Strategy, National Irrigation Policy and Plan (NIP), Irrigation Development Fund (IDF).

Understanding resilience

Resilience can be achieved through increasing the following three components:⁴

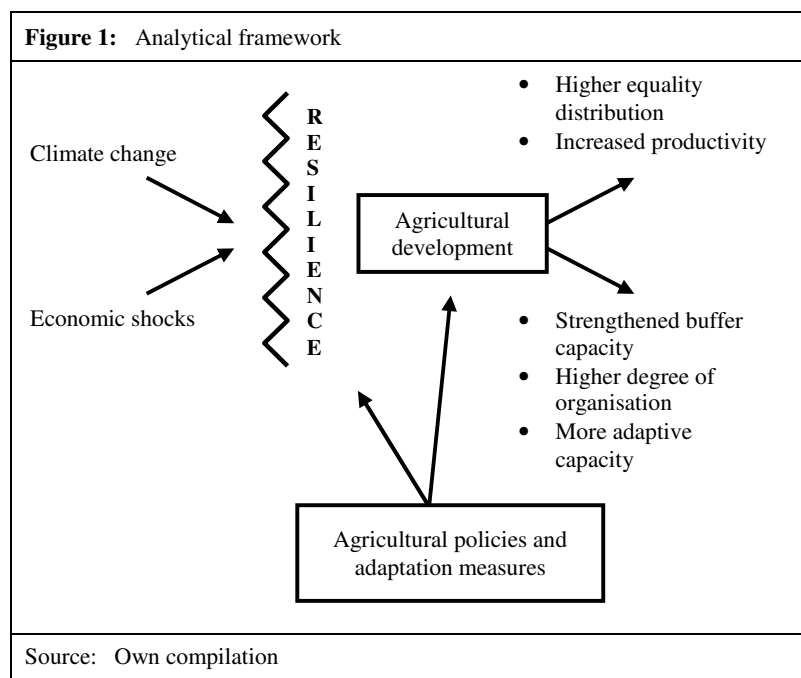
- Firstly, *strengthened buffer capacity*, meaning the increased capacity to absorb the effects of socio-economic or ecological changes such as weather hazards, and to actively cope with these effects. It refers to the resources at the disposition of the people affected, be they human, social, financial, natural or physical, as well as to the diversity of options open to an individual or institution. If a farmer owns, for instance, farm land whose soil holds more than average organic mass, he or she has a strengthened buffer capacity due to the better water holding capacity of the soil, which results in higher drought and flood resistance. Another example of increased buffer capacity is a farmer who has more options in selling his or her products due to crop diversification, if a pest destroys one crop or if the price for a certain crop is down, the other varieties or species are still there to compensate.
- Secondly, *a higher degree of organisation*, describing an enhanced social, economic and institutional environment within which adaptation is carried out. On the one hand, this can mean the ability of individuals either to organise themselves with others (or to participate in already existing stakeholder groups). On the other hand, it can refer to the opportunity of an individual to cooperate and to network with other institutions and organisations at a higher level. A farmer may, for example, participate in farmer groups within a village to better cope with external stresses. The farmers may also have access to extension services or other relevant institutions providing information on how to deal with the effects of changes.
- Finally, *more adaptive capacity*, referring to an actor's capacity for self-learning and adapting to adverse effects of external interferences through own trials and experimentation. The capability to learn depends on the access to different types of knowledge and information (e.g. prices on mar-

4 The notions of “buffer capacity” and “adaptive capacity” have widely been adapted from Ifejika Speranza’s resilience approach. In terms of the component of “organisation”, the original concept of “*self-organisation and networking*” has been extended to the wider and more general concept of “organisation”. In general, all components have been extended due to the fact that the resilience approach used in this study does not just take into account the micro level, but also integrates the meso and the macro level (Ifejika Speranza 2009, 4).

kets). Only if functioning feedback mechanisms allow an individual or an institution to respond to relevant changes in policies, the adaptive capacity can be increased. Such a mechanism can, for example, be channelled through extension services, in order to allow the farmers to receive better information on the effects of external drivers. At the same time, the service provider is informed about the needs and interests of the farmers.

As illustrated in figure 1, implementing agricultural policies in general and adaptation measures to climate change and economic shocks in particular can improve the resilience of the agricultural sector, but more generally, it can contribute significantly to agricultural development through a more equal distribution of wealth and increased productivity.

The key indicators for improved resilience are strengthened buffer capacity, a higher degree of organisation and more adaptive capacity. In reality, these three indicators may influence one another and can partly overlap. That is, a policy or measure may result in a higher degree of organisation, while also strengthening the buffer capacity of the individual or institution.



Based on these indicators and a previous data collection, adaptation measures and policies were accordingly tailored to the Zambian context.

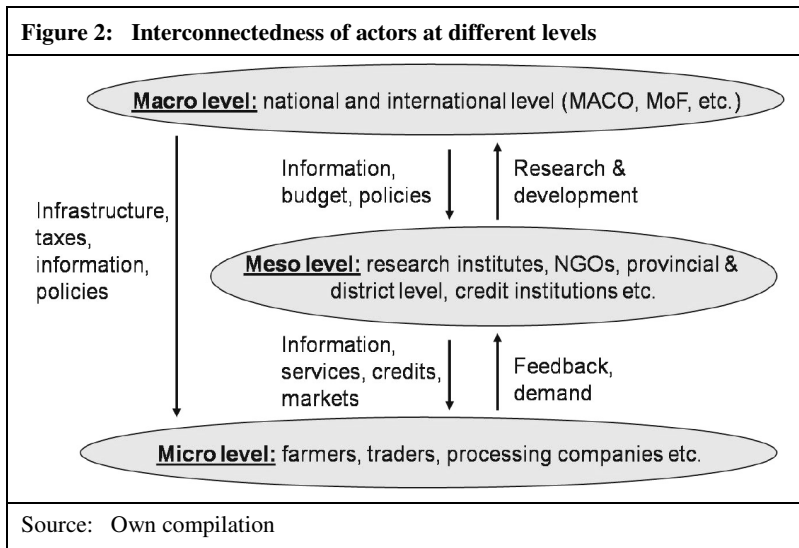
Implementation of a multi-level approach

In addition to the different indicators of resilience, this study also accounts for different levels of interventions and its relevant actors, drawing a holistic picture of adaptation strategies that result in higher resilience.

The three levels can be described as follows:

- The *micro level* refers to households, including farmers and their families.
- The *meso level* are provincial and district administrations and institutions (unions etc.), public and private extension services, as well as research and lending institutions.
- Finally, the *macro level* consists of the national governmental institutions that are involved in the agricultural sector.

The different levels of the agricultural sector do not exist independently of each other, they are interconnected given the structure of the agricultural sector. These interlinkages are illustrated in figure 2:



Adaptation measures, services and policies should be interlinked among the farm, district and provincial, as well as national level. That is, by implementing technical but also organisational innovations, measures and strategies on the micro level, agriculture can be practised more efficiently. On district and provincial levels, suitable services should be provided to give incentives or open up possibilities for implementing adaptation management measures and technologies at the farm level. Organisational and financial measures are necessary in order to enable, foster, boost or support these strategies. Lastly, general and specific agricultural policies on the macro level should improve the framework for implementing suitable social, ecological and economic measures at the other levels. The measures at the farm as well as at the provincial and district level should be embedded in those good agricultural policies and laws at the national level that facilitate their implementation.

Cost-effective responses require action at all three levels, including the removal of barriers to implementation. Only then can the production of agricultural products be increased and the livelihoods of people improved in the long run. Further delay in adaptive responses could aggravate the sector's sensitivity to climate change and economic shocks, and increase the costs of adaptation at a later stage.

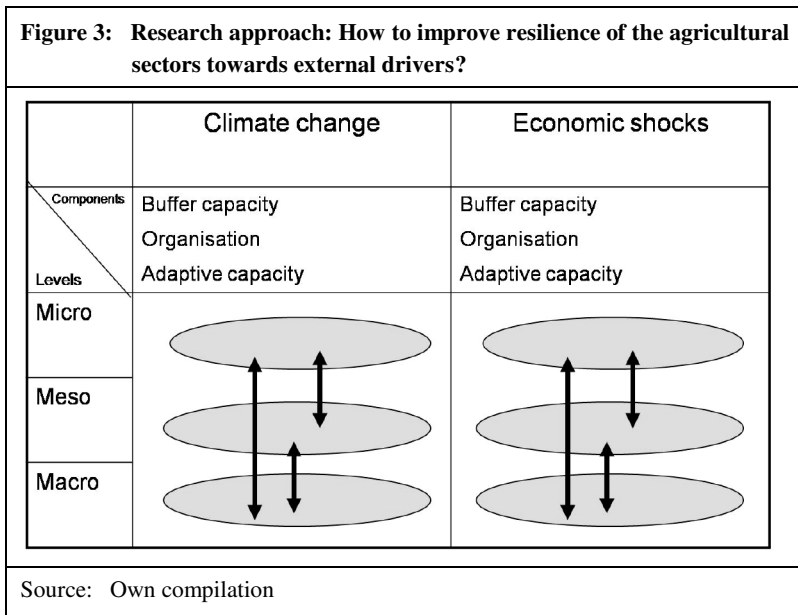
Coping principles

Such adaptation options must be tailored to the Zambian context and should be in line with the disparities among the Zambian socioeconomic groups and their given organisational capacity. The most innovative coping strategy is useless, if it has no positive and direct impact on the reality of people's livelihoods. Those people, who are affected most by climate change and economic shocks, consequently have a low capacity to adapt to the changing environmental and economic conditions and adverse effects of these external drivers. In the case of Zambia's agricultural sector, smallholders were identified as the most vulnerable groups, due to their poor natural and financial resources (refer to subchapter 4.5). Their adaptation needs should be given the highest priority in order to improve their adaptive capacity and help overcome their marginalisation. That is, policies at the national and services at the district and provincial level should be tailored to the needs of smallholders. Adger et al. (2006) (in Harmeling / Bals / Windfuhr 2007, 73) labelled addressing the poor in this way "the fairness dimensions" of adapting to climate change. This also accounts for economic shocks.

In sum, this study both views the different features of resilience and the different levels of intervention within the agricultural sector. This means that finding adaptation measures to improve the resilience of the agricultural sector in Zambia includes

- a.) the different components that can be separated in the concept of resilience (buffer capacity, organisation and adaptive capacity) and
- b.) a multi-level approach to enhance the interlinkages between the different levels of the agricultural sector (micro, meso and macro level).

This research approach is summarised and illustrated in figure 3.



2.2 Empirical methods

2.2.1 Research process, data collection and analysis

The methodological approach of this study is application-oriented, focusing on a discourse among relevant stakeholders with qualitative, semi-structured interviews and focus groups.

Research process

At first, a preliminary desk study was conducted on the basis of the literature and critical analysis. The empirical information was gathered during a three months phase of field research in Zambia from February to May 2010. The approach was twofold:

- Firstly, 88 semi-structured⁵ individual interviews were conducted with interview partners from six relevant actor groups. These were government institutions and extension officers at the national, provincial and district levels (36 interviews), farmers' representatives (8 interviews), research institutes (5 interviews), the private sector (13 interviews), NGOs (8 interviews) as well as international cooperation and consultancy (18 interviews).
- In parallel, 9 focus group discussions were held during three case studies with a total of more than 160 small-scale and emergent farmers, covering six Districts in the three Provinces North-Western, Central and Southern.⁶ Households headed by men and women were among the interviewees. From the focus group, some farmers were selected for further semi-structured individual interviews (8 interviews). For an overview of the interview partners, please see annex 4.

According to the multi-level approach, the individual expert interviews mostly accounted for the meso and macro level, whereas the micro level was covered largely by the focus group discussions. In addition, informa-

5 In general, semi-structured interviews have a flexible concept using non-suggestive questions and thereby allowing the interviewees to openly express their opinions and judgements. The content of the conversation, the questions and reactions are also driven by the conversation partners. Consequently, they may emphasise, add or omit specific issues or questions according to their own points of view (Neubert 2003, 33).

6 Solwezi and Mwinilunga were chosen in North-Western Province, whereas Mumbwa and Chibombo hosted the interviews in Central Province. In Southern Province, Sina-zongwe and Choma were visited.

tion on farmers' living conditions and social context, as well as on the information infrastructure, was gathered through transect walks and participatory observations. The expert interviews at the macro level were useful to learn about the status quo constraints and resilience of the agricultural sector as well as agricultural policies and measures to increase it. At the meso level, they served to investigate whether suitable and effective adaptation strategies are already known from the macro level and – if that is the case – why they may not have been passed on to the farmers at the micro level. In other words, proposed measures can be checked in terms of their functional efficiency in both directions – micro and macro. The information obtained from the focus group discussions contributed to identifying key challenges and the level of resilience of small-scale and emergent farmers. (Neubert 2003, 65).

Data analysis

The data was analysed with recourse to the categories from the analytical framework based on the software Atlas.ti that allowed for encoding the interviews.⁷ Single interviews with policy makers and experts are the foundation of the political analysis mostly at the macro level. Statements and positions are analysed against the background of the different functions of interviewees and cross checked either with other interviews, the literature or news media. For the micro level, the focus group interviews, combined with observations and cross checked with single interviews on the meso level, are the foundation. In addition, visits in the field and to farms, which practised conservation farming, irrigation or other technologies as well as extension documents etc. were integrated into the interpretation of data.

Based on this, preliminary multi-level charts were drafted for six selected policies and measures. During a participatory workshop with the national, provincial and district staff of the Ministry of Agriculture and Cooperatives, these results were cross-checked and developed further. Afterwards, a second validation loop took place during a workshop with representatives from the private sector, research institutes, donors and NGOs active in the agri-

7 The programme provides analytical and visualisation tools in order to visualise complex relations between the data material and to interpret it by systematically weighing and evaluating the importance of the data. In accordance with Neubert (Neubert 2003, 39), each interview was analysed individually by adding a code referring to the problem areas and giving analytical significance to the data, i.e. in the form of a remark on a statement or a text passage.

cultural sector. Both workshops initiated a revision of results and finalised with common policy recommendations.

Several methods of triangulation were applied, including the comparison of statements on the same topics made by different interview partners, within focus groups or the research team. Data was therefore also collected in different agro-ecological zones that exhibit different adverse effects of climate change and economic turmoil, as well as different administrative units in the capital Lusaka and at provincial and district level. That way, general tendencies, similarities and differences in the statements that were given on specific issues could be compared with each other (Meuser / Nagel 1991, 466; Neubert 2003, 41).

2.2.2 Sampling of case studies

The case study approach is an intensive study of a single unit or a small number of units (the cases). That allows shedding light on a larger class of similar units, although the unit under consideration is not representative and homogeneity across the sample is not assured (Gerring 2007, 37). To distinguish one or more cases, one can choose a *typical-case* approach, where the typical case exemplifies what is to be considered to be a typical set of values, to give some general understanding of a phenomenon. With a typical case one is able to explain a phenomenon of theoretical interest on a causal basis.

The case selection for this study is based on theoretical sampling. The cases for this study were selected according to typical problems or scenarios farmers face in different regions. The aim is to put up clusters with typical features for the regions under consideration, in order to show what is regarded as characteristic for a high percentage of the population.

Socio-economic group and farm type

This study focuses on smallholders and emergent farmers, because they make up for the most common farm type in Zambia and they produce the bulk of staple food for the country. At the same time, smallholders in Zambia are the most vulnerable and the least resilient within society. But as many emergent farmers are also very poor, this group will also be taken into account. Emergent farmers do have a great potential, if they are resilient enough to cope with climate change and economic shocks, provided that these potentials are valued as such and reflected by congruent policies.

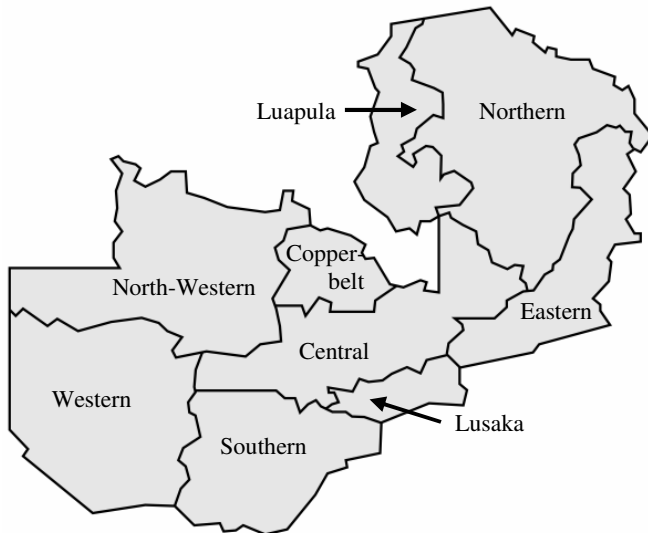
Large-scale farmers are not considered in this study. One reason is that they have different potentials as smallholders, for instance, they can employ rural labourers, which can also help achieve pro-poor development. To analyse these mechanisms would require a different approach. Commercial farmers also manage their farms under different conditions, i.e. their land is mostly fertile and they have a good access to markets. In consequence, the problem analysis would differ significantly. Although commercial farmers are also vulnerable to external shocks, they need other strategies than smallholders do to cope with them. Additionally, commercial farmers in Zambia, mostly have a different background (e.g. foreigners, academics and/or entrepreneurs). Thus, their degree of organisation and their adaptive capacity probably are also different. The conclusions (of such a study) would be rather different. Therefore, it was decided to limit the framework to the two only slightly different groups of farmers: the smallholders and emergent farmers. In fact, it is much more probable, that a smallholder develops into an emergent farmer, than that either one becomes a large-scale farmer.

Selection categories

The case selection for this study was done along four features aiming at a rough but broad coverage of all typical cases of smallholders and emergent farmers in Zambia with regard to the following criteria: climate conditions, farming systems, vulnerability to external shocks and potential for agricultural development.

The three cases selected are located in three provinces and six districts. They lie in three different agricultural zones of Zambia, the sub-humid North-Western Province (Zone III), the climatically most heterogeneous Central Province (Zone I) and the semi-arid Southern Province (Zone IIa) (see figure 4, map 1). This selection covers the most different and typical climatic conditions in Zambia (as described in chapter 4.2).

Figure 4: Maps of Zambia



Source: www.maps.com

Within these different agro-ecological zones the following cases along the above mentioned criteria were drawn:

The **North-Western Province** is dominated by smallholder and peasant agriculture, thus emergent farms are hardly to be found. Farmers grow cassava and maize as staple foods and some also grow pineapple as a cash crop. Most farmers cultivate less than one hectare, though farm land is abundant. Farming systems are simple and based only on the axe and hand tools, and since there is almost no application of fertiliser and fallow phases are constantly declining, soil fertility is declining rapidly. Soils are leached and often very low in pH, thus yields are rather low. Traditionally, livestock has no place in the culture, and farmers do not use animals for traction. Households usually do not achieve subsistence. When it comes to vulnerability to climate change, the farmers struggle with too long rainy seasons and floods, and must try to cope with too much water. Over-all, the potential for agricultural development was estimated to be the lowest compared to the other selected cases.

In North-Western Province, interviews were conducted in the districts of *Solwezi* and *Mwinilunga* (see map 2).

In contrast to the above, the **Central Province** is the area where emergent farmers are more concentrated. Farmers cultivate around five or more hectares of the most fertile soils in the country (Mulemba 2009a, 1). The farming systems are mostly maize based, being both staple food and the main cash crop. Farmers mostly own either draught animals or they have the possibility to hire service providers, who plough their fields. In the selected districts, farms are closer to domestic markets than in the other Provinces and regarding the nearby Lusaka farmers it was suggested that farmers also enjoy better access to technology, irrigation and credits. Thus, farmers should mostly achieve self subsistence. Regarding vulnerability, farmers are expected to be threatened by economic shocks, but they are also expected to have the highest economic potential. Climate change is not yet expected to be a very big issue in the region. It has been suggested that the anticipated potential for agricultural development would be the highest, compared to the two other cases.

In Central Province, interviews were conducted in the districts of *Chibombo* and *Mumbwa*.

In the **Southern Province**, both farm types, the typical smallholder with one or two hectares, and the emergent farmer with more than three hectare are very common. Farming systems are mostly maize based, rotated with cotton as cash crop and ground nuts, but in some flooded areas rice is also grown. Due to the relatively dry climate, livestock husbandry and in particular rearing of cattle is very common. Because of an infestation of livestock diseases in the 1990s, many animals died throughout the region. Thus, the province is the one with the lowest food security. Concerning climate change, the province is the most affected and most vulnerable as it is prone to both drought and flooding. Several streams flow through the province with fluctuating volumes of water, which depend on rainfalls to the north. Irrigation could be practised along the river banks, but in fact infrastructure and access to markets are both bad. Though the province can be characterised as the most vulnerable, it has a high potential if resources are sustainably used.

In Southern Province interviews were conducted in the districts of *Sinazongwe* and *Choma*.

3 Agricultural political economy in Zambia

3.1 Agriculture and politics

Today's agricultural sector cannot be understood without a closer look at the policies of the four presidents in office since 1964, and changes in donor policies in response to a changing global environment.

As in many African countries after independence, the first president Kenneth Kaunda established a socialist system based on state intervention in every sector. The effects in the agricultural sector were government organised marketing structures for agricultural produce as well as provision of inputs and disease control/containment through livestock dips and vaccinations. The understanding of the state was that it directly interferes in management practises, be it to establish distribution systems for inputs such as fertilisers or as an actor to set prices and buy as well as transport agricultural products. However, even though these provisions worked, they were also costly and economically not sustainable, due to huge transaction costs. Additional economic shocks, such as the oil crisis of the 1970s and sinking world market prices for copper, forced Kaunda to increasingly rely on outside funds. Zambia received non-concessional loans from the IMF and

World Bank, and Kaunda's spending continued, resulting in an accumulation of debt. By the time Kaunda adopted the first structural adjustment programme (SAP) in 1984, Zambia was one of the most indebted countries in the world. Nevertheless, the government tried to oppose the regulatory conditions of the IMF and World Bank and stopped repaying its debt. After some donors initiated a short period of freezing funds for Zambia, the government agreed and re-introduced reforms, once more engaging the IMF and World Bank (Fraser 2008, 305).

When Frederick Chiluba took office in 1991, Zambians brought an end to the one-party rule under Kaunda and voted for a more pluralistic system. Chiluba became known for following IMF and World Bank recommendations such as cutting public spending, introducing liberalisation of the national financial market and privatisation of state enterprises in order to create a free market and therefore achieve economic growth (Eberlei 2005, 96; Fraser 2008, 302). However, despite billions of dollars of international aid, the free-market economy failed to deliver prosperity (BBC 2007b). In addition to trying to change the constitution to allow him a third term in office as president (Eberlei 2005, 98), Chiluba was found guilty by a UK court of stealing \$ 46 million of public money (BBC 2007a).

The agricultural sector under Chiluba had to cope with sudden cutbacks in public spending. In fact, there was no agricultural policy in place between 1991 and 2003. All services that had been available under Kaunda, such as fertiliser subsidies (Eberlei 2005, 96; Fraser 2008, 307), dipping and vaccination for livestock development as well as free extension services, stopped immediately. Cooperatives, unions and parastatals, previously responsible for marketing agricultural produce and inputs, were abolished. Small-scale farmers no longer had access to micro-credit that was formerly provided by the Lima Bank (Chooma 2005). The Lima Bank was, like many other micro finance institutes, doomed to failure because loans were often not being repaid.

In 2001, Zambia joined the Highly Indebted Poor Country (HIPC) initiative and reached the completion point by 2005. Consequently, financial support for Zambia increased: Together with the Multilateral Debt Relief Initiative (MDRI), the World Bank provided a total of US \$ 2.7 billion in debt relief to Zambia in 2006.⁸

8 Together with the rising copper price at this time, the debt relief and additional donor funds are seen as additional reasons for the kwacha appreciation of 2005/2006. Windfall revenues flowed into the countries and contributed to the appreciation.

Under the third president Levy Mwanawasa and the so called ‘New Deal’⁹ government, the agricultural sector re-gained importance and with it, the cooperative movement started to rise again. The Ministry of Agriculture Food and Fisheries (MAFF) was renamed as Ministry of Agriculture and Cooperatives (MACO) and the new ‘National Agriculture Policy’ was put in place in 2004, with the aim of growing the agricultural sector by 2015 (Chooma 2005). Mwanawasa began to establish close government-donor relations, working jointly on the Poverty Reduction Strategy Paper (PRSP) as well as on the Fifth National Development Plan (FNDP) for Zambia, which “followed closely international priorities established under the Millennium Development Goals” (Fraser 2008, 317). In 2004, Mwanawasa agreed to implementing the Comprehensive African Agriculture Development Programme (CAADP) to boost Zambia’s agricultural productivity, yet, according to the view of the donor community, he did not strongly advocate the process. The CAADP process was suspended when Mwanawasa died and has been pending since.

After Mwanawasa’s sudden death in 2008, Rupiah Banda, the former vice president was elected following a transitional period. Presumably, he will be in office until 2011. As of now, all agricultural policies that were agreed upon under Mwanawasa will continue to be in place. However, the existing and very rational policy documents are generally not being implemented. The agricultural chapter of the Sixth National Development Plan (SNDP) for the next five year term (2011-2015) has been drafted and is expected to be enacted this year.

3.2 Actors in the agricultural sector

Zambia’s agricultural sector consists of a variety of different actors that interact with varied intensity and frequency at different levels of the political economy. This chapter presents the most relevant actors in the agricultural sector, in order to demonstrate connectivity as well as disconnect between actors in their working relations.

9 Levy Mwanawasa called for a New Deal based on the idea of Franklin Delano Roosevelt, 32nd president of the United States, who used the term to describe a reform programme during the Great Depression. Mwanawasa adopted the term to announce policy changes during his time of office.

Actors in the agricultural sector can be found at different levels of society with different tasks and functions. Apart from state-organised agriculture, there is also an active engagement from non-state actors and the private sector, consisting of seed and fertiliser companies, banks, consultants, NGOs and farmers' unions. Considerable financial contributions come from international donors/cooperating partners as well as multilateral organisations.¹⁰

3.2.1 Government engagement and influence on actors

National development planning was re-established under Mwanawasa, structuring national planning into a three-level-structure: District/ Provincial/ National Development Coordination Committees (DCCs) (Fraser 2008, 317). Ministries that are active in and important for agricultural development are: Ministry of Agriculture and Cooperatives (MACO); Ministry of Livestock and Fisheries; Ministry of Tourism, Environment and Natural Resources; Ministry of Finance and National Planning (MOFNP); Ministry of Energy and Water Development.

National level

The MACO has undergone decades of re-organisation. During the Kaunda era, it was called the Ministry of Agriculture, Rural Development and Water. After 1991, it was the Ministry of Food and Fisheries, before it became MACO after 2001. Presently, the MACO is again in the process of being reorganised. Livestock and fisheries are now under the purview of the Ministry of Livestock and Fisheries (MLF), whereas the MACO focuses on crop production. Whether this is helpful is not yet clear. On the one hand, the division into two ministries might involve additional costs, more bureaucracy and fragmentation. On the other hand the ACF suggested this division, because it gives livestock development a more prominent role, and this could help a faster recovery from the losses in livestock of the last decade and re-engage in livestock husbandry.¹¹

10 The Annex will provide a detailed list of all relevant actors in the agricultural sector, whereas this chapter gives a more detailed description of state-run agriculture and donor engagement in this sector.

11 For a graphic on the structure of the MACO, see Annex 1.

Provincial and district level

At the provincial level, agriculture is organised by Provincial Agricultural Coordinators (PACO), and by District Agricultural Coordinators (DACO) at the district level. Farmers are organised in camps, the smallest administrative unit in the sector, which are managed by camp officers.

The empowerment of lower level structures of governance could play a vital role in delivering services in the agricultural sector, as they are closest to people in remote areas. However, local councils are facing severe financial problems even though many donors preferably invest in decentralisation. According to Farrington, there are tensions between the local and central government, because donor funds are only channelled through the central government and local governments are not permitted to apply for donor funds directly. Additionally, donors concentrate on supporting civil society organisations, leaving out parliament (Eberlei 2005, 101). Therefore, local government planning and management systems and the information base both need to be improved substantially in order for devolution to succeed (Farrington / Saasa 2002, 16). As of now, it is not certain, that direct financing of the local governments would be successful in terms of more effective agricultural extension and training services. The local government might not have enough capacities, and the control system might be too weak to account for the financial contributions and to invest them into success stories.

Cooperatives

Cooperatives act as a link between the government and the people. According to an International Labour Organisation (ILO) definition, cooperatives are

“[...] an association of persons who have voluntarily joined together to achieve a common end through the formation of a democratically controlled organisation, making equitable contributions to the capital required and accepting a fair share of the risks and benefits of the undertaking in which the members actively participate.” (ILO 1966)

Even though cooperatives claim to be independent, in most cases they are state sponsored and therefore often carry out state policies (Öjemark / Chabala 1994). Right after independence, the Zambian government sponsored the formation of cooperatives, with the effect that many only formed because of the financial assistance. Apart from primary cooperatives, there

are also secondary cooperatives in the form of cooperative unions. They are all represented by the Zambia Cooperative Federation (ZCF) which tried to oversee the development and operations of the cooperative movement. The cooperative movement consists of a four tier structure starting with primary cooperatives at the lowest level, then district cooperative unions (DCUs), provincial cooperative unions (PCUs) and the ZCF at the top (Öjemark / Chabala 1994).

Until cooperatives were abolished under Chiluba, they were in charge of the nation's agricultural marketing functions. Under Mwanawasa it was decided to revive the cooperative movement with the Cooperatives Societies Act that aims to promote and regulate cooperative development (Chooma 2005). Furthermore, the office of the director of cooperatives was designed that is now functioning under MACO.

Even though cooperatives have the potential to provide a better marketing and business environment for effective crop marketing or help farmers organise and exchange information, the cooperative system in Zambia is suffering from mismanagement. More and more cooperatives form solely to gain access to fertilisers. The reason for this is that government decided to distribute subsidised fertilisers only to groups of farmers that are organised in cooperatives. District extension officers are supposed to monitor which cooperative is genuine and has genuinely formed and which merely exists for getting fertilisers. However, extension officers do not have the means to visit farmers in order to check whether they have an office and fulfil all the regulations required of a genuine cooperative. If fertilisers were no longer distributed via cooperatives, the movement could go back to the original idea behind cooperatives and make farmers better informed and more productive.

The Food Reserve Agency

The Food Reserve Agency (FRA) was established as a semi-autonomous state agency through the Food Reserve Act of 1996. This happened at a time when cooperatives were still abolished and an institution was needed to fill the gap for marketing particularly in rural areas. It was also established in order to manage the nation's strategic food reserves, stabilise prices and “[buy] a small proportion of domestically produced staple food crops to be released onto the market in the event of poor harvests” (Fynn 2005). The FRA describes itself as the ‘buyer of last resort’, because it buys off the produce of those who cannot sell it. A comprehensive quality check of maize

is being carried out before the FRA buys stocks. Then, farmers receive a receipt that they can cash at the bank. The price (floor price) is set by the government for a designated crop, which is usually maize but can also be rice in some regions. The FRA is being criticised for distorting the market by setting the price¹². The setting of prices is being justified by the agency as a group decision of different stakeholders (ZNFU, Peasant Farmers' Union, Millers' Association, MACO) without the intention to disturb the market, but rather acting as a cushion and equalising price volatility. Others argue that the FRA is no longer fulfilling its role as a buyer of last resort that is responsible for creating buffer stocks. After the 2008 food crisis more money was allocated to the FRA in 2009 with the result that it bought huge amounts of maize stocks at very high prices. However, soon after prices fell the FRA had to account for huge losses. Meanwhile, 75% of the agricultural budget is allocated to the FRA together with the fertiliser programme FISP. Critics reason that food policy plays a crucial role in Zambian politics, which is why FRA's market interventions are of utmost importance for government's attempts to gain voter support.

In some cases farmers receive the money for their maize too late, after the planting season has already started, and thus cannot spend the money on inputs. It is commonly agreed that prices are being set unpredictable, which is a major challenge for farmers. If the floor price that the FRA sets is too high, the policy must ensure that smallholders do not sell and re-buy it at lower prices. If it is too low, farmers do not find incentives to dispose of their yields. The biggest problem is, however, the distribution and the availability of grain marketing that should be assured in order to reach the population. Often in remote areas where there is no market, the services of the FRA are not accessible to small-scale farmers.

12 This was formerly done by National Agricultural Marketing Board (NAMBOARD). Namboard was established under Kaunda as a centralised marketing instrument. Until 1985, it was the monopoly buyer of maize at prices set by the government. Since Namboard could ignore market forces and "determine the gap between producer and consumer prices" (Fynn 2005), it absorbed a huge amount of the national budget and, according to Fynn, undermined the economy. As a government parastatal, Namboard was responsible for the fertiliser distribution. As a government parastatal, Namboard was responsible for the fertiliser distribution (WB 2007d). Even though Namboard was abolished in 1989 many interview partners perceive the Food Reserve Agency as a replacement of Namboard because it interferes in and distorts the market.

Trade Unions and Farmers' representatives

Zambian Trade Unions are organised under the umbrella of the Zambia Congress of Trade Unions (ZCTU). According to Farrington and Saasa (Farrington / Saasa 2002, 14) the unionisation of agricultural labour is weak. A major reason is difficult organisation due to long distances between spatially isolated farms. The Zambian National Farmers' Union (ZNFU) is the most important and visible union in the agricultural sector. It was founded in 1905 aiming to protect the farmers' interest. They are represented at all levels (district, provincial, village) and include all business sectors, i.e. Conservation Farmers' Union, Commercial Farmers' Union. The ZNFU is working jointly with the Ministries of Agriculture and Finance" (Farrington / Saasa 2002, 14) by submitting budget-related proposals.

On the one hand it seems a good idea that the ZNFU represents all farmers' groups with their different interests, because this forum gains a lot of negotiating power and is representative. On the other hand it seems almost impossible to unite the very diverse interests of all farmers' groups. Smallholders generally have different problems and face different challenges than large-scale farmers do. The latter sometimes cover more than one level of the value chain, such as the owner of Zambeef, Zamchick and Zamsugar. In contrast to smallholder farmers, those companies aim at low production costs and raw product prices, in order to be able to offer low prices in the subsequent processing of the value chain. At the same time, huge providers and suppliers have more bargaining power and influence within ZNFU to push their interests, than smallholders do. Under these circumstances it is not surprising that smallholders wanted to separate from ZNFU, partly because they could just not pay the membership fee of US\$ 17 per year. Therefore, they formed the Peasant Farmers' Associations which is called National Association of Peasant and Small-Scale Farmers (NAPSSFZ). However NAPSSFZ seems not yet to be an organisation representing active smallholders.

Extension services

The Ministry of Agriculture and Cooperatives is the main provider of extension services to farmers and other stakeholders in the sector. The services are organised at district level through Subject Matter Specialists, blocks and camps. NGOs and the private sector complement the services of the Government where they are present, e.g. in the cotton and tobacco sub-sectors.

Extension services are provided on a demand basis, but they also exist in a more general form when extension officers visit their constituency to deal with problems of farmers who may not be able to come to them and demand their services. The Ministry of Agriculture and Cooperatives has adopted a participatory bottom-up approach in its provision of extension services. Farmers do not pay for the services they receive from extension agents. Service organisers pay all the associated costs of delivering services. The Government extension services work with various stakeholders operating in the agricultural sector – private sector, Northern Non-Governmental Organisations (NNGOs), International Non-Governmental Organisations (INGOs), cooperatives, associations, unions and Community Based Organisations (CBOs).

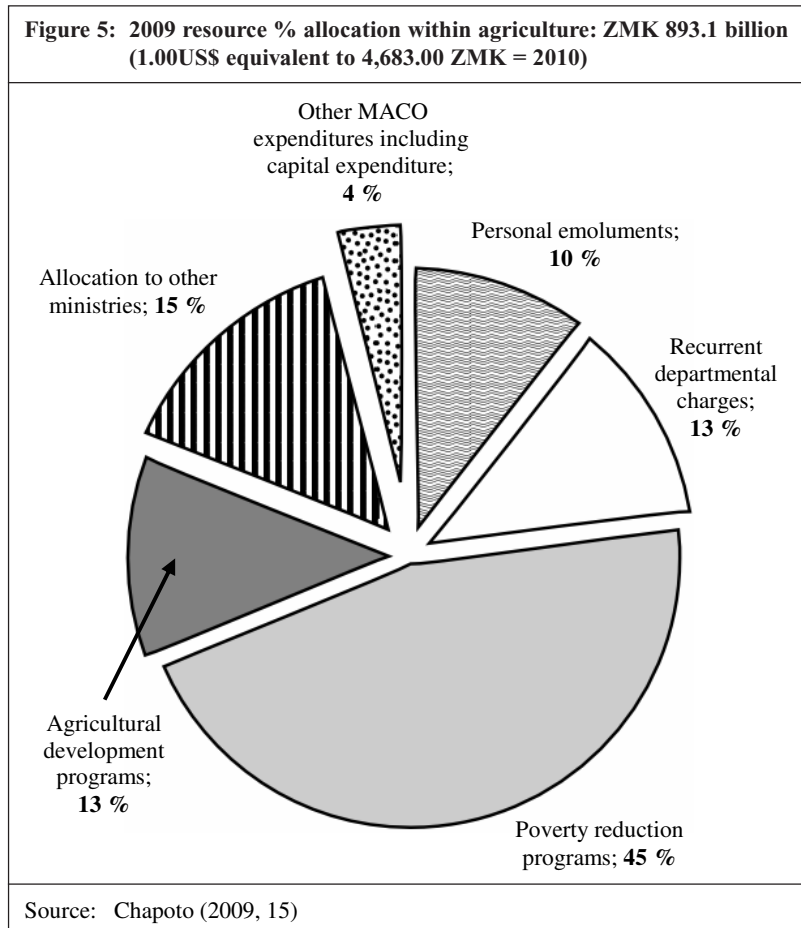
One of the main problems in extension is a lack of finance, but also the lack in means of transport. Therefore, a socially buffered cost sharing mechanism could perhaps provide a solution. Or extension services could be delivered to organised groups and/or leading farmers, who then pass on the knowledge to ordinary farmers, as it is practised for example by cotton companies, in order to strengthen efficiency (see figure 11).

MACO and public expenditure on agriculture

Many experts describe MACO as one of the weakest and least efficient ministries in the GRZ that is blamed for mismanagement of financial resources and funds. Furthermore, the competence of government officials has been questioned. There are several explanations for this:

Firstly, the frequent restructuring of the MACO is part of the problem why responsibilities are not clearly divided and defined. Secondly, the MACO submits its expenditure plan to the Ministry of Finance and National Planning (MOFNP) that only approves a fraction, on average 70%, of the requested budget. The approved budget again does not always reflect the resources that are actually being released by the government (Govereh 2006, 14–16). As a result of this policy, a lot of the projected activities can not be carried out. However, Govereh et al. also say that since 2001, allocation of emoluments for personnel has grown in real terms, but there was not enough evidence to find out whether this increase has resulted in higher wages and benefits or growth in the size of the work force. Fact is that, at provincial and at district level, offices are understaffed and lack the necessary resources (fuel, motorbikes, bicycles) to perform satisfactorily.

Govereh et al. shows in his study of 2006 that the share of the public budget to agriculture has declined from 26% in 1991 to 4.4% in 1999 and has since then not exceeded 6% (Govereh 2006, 7). This low level of public investment is then not efficiently distributed among the six major budget items of the sector: emoluments for personnel, recurrent departmental charges (RDC) (operational expenditure), agricultural development programmes (ADP), capital expenditure, poverty reduction programmes (PRP), agricultural infrastructure spending allocated through other ministries, as well as other public payments to the sector as the following figure 5 shows:



With almost half of the agricultural budget, the major part is being allocated to Poverty Reduction Programmes (PRPs). However, 80% of the PRPs consist of the two programmes Fertiliser Support Programme (FSP) – providing subsidised fertilisers – and the Food Reserve Agency (FRA), which leaves only little to out-grower schemes, farm block and land development, restocking of livestock and disease control, agricultural research and extension projects. Despite a constant increase in budget allocation to PRPs between 2001 and 2006 as well as in 2008 and 2009 in particular to the FSP, a significant reduction of poverty levels could not be observed, demonstrating that the resources are not sufficient and/or have not been used efficiently, as can be seen in table 1 and table 2 (see also WB 2010b).

Table 1: Annual budget allocations to poverty reduction programmes (real million kwacha 2006 = 100), 2001–2006, Zambia

Poverty Reduction Programs (PRP)	2001	2002	2003	2004	2005	2006
Out-grower schemes	0	22	10	2	1	2
Land and farm block development	12 ^a	3	22	18	7	6
Farm institutes and training centers rehab	0	9	4	1	3	2
Livestock restocking and disease control	14	21	10	2	3	3
Fertilizer Support Program	69	53	73	88	149	199
Food Reserve Agency	0	0	364 ^b	59	63	50 ^c
Fisheries development	0	4	5	1	1	1
Rural Investment Fund	44	11	3	2	2	1
Agricultural research	0	4	1	2	2	1
Community extension	0	0	0	1	2	1
Seed multiplication	0	4	2	0	0	0
Other poverty reduction programs ^d	0	8	12	2	4	4
Total	139	138	505	178	237	270

Source: Govereh (2006, 6)

Table 2: MACO poverty reduction programmes (PRP) 2008 and 2009

Category	2008 Actual		2009 Allocation	
	ZK billion	%	ZK billion	%
Irrigation support	5.9	0.7	6.0	1.0
Commercialization of farm blocks	6.5	0.7	0.0	0.0
Animal disease control	9.7	1.1	24.0	4.2
Livestock development	1.8	0.2	3.2	0.6
Fertilizer Support Program	490.1	56.8	435.0	75.6
Strategic Food Reserves	340.0	39.4	100.0	17.4
Cooperative Education and training	0.5	0.1	0.1	0.0
Other	7.9	0.9	6.8	1.2
Total	862.2	100	575.1	100

Source: Chapoto (2009, 18)

Whereas inefficient spending for the FSP will be discussed later on in this chapter, it is important to contrast these 45% spent on PRPs with 13% spent on recurrent departmental charges (RDCs) that are allocated to pay field allowances for Ministry staff, purchase goods and services, purchase drugs, train staff and pay for other contingencies. Therefore, RDCs contain the most essential elements needed for the operational work at district level that is the direct link to the farmers. This is most obvious for PACO and DACO staff who lack the necessary resources to visit and train farmers. In this case, a continuing decrease of RDC allocations correlated with declining efficiency of the workforce. Govereh et al. resume: “*Operational funds are the main driver of productivity change through knowledge generation and sharing with all stakeholders*” (Govereh 2006, 8; Govereh / Malawo / Lungu 2009). Other studies have shown that investment in extension services, among few others, has the largest impact on agricultural productivity and growth (Fan 2008, 10).

Among the staff of MACO, there sometimes is frustration. In fact, many competent and motivated employees drop out of the Ministry if they can, and then start a career as consultants or in NGO’s or donor organisations. Especially for experienced staff, it is sometimes de-motivating, that decision making is centralised in the Ministry and senior employees are not able to accelerate implementation. The decisions themselves are often made after pending for a long time, and then they are made rather *ad hoc* and without necessarily being based on sound data.¹³ Similar problems apply, when it comes to planning, management and organisation. All in all, there is much room for improvement in the Ministry (see also Farrington & Saasa 2002 in Edelman 2009).

Last but not least there is a problem of ownership. Mostly donors are closely involved in the drafting of plans and documents. For their implementation this might be rather problematic, because, as sound policies are often not implemented properly, if they are imported rather than the outcome of domestic political processes.

13 One example for such unplanned decision making are export bans, having been announced here in the past, and then without urgent need and without being based on a sound data. The costs, uncertainties and disincentives for traders and producers from the announcement of export bans can be enormous, whereas benefits are non-existent, if there is no real need for them.

3.2.2 Donor engagement in the agricultural sector

Leading donors in the agricultural sector are the Swedish International Development Cooperation Agency (SIDA), the United States Agency for International Development (USAID) and, as of January 2010, the EU that took over from the World Bank.

SIDA has been active in the agricultural sector for 40 years and has implemented the 5-year Agriculture Support Programme (ASP) that took a household approach with MACO's camp extension officers as facilitators. The idea of teaching 'farming as a business' to households, intended to achieve a sustainable way of common learning and knowledge transfer with the ultimate aim of supporting economic development of small-scale farmers, and thereby reducing poverty.

USAID is emphasising on private sector development, in particular with the two projects Market Access, Trade and Enabling Policies (MATEP) and Production, Finance and Improved Technologies (PROFIT). The aim of MATEP is to increase the export of agricultural products and natural resources, while at the same time trying to integrate Zambia into regional and international markets by fighting export bans and non-tariff barriers to trade. PROFIT focuses on smallholder client production and productivity by reducing costs of production, and extending services to smallholder farmers.

The EU has yet to establish a profile in the Zambian agricultural sector. Under the EU's second focal sector capacity-building of the Country Strategy Paper (CSP) and the National Indicative Programme (NIP) for the period 2008–2013 for Zambia, it was agreed to implement the 9th EDF food security/agriculture project during the period 2006–2010. One component of the project contains a pilot integrated plan to implement the national strategy for food security *"promoting smallholder agricultural production, diversification, marketing and local-value addition in two provinces of the country (Western and North-Western), with involvement of public extension services, NSAs [Non-state Actors] and the private sector"* (EU 2008, 24). This project will be continued under the 10 EDF programmes as well. At the beginning of 2010, the EU financial facility launched a fund of K15 billion for small-scale farmers to increase household food security (EU Financial Facility to Benefit Small-Scale Farmers 2010). Currently, nine NGO projects are being funded by the budget lines Food Aid and Food Security.

“The main objective is to improve the nutritional status and livelihoods of the most food-insecure and nutritionally-vulnerable groups, with a special focus on people living with HIV/AIDS and their households” (EU 2008, 2).

Apart from the troika arrangement of three lead donors, there are about ten donors active in the agricultural sector. Usually there is the differentiation of active and silent donors. Right now, the World Bank, Finland, the Japan International Cooperation Agency (JICA) and Norway are active donors in the agricultural sector, whereas the multilateral organisations International Fund for Agricultural Development (IFAD), World Food Programme (WFP), African Development Bank (AfDB) and Food and Agriculture Organization (FAO) are rather silent.

There are monthly meetings of CPs (Cooperating Partners)¹⁴. The minutes of these meetings are circulated among the donors only and are not shared with the MACO. Once a month, there is also a meeting with the two Permanent Secretaries of the MACO.

There is the ACF (Agricultural Consultative Forum) consisting of donors, MACO representatives and civil society organisations. MACO holds the chair of this meeting and SIDA and USAID are strongly supporting the ACF. The Sector Advisory Group (SAG) meetings are organised by the MACO and usually take place two to three times a year. All these meetings are a result of the Paris Declaration, taking its principles into account. However, harmonisation among donors is not working well. The MACO itself is also not united because it has 11 to 12 program management units which are difficult to coordinate. In terms of overall coordination, the donors are quite well organised.

The Joint Assistance Strategy for Zambia (JASZ) evaluation (2010) shows the status quo of current GRZ-CP cooperation in several sectors. Among them, agriculture is evaluated by *Thomson/ Saasa/ Chiwele/ Gibson*. They concluded that JASZ has not had a significant affect in the agricultural sector in recent years. The fact that there was very little movement with respect to harmonisation, alignment and general reduction in transaction costs for governments, was widely noted. CPs nevertheless found the processes ini-

14 In Zambia „Cooperating Partners“ is a commonly used term for donors, experts, NGO’s and other partners working together with GRZ local organisations in the framework of development.

tiated under JASZ useful as these would have led to a wide sharing of information and cross-CP learning. Although CPs admitted that they had to attend more meetings as part of this increased collaboration, they accepted this cost in the hope that it would lead to better results in the delivery of agricultural aid.

According to the JASZ Report, programme based approaches (PBAs) at sector level are difficult to design and to ensure sufficient multi-stakeholder buy-in in agriculture, as ASIP proved. This would again result from the complexity of the sector and the fact that the role of the state in agriculture is less well-defined, compared to social sectors. Therefore, a starting point would be to lower expectations regarding the extent to which JASZ can work in agriculture. A simpler framework that merely articulates principles and rules of engagement would work better for agriculture.

The JASZ Report further stresses that CAADP Compact provides a chance for MACO to exercise leadership in the sector. Projects found to be inappropriate should be phased out. It would therefore be critical that CPs help to build the capacity of MACO to assume its leadership role. MACO should be assisted to gain a stronger capacity for resource mobilisation by better engaging with the Ministry of Finance in the budgetary process. MACO should also be assisted to demonstrate value for money by adopting tools that will improve transparency of spending and a capacity to reform spending patterns. CPs should take steps to improve the environment for dialogue. Specifically, it should be recognised that MACO is unable to reasonably address the contentious issues of input subsidies and FRA. Discussion on this should perhaps be concentrated at the high level *Evaluation of the Joint Assistance Strategy for Zambia* policy dialogue. The Agriculture Consultative Forum rather than the SAG could handle much of the detailed discussion around these issues and help to refine the policy messages that should filter into high level policy dialogue (JASZ 2010, 102).

The study team agrees with most of the recommendations given in the JASZ Report, except with the ones about PBAs. The reason is not that there is doubt about their little effectiveness in the past. The reason is that PBAs are found to be necessary in order to scale up approaches tested successfully, for instance the e-voucher system, so that all small-scale farmers can benefit from them. It is true, common principles are easier to formulate than implementing common programmes. The former don't have to be opera-

tionalised in as concrete a manner as programmes have to be, but as all stakeholders know, concrete action is urgently needed in the sector. Therefore, the combined power of donors, private sector **and** government is necessary to achieve progress. There is probably no other way around it, than having good ideas that all can agree on, and also implementing them.

3.3 Current policies and possible improvements

Agricultural policies in the past have failed to address the needs of small-scale farmers and improve their situation. Moreover, constant and abrupt changes in policies (i.e. cuts in services, such as input delivery, extension services and subsidies for fertilisers), from the Kaunda era up until today, left little space for farmers to develop possible coping and adaptation strategies. This subchapter shows different stages of agricultural policies and their problems with implementation.

3.3.1 Historical review and policy changes over time

After Zambia's independence in 1964, its agricultural policies were characterised by state intervention and regulation. Table 3 shows how the different economic regimes alternated from a state controlled and regulated regime towards a liberalised and deregulated, free market regime, even though national planning was partially re-introduced.

In the 1980s the Zambian agricultural marketing system was organised by marketing boards, parastatals and cooperatives that had a monopoly in marketing produce, and other government-supported institutions to deliver agricultural services as well as production of commodities to some extent (Hantuba 2004). Government's dominance in the agricultural sector carried out through strict control of retail prices, input supply and actual production caused a cut down on private sector development (Farrington / Saasa 2002, 39).

With the aim of ensuring self-sufficiency in maize, it was heavily subsidised at the expense of other crops, with the effect that other crops were not supported through necessary infrastructure and services.¹⁵ Conse-

15 The maize biased policies root back to colonial times, where mostly white farmers benefited from subsidies and guaranteed markets. Rural Agricultural Marketing Boards (RAMB) had a monopoly of buying maize from the farmers and selling it to the millers. This is how Government intervention in agricultural production begun, which then continued into the post colonial period (Wicherns / Hauser / Chiwele 1999).

Table 3: Chronology of Zambia's economic policy changes	
Period	Economic regime
Before December 1982	Centralised planning and controlled regime
December 1982–October 1985	Decontrols and deregulation
October 1985–April 1987	Highly liberalised regime
May 1987–November 1988	Return to controlled regime
November 1988–June 1989	Relaxation of some controls
July 1989–November 1991	Towards full-scale liberalisation
November 1991–December 2001	Fully-fledged Structural Adjustment Programme
December 2001–Present	New Government in Power with (a) guarded approach to liberation / privatisation (b) the re-introduction of national planning and (c) the development of PRSP
Source: Farrington (2002, 6)	

quently, maize was and continues to also be produced in regions of Zambia that are not suitable for maize cultivation. This one-crop dominated policy was in the interest of the urban population, but it was counterproductive towards achieving a diversified and sustainable agriculture (Farrington / Saasa 2002, 39).

Still in the 1980s, the government started to gradually reduce subsidies for maize and fertilisers following the plan for a balanced budget. By 1994, all subsidies on maize products were abruptly eliminated, with the unfortunate effect that smallholders who had in the meantime grown to depend on these subsidies suffered tremendously (WB 2007, ix).

From 1992 until now, there have been four main policy documents in place, introduced by the GRZ and aimed at agricultural and subsequently economic growth:

1. The Ad Hoc Agricultural Policy Paper, covering 1992 to 1995
2. The Agricultural Sector Investment Programme, covering 1996 to 2001
3. The Agricultural Commercialization Programme, covering 2002 to 2004
4. National Agricultural Policy, covering 2004 to 2015 (GRZ 2009b, 8)

The first paper was the main driver for the implementation of the structural adjustment programme (SAP) in the 1990s. Zambia started a series of reform initiatives to push the liberalisation processes further. This involved the withdrawal of government engagement in production, marketing and distribution of agricultural outputs and inputs, and promoting private sector development in the agricultural sector in the form of participation in production and distribution of agricultural goods and services (Hantuba 2004). Furthermore, parastatals were either being abolished (e.g. Namboard) or privatised (Farrington / Saasa 2002, 39), price controls eliminated, market-determined input and output prices were introduced, and producer subsidies abolished (GRZ 2009b, 9).

In 1996, the Agriculture Sector Investment Program (ASIP) was launched and became the new “*main vehicle*” (Hantuba 2004) for the implementation of agricultural policies in the agricultural sector until 2001. It was established as a sector-wide multi-donor assistance programme with the support of the World Bank, but coordinated and implemented by the then Ministry of Agriculture, Food and Fisheries. According to the MACO’s self-assessment project it was “[...] *a joint public-private sector investment facility to consolidate the government’s policy of liberalisation and market reform [...]*” (GRZ 2009b, 9).

The ASIP consists of four main components:

1. Policy and institutional improvements (policy reforms in the areas of marketing (eliminating subsidies to marketing parastatals), trade and pricing, food security, land use and land tenure)
2. Public investment to complement and support the policy and institutional improvements
3. Private Sector development (creation of an enabling environment and incentives for the private sector)
4. Pilot investment schemes (establishment of a rural investment fund to support small-scale capital investment in rural communities on a matching grant basis and support of the privatisation of government farms (WB 2001))

The idea of the sector investment programme (SIP) was to pool resources and to bring together donors as well as government under a common policy framework and investment programme. This type of financing scheme

was supposed to finance all ASIP activities (Farrington / Saasa 2002, 48; Hantuba 2004). The ASIP was described as one of the greatest institutional challenges for smallholder agricultural development, because credit had to be made available and accessible to farmers (Farrington / Saasa 2002, 41). However, the programme has not been as successful as it could have been. Because of the market reform, government withdrew its support from agricultural financial institutions, which also hindered input supply in the ASIP implementation period. Eventually, institutions had less financial resources to lend to farmers; especially smallholder farmers' access to credit declined throughout the country (Farrington / Saasa 2002, 41). Additionally, only poor crop and animal husbandry was practiced, there were only low levels of farm power and mechanisation, and finally, soil fertility decreased especially in traditional farming areas (GRZ 2009b, 9).¹⁶

The Agriculture Commercialization Programme (ACP) replaced the ASIP. It was designed to implement the agricultural component of the Poverty Reduction Strategy Paper (PRSP). In contrast to the ASIP, it focused on “[...] *increasing the generation of income from farming through improving access to marketing, trade, agro-processing opportunities, agricultural finance services, improved agriculture infrastructure and serviced land, appropriate technology information*” (Farrington / Saasa 2002, 9). However, the ACP almost exclusively focused on private sector development, out of a mistrust of political interest. Consequently, it lacked prioritisation of policies and had only limited funding (GRZ 2009b, 11).

Since 2004, GRZ is implementing the first comprehensive National Agriculture Policy (NAP) that “[...] *is aimed at providing a conducive environment for the growth of the agricultural sector up to 2015*” (GRZ 2004, vi). The vision and policies of the NAP are reflected in the Agricultural Sector Chapter of the FNDP and has been established in a consultative process of all stakeholders. The NAP recognises that the sector's high potential for production has not been fully exploited due to, for example unfavourable weather patterns; but the NAP also recognises policy failures in the 1990s through government interventions or the focus on a single crop, and formulates measures to improve the situation of the agricultural sector. For example, the Ministry of Agriculture and Cooperatives aims to commercialise services that it is currently providing, including cost sharing. Among

16 See also chapter 3.3.5 about the FSP.

these services are research, extension, soil and seed testing, as well as agricultural training (GRZ 2004, ix). The NAP focuses on smallholders, but also recognises the role of commercial farming “*in contributing not only to surplus production for export but also in their linkages with the smallholder sector*” (GRZ 2009b, 12). Even though the regulatory framework of the NAP is well developed, implementation of policies is lacking, mainly due to shortage of finance. The MACO self-assessment report therefore suggests the following improvements for a strengthened agricultural sector:

1. Building the capacity of MACO to provide efficient services to farmers
2. Building the capacity of farmer groups including cooperatives to service their members efficiently through the provision of education, training and other support services
3. Strengthening a legal foundation that is conducive and will guide both private and public sector activities
4. Making proposals to the Ministry responsible for biotechnology on the formulation of legislation and guidelines on the use of biotechnological products as they impact on agriculture
5. Initiating legislation and guidelines on the sustainable use of agro-biodiversity (GRZ 2009b, 13)

3.3.2 Regional policies – the example of CAADP

Zambia’s engagement in the CAADP process could be used to help overcome current constraints in Zambian agriculture. It is a chance to mobilise resources and cooperate with partners. Even though CAADP guidelines are not legally binding, there is a strong peer pressure mechanism at a national (parliament) and regional (COMESA, Southern African Development Community [SADC], and African Union [AU]) level and this is where Zambia has to justify its levels of food security. However, until now the Zambian government has not shown the necessary political leadership needed to take advantage of the process.

Objectives of CAADP

In 2003, CAADP evolved as a programme under the New Partnership for Africa’s Development (NEPAD) which is again an initiative within the AU

and responsible for driving economic integration in Africa. The idea of CAADP is to bring together different stakeholders in the agricultural sector at different levels (national, regional) and to improve agricultural productivity, eliminate hunger and eventually, reaching the Millennium Development Goal (MDG) 1 goal of halving poverty of all participating countries by 2015. The new element of CAADP is that it is approaching agricultural development from an African perspective. Increasing agricultural productivity by 6% annually and investing 10% of member countries' national budget in agriculture are the major principles that have to be achieved. CAADP is based on four main pillars: P1 'Sustainable Land and Water Management'; P2 'Market Access'; P3 'Food Supply and Hunger'; and P4 'Agricultural Research' that are managed by lead African pillar institutions. In the case of Zambia, the University of Zambia (UNZA) is in charge of Pillar 1, developing and nurturing networks of knowledge centres and providing technical backstopping.

Implementation of CAADP

CAADP is being implemented through strategic functions, regional and economic communities, and national roundtables. Because CAADP is a policy framework at a regional and continental level, there is a need for institutions facilitating the implementation of the pillars at a national level, adapted to each country's specific condition. Therefore, national roundtables are being set up in every country, allowing individual governments together with donors to agree on a national pact, the 'CAADP compact', that will help different countries to achieve the four pillars. National roundtables are responsible for aligning state policies with regional priorities and the four pillars. Besides, roundtable processes identify gaps in donor funding, and develop long-term commitments to finance agricultural investment programmes. CAADP provides a framework for donors to align their support and coordinate their investments to the agricultural sector. However, as the World Development Report points out: *"Although these national and regional efforts provide the institutional frameworks for donor support to agriculture, progress in implementation has been slow"* (WB 2008, 24).

As of now, not all countries have signed the CAADP compact. Until April 2010, the following countries have signed: Togo, Burundi, Ethiopia, Sierra Leone, Benin, Mali, Niger, Liberia, Rwanda, Swaziland and Uganda.

Zambia's status in CAADP

Zambia has still not signed the CAADP compact and dates have already been postponed a few times. Experts argue that the hesitant behaviour of the government has to do with a lack of interest and a lack of political will. Some cooperating partners also argue that government perceives CAADP as a donor-led initiative. Others say the government does not want to sign because the MACO wants more than 10% of the public budget to be allocated for agriculture. Nevertheless, the roundtable process is making progress in Zambia after a long phase of stagnation and the discussions pave the way for signing and implementing the compact.

According to a Study of the International Food Policy and Research Institute (IFPRI), Zambia has to allocate at least 18% of the public budget to agriculture in order to achieve 6% annual growth. But even if Zambia were to meet the 6% goal of agricultural growth, Zambia would not meet MDG 1 and halve poverty by 2015. This goal could only be met at a growth rate of at least 10 percent, which appears to be beyond reach. That is why the study concludes that Zambia should focus on the CAADP goal of reaching an annual growth rate of 6% because the number of people living below the poverty line could already be reduced significantly (Thurlow 2008, 44).

3.3.3 The dominance of the mining sector and its influence on agricultural development

Though Zambia is pursuing an economic diversification programme to reduce the economy's reliance on copper mining, Zambia's economy still relies heavily on the revenues from copper exports.¹⁷ In 2010 copper mining contributes 15% of Zambia's GDP, representing around 80% of export earnings. As Zambia's economic growth was negative until the middle of the 1990s (GDP% growth = -1,14), the country started to recover between 1995–2000 (GDP% growth = 2,47) and continued in 2001–2002, which accelerated 2003 (more than GDP% growth = 3,84), when copper prices rose, turning Zambia into one of the fastest growing economies in Southern

17 The service sector employs 9% of the total work force but contributes 49.5% to the GDP. Industries use 6% of the labor force but contribute 31.3%. However, the biggest drawback is that the agricultural sector employs 85% of the population, while it contributes only 19.2%, so a transition from the primary to tertiary sector is required (http://www.economywatch.com/world_economy/zambia/structure-of-economy.html)

Africa. Windfall revenues flowed into the country, mainly caused by the rising copper prices on the global market (Simumba 2008, 3; Cali / te Velde, 2007).¹⁸ The monthly value of production and export increased ten- and nine-fold respectively between January 2003 and July 2006, with the majority of the rise occurring since the second half of 2005, mainly because of rising copper prices. However, real GDP growth rates reached 6% per year from 2005 to 2008. The global financial crisis then caused a drop in copper prices but only for a brief period. Due to copper prices rising again in 2009 and 2010 and because of new mines in the North Western Province, Zambia's copper sector recovered completely from this recent shock and the GDP is predicted to grow again between 5–7 % in 2010.

As is also the case in Zambia, the growth in rent-dependent economies is typically very uneven compared to when growth is achieved through the productive sectors. The reason is, that all resources of the country are shifted into the traditional minerals sector, while the other sectors stay underdeveloped. This rather benefits the rich elites and urban areas, leaving a poorer population in the rural areas. Accordingly, in Zambia in spite of the considerable growth of GDP, the per capita annual incomes of today are still well below levels at independence: 1,5 \$/per capita/ day on average and 2/3 of population belong to extreme poor (Bureau of African Affaires, July 2, 2010), and thus the Gini index is extremely high.¹⁹

But these one-sided economies are also always at risk. Since natural resource prices on the world market fluctuate, they do not have many means to compensate for it. If prices of the mineral resource fall, the overall revenues shrink dramatically, and tax revenues as well as investment capacities drop all of a sudden, affecting the whole economy. But if prices of the mineral resource rise, windfall revenues flow into the country and this can – if no smart policies are put in place - induce currency appreciation. Currency appreciation again can have ambiguous effects. The positive side is that inflation rates go down. But the negative effect is that exports over all, and also in the agricultural sector get more expensive, i.e. loose competitiveness, and thus eventually, the economy as a whole can degrade (including the mineral sector).

18 Other factors were reaching the completion point of HIPC-dept relief in the end of 2005 and a rise in foreign aid.

19 See: <http://www.state.gov/r/pa/ei/bgn/2359.htm>.

This also happened in Zambia. At the end of 2005, and mainly due to the rising copper prices,²⁰ the kwacha suddenly appreciated sharply against the US dollar and Zambia developed symptoms of Dutch disease (Cali / te Velde, 2007, 6; Botterweck, 2006).²¹ Though inflation rates went down, some exports were hit hard. Since this time, Dutch disease and its appearance and importance for Zambia as a whole, but in particular for the Zambian agricultural sector are discussed.²²

Another effect of currency appreciation is that imports get more inexpensive. This again mostly benefits the upper class, who can in principle afford such measures as buying imported and luxury foods in supermarkets.

For the agricultural sector, this effect is again ambiguous: Since agricultural inputs such as imported fertilisers and pesticides etc. also get more inexpensive during currency appreciation, this can partly balance out the increase in export costs of commodities. On the other hand, imports of staple food stuffs can also get more attractive, lowering the competitiveness for the local producers. This also happened in Zambia. As shown by Fynn / Haggblade (2006, 3) imports of maize became more competitive and Zambia tended to import maize with increasing frequency.

As a matter of fact many effects come together and eventually it is often not very clear, which effects overwhelm and/or neutralise which other ones. However, in Zambia, especially the cotton, tobacco and horticultural sector were hit hard as an effect of kwacha appreciation. In contrast to that, the sugar and other sub-sectors in agriculture remained stable.

20 The completion point of HIPC debt relief and the increased inflow of foreign aid into Zambia within the same timeframe were also discussed as additional causes for Dutch disease in Zambia in 2006. However, Cali / te Velde (2007) calculated, that the influence of the rise in copper prices was by far the most important.

21 Dutch disease is an economic condition that in its broadest sense refers to negative consequences arising from large increases to a country's income. Dutch disease is primarily associated with a natural resource discovery, but it can result from any large increase in foreign currency, including foreign direct investment, foreign aid or a substantial increase in natural resource prices. This condition arises when foreign currency inflows cause an rise in the affected country's currency. This has two main effects for the country with Dutch disease:

The end result is that non-resource industries are hurt by the increase in wealth generated by the resource-based industries (<http://www.investopedia.com/terms/d/dutchdisease.asp>).

The term was coined in 1977 by The Economist to describe the decline of the manufacturing sector in the Netherlands after the discovery of a large natural gas field in 1959.

22 See also Botterweck (2006).

But how can governments try to prevent these negative side effects of wind-fall revenues and kwacha appreciation? Lam / Wantchekon (2002) argue that, at least in the short term, elites profit more from growth through rents than through a rise of productivity in non-traditional tradable sectors such as agriculture²³. Thus, it can be advantageous for governments, not to react with smart policies in a pro-active way or immediately after currency appreciation has happened. In such cases, an economic Dutch disease actually turns into a political one.

3.3.4 The Fifth and the Sixth National Development Plan

In 2002, Levy Mwanawasa commissioned the Ministry of Finance to design a five-year national development plan, known as the Fifth National Development Plan (FNDP) 2006-2010. In his foreword Mwanawasa declared:

„The Plan focuses on agricultural development as the engine of income expansion in the economy. My Government is convinced that agriculture offers the best opportunities for improving livelihoods. To this end, the sector has received a marginally higher allocation of the resources. Among other economic sectors that complement this focus, either directly or through inter-linkages are infrastructure, tourism, manufacturing, mining and energy. The sources of economic growth as identified by the above sectors constitute the economic sub-theme of the FNDP (GRZ 2006, i).“

The FNDP was meant to cost K62,623.22 billion over a period of five years financed by government and cooperating donors. Some authors (Eberlei 2005; Fraser 2008; van Donge 2007) view the FNDP as a Zambian initiative to counteract past donor-driven development policies such as the Poverty Reduction Strategy Papers (PRSP)²⁴ and Structural Adjustment Programmes (SAP). However, the development of Zambia, and in this case the development of the agricultural sector, still depends on donor's financial support.

23 It is called “non-traditional tradable sector”, because the traditional tradable sector is the mining sector here.

24 PRSPs contain an analysis of the poverty situation, a strategy to eradicate poverty, and advice on how to implement and monitor the process (IMF 2008).

The Mid Term Review of the FNDP of 2009 could only present a marginal reduction of poverty levels (1998: 73%; 2004: 68%; 2006: 64%) and even an rising trend in rural poverty (2004: 78%; 2006: 80%). The average GDP growth of 6,1% (2006–2008) has not translated into major changes in poverty. Despite a number of new policy initiatives²⁵ and structural reforms, the agricultural sector delivers a poor performance. Instead, growth has been oriented towards few sectors that are capital intensive, and thus do not contribute significantly to job creation (construction, mining, tourism, transport, communications) (GRZ 2009a).

Under the current president Rupiah Banda, the Sixth National Development Plan (SNDP) is being drafted. Just as the CAADP compact was based on the FNDP, the SNDP is now based on CAADP as well as on the NAP.

The agricultural chapter of the SNDP again highlights agriculture as the key priority sector in Zambia and the challenges still remain the same. Reviewing the FNDP, the SNDP acknowledges that the aim of increasing sector growth could not be achieved due to *“unfavourable weather conditions in the country coupled with late distribution of inputs; constant outbreak of livestock diseases; inadequate budgetary allocation to the priority FNDP programmes as well as unpredictable export bans that affected the investment environment”* (GRZ 2010, 4).

The SNDP presents five programmes that should be implemented by 2015 that are in line with the four pillars of CAADP. These programmes are:

1. Sustainable Land and Water Management
2. Agricultural Production and Productivity Improvement
3. Agricultural Marketing Development and Investment Promotion
4. Food and Nutrition Security
5. Research, Seed and Extension Enhancement

However, the SNDP fails to give concrete examples or a timeline for the implementation of these programmes. It does not take into account how farmers can adapt to adverse external circumstances such as climate

25 Such as a revision of the legal framework governing the cooperative movement, draft Cooperative Development Policy (CDP), review of the Fisheries Act, Agricultural Marketing and Credit acts, formulation of Aquaculture Development Strategy, National Irrigation Policy and Plan (NIP), Irrigation Development Fund (IDF).

change, but also economic shocks. It mentions the implementation of a voucher system for agricultural inputs and simply lists “Electronic voucher for farm input subsidy programs” under investment profiles for the implementation of the Agricultural marketing development and investment promotion programme, without explaining how such a system could be implemented. The SNDP identifies the promotion of crop diversification or livestock development, building marketing capacity in the private sector and strengthening agro-dealers, but these, and other strategies degenerate into a wish list that lacks a serious plan for implementation. The SNDP entails an agricultural sector budget for each programme for 2011 to 2015, although these numbers will hardly display the actual amount that will eventually be disbursed.

In conclusion, the agricultural chapter of the SNDP lacks concrete recommendations, as will be outlined in the next chapters. This is also due to the fact that the SNDP is a general policy framework paper that has to be as vague as possible in order to unite different stakeholder opinions.

3.3.5 The effects of maize policies on the markets

Maize is Zambia’s staple food. It was introduced during the colonial period, being seen as the ideal crop to feed the urban population. As price policies and input subsidies were solely concentrated on maize, this led both to one-sided farming systems and one-sided consumer habits.

Today, the traditional dish ‘nshima’ is a part of almost every traditional Zambian meal and is integral to everyday life. Therefore, maize production is an essential part in Zambia’s strategy for food security. Between 1991 and 2004, maize accounted for more than 60 percent of cropped land, and more than 70 percent of land cropped by smallholders are still under maize (ACF 2008, 8). 30 percent of smallholders also sell their maize (Govereh 2007, 2).

If the agro-ecological prerequisites were present, such one-sided emphasis on maize cultivation would not be such a big problem. This is the case in many of other countries, such as many Asian countries that concentrate their crop system on very few types of crops, like rice cultivation, and thereby secure their basic nutrition. In Zambia, however, there are agro-ecological zones, e.g. North-Western and Southern Province, that do not offer favourable conditions for maize cultivation. This situation is aggra-

vated by the effects of climate change (see chapter 5.1.2 for the effects of climate change on Zambia's agriculture).

For that reason and in order to achieve higher yields and productive farming systems, diversification of maize varieties is necessary as well as the cultivation of other crops that are more suitable for the respective agro-ecological zone and that have other nutrient requirements in order not to deplete the soils.²⁶ In addition to the fact that a one-sided agricultural farming system encourages the growth of weeds, which are very difficult to eradicate, it provokes a higher infestation with pests, when insects and fungi find the same host year after year. Thus, crops rotation and mixed cropping are also an important strategy for lowering risks and costs, and also some of the work load, as massive infestations of weeds and pests are avoided.

What is problematic and not easy to bring about is a shift in diets and eating habits. Most Zambians prefer "nshima" that it is made from maize rather than out of cassava or other crops.²⁷ As a matter of fact, Zambians could keep it, as long as they change the proportions and enrich their diets with other components such as vegetables, beans and/or sweet and Irish potatoes etc. that all grow in Zambia with no problems. In fact, this would be very important just to improve nutrition and health.

If Zambia wants to develop its food security sustainably, a policy is needed that secures stable markets especially for the trade in maize, as described briefly in the following paragraphs. However, volatility in world food prices as well as unpredictable GRZ intervention and control are threatening both the development of a flourishing domestic and export maize trade,

26 In comparison to other cereals, maize has relatively high nutrient requirements and can thus easily deplete soils, when fertilisers are not applied or inadequate. Maize fields are also prone to erosion if it is grown as a single crop and without mulching. Furthermore, high yielding varieties of maize are susceptible to pests. Thus, the production risks for maize are higher compared to other cereals.

27 But diets also evolve and change over time. In fact, before maize was introduced, "nshima" was made from sorghum, millet and cassava. According to Zambians, the most important hindering factors for eating "nshima" from other crops the following: i. they lost the knowledge on how to prepare it, ii. the taste is different and not so good; iii. "nshima" from other crops is considered a poor man's food. Thus, it would require some awareness raising and training on how to prepare non-maize "nshima", and it could become attractive as an alternative for the population.

and a vibrant private sector. The study by Chapoto / Jayne (2009) highlights three findings in current GRZ pricing, marketing and trade policy tools and analyses, whether those actually help to stabilise the price of maize.

1. Government purchases of maize through the FRA seemed to influence regional market prices. For example, FRA maize sales were found to lower prices for sales in the following month. Usually, the market is exposed to seasonal price fluctuations: After harvest, prices are usually low compared to rising food prices during hunger periods. *“Unfortunately, government maize sales at below-market prices disrupt this seasonal pattern in maize prices, which then reduces the returns to private intra-seasonal grain storage”*. However, the FRA generally appears to be moderating the extent of seasonal maize price rises.
2. The use of altering maize import tariffs and banning exports has negligible effects on the mean price. This is only assuming that the informal trade has hardly any influence on prices of these trade policy tools.
3. There are unintended effects on maize price levels resulting from time lags between announcing policy changes and actual implementation or execution of these policies. For example, for every additional month that imports are delayed after the announcement, prices rise again by a similar amount each month.
4. Trade policies of the Zambian government are actually making the market more instable. *“Most of the instability appears not to be associated with FRA maize purchase and sales activities (...), but rather the uncertainty of the timing of changes in ad hoc government trade policies. Price unpredictability tends to make trade riskier and raise the implicit risk premia that traders build into their trading margins”* (Chapoto / Jayne 2009, vi-viii).

Concluding, Chapoto and Jayne suggest promoting more ‘rules based’ approaches to marketing and trade policy that may reduce the level of policy uncertainty and the price instability associated with it, meaning that leaders are bound to act according to predefined rules and triggers. This could eventually lead to long term private investment in the development of markets (Chapoto / Jayne 2009, viii).

Since Maize has always been a political crop, its future direction should be considered in conjunction with political developments (JICAF 2008, 1).

3.3.6 The effects of fertiliser subsidies – from FSP to FISP

Even though fertiliser subsidies have been disapproved of in a lot of sub-Saharan African countries for a long time, there has been a comeback of this type of government support. Especially in the 1970s and 1980s fertiliser subsidies were distributed by state-owned monopolies that had to be abolished, both in the course of liberalisation and the prescribed austerity measures by international financial institutions. The current debate in sub-Sahara Africa justifies the use of fertiliser subsidies as a productivity booster that is necessary to assure food security and agricultural development. The global food crisis in 2007/2008 was another reason for governments to detain subsidies for higher crop yields. Sceptics of fertiliser subsidies emphasise the high opportunity costs that accumulate when public funds, needed for market development and the development of public goods, are re-allocated for that purpose. Furthermore, they see the development of the private sector in danger. Supporters perceive fertiliser subsidies as the only way to *“jump-start African agriculture and deliver concrete food security and income benefits to the rural poor”* (Minot / Benson 2009, 2).

In Zambia, fertiliser subsidies were re-established under Mwanawasa. The Fertiliser Support Programme (FSP) was launched in 2002 as a government initiative responding to the poor performance of the agricultural sector. The distribution of fertilisers that is subsidised at 75%, was thought to benefit 200.000 small-scale farmers who would otherwise not be able to afford inputs. The subsidised package included both basal and top dressing, as well as seeds. Two supplier companies were contracted to deliver the fertilisers to countrywide depots on time. Farmers could then collect their inputs from storage sheds, satellites depots or other farms. The idea was not only to assist farmers and secure household food security, but also to support the private sector companies and to build capacities in order to improve the use and provisioning of fertilisers and related inputs.

However, the FSP, despite increasing disbursements, failed to significantly reduce poverty and can therefore be considered as inefficient. There are several reasons why the FSP failed to deliver the expected positive results:²⁸

28 A variety of articles and publications discuss the same problems: ACF (2009); Kachingwe (2009); Muleba (2008); WB (2007c).

1. Poor targeting

The aim of targeting the most vulnerable farmers with the FSP could not be met. The process of identifying the beneficiaries for fertiliser subsidies by District Agricultural Committees was untransparent. The system does not lay open how the beneficiaries are chosen and there is no measure to prevent that some farmers benefit more (and more often) than others, even though they might not be the most vulnerable and might not be as dependent on subsidies. There have been many cases where members of the District Agricultural Committees and the Cooperatives have discriminated against other farmers or cooperative members to their own advantage.

2. Black market and side-selling

Many farmers sell their fertilisers to other farmers at higher prices, instead of applying it to their crops. The reasons are: i. profit margins for side-selling are high ii. there is always an urgent need of money, iii. in some areas, fertiliser response is low, due to deficiencies in other nutrients, which are not included in the subsidised package, iv. production risk for maize stays high, also when fertiliser is applied.

Other forms of misuse of fertilisers have been both theft by MACO staff or agents of suppliers, and officers charging farmers more money than necessary for the inputs.

3. Late delivery

Fertilisers are often delivered late. Every day that fertilisers are applied too late, results in loss of harvest of 1 to 1.5%. Even though fertilisers are supposed to be delivered in September, farmers very often only receive their inputs in late November or even December. This also has to do with poor infrastructure, either poor rural roads or logistical mismanagement.

4. Lack of extension

Fertilisers are given out without training. Many farmers do not know how to apply the fertilisers in the optimum way and which fertiliser is suitable for their soil. One of the problems here is that usually only one type of fertiliser is distributed, and the same applies to seeds.

5. Insufficient quantity

The quantity of fertilisers and seeds, which farmers receive, is mostly only sufficient for one hectare or less. So farmers try to increase the ben-

efit by decreasing the quantity of inputs applied per surface unit. This practise often does not pay off. On the contrary, it tends to result in higher work loads but lower yields, because of larger surfaces to be prepared, increased weeding requirements and erosion risks as a result of wider planting distances and of course due to the persistent lack in nutrient supply.

Even though the MACO is well aware of all of these problems, the FSP was still considered a success:

“Overly, however, even after taking into account all these deficiencies in the programme, Fertiliser Support Programme has been done successfully in that those areas where there were no thefts and abuse, the beneficiaries managed to plant according to their area rain patterns and are expected to have good yields and harvest, current weather conditions remaining the same.” (GRZ 2009c, 3)

The FSP was heavily criticised by donors, the Agricultural Consultative Forum (ACF), Conservation Farming Unit (CFU) and other NGOs for all of these deficiencies that the government at last revised the FSP and renamed it to Farmer Input Support Programme (FISP). Apart from renaming the programme, the FISP is now supposed to have widened its approach, no longer simply focusing on fertilisers and on maize, but also on other inputs and crops. But it also reduced the size of the input package distributed to farmers. Since the FISP was only started in the season 2009/2010 it is still too early to conclude whether other problematic issues could be addressed. However, as the structure has not significantly changed and many of the problems are not addressed, it is questionable whether the FISP is a real improvement over the FSP.

Initiatives to tackle these problems have been developed in the form of a voucher system that has been tested as a paper version and in electronic form. In a study of fertiliser subsidies in Malawi and Zambia, Isaac Minde also discusses suitable mechanisms that have to be developed, in order to identify poor households, channel vouchers to them, and provide them at reasonable cost including compensating for losses (Minde / Jayne / Crawford 2008, 3).

According to Minde, the government should on the one hand increase farmer’s demand for fertilisers and provide the necessary infrastructure. On the other hand government should establish a supportive policy environ-

ment that attracts local and foreign direct investment. Simultaneously, extension services need to provide farmers with knowledge on the correct application of inputs.²⁹

The rural enterprise and agri-business project in Zambia found out that there is a linkage between the availability of fertilisers and the distance of farmers to where they can access inputs. The conclusion is that if farmers had access to inputs in rural farming communities, all year round, it would improve planning farming operations and achieve significant improvements in the efficiency and effectiveness of input use (Siame 2005b, 3).

The e-voucher system for agricultural inputs is one possibility to tackle the existing problem. It has already been piloted in some provinces and is supported by many donor initiatives. This e-voucher system is one of the recommendations of this study to increase agricultural productivity, and will therefore be discussed later, on proposing how to implement such a system at various levels.

3.4 Markets and marketing structures

Zambia's opportunities to achieve agricultural development strongly depend on the existence of functioning markets for agricultural produce. Therefore, it is crucial to recognise the relevant structures of all markets – domestic, regional and export – as well as assessing the chances and constraints for improved marketing. The following subchapter will outline basic characteristics of the Zambian agricultural markets.

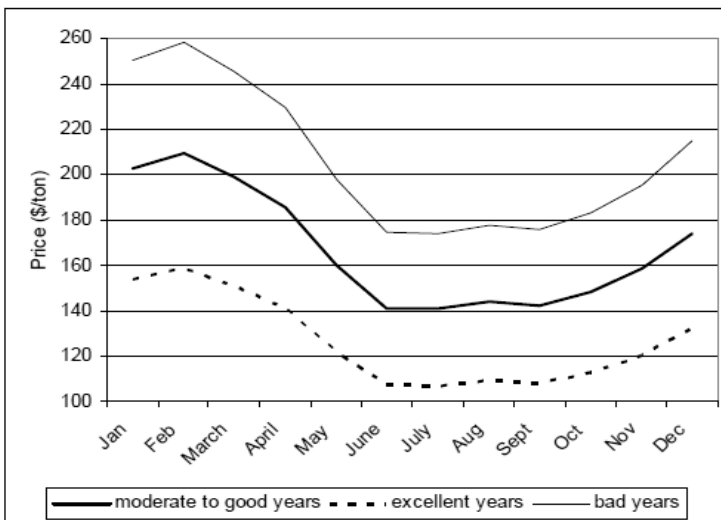
3.4.1 Local and domestic markets

Maize as the main food crop is also the main cash crop for the domestic market in Zambia, followed by rice, cassava, groundnuts, soy beans and vegetables like tomatoes and cabbage. According to MACO forecasts for the 2009/2010 season, overall maize production accounts for 1.2 to 1.6 million tonnes. Millers buy the maize and produce mielie-meal.

29 Minde et al recommend promoting farmer's use of improved crop management in order to use fertilisers more efficiently, i.e. crop rotation with legumes, changes in density and spacing patterns of seeds and placement of fertilisers and seeds at planting, applying fertilisers according to rainfall, water harvesting and conservation farming methods (Minde/Jayne / Crawford 2008, 4).

Most smallholders sell a part of their produce directly after harvesting, when prices are lowest. During the off season they usually need more than they have kept for their own consumption, so they buy maize back at the end of the marketing season, when the prices are highest. This anti-cyclical purchasing behaviour is due to the urgent need of cash after harvest, insufficient storage facilities, lack of market information and high market risks. As figure 6 indicates, the prices for maize vary around 30–60% during a season in Zambia, making it understandable why most smallholders in Zambia complain about high food prices more than they do about low prices (see also Jayne et al, 2001, 18). The lower the yields, the more pronounced are these price differences during the year.

Figure 6: Seasonal price fluctuations for maize



Source: Haggblade (2006, 3)

In Zambia, access to markets is a major problem for smallholders. Many of them live in remote areas where means of transport are rare, distances to towns are great and good roads are lacking. The link between farmers in remote areas and the markets is often provided by traders whose role is at the centre of many debates on marketing in Zambia. These “briefcase

traders” visit the farms directly and pay for their products in cash (or sometimes also in exchange for second hand clothing). Farmers often describe them as cheaters and extortionists, but they often constitute the only opportunity for farmers to market their products. In fact they are the winners of seasonal price fluctuations, since these fluctuations are much less pronounced in Lusaka, so that they benefit from the difference.³⁰ On the other hand farmers tend to underestimate the high transaction costs for traders, as they have to hire transport, tackle long distances on bad roads and they often spend a lot of time collecting a truckload of produce, eventually selling it to larger traders or millers.

But also formalised markets in Zambia are difficult for smallholders. They are dominated by powerful international food companies. Supermarkets like Shoprite play a key role in the selection of agricultural products, and their monopoly position as the only supermarket in many towns allow them to dictate producer prices.³¹ As smallholders often have the problem to meet the quantity and quality requirements and to achieve standard sizes etc., the supermarkets often do not accept their produce.

Farmers could often achieve much better prices if their bargaining power were increased. This could be done by joint marketing within their community or cooperative, and would both reduce the transaction costs for traders and increase the negotiation power of the farmer groups towards the traders.³² In addition, farmers need to have information about prices for produce on district markets to make realistic and profitable business decision with traders. This is still a problem, though the lack of market information is already being recognised by several stakeholders in the agricultural sector, and several projects have been established to provide this information by a weekly bulletin (compiled by the DACOs) and also with a text message service by mobile phone (see also Felgenhauer 2008).³³

30 In interviews with farmers and farmers’ representatives it became clear that there are some cases reported where farmers were cheated by traders, e.g. by incorrect weights. Thus, some NGOs call for a licensing system for traders to make the market more transparent.

31 As stated in several interviews, some farmers in North-Western province can sell their produce to Shoprite, mainly unprocessed products like honey and pineapples.

32 However, cooperatives rarely function, as farmers often do not trust each other as some have had disappointing experiences in joint marketing.

33 See also <http://www.agritrade.co.zm/>. One large problem is that there often is no communications network, so the use of the mobile phone is very limited in rural areas.

Thus it would be very important to link deficit regions with surplus regions through the construction of an improved system of rural roads. Together with better price information, this would lessen the power of briefcase traders and smooth out seasonal price fluctuations, and as a consequence increase farmers' choices and food security.

Lack of storage facilities

Another reason, why farmers feel forced to sell their produce early after harvest and at any price is the fact that many farmers do not have good storage facilities – either their own or communal. This would allow storing the produce for some time until the price increases while maintaining the quality of the produce and avoiding significant post harvest losses. Moreover, government officials emphasised that storage systems are necessary in times of long rains when farmers need to dry their harvest for achieving the optimal level of moisture for marketing. Policies to promote storage systems at individual and at the community level were mostly put in place in the 1990's (e.g. the rural investment fund), but many sheds that were established at that time can not be used anymore for lack of maintenance.

Another cause for the diminishing ability and/or motivation of farmers to store maize, is the lower suitability for storage of the hybrid maize varieties compared to traditional varieties. Many of the common and mostly single cross varieties are dental corn, which makes them more easy prey to post harvest fungal and insect infestation than the lint corn of traditional varieties. Thus, stocks with dental corn maize require post harvest treatment. On an individual basis this is very difficult and expensive for smallholders to provide. Another solution would be to grow double cross or triple cross hybrids, being less susceptible to diseases in general and having better storage characteristics. The challenge here is the access to and the high prices for seeds (see 6.3.5).

Processing and value chains

During the first republic, there were several opportunities for processing other agricultural raw products like pineapples and rice, but they later failed due to a lack of investments and mismanagement. Now, as government representatives pointed out, only few processing opportunities are left such as sorghum for Zambian Breweries, soy beans being processed for animal feed and sunflowers for cooking oil (besides some honey production at small scale). To improve the value chains, for instance through the estab-

ishment of processing plants in nearby towns (e.g. pineapple juice plant, see 6.1.1) or through enabling farmers' groups to do the first stage of processing themselves (e.g. by processing peanut butter and/or oil with simple equipment and at a small scale) is therefore crucial in order to preserve the produce until it can be marketed, and thereby establish profitable niches for diversification.

Concerning the Zambian textile industry, a sharp decline has been reported in this sub-sector from around 140 companies operating in the 1980s to less than 10 still competitive in 2004. Suffocated by the influx of cheap imports, most companies in the weaving, knitting and garment industry are surviving by supplying local niche markets, such as school uniforms, protective wear of miners, and professional uniforms, where they are competitive in services and delivery. However, there is hope, that the expansion of the mining sector in North-Western Province can have a positive spill over effect on the textile industry, and there might also be windows of opportunity to approach exports markets for textiles and clothing in COMESA member countries (Koyi 2005, 1 f.). In fact, it could be very important for the Zambian cotton sector to diversify its markets, either on the regional scale or through product diversification in order to increase the ability to cope with international price fluctuations.

But also for other products, the environment needs to be friendlier to intermediary companies, who do processing, packaging, quality control etc. Regarding foreign direct investments for agricultural production, they can only be attracted, if infrastructure is improved. Not least, the main constraints to exports are not the policies *per se*, but the lack of speed and efficiency of government services (i.e. in tax clearance, bureaucracy).

Food security and growth: potentials on the domestic market

Though the improvement of domestic market access and bargaining power of smallholders are crucial, and the storage as well as processing systems should urgently be improved, food security and agricultural growth cannot be achieved by relying only or foremost on the domestic market in Zambia. Unlike in Kenya and other highly populous and dynamic African countries, where the domestic market still has a huge potential, the domestic markets in Zambia are rather small and stagnant, for which the following reasons are the most important:

- Low consumption rates in towns and rural areas, because of low purchasing power as a result of very high incidence of poverty
- Constant and low population density outside of towns and thus only a low and stagnant number of consumers
- Low life expectancy due to bad community health (incl. HIV/Aids)

Only in Lusaka and in specific regions, where the mining industry is expanding, as presently in Solwezi, significantly growing demand can be expected.

Therefore, the integration of regional and overseas trade regimes for food and cash crops is necessary in order for Zambia to achieve both real food security and higher income.

3.4.2 Regional and overseas export markets

Zambia is a landlocked country. Therefore, overseas exports generate higher transport costs for the marketing of produce and the transport of inputs, together accounting for around 60–70% of the overall production costs of goods in general (CSTNZ/CSPR/JCTR 2008, 32). Major export crops are sugar, cotton, horticultural products, flowers, coffee and tobacco, being marketed with very different and also changing levels of success during the last decade. Though in the last ten years non-traditional exports as a whole were increase yearly by 12–31%, in 2008, the exports of agricultural goods together still only accounted for less than 10% of the overall Zambian exports (Ndulo / Mudenda / Ingombe 2009, 14). This is a low percentage, but as table 4 indicates, agricultural exports have clearly gained in importance over the last decade. In fact, it must be seen, that some attempts of the GRZ, supported by different programmes of the EU and USAID (incl. MATEP and PROFIT) in order to diversify the national economy were at least partly successful.

Even though Zambia is landlocked, it has high export potential, as it is surrounded by eight neighbour countries and so has many traditional and potential trading partners within the region. As a member of both the Common Market for Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC), there is a huge potential to strengthen these regional markets. This is most true for South Africa, the

Democratic Republic of Congo and Angola, being the richest of these countries, that also have the largest and still growing demand for commodities.³⁴

Table 4: Export markets of Zambia	
Product	Export market
Sugar, copper rods, copper wires and cables, fresh produce, textiles, coffee, tobacco, cotton, honey, beeswax, timber & wood products, minerals, leather, handicrafts	South Africa, USA, EU
Sugar, maize, timber, hydrated lime, limestone, slaked lime, tea, electricity	Zimbabwe, Congo
Sugar, wood & wood products, cement	Burundi, Rwanda, Botswana, Swaziland
Eggs, beef, sugar, tea, electricity, wood & wood products	Angola, Kenya, Malawi, Tanzania, Namibia
Gemstones, minerals, lint cotton, coffee, tobacco, handicrafts	Asia
Source: CSTNZ/CSPR/JCTR (2008, xiv)	

According to the literature, but also to interviews, the regional markets still have a very high potential to develop. This is particularly true for exports to Congo coming from North-Western Province. In Congo and especially in its border region, demand is very strong and exports could easily be strengthened by high and stable prices throughout the year.

Aside from improvements of the markets for typical export crops, maize also needs better export marketing, as only through formal and informal cross-border trade, bigger fluctuations in yield and prices can be absorbed. Such a regional market for maize and other commodities could help to reduce price volatility and food insecurity, as is also outlined in the next chapter.

34 In 2008, SADC accounted for 31% of exports, COMESA for 12%, the EU for 11%, Asian countries for around 16% and Switzerland for 30%(!!) (CSNZ/CSPR/JCTR 2008, 65).

3.5 Political interferences in markets, the private sector and how to improve some marketing constraints

Based on the description of agricultural markets and marketing in Zambia in chapter 3.4, several policy reforms need to be applied to improve agricultural marketing, particularly small-scale crop marketing. This chapter focuses on the role of the different market actors that are relevant for implementing policy reforms: the farmers, the private sector and the state. The topic of cooperatives and associations is being excluded here, as it has been recognised in this study as one of the crucial mainstream issues, and will be discussed exclusively in chapter.

Farming as a business

In Zambia, where agricultural activities are a traditional source of income and a mainstay for the majority of the rural population, farming is overwhelmingly considered a 'lifestyle' rather than a 'business'. It can be estimated that among the 800.000–900.000 households classified as smallholders, about 600.000 can be considered as rural peasants engaged in farming in spite of a lack of knowledge of agricultural practices and market-orientation. Many farmers do not have the skills to calculate their costs for growing and marketing, which makes it difficult for them to assess profits and consequently make sound business decisions. This situation is not improved by extension services that often similarly lack the capacity to conduct contribution accounting, calculate crop margins and train farmers on business-oriented farming.

In order to react to this situation, a number of organisations have introduced 'farming as a business' programmes that are supposed to help farmers develop the necessary skills to run their farms like a business entity, and thereby increase their income. Most notably, SIDA has promoted farming as a business on a larger scale through its Agricultural Support Programme (ASP). Donor representatives emphasised that, despite the approach being non-distributive (in terms of inputs or money) and focusing on coaching only, it has produced remarkable results and helped farmers tap their productive potential and improve their livelihoods within a relatively short period of time.

The farming as a business approach follows a number of steps that are supposed to create skills and awareness among farmers to professionalise their

activities with each replication, as the whole process takes one growing season, due to the dependency on rain-fed agriculture.

1. Information is provided on market issues and the current situation in agricultural markets (ideally through extension officers)
2. The farmers formulate their goals for the coming year in terms of income generation and livelihood (i.e. be able to send their children to school etc.) whereupon, an action plan is put together
3. The available options are checked (gross margin budgets) and the necessary decisions are made
4. A business plan is designed, which includes training on cash flow and budgeting issues
5. Production
6. Sale/marketing
7. Monitoring/evaluation/writing records, so farmers know what goes wrong and what goes well
8. Revision of past goals and processes
9. A new action plan is put together

However, a major criticism of this approach lies in the replicability due to high costs that are caused by intensive training and monitoring. When the programme was phased out, SIDA asked MACO to adopt the approach, but the ministry declined because of the high expenses.

Role of the private sector

In theory, the private sector could be the main driver for agricultural development, while government is mainly responsible for providing the ideal business framework and the major public goods such as education, health and infrastructure. However, for the private sector to become fully involved, there is a need for predictable public policies and avoidance of market distortions.

The increased participation of private actors in the agricultural sector is being discussed particularly to improve the provision of agricultural inputs. The current division between private agribusiness and public provision of subsidised inputs is said to be very ineffective and also hampers the estab-

lishment of a comprehensive private market. Consequently, an improved system of input provision, as proposed for the e-voucher system, but possibly also in form of the innovative seed promotion and production systems as outlined in chapter 6.4 transfers the responsibility of the GRZ to private agribusiness traders.

Another positive role for the private sector is being proposed in establishing storage systems for improved agricultural marketing in Zambia. Traders and millers both have an interest in an ensured supply, and also in improved quality of the produce. Storage can help to make markets more transparent and improve the quality of produce. Therefore, the private sector shows an increased interest in the establishment of a functioning storage system.

With regard to the provision of extension services, however, the role of the private sector is being discussed ambiguously by a number of interviewees. On the one hand, government's failures and distinctive pilot projects by the private sector in providing sound extension services – and also credits – indicate the potential role that the private sector could play. On the other hand, it has also clearly been stated that this would only work for selected cash crops where private companies are interested in processing and/or the market. But as a matter of fact, this is not necessarily such a disadvantage. Farmers can, wherever possible, create spill over effects and apply similar techniques to their food crops, even though they initially learned it in relation to a specific cash crop. Many techniques, such as early land preparation, timely planting, thinning and weeding as well as integrated pest management practises apply to more crop species and can be generalised. One example for such a system is the extension service of cotton companies in the framework of the COMPACI programme.³⁵ Farmers contracted by the cotton companies Dunavant and/or Cargill receive training in several management techniques, and they can then apply these to their cotton fields as well as to most other crops they grow. However, this requires a donor, who can ensure that expenses which are beyond cotton production, i.e. in relation to entire farming systems, can still be made in order to provide a comprehensive picture or understanding for farmers. Thus, there is the possibility for companies to expand their exports to two or three crops, as cur-

35 Competitive African Cotton Initiative financed by the Bill and Melinda Gates Foundation (BMGF) and implemented by the German Investment and Development Company (DEG) / German Technical Cooperation (GTZ).

rently discussed by Cargill in relation to soy beans, in addition to cotton. Another possibility is a complementary approach to extension services, where the public and the private sector work together to ensure both good quality and comprehensive coverage of these services in order to improve the management of the farming system as a whole.

As a matter of fact, the private sector is also the crucial facilitator to help farmers with producing, bulking and marketing of their produce, as already practiced by a number of companies and in contract farming arrangements and out-grower schemes (see further outlines in chapter 4.6). Though in the long run, such arrangements might shift into more autonomous systems, as proposed by the *Cotton Association of Zambia (CAZ)*, in which farmers can fully decide by themselves what they grow, reality shows clearly, that Zambian smallholders are still far from getting there. Until now, contract farming is actually the only structure, which enables farmers to meet export requirements and standards, and thus to participate in export markets. The better vision is not to break up such systems, but on the contrary, to strengthen them by achieving fair and sustainable agreements between companies and farmers, so that both can have a reliable profit.

Last but not least, and because of its wide connections and good access to knowledge and technology, the private sector can play a crucial role in the introduction and distribution of innovative agricultural systems within and at the edge of agriculture. Such systems can be the introduction and marketing of new crops, such as jatropha, or the introduction of new processing plants and techniques.

Government distortions

Several government activities are being strongly criticised by many stakeholders, including some representatives from the public sector. The provision of subsidies for fertilisers to small scale farmers has a strong impact on the business of providing inputs to these farmers. As the government accounts for one third of the overall purchase of fertilisers in Zambia, GRZ has a strong influence on the pricing, and particularly on distribution mechanisms of fertilisers. The FSP did not achieve its projected positive effects on agricultural development, and also the FISP does not address the major weaknesses of the FSP. Therefore, a reform to an e-voucher system in cooperation with the private sector would improve efficiency in the input markets, and at the same time probably save a lot of public funds.

Another point of contention is the role of the parastatal FRA: A major criticism refers to the fact that the FRA plays not just its attributed role of being a buyer of last resort, but also interferes in market sectors where the private sector is engaged (WB 2007b, 56). Despite the fact that the FRA only purchases 6% of the maize produced in Zambia, it is the largest individual player in the market and therefore has a strong impact on the price setting processes in this sector. The FRA fixes the price of maize very early in the marketing season, which distorts the development of prices according to supply and demand. Moreover, the FRA setting relatively high floor prices discourages smallholders and commercial farmers from adopting improved technologies and facing competition with other farmers in the region. (ACF 2010, 1). Summing up, the public spending on fertiliser subsidies and maize purchases are said to be misguided, and could be better used for research and extension services (Bonaglia 2008, 27).

A third aspect of the current market distortion by the state refers to the export bans on different products announced by GRZ (i.e. wheat). Export bans help to contain short term pressures on domestic prices, but they serve as a disincentive for farmers and exacerbate price instability in regional markets. In the long run, export bans are a significant detriment to food security and agricultural growth. Consequently, several stakeholders opt for the cancellation of export bans, and the opening up of borders to allow free trade for agricultural products. In fact this would, together with an eased bureaucracy for exports and a better system of roads to neighbouring countries, remarkably enhance cross border trade, in particular to Congo, and therefore effectively foster agricultural development. Key policy instruments for encouraging cross-border trade include cessation of quantitative controls, tariff reductions, and harmonisation of customs procedures.

However, it should be acknowledged that besides these different points of criticism of GRZ's role towards the private sector, there are positive aspects of the cooperation between public and private actors. Regarding the provision of storage systems, FRA plays an important role in maintaining sheds all over the country, even if not all sheds are well managed. Particularly the dispersal of sheds offers a good opportunity for the private sector to rent storage space from the FRA and thereby to improve their domestic trading structures. Moreover, particularly for some small-scale farmers, the FRA truly offers a good and reliable opportunity for marketing their maize.

In general, it can be concluded that the relationship between the state and the private sector is characterised by mistrust: The state does not want to rely on the private sector, and vice versa. Constantly changing policies by the GRZ also hamper the willingness for investments in the agricultural sector. Accordingly, structural policy changes are necessary to increase the predictability of private sector investments.

Thus, GRZ should concentrate more on creating an enabling environment than on direct interference. One of the most important actions would be to improve the regional infrastructure and so lower transport costs. Surplus-regions should be better linked to deficit markets to benefit both sides: producers and consumers. In addition to that, market information such as crop forecasts, price developments, stock levels etc. would be crucial in order to enable farmers to improve their adaptation strategies. On top of this, trust building seems to be important. Government should learn confidence that markets will deliver staple foods at low cost and in adequate quantity. And the private sector must trust, that the governments will not change policies unexpectedly

4. Agricultural systems in Zambia

4.1 The Zambian agricultural sector

The agricultural sector employs 85% of the Zambian population and – even though it contributes only 19% to the GDP – agriculture is also the dominant livelihood for the population.³⁶ As already outlined, Zambian agriculture holds an immense untapped potential for self-sufficient food production, economic growth and poverty reduction. This is due to a generally high level of soil fertility, about 58% arable land (only a small percentage of which is under cultivation) as well as abundant water resources (both ground and surface water) and generally favourable climatic conditions (GRZ 2006, 46). However, the rural areas of Zambia continue to be poverty-stricken, and food production on a larger scale faces severe con-

36 The service sector employs 9% of the total work force but contributes 49.5% of the GDP. Industries use 6% of the labor force and contribute 31.3% to the annual GDP. (http://www.economywatch.com/world_economy/zambia/structure-of-economy.html)

straints, including a lack of production assets and inputs, limited irrigation infrastructure and missing governmental extension services. Economic growth potential remains untapped for similar reasons, in addition to uncoordinated and sometimes contradictory marketing responsibilities of both the private sector and the Zambian government, as well as limited market access for net producers (Tembo / Chapoto / Jayne 2009, 18).

Zambia enjoys a sub-tropical climate with three distinct seasons (see table 5 below). The rainy season is the peak season for agricultural production, while the off-season lasts from June to September. However, during that period production is limited to those farmers that have access to irrigation.

Table 5: Climatic seasons in Zambia			
Season:	Cool and dry season	Hot and dry season	Rainy season
	(Off-season for crop production June-September)		(Peak season for crop production)
Months:	May to mid-August	Mid-August to November	November to May
Temperature range:	13 C° - 26 C°	26 C° - 38 C°	27 C° to 34 C°
Source: GRZ (2007, 1)			

Agriculture in Zambia remains predominantly rain-fed, with less than 5% of cultivated land under irrigation. Conventional farming methods are predominant. Maize is grown on about 72% of cultivated land used by small-scale farmers (ACF 2008, 8). In order of importance for national consumption, maize is followed by cassava, which is widespread in the northern parts of Zambia. Widely grown minor crops are sorghum, millet, sweet potatoes, groundnuts and rice. Major cash crops produced are tobacco, cotton and coffee (Dorosh / Dradri / Haggblade 2009, 351).

The government has highlighted agricultural revitalisation in its National Development Plans. This chapter will explore the main production related preconditions, limitations and opportunities of the agricultural sector to develop in this anticipated way. Starting with a brief overview of the agro-

ecological zones of the country (4.2), it will be followed by an introduction to the main farming methods that are common in Zambia (4.3). Then, the predominant farm types and farming systems in Zambian agriculture will be identified (4.4) and both the socio-economic groups engaged in farming are characterised (4.5) common contract farming systems are explained (4.6). In addition and because of its great potential importance, an overview of the irrigation sector will be provided (4.7). A description of the social dimensions of agriculture will complete this chapter, outlining the influence of poverty, food security, HIV/AIDS and Gender-related issues on agrarian livelihoods and agricultural production (4.8).

4.2 Agro-ecological zones

This chapter will provide an overview of the different agro-ecological zones of Zambia, which make one-size-fits-all approaches for agricultural development unsuitable and instead require a wide range of solutions to the specific constraints, in order to equip agriculture for increasing resilience to climatic disturbances.

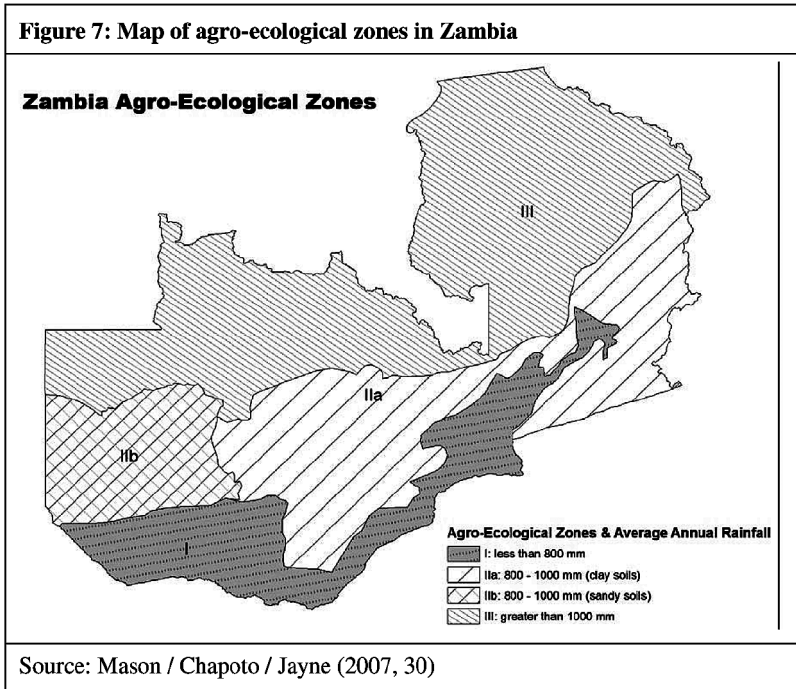
Generally, Zambia can be divided into 36 different agro-ecological sub-zones, according to a number of meteorological characteristics³⁷. Based on precipitation-patterns, these sub-zones can be grouped into three main zones with differing preconditions for agricultural production³⁸:

1. The low rainfall area – Zones I and IIb (roughly corresponding to Southern and Western Province, respectively, plus parts of Central and Eastern Province)
2. The medium rainfall (and high agricultural potential) area – Zone IIa (parts of Lusaka, Southern, Central and Eastern Province)
3. The high rainfall area – Zone III (Copperbelt, Northern, Luapula and North-Western Province) (Siacinji-Musiwa 1999, 3)

37 These include the amount of precipitation, length of growing period, occurrence of drought, minimum night and maximum day temperatures during December to February, occurrence of frost in the dry season (June to August), as well as the amount of sunshine during the dry season (Akayombokwa / Mukanda 1998, 1).

38 For an overview of crop suitability according to agro-ecological zones, see Annex 2: Map of Crop Suitability.

Although the boundaries of these zones are constantly moving and are currently being remapped – because it is felt by the Zambian Agricultural Research Institute (ZARI) that climate change already changed them – the distinctions between them still exist.



Agro-ecological Zone I

Zone I covers the semi-arid south-western and southern parts of the country. Maize is the predominant crop and the zone used to be Zambia's 'bread-basket', but has seen the most severe climatic changes over the last two decades. This region receives the lowest, most unpredictable and poorly distributed rainfall: On average, precipitation is between 600-700 mm, resulting in short growing periods. Thus, Zone I can now be considered a drought-prone area. In combination with a range of physical and chemical soil limitations – such as salinity/sodicity and soils of a heavily

textured nature – both the variety and production of crops is limited (Haggblade / Tembo 2003a, 25). The number and heat of dry-spells during the main growing season has increased over the last years, resulting in repeated significant crop losses in parts of southern Zambia.

Agro-ecological Zone IIa + b

Zone II includes the majority of the central plateau, stretching from Eastern to Western Province. Rainfall is moderate at 800-1000 mm and growing periods are generally longer than in the south. The region is divided into two sub-regions, Zones IIa and IIb. Sub-region IIa enjoys an even distribution of rainfall and fertile soils, although with abrupt changes of texture in topsoils (Akayombokwa / Mukanda 1998, 2). It has the highest agricultural potential of all agro-ecological zones and is suitable for all common crops grown in Zambia. Farm output levels in Zone IIa are generally high and the effects of climate change are currently less severe than in other regions of the country. Zone IIb enjoys the same overall precipitation levels, but distribution is uneven, more unpredictable and periodically scattered. Crop suitability in this area is limited due to very sandy soils with little capacity for moisture retention (GRZ 2007, 4).

Agro-ecological Zone III

The ‘high rainfall area’, or Zone III, receives an annual average precipitation of 1000-1500 mm, which creates a semi-humid climate, with peak amounts of rainfall of around 2000 mm in some areas (i.e. Mwinilunga District in North-Western Province). This zone covers about 46% of the country. However, only 35% of the area is cleared for agricultural use, so there still is large potential for increases. Apart from maize, cassava is a widespread food crop in this area. However, longer and heavier rains of up to eight months per year are being identified as climatic changes that cause a higher water-table. In combination with widespread deforestation and soil erosion, this increases the threat of flooding in this area. Soils are highly leached and characterised by strong acidity, aluminium toxicity and low capacity for nutrient retention (Akayombokwa / Mukanda 1998, 2).

4.3 Farming methods

4.3.1 Introduction to principle methods

Agricultural productivity, financial returns per hectare and the sustainability of agricultural systems highly depend on the farming method applied.³⁹ While conventional farming is the predominant farming method worldwide, there is a variety of alternative methods that revolve around different concepts of ecological, economic and socio-political sustainability.⁴⁰ Generally, sustainable agriculture seeks to optimise the use of locally available resources, and includes attention to the enhancement of natural resources (Siame 2006, 1–2). The main differences that distinguish these methods refer to the general orientation of production, soil management techniques and to the particular inputs either used or rejected.⁴¹

In Zambia, where conventional agriculture has led to decreasing soil fertility and low productivity, still even lower than in many other African countries, agricultural development is closely connected to a debate on changing the farming methods applied. In order to raise productivity levels, the need to venture into alternative farming methods has been recognised also by the Government, although the objective remains the increased production through expansion of the area under cultivation (GRZ 2010, 12).

39 The term farming method describes the overall orientation of the agricultural production process. The main differences between farming methods are in land preparation, seed and planting material, fertiliser use, methods of irrigation and plant protection measures. The term “farming system” describes the various characteristics and components of a farm and their interrelationships that arise from the resource endowments, land tenure, as well as circumstances of family and livelihood of a particular farm. This includes the crop varieties, crop rotations, animal husbandry and the techniques applied (Dixon / Gulliver / Gibbon 2001, 9).

40 This comprises a number of ecologically friendly, sometimes low-input agricultural production technologies, which may have certain features in common, while others differ completely. Methods that play a role in tropical climates include Sustainable Agriculture (SA), Low External Input Sustainable Agriculture (LEISA), Sustainable Land Management (SLM – which is similar to Conservation Farming and applies Integrated Pest Management (IPM) (Siame 2006, 2). However, due to its importance as an adaptation measure to climate change and its potential and relatively high adoption rate among farmers in Zambia, this study will mainly focus on conservation farming as an alternative farming method.

41 The use of genetically modified organisms (GMOs) in agriculture is highly disputed as a means to increase agricultural productivity. Since the Government of Zambia rejects the use of GMO, they will not be considered in this study.

Recent analyses have identified farming methods as a main factor in adaptation to climate change, including the implementation of alternative methods (see UNEP / UNCTAD 2008; WB 2010a; GRZ 2007). Drawing on these findings, it is presumed in this study that resilience to climate change and economic shocks can be increased – inter alia – by changes in the farming methods. This is further based on two underlying assumptions.

Firstly, vulnerability to economic shocks highly differs depending on the costs of external agricultural inputs (i.e. fertilisers and pesticides) and the prices for export crops. As explained below, these price categories vary significantly depending on the respective farming method applied. *Secondly*, vulnerability to climate change varies according to soil conditions, water infiltration rates, as well as the soils' capacity for water and nutrient retention. This again is highly influenced by the farming and soil management methods applied.

However, a major constraint associated with a change of farming method – beyond the fact that farmers are in general rather risk averse – are the impacts on labour or peaks in workload that are sometimes connected to it. A change of method can require certain adjustments in work processes (i.e. breaking compact layers when switching to minimum tillage; composting; more weeding due to increased weed pressure; timeliness and precision in input application) and can therefore become a major challenge. However, since peaks in workload and not the total amount of work, is usually limiting household capacity, the shift into a new method might not be a problem, even if total labour requirements increase, as long as peak workload is stretched.

In this chapter, four principal farming methods will be briefly described, before outlining their assumed potential as adaptation measures:

- Conventional farming
- Conservation agriculture
- Low External Input Sustainable Agriculture (LEISA)
- Organic farming

Within each method, several different farming systems, techniques and tools are used and their criteria such as sustainability, labour demand and input costs can again vary considerably. All of these farming methods can be applied with and without irrigation, which again influences vulnerabil-

ity to climate change. Differences between the four methods can be described along the categories of highest priorities in the agricultural production process and their position towards soil management and input use.

Highest priorities in the production process:

- maximum production capacity (conventional) versus consumer health (organic) versus environmental protection (LEISA). Conservation lies somewhere in between and stresses maximum sustainable productivity.
- high external input (conventional) versus low external input (LEISA and organic). Conservation farming lies somewhere in between and can apply both, high or low input levels, the focus lies on the effect not on the means.

Soil management and input use:

- ploughing (conventional and organic) versus minimum to zero tillage through ripping/planting basins (conservation) for field preparation. Minimum tillage can also be used in organic or conventional farming, but in conservation farming this is the core principle.
- use of mainly inorganic fertilisers (conventional and conservation), sometimes complemented by planting legumes and crop rotation techniques and/or manure application (mostly conservation) versus total restriction of inorganic nitrogen and phosphorous fertilisers, but instead use of animal and green manure, plus in sophisticated systems some specific inorganic elements as stone flower etc. (mostly in organic agriculture).
- the use of chemical pesticides (insecticides, herbicides and fungicides) (conventional and conservation) or their complete restriction, and the application of biological and mechanical pest management techniques instead (LEISA and organic).

The following is a more detailed description of these four relevant farming methods:

4.3.2 Conventional systems and the bias on maize

Conventional farming comprises a number of techniques that revolve around intensive tilling and high external input production. The use of high amounts of agrochemicals as well as systems of intensive mass animal husbandry are common features (Siacinji-Musiwa 1999, 28). In many developing countries, this high input level in soluble and inorganic nutrients is

very expensive, because inputs are mostly imported. For that reason it is often connected to the production of high value crops in very intense farming systems. This can result in declining soil quality and productivity, while neglecting subsistence culture can subsequently lead to increasing gaps in food supply. In recent years, and in the face of repeated food shortages in southern Africa, it has become clear that under the given climatic circumstances and soil conditions, conventional farming methods and the connected agricultural policies have failed to fulfil the food related needs of the region (UNEP / UNCTAD 2008, 40).

Conventional production methods (and ploughing in particular) are nowadays considered 'traditional' by many farmers in Zambia, despite the fact that they have only been introduced to the country in the late 1940s under British colonial rule, and scaled up after independence (Good 1986, 243-244). From then on, the Zambian government promoted conventional maize production by providing large-scale marketing support, coupled with fertiliser and input subsidies as well as tractor and plough credits to farmers (Xu / Guan / Jayne 2009, 1). Though this policy was targeted at poverty reduction, it led to significantly leached soils and declining productivity, as it supported farming methods that did not provide for sufficient resource and environmental protection. The result was severe soil degradation and more poverty. After large-scale government support to agriculture ceased in 1991, the increasing costs for inputs have led to stagnation in the agricultural sector over the last two decades (Baudron / Mwanza / Triomphe 2007, 7).

Since the reintroduction of input subsidies in 2002/2003, heavy reliance on inorganic fertilisers for maize production has again been established among small-scale farmers and thereby, conventional production systems are being upheld in Zambia (see chapter 4.3.2). However, as a result of poverty and lack of organisation, access to inputs is limited. It is therefore necessary to strengthen alternatives to conventional production (see also Ifejika Speranza 2010, 92).

4.3.3 Conservation agriculture

Conservation agriculture (CA) practices are aimed at combining high and sustained production levels with environmental conservation. Core features of CA are the application of reduced tillage (minimum or zero tillage) for an improved soil structure and increased water retention; in situ rainwater harvesting for increased independence from erratic rainfalls; and soil fertil-

ity management to increase capacity for nutrient retention (Baudron / Mwanza / Triomphe 2007, 5).

*CA*⁴² refers to a diversified production model which includes Conservation farming systems (CF)⁴³ and also integrates perennial agro-forestry species such as Cassava, *Faidherbia albida* and fruit trees. Moreover, the *Jatropha* plant is promoted as a fence or hedge. The aim of planting trees within or at the edge of fields is manifold: It demarcates farmers' lands, gives wild beneficial organisms a habitat, can have a green manure effect from falling leaves, protects soils from wind erosion, transports nutrients through their root system from deeper soil layers up to the top soils and might be an additional source of income (e.g. fruits, oil, bio fuel).

In *CA*, the plough is replaced by what is called a 'ripper' in the case of farmers who dispose of animal draught power, or planting basins for farmers using hand tools.⁴⁴

While ploughing can only be done after the first heavy rains, because in the dry season the soil layers are too hard to break through, both of these minimum-tillage techniques are ideally conducted **before** the rainy season starts and thus planting can take place as soon as the first rains fall (Siacinji-Musiwa 1999, 29). This advantage of early planting not only gives the crop more time to develop and so increases the gross margin per hectare remarkably⁴⁵, it also extends the time for doing all other field work during

42 In the following, the more holistic term conservation agriculture will be used, although Baudron / Mwanza / Triomphe (2007, 4) point out that in Zambia the term "conservation farming" is still more common. In other countries, however, the term "conservation agriculture" prevails.

43 *Conservation farming (CF)* describes a set of agronomic soil and crop management practises, mostly targeting food crops. CF is suited for farmers using either hand tools, oxen or a tractor. It aims at resource-saving agricultural crop production, particularly applicable to regions that suffer from difficult climatic conditions and highly degraded soils. The farming practises can help to preserve soil moisture, maximise water infiltration and minimise rainwater and nutrient runoff. Therefore, they are highly suitable as adaptation measures for drought prone or flood prone environments.

44 The ripper draws lines in the soil, in which the seeds are planted and nutrients are applied. Ideally, these lines are in the same place every year and the top soil between them stays intact. Planting basins, on the other hand, are rectangular holes in the soil that are re-dug each season in the same place. Seeds and other inputs such as lime, fertiliser, manure or compost are precisely placed in the basins or ripped lines in order to make sure that they are used efficiently by the plant.

45 For every day planting earlier, the yield for cotton farmers is increased by one percent.

the same growing period. Due to the fact that in Zambian hand tool systems, peak workload is a key constraint for farmers, this is evaluated as a very important factor. Conservation agriculture can thus not only increase productivity, but also overall production. When the peak workload is extended, farmers also have more opportunities to do weeding and other chores on time. Shortage of time is very often the main reason for poor crop management. Thus, the need for increased weeding resulting from not ploughing for farmers who cannot, or do not want to, use herbicides, is balanced by longer timeframes for doing the various chores. Since inversion of the soil by means of a conventional plough causes high evaporative losses, both ripping and planting basins are aimed at improved water management (water harvesting), reduced runoff and making the most efficient use of expensive inputs such as fertilisers and seeds.

Conservation farming can be adapted to farming systems involving more and less mechanisation.⁴⁶ In systems, in which herbicides are too costly, as for most smallholders and emergent farmers in Zambia, weeding might be a problem in conservation farming, especially in the first years after adapting the system. However, early and continuous weeding with the objective of decreasing the weed seeds over time, has proven to help farmers control weeds without tillage (Baudron / Mwanza / Triomphe 2007, 5). However, more insights on how to deal with these possible challenges are given in subchapter 6.3.6.

In Zambia, CA is mostly promoted by the Conservation Farming Unit of the Zambian National Farmer's Union (ZNFU). Some key practices of CA packages promoted in Zambia are:

- dry-season land preparation using minimum tillage systems (see above);
- crop residue retention to reduce soil temperatures, protect the soil, minimise runoff and improve fertility;
- seeding and input application in fixed planting stations (see above);

46 When it is practised in modern and mechanised systems, conservation farming is closely linked to the use of herbicides, and in recent years also used in combination with genetically modified crops, which are resistant to non-selective herbicides. A precondition for this is a good understanding of how herbicides work, how toxic they are to humans, but – if used in conventional crops - also whether or not they are selective for specific crops and/or weeds. In addition to that, effective and environmentally friendly herbicides should be available, which is not always the case in Zambia.

- nitrogen-fixing crop rotations, including planting legumes on roughly 30% of the cultivated area, as they fix nitrogen and reduce the requirement for synthetic fertilisers. (Haggblade / Tembo 2003b, 3).

Although often contested, conservation agriculture practices have over the last decade repeatedly proven successful for farmers in sub-Saharan Africa and elsewhere, in terms of producing significantly higher crop yields⁴⁷ and improving soil conditions, while reducing external inputs (Rockström / Kaumbutho / Mwalley 2009, 27). However, critics argue that longer-term evidence is still missing.

The Zambian government has adopted conservation agriculture as a strategy to counter climate-related disturbances, land degradation and decreasing yields. In 2007, around 120.000 Zambian farming households applied conservation agriculture practices. By 2011, their number is projected to double through government promotion, which would then be equal to approximately 30% of the farming population (CFU 2007a, 3). As CA is defined by the Ministry of Agriculture and Cooperatives, it comprises of the following principles: (1) minimum soil disturbance, (2) maintenance of a complete soil cover, and (3) legume based crop rotation (i.e. agro-forestry or crops for sale such as groundnuts).

4.3.4 LEISA and organic farming

Low External Input Sustainable Agriculture (LEISA) prioritises the protection of the environment, by primarily using the inputs that are locally available, thus saving on high input costs, especially when inputs are imported. The principle is to work in harmony with the environment, rather than controlling it. It is wrong to claim that this farming method is new to African farmers. For example, the knowledge about which varieties to grow where, on adopting crop-crop or crop-livestock combinations, or the timing of operations has often been maintained and passed down through oral tradition for many years. Traditional LEISA farming – as surveyed in Ghana for example – includes biological pest management techniques such as applying animal manure onto the soil before farming at the beginning of the rainy

47 Results from a survey conducted during the 2001/02 growing season in Zambia showed that maize yields produced under conservation farming methods and using fertilisers roughly doubled compared to conventional ploughing, while in cotton production, yields increased by about 60% (Haggblade / Tembo 2003b, 11; Rockström / Kaumbutho / Mwalley 2009, 27–28).

season. To avoid erosion on sloping terrain, putting stones across the slopes can prevent water from running down and hold back the soil (Millar 1990, 22–23; see also Kessler / Moolhuijzen 1993). However, the issue of ploughing, which is particularly damaging soils in the view of conservation farmers, especially under conditions of climate change, is not addressed in LEISA. Consequently, the conservation aspect, which is a core aspect to deal with under drier and wetter conditions, is not central to LEISA.

It was found, that low external input agriculture or organic farming are both known among Zambian farmers. Organic farming goes one step further than LEISA, claiming consumer health to be at the centre of the production process. Soil management practises completely forbid the use of organic chemical pesticides but promote animal and green manure as fertilisers.

Organic farming again includes different concepts, but as an agricultural method it attempts to create integrated, environmentally and economically viable agricultural systems. It minimises the adverse effects of agricultural production on natural resources, while reducing the use of external inputs to a minimum, promoting local or on-farm renewable input resources (UNEP / UNCTAD 2008, 6). It is considered particularly important as a tool for mitigation of and adaptation to climate change, due to its much lower level of greenhouse gas emissions. Furthermore, due to the specific techniques of manure application and crop rotation used in organic farming, the soils are rebuilt, and thus sequester carbon in the soil. Thereby, the soil's fertility can be restored and its capacity for water retention increased, also making organic farming a very useful tool for regions that suffer from land degradation and erosion (IFOAM 2009, 2).⁴⁸

At the economic level, a lower risk of complete crop failure and the potential for income diversification can help reduce poverty. Due to the lower costs of on-farm inputs applied in organic farming, as compared to conventional grow-

48 Through a higher level of diversity of crops, crop rotation and farm activities than generally applied in conventional agriculture, organic farming can improve the ecological condition of cultivated land and the economic situation of farmers, and also help conserve agro-biodiversity. At the ecological level, a higher diversity of crops grown in an organic system and planted at different times of the year, as well higher water efficiency, make organic agriculture more stable under uncertain climate conditions. During climatic disturbances such as droughts or changing rainfall patterns, organic farming methods can reduce the risk of crop failure due to a diversified cropping pattern. That way the farmers' resilience to cope with the effects of climate change can be increased (Muller / Davis 2009, 2).

ing, organic agriculture approaches are also accessible to poor farmers (mostly small- and medium-scale farmers in developing countries) who depend on locally-available resources for agricultural production (IFOAM 2009, 7).

It becomes clear that organic agriculture has the potential to result in significant benefits for developing countries, in economic, social and developmental terms. However, besides the yields, which are similarly high in organic agriculture as in conventional and/or conservation agriculture in tropical systems, there are also several constraints to a far-reaching and profitable introduction of organic agriculture in Zambia. This relates to labour intensity and the marketing of organic products.

First of all, organic foods typically have higher transaction costs than conventionally produced crops. The post-harvest handling of relatively small quantities of organic foods is more expensive due to the mandatory segregation of organic and conventional produce, for instance during processing and transportation. Another disadvantage and/or cost factor is that organic farming can be much more laborious than conventional systems, especially when farmers only rely on hand tools. The additional workload is caused for example by mixed instead of single cropping, which requires more time for planting, possibly weeding and harvesting. Techniques such as green manuring and mulching take time, as does the non-use of pesticides and herbicides, because their effect has to at least partly be compensated by weeding and biological methods.

In temperate climates and/or highly industrialised countries, these added labour costs, combined with generally lower yields, are the reason in why organic produce is usually more expensive and is certified and labelled. The differences in price – as compared to conventional farming output – make both national and international markets for organic products small and depend of the awareness of consumers (Vosselaar 2003, 10).

Since a domestic certifying system is not yet developed, the prices for conventional and organic products are not differentiated in Zambia. This is not necessarily a big problem for domestic products, as yield levels in organic agriculture can be very high, and input costs might be much lower in organic agriculture than in conventional systems in Zambia, because all inputs have to be imported. Therefore, the application of inputs that are already available on the farm is more of a reason for practising organic farming, than the idea of producing healthy food.

But in most countries there is only a very small domestic market for organic food, as people primarily look to get enough food to eat, and not at the quality. There is often a general lack of awareness on the issues of organic production and human health on the side of both producers and consumers (Parrot / Ssekyewa / Makunike 2006, 99). Accordingly, the situation is running in circles: markets and demand do not develop because the necessary separate infrastructure is lacking. At the same time, there is a lack of infrastructure because the market is inadequately developed (Parrot / Ssekyewa / Makunike 2006, 100). In Africa therefore, the most important challenge in connection with organic farming is not the possibly limited production potential, but marketing.

As of now, the market potential for organic products in Zambia is at present still limited to export crops, e.g. cotton. There are four major initiatives for cotton in Africa: organic cotton; Fairtrade (FT) cotton; Cotton made in Africa (CmiA), which is also very active in Zambia; and the Better Cotton Initiative (BCI). While organic certification focuses mainly on the farming system and environmental sustainability, Fairtrade, the CmiA standards and the BCI mainly focus on tackling rural poverty.

One challenge for (a more flexible) regulation in the future is that organic cotton can only be labelled as “organic” when it is produced within an organic farming system, i.e. where all crops rotating on the same land are produced according to the organic criteria. As maize is the most common crop and part of almost every farming system in Zambia, its production would have to meet these standards, even if only cotton is to be sold as “organic”. However, according to Hortmeyer (2010), there are so far no detailed international standards for growing organic cotton, and legal standards in several countries regulate the certified production of organic cotton.

Another difficulty exists with regard to the marketing of organic cotton as the demand is not guaranteed. Thus, there is no premium or minimum price guarantee for farmers, except if they produce FT cotton. A minimum price and an additional premium are paid to FT cotton producers; the premium is invested in projects. Organic cotton usually receives a premium over the conventional price, but this premium is the result of negotiations between producers and merchants and varies depending on supply and use. BCI and CmiA cotton, of which the latter is mostly sold on the mass markets, do not guarantee a higher price to producers, but for instance plan to pay direct dividends to farmers, and realise social projects in communities from the surplus they achieve. In

conclusion, though alternative cotton markets are still niche markets, they have gained in importance over the last few years, as consumers' sensibility to the origin and manufacturing process of textile products has increased. Some of the initiatives, however, also participate in both conventional and organic markets in order to lower their production risks.

Thereby, it is important to emphasise that none of these alternatives target income volatility for cotton producers, nor do they target the risks associated with cotton price volatility, except for the FT initiative that sets a minimum price for FT cotton, although FT cotton producers are not guaranteed sale of their cotton at FT minimum prices (see ICAC 2010, 5).

Farming method and climate change

Also, for this to be applied here (see below), the full range of pros and cons, including greenhouse gas emissions, would actually have had to be included when comparing these three methods. Hence, the disadvantage of allowing inorganic fertilisers in CA, would turn into an even more obvious disadvantage, when the greenhouse gas emissions from fertiliser production and application were included in the analysis. But this approach could also be politically ambivalent and would result in an ideal, but less practical recommendation. As Zambia itself does not emit relevant amounts of greenhouse gases so far, but suffers from climate change caused by the emissions of other countries, it should also directly benefit from mitigation efforts, if organic agriculture were to be applied widely. So far, the advantage that organic agriculture both sequesters carbon in soils **and** avoids (most importantly) nitrogen emissions by not using fertilisers is not taken into account in international agreements or mechanisms, such as the Clean Development Mechanisms. Only if this happens, could Zambia make increased use out of organic farming, being thus compensated for the extra labour costs. And such a scenario could soon come to pass. Therefore, and also because both organic agriculture and Zambian law prohibit genetically modified organisms (GMOs), the country should prepare itself and steadily work on further developing organic farming.

As of now and on the political agenda (i.e. through the Conservation Farming Unit, the Government and NGOs, as well as some donors in the agricultural sector), CA is promoted much more and applied more widely in Zambia – as compared to LEISA and organic farming. For this reason, and because several hundred thousands of farmers already practise CA, its nationwide application appears much more probable. An argument in

	Conservation agriculture	Organic agriculture
Yields/productivity	As high as and higher than common conventional systems of smallholders in Zambia	As high as and higher than common conventional systems of smallholders in Zambia
Genetically modified organisms	Allowed (but not in Zambia)	Not allowed
Mineral fertilisers (nitrogen)	Allowed	Not allowed due to consumer health and environmental reasons (i.e. leaching and green house gas emissions)
Ploughing	Not allowed	Allowed, but ripper could be used instead
Pesticides/herbicides	Allowed	Not allowed
Mulching, green manuring, legumes, crop rotation etc.	Practised, more or less, according to sub-concepts	Practised as core elements
Livestock husbandry	Not explicitly included in the concept, but depends on sub-concept	Included in the concept, but OA can also be practised without animals
Labour input	Depending on sub-concept, can be more labour intensive in the first 1-2 years after adoption, but spreading of peak workload	More labour intensive
Source: Own compilation		

favour of CA is that it puts more of a focus on the objective of productivity, and that the system is already interesting for all, subsistence as well as export oriented farmers. In LEISA and in organic agriculture, the ripper can be used, but the soils' capacity for water retention is not the core aspect at the moment and ploughing is allowed in principle. As an adaptation measure for both wetter and drier conditions, CA is therefore particularly suitable. This is why the recommendations in chapter 6 will focus on CA.

4.4 Farm types and farming systems

In Zambia, farming systems developed from patterns of hunting and gathering to more complex permanent present systems. Only occasionally did development achieve the level of commercialised agriculture and for most smallholders it has almost stagnated, or only developed up to a certain point: the system of hand tools and/or semi-permanent ox-ploughs. This evolutionary process of farming system development also implies far-reaching changes in land tenure and settling traditions, from nomadic to sedentary and then on to modern lifestyles (Kajoba 2009, 7).⁴⁹

There are five main cultivation systems in Zambia that are relevant for this study, with its focus on land cultivation agriculture, although some contain elements of animal husbandry or fishing. As described in more detail below, farmers in Zambia can be identified by the size of the land they cultivate as small-scale, emergent and commercial farmers. In Zambia, the first four farming systems are mainly associated with small-scale and emergent farmers, while the fifth is generally associated with commercial farming. These systems are (Saasa 2003, 11–12):

1. shifting axe and hoe cultivation;
2. semi-permanent hoe system;
3. semi-permanent hoe and ox-plough system;
4. semi-commercial cultivation and;
5. commercial systems.

The *shifting axe and hoe cultivation* is a traditional system in those regions that used to practice “chitemene”,⁵⁰ and those areas of medium to high rainfall, where fallowing takes place, i.e. Zone III. It has proven useful in countering highly leached soils, since it is known to be very good at preserving the soil’s structures and fertility – as long as the population density is low.

49 Farming systems in Zambia are mainly characterised by socio-economic groups, ethnicity, tradition, land tenure, soil types and rainfall (agro-ecological zones). These in turn determine the farming system as expressed in the dominant pattern of farm activities, crops, crop rotations, animal husbandry and household livelihoods, including the relationship to markets and the production intensity. Farming systems determine the diets and other cultural aspects of livelihoods, and are in turn determined by them. The development of farming systems is therefore an evolutionary and rather slow process, which cannot easily be changed.

50 Slash and burn, where seeds are sown in the ashes that result from burning plant residues.

Due to an increasing population and the change of cultures under the influence of fertiliser subsidies etc., shifting cultivation has increasingly been abandoned (Siacinji-Musiwa 1999, 31).

The *semi-permanent hoe system* is shortening fallowing phases – or prolonging growing periods – on a piece of arable land up to ten years. It requires less land per family than shifting cultivation, but demands more labour and therefore, historically, has facilitated a more stable land settlement in Zambia. In present times, it is often combined with fishing as a second agricultural activity. The semi-permanent hoe system is practised mostly in locations of Zones III and IIb that are close to bodies of water, such as Lake Mweru, Lake Tanganyika and the flood plains in Western Province. In Zone I, The dominant crops under this system are maize, cassava and groundnuts (Saasa 2003, 12).

The *semi-permanent hoe and ox-plough system* is the next step in the quasi-evolutionary development of farming systems. It advances cultivation using hand tools through animal husbandry for draft power and the application of animal manure for maintaining fertility. The system had been developed among the Luvale, Lozi and Mambwe peoples, who have a tradition of livestock breeding. It is mostly practised in Zone II with maize, finger millet, sorghum, groundnuts and beans as the dominant crops (Kajoba 2002, 1). Most importantly, ox-drawn ploughing facilitates the expansion of cultivated areas.

The impact of modernisation has allowed for the development of *semi-commercial ox and tractor plough systems* and subsequently for a group of emergent farmers to arise in Zambia. The land area cultivated is usually above 5 hectares involving both draft and tractor ploughing. Crops for the cash market, such as cotton, maize and groundnuts are dominant. Although the system is widespread in all of Zambia, it is mostly found in Zone II (in Central, Southern and Eastern Plateau regions), where a widespread adoption of oxen and tractors for ploughing has taken place (Saasa 2003, 12). Permanent cultivation on relatively large rectangular holdings and higher yields have been made possible by the combined application of fertilisers and cattle manure. The surplus generated has led to a semi-commercialisation of agriculture in these regions (Kajoba 2002, 1).

The development of *commercial systems* has led to highly specialised large-scale farms with wide variations in crops and (mostly exotic) breeds of livestock. Their characteristics are extensive mechanisation and high-level

technology, especially in irrigation, as well as professionalised management and marketing. These farms can be found both in Zones II and III, where they are mostly concentrated along the railway lines and in peri-urban areas, for a better market access. Crops grown by large-scale farmers include maize, wheat and sugar (De Wit 2006, 3). Large-scale farmers mostly have European backgrounds and/or were farmers in Zimbabwe, or they worked as entrepreneurs and in other jobs before they moved into agriculture, holding on to their financial assets. In interviews, some lending institutions complained that even some commercial farmers were lacking in farming experience and claimed, that credits were often not invested in an ideal manner. Nevertheless, there is both a huge difference in adaptive capacity and capital, and a big socio-cultural gap between the typical smallholder and the commercial farmers. This also makes it very difficult to progress from the status of emergent to that of commercial farmer.

In the 1990s, the politics of structural adjustment and radical cuts in governmental services for the agricultural sector, brought about a rapid decline in animal husbandry. Following a number of outbreaks of animal diseases (particularly corridor disease) in the early 1990s, the number of farmers who cannot afford draught animals has increased, and using hand tools is still the most common way of cultivation today (Baudron / Mwanza / Triomphe 2007, 4). Accordingly, Zambian agriculture has come a step backwards on the evolutionary ladder of farming systems, with food insecurity and poverty increasing.

As interviewees pointed out, the lack of animal draught power is one of the main production constraints among smallholders. So government plans, to significantly increase the area under cultivation without adequate restocking and training plans, as well as extension services for the sub-sector of livestock, currently seem unrealistic. However, several interviewees pointed out that the separation of the Ministry of Livestock and Fisheries from the Ministry of Agriculture and Cooperatives that took place in early 2010 has brought about some promising plans for restocking stations in the provinces, in order to overcome the limiting factor of production using hand tools.

4.5 Socio-economic groups: Small-scale, emergent and commercial farmers

85% of the Zambian small-scale farmers cultivate areas of between 0.1 and 5 hectares. Due to the sheer size of this group, they account for a significant part of total agricultural output and hold a significant potential to contribute to food security (Tembo / Chapoto / Jayne 2009, 5). However, the majority of small-scale farmers have very small landholdings, with roughly 40% of all small-scale farms comprising a hectare or less, and another 20% of all small-scale farmers cultivating less than half a hectare. Accordingly, they are highly vulnerable and make up the majority of Zambia's poor. The group of small-scale farmers has a poverty incidence of 79% (with 66% being extremely poor), and most small-scale farmers, who were interviewed in the course of this study, considered themselves net consumers not producing enough to feed their families. Therefore, pro-poor agricultural policies mostly have to target this group.

About 13% of Zambia's farming population are emergent farmers. The size of their cultivated land ranges from 5 to 10 hectares. Similar to the group of small-scale farmers, poverty is widespread among emergent farmers, with 73% considered poor.⁵¹ (GRZ 2006, 13).

The smallest group of Zambian farmers are commercial farmers, about 2% of the farming population. Aside from their relevant contribution to total land use in Zambia, at 10 hectares and above (mostly much more than that), commercial farmers contribute significantly to total crop production and sale, especially for sugar and wheat (Tembo / Chapoto / Jayne 2009, 5).

Unlike in many other African countries, where the sizes land holdings are decreasing as a result of customary inheritance law (UNEP / UNCTAD 2008, 4), Zambia continues to enjoy a wealth in arable land and access to land – whether for expansion or for shifting cultivation areas – has been described as uncomplicated by the interviewees. Village chiefs control and assign the community land, so that community members can approach them if they want to cultivate more land. However, as described in chapter 4.3, expansion is usually limited due to labour constraints, lack of funds, technology and skills.

51 Due to the generally small sizes of landholdings of the majority of Zambian farmers, and for reasons of brevity, the term 'smallholders' will be used for the group of both small-scale and emergent farmers, thereby encompassing about 98% of all Zambian farmers.

Land tenure in Zambia is regulated by a combination of traditional and statutory law. As in many other African countries, there is a strong dualism of land tenure systems in Zambia. While the official, codified law of the government easily entitles people to land, the traditional system predominates in the rural areas and elders determine land allocation. In rural and more remote areas, it is the bureaucracy and illiteracy of farmers, which makes it difficult to get a formal land title, which is often one prerequisite for getting a credit. In contrast to this, around Lusaka land titles are generally difficult to obtain. In fact, conflicts over land arise, when new land is claimed by commercial farmers or the private sector, and parts of these lands are already cultivated by more traditional smallholders. Since the smallholders are the weakest link in the system, they usually lose their lands, being forced to leave it to the business men.

4.6 Contract farming systems and farming blocks

Contract farming, or out-grower schemes, is a common feature in Zambian agricultural production, mostly for cash crops such as cotton, horticulture, tobacco or sugar.⁵² It is regarded as a strategy to commercialise African agriculture, make it more competitive in a global perspective and engage the private sector in agricultural development. Therefore, it is embedded as a prominent feature in regional agricultural initiatives such as CAADP/NEPAD and promoted by the Zambian government as an opportunity for agricultural development by integrating smallholders into the system. Internationally, pre-planting price agreements are a typical element in contract farming, which should allow for increased planning reliability for both sides (Eaton / Shepherd 2001, 2). In the ideal concept, farmers enjoy both a guaranteed market for their produce – and thereby an assured income – and increased production and know-how, as the com-

52 Out-grower schemes and contract farming are in principle synonymous. Both describe a contractual relationship between private companies and farmers. There are some differences, however, with regard to land tenure. In out-grower schemes, the cultivated field belongs to the company and farmers are contracted as seasonal workers or tenants of the fields. Thus, out-grower schemes are usually dominated by the companies and leave little room for participation of farmers. Contract farming on the other hand means that the farmer holds the land title and enters into a contract with the company that provides him with the necessary inputs to produce a certain product on a credit basis, and a purchase guarantee at a fixed price. In order to limit the bargaining power of agri-business companies over the producers, farmer organisations should be strengthened, and codes of conduct for environmental and social standards need to be elaborated.

pany provides them with inputs on a credit basis, and privately organised extension services. The companies themselves can integrate the products into the value chain and make their profit, as well as reduce their transaction costs by employing a fixed network of farmers who deliver their produce within a certain timeframe.

However, contract farming is also fraught with risks and challenges for both contracting sides. For companies engaged, side-selling/buying is a particular challenge: Mostly smaller Ginners take advantage by buying, with slightly higher prices, a part of the cotton harvest from farmers, who are holding a contract with other, mostly a bigger company. Thus, the contracting companies, who pre-financed and trained the farmers, are regularly experiencing big losses. Though in Board meetings of the Ginners' Association, in which most of the companies are members, common prices are always set, some of the members immediately break these agreements by increasing this price and leading farmers into temptations.

A particular problem here is the weakness of enforcement when the contract is breached, because the litigation process in Zambia takes too long and is too costly (Likulunga 2005, 8). Although the Zambian government has made attempts to protect companies by enacting the *Agricultural Charge Act*, which allows them to hold both the illegal seller and buyer liable, the companies rarely make use of it up to now, as they want to keep on cooperating with the farmers, instead of ruining them. In 2009, the Cotton Board was established in order to fully and eventually operationalize the *Cotton Act*, which has already been emended in 2005. With this step, there is hope again that the sub-sector will be regulated more efficiently in future and thus side buying/selling can be reduced. Probably only then, this sub-sector has the chance to expand.

In addition to that, poor infrastructure causes a reduced benefit to private companies in terms of transaction costs. Since most farmers in rural Zambia live very scattered and infrastructure is highly underdeveloped, the companies usually encounter high transaction costs and the expected effect of contract farming remains limited.

A fair agreement between farmers and companies, which is profitable for both sides, is the crucial factor, that decides, whether contract farming can be regarded as a pro-poor production system, which also fosters resilience. Up to now, the ginners set the prices while the farmers' representatives do

not have the power to influence this process. Thus, farmers' organisations as the CAZ should develop into more powerful entities that really represent smallholder interests. However, the CAZ would have to further increase the number of its members and to sharpen its strategic skills to achieve this. Together with donors' engagement and a fully operationalized Cotton Act, this can help farmers and their organisations also in this regard.

Farming blocks

Farming blocks are a special case of a Public Private Partnership (PPP) that fosters a better marketing of agricultural produce and can result in the establishment of contractual production schemes. Government provides all relevant public services (particularly infrastructure for electricity, road access and irrigation) and the scheme is then managed by a private company, which in turn is responsible for contracting the farmers. The aim of this approach is to create an whole agricultural business entity, covering both the provision of inputs and sound extension services, but also the processing and the marketing of products to traders. It can therefore strengthen the buffering and organisational capacity of farmers and result in pro-poor growth, if the setting is suitable.

Farming blocks are sometimes combined with a contract farming mechanism, where associated smallholders have long-term agreements with commercial farmers. However, the challenge involved in farming blocks is that it is often difficult to artificially create a market at will and consequently make such farming blocks work. As confirmed by private sector representatives, Nakambala Zugar Estate is the most famous farming block in Zambia. However, its reach is quite limited as only around 400 small-scale farmers can participate in the three different out-grower schemes.⁵³ Hence, this approach from the sugar sector of Zambia is at the moment limited in its opportunities for scaling up and achieving a broader impact. The establishment of farming blocks all over Zambia mostly depends on the government providing sufficient funding and predictable agricultural policies. Moreover, in addition to the needed public policies, sufficient private investments are also essential to ensure the sustainability of these approaches.

53 It is important to note that not even one out of three schemes is a public private partnership. The other schemes are solely managed by ZamSugar.

In 2005 the government announced a policy to establish a farming block in each province. Currently, MACO decided to concentrate the funding on one specific province, Central Province, in order to be more effective in the implementation. Farm block development should be a major tool of the government to increase the area under cultivation and thus overall production (GRZ 2010, 13).

4.7 Water and irrigation systems

It is widely recognised that small-scale irrigation schemes – if managed appropriately and in a resource-saving manner – can contribute significantly to increasing food security, agricultural growth and resilience to climate change (UNEP 2006, 84-85). Though around 40% of water resources in the SADC region are found in Zambia (Kodamaya 2009, 4), the total irrigated agricultural area is only around 100.000 hectares (GRZ 2006, 49), although an estimated 420.000 hectares could be easily irrigated.

The under-utilisation of irrigation – in terms of access to technology, knowledge, organisational capacity, infrastructure and adequate irrigation schemes – has been repeatedly identified as a major constraint to development of the agricultural sector, especially for small-scale farmers (GRZ 2006, 47; GRZ 2007, 1; Saasa 2003, 41).

The main constraints for irrigation in Zambia are in high costs, sustainability of water use and repeated policy failure.

Irrigation infrastructure is capital-intensive and requires both investment and maintenance capital. Production costs rise due to an increase in working hours. If water is pumped, costs for electricity arise, and also for the maintenance of equipment and the higher need in spraying etc. These increased costs are the reason why only some emergent farmers so far have access to irrigation systems, and why irrigated crops are usually high in value and can be sold in a thriving market.

Therefore, the first precondition for profitable and sustainable irrigation is the existence of a stable and accessible market that can absorb the surplus. Around Lusaka, in the Copperbelt and other urban areas, vegetables or fruit trees are probably the most appropriate crops, since they have a much higher gross margin per hectare than cereals. Those farmers who do have access to irrigation mostly use it for horticulture and gardening. Crop irri-

gation is still rare; it is only practiced by large-scale farmers during the off season in August and September.

In order to also make irrigation feasible for smallholders, the costs and production risk must be low. Accordingly, the promotion of irrigation requires low-cost solutions (i.e. treadle pumps, furrow irrigation or gravity assisted delivery wherever possible) and the cultivation of storable crops grown during the off season, wherever the availability of such produce is low, but the demand is high. This could for example be winter maize or rice.

According to the African Development Bank, access to finance is limited because investments in irrigation are even more risky. Also, input costs have risen significantly over the past years, so the returns from irrigation schemes have gone down further and interest rates for credits are often too high, ranging around 20-30%.

Money contributions to water withdrawal can be more easily controlled when irrigation is done in projects, rather than individually. On the other hand, many examples show that individual irrigation is much easier to promote, particularly in Africa, where water user associations are often weak, and common irrigation is beyond what is conceivable with the current degree of organisation. Furthermore, when it comes to sustainability, small irrigation projects in Zambia have often failed in the past because of lacking maintenance and adoption: a World Bank representative stated that financial contributions would have to come out of farmers' crop revenue. Currently, approaches are being tested, where the private sector borrows money from donors in order to build infrastructure for bulk water/dams/electricity that subsequently come under public ownership. Afterwards, service providers (NGOs, agribusiness) could provide services that farmers would then pay for.

Irrigation projects can actually only be sustainable, if it is possible to estimate the volume of water tapped (as it is in streams) and if farmers pay for the water they receive. But as water experts know, measuring groundwater resources for example, but also of raw water extraction is a very difficult task. Extraction is very hard to control, given the limited capacities of the institutions in place and the uncertainty about the amount of existing water resources. In fact, there is probably no country in Africa and Asia where measurements of raw water extraction on a small scale is done. For Zambia, this matter should therefore be evaluated by comparing the available

water resources on the one hand to the number of water users and their extraction potential on the other. As long as this number is small and the extraction method is based on human muscle power, e.g. treadle pumps, there is no danger of depleting water resources .

If minor water resources such as seasonal creeks are tapped and population density increases, unplanned irrigation can quickly lead to water scarcity, and also to a decline in water quality, as contamination from more agro-chemicals also increases. The example of Kenya shows these trade-offs, as Neubert et al. (2007, 25) pointed out. Though Zambia has much more available water resources, some are already beginning to show strain, such as the river Kafue, where a number of large-scale users such as Zambia Sugar or the electric power company ZESCO are involved.

A potential solution to this trade-off is the introduction of an Integrated Water Resource Management approach, as currently intended by the Zambian Ministry of Energy and Water Development. However, this has already been in the pipeline for a number of years. The Integrated Water Resources Bill (IWRB) was planned to be passed in 2006 but has not been decided on until now. Its intention is to regulate water extraction and to avoid conflicts in water use. It remains to be seen whether its implementation will have a significant impact on agriculture in the future.

Past efforts to increase the share of irrigated agricultural production have largely failed. In Zambia, government spending on irrigation over the last seven years amounted to 3.4% of the national budget for agriculture, compared to more than 52% spent on subsidies, i.e. the Fertiliser Support Programme (Govereh / Malawo / Lungu 2009, 33). However, public spending should have been significantly higher in order to meet the objectives of the Fifth National Development Plan of 2006, which proposed doubling the area under irrigation from 100.000 to 200.000 hectares by 2010 (GRZ 2006, 49).

A ‘National Irrigation Plan’ was put together for achieving this target. Implementation has so far severely lagged behind government plans, though. During the empirical research for this study, it was repeatedly pointed out that the ministries responsible for issues of the water sector, and therefore the execution of such a programme – the Ministry of Energy and Water Development, Ministry of Local Government and Housing as well as Ministry of Agriculture and Cooperatives – have failed to cooperate, result-

ing in uncoordinated and insufficient efforts to promote irrigation. The National Irrigation Authority that was outlined in the plan has never been established, because of informal and internal constraints within the government. Similarly, funding from the newly established ‘Irrigation Credit Fund’ never took off, particularly because the Mwanawasa administration decided to move it out of MACO, due to its limited capacity to handle such a fund. It was then managed by the Civil Economic Empowerment Commission (CEEC) as an umbrella organisation, where it was no longer recognisable as a distinct irrigation fund, and dissolved in the CEEC budget pool. Accordingly, no specific targets for the promotion of irrigation were set and disaggregation of allocations became impossible due to the intransparent structure of the CEEC.

Furthermore, within the administrative structures, funds do not trickle down appropriately from the ministerial level, a problem that is intensified by a lack of fiscal decentralisation and inadequate structures at the sub-national level (GRZ 2009a, 40-41). As a consequence, improved performance of the agricultural sector not only requires significant scaling-up of investments in public goods such as irrigation infrastructure, but also structural changes for improved dispersal of funds and coordinated efforts of all stakeholders involved.

At the same time however, irrigation is becoming more important as a strategy to counter the adverse effects of climate change. Due to the prevalence of droughts as well as more and longer dry spells during the rainy season as a potential consequence of climate change in Zambia (see chapter 5.1), irrigation is also an adaptation measure. During times of lower or less predictable rainfall, irrigation schemes can contribute significantly to the reduction of the risk of crop failure in agricultural production processes.

In Zambia, the use of both rechargeable groundwater and surface water resources should be encouraged. Setting up a regulatory framework for groundwater irrigation requires a thorough survey of existing water resources and suitable soil types as essential prerequisites. Such a survey is currently underway around Lusaka with the help of BGR for estimating the existent resources of drinking water, but is still lacking for agricultural water use in almost all regions of the country. The use of surface water on the other hand, requires good organisation of farmers in water user associations and river water user associations. Surface water irrigation cannot be done individually, because a distribution system must be put in place, as the

water cannot be tapped from everywhere (as groundwater), but only from one place (the river). Thus it is crucial for user rules to be applied as part of a regulatory framework to assure secure water yields and a fair distribution of water among different water users and sectors. Models for doing this exist. Some good practises and examples from Kenya are shown by Neubert et al. (2007). The biggest challenge is to raise the Zambian farmer's organisational capacity.

Several different objectives can be linked through irrigation projects. An important one for smallholders would be to make the off-season more productive and to produce vegetables and special crops. But growing periods can also be extended and dry periods can be bridged by using irrigation technology. Moreover, even in areas of higher rainfall (such as in Zambia's agro-ecological Zone III), irrigation systems can supplement rain water for rain-fed crops and provide water for those crops that are grown during the winter period (i.e. green maize, which is highly profitable in Zambia), resulting both in higher and more stable crop yields and additional sources of income (Siame 2005a, 3). In some areas the agricultural productivity can be more than tripled with the help of irrigation, since not only the yield per crop, but also the number of harvests per year can be increased.

4.8 Social dimensions of agriculture

The following chapter elaborates on such social aspects related to agriculture as poverty and food insecurity, gender and HIV/Aids.

4.8.1 Poverty and food insecurity

Zambia is one of the poorest countries in Sub-Saharan Africa, currently 164th on the Human Development Index (UNDP 2009). 73% of the population lives below the poverty line, whereas poverty is at 83% in rural areas (GRZ 2007, 1). Most of the rural poor are engaged in subsistence farming, and for them the (non-)performance of agriculture has been the fundamental determinant for poverty over the last decades. The highest incidence of rural poverty is at 94% in Western Province, followed by North-Western Province and Luapula Province with 92% (Kajoba 2008, 15).

The reasons for poverty are manifold: a lack of access to productive resources, geographical isolation (causing lack of access to services and

markets), lack of productive assets (oxen or farm equipment) which constrain agricultural productivity, and the lack of labour in some households (Kajoba 2008, 24).

Also climate variability has severe effects on income and poverty. It slows the rate of poverty reduction and will cause the national poverty rate to be 2.3 percentage points higher by 2016 – that means 300.000 more people living beneath the poverty line in 2016 – than it would have been without climate variability. The national poverty rate rises by 7.5 percent in a severe drought year and by 2.4 percent during a severe flood year (Thurlow 2010, 17).

Poverty and food security are mutually dependent so that it is not surprising that the levels of food insecurity in Zambia are also “alarmingly” high, with 46% of the population undernourished (WFP 2007b). Zambia has one of the world’s highest proportion of stunted children.

Food insecurity seems to be cyclical as well as temporary. Floods, which occur regularly in Southern Province, wash away the crops and make the bridges in the region impassable for goods. Due to droughts, floods and the poor infrastructure, Sinazongwe district in Southern Province is especially hard hit by eight months of food insecurity per year. In total, 60% of the population in Sinazongwe district is food insecure. In North-Western Province, food insecurity is at 40%, with 70-80% of the population with only one meal per day in Mwinilunga district. The situation seems less bad in Central Province – 30% of farmers are food insecure between December and February, and Mumbwa district accounts for only 10% food insecurity.

In all regions an anti-cyclical marketing behaviour prevails: farmers sell their produce directly after harvesting, when prices are low, only to have to buy food later in the year when prices are high – which leads to adaptation strategies such as skipping meals, selling livestock etc, which causes seasonal food insecurity.

According to the Zambian National Farmers Union, 40% of Zambians depended on food aid from the World Food Programme during the last four years. This partly resulted from the high number of refugees originating from Rwanda, Congo and Angola currently located in five refugee centres, but also from low yields, bad harvests and poor marketing.

Across the population, the old, orphans and the young are most exposed to food insecurity. A number of factors contribute to household vulnerability:

household income levels, age of household head, education level, gender of household head, size and structure of household, workload constraints, food production levels, food prices and distance to food markets (ACF 2008, 2). During the last years, the HIV/AIDS pandemic is contributing significantly to food insecurity in rural households, especially in years of droughts (Siame 2005a, 2).

4.8.2 Gender

The role of women in agriculture is constantly underestimated for much of Sub-Saharan Africa. A variety of constraints keeps them from participating equally in development efforts. Against this background, three main lines of gender-related state-community interaction have been scrutinised: participation in decision-making, access to land and land rights, and access to extension services. The situation of rural women in Zambia shows significant differences with regards to their legal status in comparison to their de facto interaction with the state, as well as their traditional role and their actual position in rural society.

A fourth important aspect that was looked into is the workload of female farmers. However, this has to be seen more in the context of gender roles within rural society, than the relationship of rural women with the state and their formalised rights.

This research came to the conclusion that there is a dualism of formal and informal patterns of *participation* of women in Zambia that has intersecting effects for women: on the one hand, Zambian law grants women equal rights in participation, and it is actually being carried out on the ground within rural communities. On the other hand, however, when it comes to issues such as access to land and government (extension) services, de facto interaction between female community members and the state disadvantages women and does not fulfil the legal concept of equal opportunities: Despite formalised equal rights, they are confronted with a number of inequalities. For women in rural areas, this includes access to education, credit and suitable technologies (Rodenberg 2009, 18). Accordingly, women are most susceptible to poverty, a process known as the ‘feminisation’ of poverty, which is also going on in Zambia, as confirmed by the Zambian Government (GRZ 2006, 310).

But looking at it from a historical angle, the situation changed a great deal during the last 20 years. In Zambia, most ethnic groups in rural areas used to live, and still do, in polygamous families, and there was no question about it that wives had to do what their husbands told them to. Neither did they have the right to speak up or to make their own decisions, on what crops they want to grow. Bearing this in mind, a huge difference can be noticed compared to this: the situation of women really improved since then.

When it comes to participation in (political) decision-making at the community level, this statement can also be confirmed by the case study, which shows that many women in rural communities actually enjoy a right to participate, and use it. Many stated that they ‘participate equally’, have a ‘good collaboration’ with their male counterparts in the village groups and ‘are also consulted’ when problems arise. Also in regard to credits, all institutions questioned had special credit schemes for women, and though the amounts of money they applied for were usually very small, they were more successful with it than men. Although this is an ongoing process, it indicates that traditional rural societies have been embracing the principles of equal participation in decision-making that Zambian law guarantees for some years now, as several interviewees pointed out.

This promising vision is not as true with regards to *land access*. In Zambian rural society, there are usually two situations where women head households. First, there are widows and secondly, there are households where the husbands are elsewhere in order to earn additional income (i.e. working in the mining sector). Although Zambian statutory law provides women with the right to own, sell, rent or mortgage land, a number of adverse socio-economic and cultural factors, such as illiteracy, the high costs of land, lack of capital, and patriarchal attitudes among civil servants prevent women from applying for a lease or to own land (GRZ 2005b, 19).

Furthermore, this limited access to land is a cultural phenomenon that can be traced back to past practices, when women only had access to land through their husbands, regardless if they were from patrilinear (patrilocal) or matrilinear (matrilocal) societies. Even today, as researchers confirmed, only few women have the right to inherit land when a relative dies.

Women are also disadvantaged in the marketing of agricultural products. Despite the fact that women are mostly responsible for the greatest workload in fieldwork, men are mostly responsible for marketing, and in Zam-

bia they are not necessarily obliged – in contrary to some other systems in African countries – to pass it on to the women in order to meet family needs. This disadvantages women in their access to funding and privileges men in the investment and consumption decisions of the household.

A high HIV-infection rate among women, coupled with a variety of traditional or customary disadvantages, also makes them the group most affected by the negative side-effects of the pandemic within Zambian rural society. Due to customary land tenure systems in Zambia, a large number of women in rural areas who suffered the loss of their husbands due to the AIDS epidemic, lose access to their land and thereby get impoverished (Chapoto / Jayne / Mason 2007, 20–21). However, this applies more or less according to the prevalence of HIV/Aids in different Provinces. In North-Western Province, for example, HIV/Aids is far less pronounced than in Central and Southern Province.

Another common disadvantage for female farmers is little *access to governmental extension services and also to training held by private firms such as cotton companies*. Since most women received little education, they lack the skills and knowledge on good farming and marketing practices even more than the men do. This is aggravated by the fact that during meetings, women often remain at the farm houses and rarely attend field days. Hence, they do not have direct access to extension services, which predominantly target male farmers. Here again, traditional patterns overlap with legal claims of the women, and their interaction with the state is putting them at a disadvantage compared to their male counterparts.

A structural disadvantage also exists for women in households engaged in cotton contract farming. Mostly men hold the contracts, which usually also means that they receive the training and get the money from cotton sales, while the women do much field work, sometimes without any benefit from it. In the framework of development cooperation, i.e. within the framework of the COMPACI, cotton companies are requested to encourage more female farmers to take a contract or at least attend the training sessions.

Nevertheless and in order to ensure equality, poverty reduction and sustainable economic growth for the rural population of Zambia, agricultural reform will have to address these existing disparities between women and men in relation to state-individual interactions and to overcome women's limited participation in the development process.

Concerning *workload*, women are still disadvantaged in rural Zambia. There is a traditional division of labour, with men taking care of the livestock and all related work (i.e. ploughing), whereas women often still do the majority of the field work (planting, weeding and harvesting). Only land preparation and pesticide spraying are tasks that are traditionally done by men, but women always assist, for instance by picking up and carrying water for the sprayer. However, empirical data shows that this traditional division of labour softens, i.e. women and men are increasingly working together. Men now often help women with the weeding and also accept women, who take a more responsible role, as contractors in cotton farming for example. One rationale behind this is that they increasingly need the income of women and also see that women can perform their task, such ploughing with a draught animal, when given no other choice. At the same time, women's workload in the house also increases, as they are mostly the ones taking care of sick family members and of orphans in their communities.⁵⁴ Although there is some progress in the areas of participation and decision making over crop production, access to land, extension services and information is still limited for women, whereas the workload remains heavier.

Referring to buffer and adaptive capacity, it is not surprising that women are still lagging behind. They usually have a hard time expressing themselves, pointing to critical issues, and developing solutions and a vision, but – as a matter of fact – neither did men show these qualities. But among these categories, women probably have a better chance to organise themselves than men currently have. The reason is that they did not experience so many failures in the past – they are not so frustrated as men are and not as prone to alcohol etc. As reported by lending institutions, there are quite a number of successful cases of common money lending by women's groups, which would – as they stated – still be very rare or even impossible for men.

4.8.3 HIV/Aids

As the southern African region as a whole, Zambia is severely affected by the HIV/AIDS pandemic. The prevalence rates were constantly high at about 16-17% for many years, but according to the Central Statistical Office Zambia they have started to decrease to 14,3 percent in 2007. Still,

54 With an infection rate of close to 15%, most households are affected by the disease in terms of taking care of one or several sick family members.

Zambia is one of the most highly affected countries in the region (Mason / Chapoto / Jayne 2007, 1). A number of studies have highlighted the links between agricultural productivity and HIV/AIDS or AIDS-related prime-age mortality, respectively (i.e. Mason / Chapoto / Jayne 2007; Chapoto / Jayne 2005). Zambian agriculture is particularly prone to yield loss in case of sickness of the producers, due to its high dependency on rainfall. The reason for this is, as multilateral donors stated, that there is hardly any supplementary or full irrigation that could help to make up for times of sickness, when the fields are left unattended. Apart from the low population density, HIV/AIDS is another key factor for the lack of labour that influences and limits agricultural production in Zambia.

An estimated 12.5 million children have been orphaned by AIDS, leaving thousands of households headed by children in Zambia. The affected children rarely have the knowledge and skills required for effective agricultural production, and various agricultural operations such as raising seedlings in nurseries, planting, weeding, harvesting and tending livestock are left unattended (Siame 2005a, 2). It was stated that extension officers find it hard to work with households headed by children, as it is even more difficult for them to access inputs and credits than for adult farmers, and they therefore have different requirements in extension.

AIDS has become one of the major causes of infirmity and death among young and middle-aged Zambians, with far-reaching repercussions for rural areas and livelihoods: reduction in working hours for agricultural activities, as well as a reduced number of working adults per household result in decreasing income and food supply (Hamusimbi / Mataa / Jere 2006, 7). Furthermore, families afflicted HIV/AIDS often stop producing traditional crops that are high in proteins and nutrients (i.e. cowpeas or beans) and start growing less nutritious root vegetables that are easier to produce and have a higher level of drought and flood tolerance (Siame 2005a, 2). Researchers mentioned that, particularly if women die of AIDS, the loss has a negative influence on the nutrition levels of the household.

Hence, there is a direct link to the object of research of this study. Agricultural production and HIV/AIDS are mutually influencing each other in a negative way and thereby aggravate the situation of the rural poor. With agricultural productivity and food security decreasing, agriculture needs to respond to the serious challenge of HIV/AIDS. Civil society organisations (i.e. the Programme Against Malnutrition – PAM) are making attempts to

meet this challenge by promoting the use of less labour intensive cropping technologies and production techniques – such as weed suppression by use of cover/inter crops – and the distribution of antiretroviral drugs. However, a coherent strategy by government for the agricultural sector that will both integrate the requirements of the population affected by HIV/AIDS and provide a clear directive for extension officers is still missing, as pointed out by its representatives.

Thus, HIV/AIDS can be seen as an additional internal driver which hinders agricultural development and needs to be addressed in agricultural reform, with the assistance of extension services, as well as by measures that ease the work burden of those affected, such as using animal traction and/or irrigation technologies.

5 Impacts of external drivers on Zambian agriculture

This chapter addresses the effects of external drivers, climate change and economic shocks, on the agricultural sector in Zambia, and presents possible ways to adapt to these changing conditions. The study is based on the assumption that Zambia's agriculture can develop in terms of increasing agricultural productivity, as well as enhancing resilience towards external drivers and related risks if both suitable agricultural framework policies and adaptation measures are to be implemented.

Subchapter 5.1 will first deal with uncertainties related to climatic changes as well as with the current and future impacts of climate change in Zambia. Then, it will be analysed how adaptation measures should be designed, following a multi-level approach at the macro, meso and micro level. In subchapter 5.2, the characteristics and impacts of external economic shock s will be discussed.

5.1 Climate change

While there are some regions that are endowed with fertile soils and sufficient water, there is also a significant part of the country that over the last two decades suffered from adverse climatic effects, such as reduced and/or shorter, or heavier and/or longer, and generally more erratic rainfalls. In a number of years, poor precipitation, high temperatures and excess evapo-

transpiration have culminated in drought periods. Between 2000 and 2007, there have been two drought years, two flood years and two years with normal conditions (GRZ 2007, 1).

5.1.1 Uncertainties and climate change

Climate change is expected to affect ecosystems, access to natural resources, such as water and arable land, and thereby the vulnerability of people worldwide. However, length, strength and frequency of climatic hazards and the way they affect rural development, remain highly uncertain. Climate projections for Sub-Saharan Africa, for instance, predict shifts in annual precipitation ranging from -12 percent to +25 percent by 2100, with seasonal changes from -43 percent to +38 percent (Müller 2009, 30).

Determining future climatic variations and hazards and their impact on agricultural production is very uncertain for four reasons:

- It is uncertain how the factors of climate change – such as carbon dioxide emissions – may change in the future. Different climate scenarios on Greenhouse Gas (GHG) emissions try to account for that.⁵⁵
- The highly complex nature of climate change cannot fully be described by climate models, especially because the mechanisms and tipping points⁵⁶ in the climate system are not fully understood.
- Interlinkages exist between climate change and its origins such as with agricultural production systems and land use. On the one hand, the latter has itself an impact on carbon dioxide emissions, e.g. if intensive ploughing is applied. On the other hand, droughts or other climatic changes impact or diminish the amount of arable land. This interdependence increases uncertainty about the future development of climate change and the of impact projections (Müller 2009, 2).

55 The families of so-called “SRES” scenarios (A1, A2, B1, and B2) are the most prominent emission scenarios. The Intergovernmental Panel on Climate Change (IPCC) introduced them in their Special Report on Emission Scenarios (SRES) (IPCC 2000 in Müller 2009).

56 Certain temperature thresholds in the global climate system, the so-called tipping points, may be surpassed due to global warming. As a consequence, non-linear and possibly irreversible processes may be accelerated and negatively change the livelihoods of people and ecosystems (WBGU 2007).

- Lastly, downscaling projections for specific countries and their regions, adds to the overall uncertainty (Müller 2009, 2).

To account for the uncertainty of trends – e.g. higher/constant/lower precipitation – and moderate or overcome the adverse effects of climate change and its variability, it is necessary to increase the resilience⁵⁷ of the agricultural sector. However, as there exists no definite information on climate change and climatic variability, planning for the adaptation process afterwards becomes, a challenge in itself. This not only concerns exactly identifying to what it is necessary to adapt, there also is no guarantee that implemented adaptation policies and measures will increase resilience in the end (Horstmann 2008, 2).

It is therefore all the more important to apply context specific technical and/or social adaptation strategies and support them, for instance by financial or political incentives, production systems, making households less dependent on environmental and climatic conditions. Moreover, variable production choices and diversification of income within and outside of agriculture make farmers more flexible to react to climatic hazards (Müller 2009, 3).

5.1.2 Current and future impacts of climate change

As long as irrigation systems have not been installed, agricultural yields highly depend on precipitation. Even small changes in the timing, intensity and frequency of rainfall and temperature patterns can affect agricultural production in varying ways. If, for example, the rain starts one month later than usual or is delayed in the growing period or has a lower amount of precipitation, food production can suffer tremendously. In case of temperature rise, higher evapotranspiration challenges the availability of fresh water for agriculture in Zambia and increases uncertainty of water availability (Thurlow / Zhu / Diao 2009, 1).⁵⁸ Scenarios estimate that sub-Saharan African regions experience a loss of water from precipitation of about four percent. Every type of crop and its varieties can only develop its optimal potential at a certain temperature. Consequently, changes in temperature will alter seedling growth for the crops and probably decrease their harvest yields. Yields in sub-Saharan Africa could potentially decline by 15, 34 and 10 per-

57 Resilience refers to the ability of socio-economic and ecological systems to withstand external disturbances. For a detailed discussion see sub-chapter 2.1.

58 Next to plant-available water, water availability also includes stream-flow water, water withdrawals and water consumption (Müller 2009, 34).

cent for rice, wheat and maize, respectively (Nelson / Rosegrant / Koo 2009, 4–6).

Eventually, the whole world will be impacted by higher climatic variations as the Intergovernmental Panel on Climate Change (IPCC) made clear in its Fourth Assessment Report (Rosenzweig / Casassa / Karoly 2007, 112). However, Africa is especially sensitive to changes in growing season length, reduced rainfall and changes in temperature, since the continent's staple food production is mainly based on rain-fed agriculture (Padgham 2009, 9). The IPCC expects a decrease in areas suitable for agriculture, yield potential for semi-arid and arid areas and the length of growing seasons (Easterling / Aggarwal 2007, 282). For Zambia, being in semi-arid and dry sub-humid regions, Thornton (2006, 46) estimates a reduced length of growing seasons of 20 percent by 2050. In the last 20 years for example, Agro-ecological Zone I in the south of Zambia experienced more severe dry seasons than Zone II (CEEPA 2006, 3). Increased vulnerability also arises from the fact that Zambian farmers have very little access to irrigation systems (Thurlow / Zhu / Diao 2009, 1).

Moreover, Zambia is one of the five countries in the world, whose agriculture is considered to be most vulnerable to the uncertainty arising from climate change (WB 2009b, 19). Since the late 1980s, rainfall patterns in Zambia have changed significantly, with a tendency of later onset and earlier end to rainy seasons (Jain 2007, 7) in many areas. Southern Zambia is close to critical thresholds, with only 130 days left for farming maize varieties (Tadross et al. 2007, 201). Moreover, studies predict an increase in heavy rainfall and severe weather events (Tadross 2008 in Ifejika Speranza 2010, 45).

At the same time, meteorological observations over the last 30 years indicate that the average summer temperature in Zambia has increased at a rate of about 0.6°C per decade (a total increase of 1.8°C) (CEEPA 2006, 2). It exhibited the highest increase during the main cropping period, from November to December, across all agro-ecological zones. This rate is ten times higher than the average rate of temperature increase globally and for southern Africa. Regression models on the impacts of climate change estimate that such an increase in the average temperature in November and December and a decrease in the average rainfall from January to February would have negative effects on the net farming income (Jain 2007, 6; van Aalst / Cannon / Birdman 2008, 172). They may cause higher water

demand at decreasing water availability. In addition, extreme weather events, such as droughts and floods, already have devastating impacts on Zambian agriculture and have led to loss of harvests for farmers.

Opportunities of climate change

However, climate change may also have positive effects on Zambian agriculture, as Zambia is mostly situated on a high plateau, with hills and mountains. The plateau reaches an elevation of 2,187 m at the highest point in the eastern regions, giving the country an almost temperate climate during the cool season. For at least eight months of the year, average temperatures remain below 26°C. The plateau is dissected by several river valleys, making Zambia the home to 40% of all water reserves in sub-Saharan Africa (Jain 2007, 4–5). Therefore, it may well be the case that Zambian temperatures could still remain tolerable despite climatic changes. Jain (2007, 13), for example, estimates via regression function the positive effect of a temperature rise by 1°C during the growing stage of maize (January – February) to US\$ 315.70 per hectare.

Compared to the hot tropical countries, where a further temperature rise has immediate and direct negative impacts on vegetation, this is not necessarily the case for Zambia. The direct impacts in Zambia would firstly boost growth of biomass, as it also does in northern temperate climates, as long as there is enough water for such growth. Since every crop species has its specific optimum growing temperature, and these optima are not yet achieved in Zambia, temperature rises as such will impact agriculture positively. And for adaptation, many different annual and perennial tropical crops and varieties are available, that prefer still higher temperatures. Millet, sorghum, rice, root crops, pineapple, sugar cane, dates, citrus, cotton, soy beans etc. are only a small range of these. However, such predictions are highly risky, because the actual constraint is the changes in the run-off water and in rainfall, which occur very quickly in parallel to and as an effect of rising temperatures. Thus, predictions on temperature effects alone are not very helpful, and can be misleading.

Impacts of droughts and floods

During the last decade three droughts have occurred in the rainy seasons of 2000/01, 2001/02 and 2004/05, affecting two thirds of the country. Crops were especially devastated by dry spells during the growing season and a shortening of the growing period resulting in partial and/or complete crop

failure in the affected areas (GRZ 2007, 8; ZVAC 2005, 31). The droughts even affected relatively drought tolerant crops such as cotton and tobacco, while the most severe crop failures due to erratic rainfall were recorded in southern and western Zambia (GRZ 2007, 9).⁵⁹ According to the Zambian Vulnerability Assessment Committee (ZVAC 2005), some 1.2 million vulnerable people in the drought-prone areas depended on food aid as a direct result of the drought in 2004/05, receiving about 120,000 tons of food.

In addition to that, Zambia suffered from two mayor floods in 2005/06 and 2006/07, affecting more than half of Zambia's districts, some for the first time in history. Also, Southern Province has been hit by floods from the river channels as a result of higher rainfall in the north-western regions (Interview with Siame, 2010). Floods are especially dangerous for people who have never experienced floods before and thus lack traditional coping strategies (Disaster Management and Mitigation Unit (DMMU) under the Office of the Zambian Vice-President). The lack of information and knowledge increases the pressure on their livelihoods (GRZ 2007, 13). Even in Western Province, which is frequently hit by floods, flooding occurred unexpectedly early, and of unusual magnitude, catching people unprepared. The impacts of flooding are destruction of crops and cultivable land, soil erosion, outbreaks of human and animal diseases such as malaria and waterborne diseases, displacement of human population and destruction of property and infrastructure such as houses, roads and arable land. In 2006/07, the number of affected people amounted to 1.4 million in 41 districts (GRZ 2007, 8–9). For 2009/10, the Zambia Meteorological Department (ZMD) anticipates a total population of 713,193 (118,866 households) residing in 43 districts to likely be affected by floods (DMMU 2009, iii).

Impacts on livelihoods

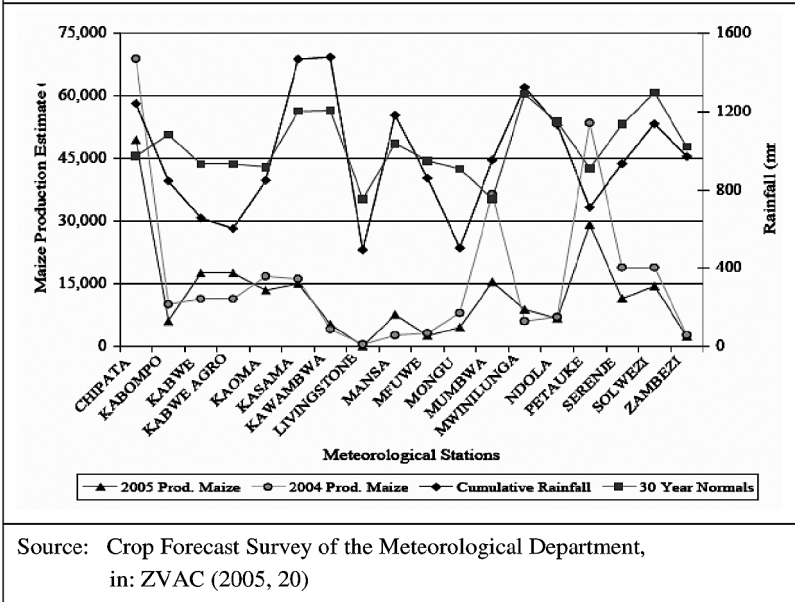
Due to the high dependency on rainfall, climatic hazards increase households' vulnerability to food insecurity, and in recent years, all farmers interviewed claimed that the increased climatic variability has several times already led to significantly lower yields.

Figure 8 depicts the relationship between the cumulative rainfall of the past 30 years and the maize production in selected locations. Droughts and

59 See Annex 2 for a detailed overview and comparison of the output in cereal production for Zambia's different zones for the good growing season of 2003/04 and the drought year 2004/05.

heavy rainfall negatively affect maize production and cause crop failure, especially if they hit the crop at its critical stage in the growing period or during maturing. In Kawambwa and Ndola districts, for example, high erratic rainfalls in 2005 led to decreased maize production.

Figure 8: Relationship between cumulative average rainfall (1960-1990) and maize production as of March 31, 2005



Source: Crop Forecast Survey of the Meteorological Department, in: ZVAC (2005, 20)

Thurlow / Zhu / Diao (2009, 32) estimate that Zones I and IIa will be hardest hit by increased climate variability, if the rainfall patterns of 2007–2016 were similar to those of 1985/86 till 1994/95. Based on the assumption that a similar rainfall pattern were to occur, the number of poor people in Zambia would amount to 7.6 million by 2016 (lower estimate).

Table 7: Main impacts of climate hazards on agriculture			
Droughts	Floods	Extreme heat	Shorter rainy season
<ul style="list-style-type: none"> - Crop damage/loss, resulting in food scarcity and hunger - Water shortages - Loss of income - Increase in diseases, affecting humans, animals and crops (malaria, dysentery, cholera etc.) - Decreased water quality - Increased soil erosion - Decreased soil fertility 	<ul style="list-style-type: none"> - Crop damage/loss, resulting in food scarcity and hunger - Loss of crop land and grazing land - Increase in diseases, affecting humans, animals and crops (malaria, dysentery, cholera etc.) - Destruction of infrastructure (houses, roads) - Loss of life (humans and livestock) - Interference with energy production due to change in water flow 	<ul style="list-style-type: none"> - Increase in diseases, affecting humans, animals and crops (malaria, dysentery, cholera etc.) - Decreased human capacity to do work - Loss of life (humans and livestock) - Crop damage/loss - Reduced livestock feed - Reduced water quality 	<ul style="list-style-type: none"> - Increase in risk of crop failure - Crop damage/loss - Loss of income from crop sales for those with reduced production - Crop seeds do not reach maturity, which negatively affects the next generation of crops - Reduced plant/forest regeneration
Source: GRZ (2007)			

Table 7 sums up the main impacts of climate hazards, such as droughts and floods on agriculture and communities in Zambia.⁶⁰ They may also bring to light other developmental challenges such as conflict and security risks (Boko et al. 2007, 441). Institutional and legal frameworks in Africa are, for instance, in some cases considered to be insufficient in dealing with environmental and disaster risks (Sokona / Denton 2001; Beg et al. 2002). A poor policy environment in the agricultural sector often hinders the delivery of public services in both rural and urban areas and makes an efficient response to climate variability and changes difficult (Tiffen 2003; Reid / Vogel 2006).

In sum, it can be concluded that climate change does already have significant negative impacts on Zambian agriculture and its overall development.

5.1.3 Improving resilience of agriculture to climate change

Through a holistic approach, the adverse effects of climate change and its related risks can be reduced by adapting Zambia's agricultural system and building resilience, which can at the same time, together with suitable agricultural policies, increase the country's ability to achieve food security. Policies and measures should match the economic goals of the agricultural sector in terms of increasing productivity and contributing to agricultural development. They should take advantage of the respective resource endowments and comparative strengths of the regions in Zambia. In the following, the study will shed light on them, with regard to adverse effects of climate change.

Overall, the implementation of resilience-building adaptation measures has positive effects in three different ways:

- It reduces the adverse impacts of climate change
- It allows taking advantage of opportunities created by climate change and boosts economic development
- It increases the readiness to cope with the unavoidable consequences of climate change (GRZ 2007)

⁶⁰ For major impacts of climate change on the reduction of poverty, see for example, Harmeling / Bals / Windfuhr 2007.

Possible measures and policies

The Climate Change Facilitation Unit (CCFU) under the Zambian Ministry of Tourism, Environment and Natural Resources (MTENR) has formulated a National Adaptation Programme of Action (NAPA) in September 2007 to react to the adverse effects of climate change.⁶¹ The aim of the NAPA is to contribute to improving food security by conducting a number of recommended adaptation projects and programmes for various sectors, targeting vulnerable communities and areas.⁶² However, only one project is currently in the inception phase, addressing activities in drought- and flood-prone areas. For the drought-prone Zone I, for instance, the NAPA proposes the following adaptation measures:

- Introducing pilot irrigation and water management systems
- Training communities on how to maintain and manage irrigation systems in the context of climate change, including climate variability
- Capacity building for farmers on water management practices
- Providing support in extension and marketing (supported by co-financing)
- Providing credits for irrigation schemes (supported by co-financing) (GRZ 2007, 45)

The CCFU was installed in 2009 with the main mandate to support the ministry in developing four key products dealing with climate change in Zambia. First of all, a comprehensive climate change response strategy and a strategy for advocacy and communication will be drafted. Then, the CCFU is to support the policies and principles of the National Policy on the Environment and to set up guidelines for the effective participation in international climate change conferences. Other outputs are the NAPA and the task of mainstreaming climate change in development plans such as the SNDP.

61 To develop the NAPA, policy officials firstly assess all available information about the impacts of climate change and climate variability and extreme weather events on Zambia. Secondly, they analyse projections of impacts of climatic hazards. For both steps they apply participatory assessments in the form of community consultations. As third step, key adaptation needs must be identified. Then, the responsible officials set up criteria for prioritising and selecting potential adaptation measures by short-listing them.

62 For information on the relation between the NAPA and national agricultural key policies and programmes confer subchapter 2.2.2.

The *Zambian Agricultural Research Institute (ZARI)* is also engaged in the design of adaptation programmes. In several regions it has conducted resilience checks by interviewing smallholders in order to assess their vulnerability and adaptive capacity to climate change. In addition, researchers stated that inter-ministerial papers discuss how the *Zambian agricultural sector* should react to the external climatic and economic shocks. Moreover, the *University of Zambia (UNZA)* conducts considerable research as part of international partnerships on climate change and adaptation in *Zambia* (see e.g. *Dinar et al. 2008; Kurukulasuriya et al. 2006*).

In principle, adaptation and mitigation strategies should go hand in hand to level out the adverse effects of climate change and slow down the rate of global warming. However, *Zambia* does and should mostly centre its measures on adaptation, because it contributes much less than 1% to global greenhouse gas emissions (*Mulemba 2009a, 4*). Since all adaptation measures involve both costs and disadvantages, it is important to choose those that are most effective in increasing the resilience of the agricultural sector.

Additionally, in a country like *Zambia*, where rural poverty is pronounced, it is vital for adaptation measures not solely to focus on resilience, but also on productivity. Thus measures and policies are called for that address it all, the effects of climate change, economic shocks and pro-poor development, as is done in this study.

To answer the question which coping strategies are most suitable and efficient for each policy measure and for each agro-ecological zone or region in *Zambia*, it is necessary to establish the relation between the micro, meso and macro level.

In order to illustrate the variety of aspects, which are to be considered when effective adaptation measures are to be put in place, an example from this research is highlighted. In the focus group discussions, farmers in *North-Western Province* all complained about longer and heavier rainfalls, whereas farmers in *Southern Province* were troubled shorter rainy season. Long rains have the effect that maize rots in the field before it can dry, and short rains have the opposite effect, i.e. the maize dries up before it is ripe. So in both cases yield losses can be tremendous. Effective adaptation measures can be applied in both cases. In *Southern Province*, early maturing maize varieties can be planted, which also can withstand a certain number of dry spells; and in *North-Western Province*, late maturing varieties are the

right choice. They only dry up when rains have ceased. These measures sound very easy, but in fact they are linked to a number of different challenges at different levels. For instance, early maturing varieties have lower yields, so there is a cost and the temptation for farmers to stick to the common varieties. Awareness rising is crucial. In contrast to this, late maturing varieties can yield very high, if fields are well-managed. But for this reason, seed prices are five times higher than what farmers are used to. Again training is essential to make farmers understand, that these added costs can partly be compensated by the higher yields. In addition to that, measures at the meso level are necessary to produce and to distribute seeds on the basis of having special farmers under contract with seed companies, and thereby lowering the seed prices over time. At the governmental level, the Seed Control and Certification Institute (SCCI) is involved in terms of giving advice and further developing varieties. In parallel, extension services are also involved. They have to provide support for farmers, for them to get better access to the seeds, but also to become competent to manage its different requirements. This means of course, that they themselves have to first learn about these specific requirements.

Given the state of research on adaptation strategies, such analysis of measures in a multi-level environment has not yet been conducted for Zambia, and adaptation strategies do not complement each other, are only partly suitable and the strategies for implementation are not outlined. In the following chapters this study tries to fill this gap.

5.2 Economic shocks

5.2.1 Characteristics of economic shocks

Zambia's agriculture is also threatened by economic shocks, such as unstable prices for products and inputs, and also by fluctuating currency rates etc.⁶³ Before describing the most relevant economic threats to Zambian agriculture, a few general characteristics of these will be outlined.

While "exogenous shocks" have a wider definition and include natural and other disasters (see IMF 2003, 3), "economic shocks" can be defined as short term import or export shocks (significant short-term trade imbalances

63 The terms "crisis" and "shock" will be used synonymously.

including currency volatility), highly volatile flows of investment and highly unstable commodity and energy prices (Messner et al 2009, 2; FAO 2009a).⁶⁴ Although economic shocks can also have positive effects, especially in the long perspective (i.e. by provoking the development of new technologies), their impact, at least in the short perspective, is mostly negative. In general, the longer economic shocks last and the weaker they are the less harm they are likely to do. Adaptation measures can buffer such shocks and therefore also influence their impacts.

This means, that shocks can refer both to abruptly rising and sharply falling commodity prices, and thus can have even opposing effects on the national economy.⁶⁵ An important characteristic of a global economic shock is that it might impose contagions, and that several shocks with contrary, neutralising and also synergetic effects can happen at the same time. This means that shocks have impacts across sectors and countries and thereby cannot be – at least not in a rigorous understanding – analysed separately by qualitative means. Last but not least, shocks do the most harm the stronger they are and the shorter they last, especially when they fluctuate. Further, their impact largely depends on the measures being put in place in order to mitigate or to buffer them. Thus, currency appreciation impacts negatively on the economy, when it comes suddenly, sharply and abrupt, so that smart policies cannot be put in place. And smart policies can in themselves have surprising and unintended side effects, hitting back at the problem, which was actually meant to be solved.⁶⁶ The same applies to depreciation, which also impacts negatively, especially if there is no time to adjust.

The financial crisis had a sequence of different effects on agricultural development in developing countries starting in 2008. It began with the collapse of the global credit market, which lead to a drop in direct foreign investments and subsequently to declining exports. These then had the

64 See also: <http://www.wisegeek.com/what-is-economic-shock.htm>.

65 However, sometimes it is not even possible to distinguish between the effects of different crises when they happen at the same time.

66 One example is the higher taxation on windfall revenues in order to pass the benefit on to the population. On the one side, higher could foster indirectly agricultural development. On the other side, over-taxation can easily cause the withdrawal of the foreign investor, leading then in the longer run the counter-effect again. This is one of the reasons, why governments are very prudent to increase the taxes.

impact of depreciation, and thus reduced governmental and private budgets with the consequence of reduced investments, production rates and falling commodity prices. The consequences of these effects again were rising unemployment and increasing poverty, among others. But because in this case these impacts were cross-sectorial, the shocks also had the opposite effect, that parts of the urban population re-migrated, coming from other industries back into rural areas, and thus this eventually could have resulted for some countries in a greater workforce in rural parts (Wolff 2008, 2).

Essentially, these links between sectors affected by a crisis are further strengthened by the interconnectedness of actors within global supply chains as part of the worldwide economy. This refers to the fact that producers are often contractually linked with processors. Again, the latter often have direct agreements with traders, which constitute the connection to retailers. Hence, changes in both the demand from consumers and the supply from producers effect investments, and thereby finally affect opportunities for economic growth at different levels (OECD/FAO 2009, 47f.). Whether these effects also occurred in Zambia and which farm types were the most concerned will be elaborated in the following sub-chapter.

5.2.2 Impacts of external economic shocks on the agricultural sector

In the past few years, the Zambian economy faced substantive effects on its development due to different external shocks with varying impacts on the agricultural sector.

Impacts of the currency appreciation

While the kwacha was stable in the early part of this decade and agricultural exports were on the increase, it appreciated strongly against the Dollar at the end of 2005 and then triggered symptoms of “Dutch disease”.

For the Zambian agricultural sector, this effect was ambiguous. Some commodities became more expensive and thus less competitive, others stayed the same or exports still increased (WB 2007b, 26). As only overseas markets were directly affected by the kwacha appreciation and agricultural inputs such as imported fertilisers, pesticides etc. became slightly less expensive as a counter-effect of appreciation and Dutch disease, these partly balanced out the increased pressure on export prices.

Aside from export crops, food crops were also affected, since importing them also became less expensive, and thus more attractive. This reduced the competitiveness for the local producer. As stated by Fynn / Haggblade (2006, 3). Zambia has since then tended to import maize with increasing frequency.

The effects of more inexpensive imports were also noticeable in supermarkets. But this only benefited the upper class, the only ones who could afford to buy imported foods in supermarkets.

A negative effect of appreciation for the agricultural sector was especially felt in the smallholder crops of cotton and tobacco, as can be seen in table 8. These sub-sectors were confronted with price pressure and obviously did not benefit from the decrease in import prices for inputs. The reason for this is that they did not use great amounts of inputs anyway, because of the high prices for imported fertilisers and the low degree of mechanisation of smallholder agriculture.

So companies came under pressure in 2007, and passed this effect on to the farmers by offering a lower price than had been negotiated before. As a result, many farmers abandoned cotton and tobacco, due to unattractive purchase prices, which for cotton even fell below 1000 kwacha/kg in 2008.

But as shown in table 9, cotton growing is still at stake though prices increased. Besides extremely low gross margins for both cotton and maize, the table also indicates that maize can be the much more profitable cash crop, when grown and sold under subsidised conditions. This is why maize is perceived as competing crop by the cotton companies and explains part of their mistrust towards the government.

In the meantime, both the tobacco industry and cotton companies have recovered from this. However, until this day they are still struggling for farmers to return to cotton growing, also in order to bring their ginneries back to full capacity. To completely achieve this, may take another few of years, but is possible in light of the favourable growing seasons of 2008/2009/2010.⁶⁷ Assuming that conditions stay favourable, a complete recovery can be expected in 2011/2012.

As can be seen in table 8, sugar was not affected by the kwacha appreciation, or these effects were overshadowed by others. One reason for that is,

67 Since growing decisions of farmers are always based on the results of one or two seasons before, the effects of changes and/ or fluctuations always appear accordingly to that time lag.

Table 8: Trends in exports of most important agricultural products (non traditional exports)									
Produce	2001	2002	2003	2004	2005	2006	2007	Trend and follow up	
Tobacco (smallholder crop under contracts)	10,1	18,7	19,0	43,3	60,3	70,5	63,2	Sector was booming, but export values dropped sharply after 2006 as an effect of kwacha appreciation. No recovery so far. No diversified markets. No domestic markets.	
Cotton lint (smallholder crop under contracts)	12,2	30,2	28,6	51,4	55,9	62,3	37,1	Values clearly increased up to 2006. Hard hit by kwacha appreciation in 2006. Not yet fully recovered by 2010 from low prices in 2008, but recovery in next seasons still possible.	
Cotton yarn (manufactured)	31,0	20,9	22,2	23,9	24,1	18,9	12,4	Value is clearly decreasing, as a result of shrinking local cotton industry.	
Fresh fruits / vegetables (commercial & out-grower schemes near railway)	23,3	27,8	26,9	23,2	21,3	25,3	24,6	Slightly fluctuating without clear tendency. According to literature, hard hit by kwacha appreciation.	
Sugar (commercial farms, some out-grower schemes)	34,3	35,1	30,6	33,4	67,8	54,3	74,4	Clearly increasing. No effects from kwacha appreciation. Diversified markets.	
Fresh flowers (commercial farms)	29,0	27,3	22,4	25,5	32,1	34,7	38,3	Sector increasing. No effects from kwacha appreciation.	

Source: CSTNZ/CSPR/ICTR (2008, 65)

that Zambian sugar markets are much more diversified, as shown in table 4, whereas cotton and tobacco exports are all directed towards overseas markets, and thus were paid in US-Dollars or Euros, or other major currencies. The other reason may be, that sugar production – because it is mostly on a large scale – could benefit from the slightly lower fuel prices and from (somewhat) lower input prices. Be that as it may, these effects were not very pronounced. Thus, the different effects from kwacha appreciation could have cancelled each other out. Obviously, lower input prices could not impact positively on cotton growers. Rather, the explanation is that even before they did not use much inputs and machinery, as – in the face of low gross margins (see table 9, pp. 136-137) – prices for fertilisers and fuel were too high.

All in all, many different effects overlap each other and eventually it is often not very clear, which effects overwhelm and/or neutralise which others. However, in Zambia, the cotton and tobacco sector were especially weakened from kwacha appreciation. In contrary to that, the sugar and other sub-sectors in agriculture remained stable.

Instead of implementing policies that could have buffered some of the negative side effects of kwacha appreciation, GRZ and the Bank of Zambia pointed only to the decreasing inflation rate as an effect of appreciation, and claimed that the people should be proud of having a strong currency. They preferred of maintaining a free floating currency, thereby setting up further incentives for foreign investments in the mining industry.

Impacts of the food crisis⁶⁸

The global food crisis began right after the rise of natural resource prices (especially fuel) in 2007/2008, with rising commodity prices on the world markets (FAO 2009b, 59). This global rise was a result of many different factors, for which losses in yield caused by droughts in some areas of the world, a rising oil price, and a sharp increase of demand for cereals, for instance in China and India, were among the most important reasons.

In Zambia, price fluctuations are for example reflected in the assessment of the Jesuit Centre for Theological Reflection's Basic Needs Basket.⁶⁹ In April 2008, the cost for this basket rose to ZMK742,700, from ZMK654,750 in February, and ZMK514,600 one year earlier, in April 2007

68 See also Neubert (2009).

69 The basket reflects the cost of basic food items for a family of six (Henriot 2008, 1).

(Henriot 2008, 1). For the period of June to December 2008, the Famine Early Warning Systems Network (FEWS NET) noted a rise in prices for staple foods by at least 70 percent, while prices also increased much earlier than the normal annual price pattern (FEWS NET 2008b, 2).

These threats were particularly severe for the urban population, who is entirely dependent on buying food, whereas farmers could have been the winners, with high prices as incentives for raising their productivity. Unfortunately, these benefits were rather low in Zambia. For smallholders, this was true, because they are mostly net consumers, so they also suffered more from high prices than benefiting by them, at least for the first time after the price rise. For commercial farmers, the benefits were also relatively low, as the input prices – for fertilisers and fuel – also doubled or tripled, so that gross margins stayed rather small (Henriot 2008, 1; FEWS NET 2008, 4).

Last but not least, some traders were speculating by hoarding maize, prompting the FRA to sell maize from strategic food stocks to stabilise prices, which led to shrinking food reserves (FEWS NET 2008, 5). As a consequence, Zambia was listed by FAO among nineteen countries that were particularly threatened by the global food crisis (FAO 2008, 30). Moreover, given its weak fiscal capacity, Zambia was said to have problems spending more money to buffer the effects of the food crisis (PREM/ARD/DEC 2008, 6). However, the potential winners of high food prices, the farmers, would have really benefited if prices had stayed high, so they could have increased their production for the next season. But this was not possible, because the global financial crisis was already under way.

During the food crisis, GRZ established a “Task Force on Rising Food Prices”, which put together a comprehensive report in September 2008, including a short-, medium- and long-term action plan, but it could not gain political relevance (GRZ 2008).

Impacts of the financial crisis

Shortly after the food crisis, the Zambian economy was affected by another economic shock: the global financial crisis. In general, the collapse of the global financial markets resulted in a sharply declining volume of investments, due to expected higher risks (FAO 2009a, 18, Wolff 2009, 1). Zambia was affected in October 2008, when foreign investments were withdrawn, followed by high exchange rate volatility (JCTR 2009, 2 f.). The crisis took its course: Growth projections for 2009 were moderate

Table 9: Average cross margins per hectare for traditional small scale farms				
Cotton	2005–2009	2010	2011	
Income (ZMK/ha)	600,000.00	858,000.00		
farm gate price (ZMK/kg)	1,200.00	1,950.00		
average small scale farmer yield (kg/ha)	500	440		
Costs (ZMK/ha)				
loan for seeds/chemicals	132,000.00	132,000.00		
land preparation as service provision – with oxen ¹	160,000.00	160,000.00		
Total costs	292,000.00	292,000.00		
Gross margin (ZMK/ha) (before labour) = USD/ha	308,000.00 65.77	566,000.00 120.86		
Labour (days/ha)	70	70		
ZMK/Labourday	4,400.00	8,086.00		
USD/Labourday	0.94	1.73		
Maize	2005–2009	2010 (free market)	2010 (subsidized by FRA and FISP)	
Income (ZMK/ha)		1,680,000.00	2,730,000.00	
farm gate price (ZMK/kg)		(800.00)	(1,300.00)	
average small scale farmer yield (kg/ha)		2,100	2,100	

Costs (ZMK/ha)			
seeds		279,000.00	139,000.00 ²
fertilizer		930,000.00	232,500.00 ³
land preparation as service provision		160,000.00	160,000.00
Total costs		1,369,000.00	531,500.00
Gross margin (ZMK/ha) (before labour) = USD/ha		311,000.00 66.41	2,198,500.00 469.46
Labourdays/ha		50	50
ZMK/Labourday		6,220.00	43,970.00
USD/Labourday		1.33	9.39
<p>US\$ was equivalent to 4,683.00 ZMK = 2010.</p> <p>1 = 175,000.00 for service provision with the tractor, 2 = 50% subsidies on seeds, 2 = 75 % subsidies on fertilizer.</p> <p>Seed prices, fertilizer prices per ha, labour days in 2010 = Zambian National Farmers Union (ZNFU, 2010). Revision of seed and fertilizer prices on maize at 14.2/2011 with extension officer in Mumbwa. Subsidies: Fertilizer 60%–75%) as usual, 1,300.00 ZMK/kg price given by Food Reserve Agency in 2010. Average small scale farmers' yields in 2010: Central Statistical Office, Lusaka (CSO, 2010). Input package and yields for cotton = Dunavant, Lusaka: Interim Report, 2010. FSRP (Food Security Research project - Zambia) (2008): Empirical Information on Smallholder Maize: Production and Fertilizer Use In Zambia. Presentation at Fertilizer Support Programme Evaluation Kick-Off Workshop, Protea Safari Lodge, June 25–26, 2008, By Michael T. Weber</p>			
Source: Own compilation			

(5.0% in 2009, compared to 7.0% in 2008), while sectors such as mining, tourism and services were faced with the strongest impacts (Bank of Zambia 2009, 6). Among them, the mining sector was affected by a sharp decline in copper prices (down by 67% from US\$ 8,985 per tonne between September and December 2008), with subsequent cutbacks of contracts with the private service sector and reduced public revenues and taxes for necessary public investments. These processes had negative impacts on Zambia's balance of payments, resulting in a higher current account/trade deficit (from US\$ 652.1 million to US\$ 910.7 million).⁷⁰

Reduced export earnings, less access to foreign currencies and increased risk aversion to financial assets, lead to a devaluation of the currency. In Zambia, the kwacha depreciated against major currencies, and so domestic inflation went up again (Bank of Zambia 2009, 3–12). As a consequence, substantial resources of the Zambian public budget were tied up for ensuring macro-economic stability. In 2009, the financial crisis continued to decrease public revenues due to a decline in taxes, so public spending for poverty reduction was also undermined (Mutesa 2008, 2, World Bank 2008, 37).⁷¹ These resources were also not available for the investment opportunities that the food crisis has generated.

In general, the direct effects of the financial crisis on agriculture would have been more pronounced, if the sector had developed. Although the financial crisis limited import and export business, it is doubtful if the major problems of the export sector can be attributed to it. For example, on the global cotton market, prices had fallen even before the onset of the financial crisis. In Zambia, only the horticultural sector was severely hit, due to a serious decrease in exports, especially to the EU. On the financial market, the effects on small-scale farmers were limited, because neither did they have access to finance before. However, some large-scale farmers felt the credit crunch by way of more limited access to finance, which resulted in a further reduction of the overall area under cultivation.

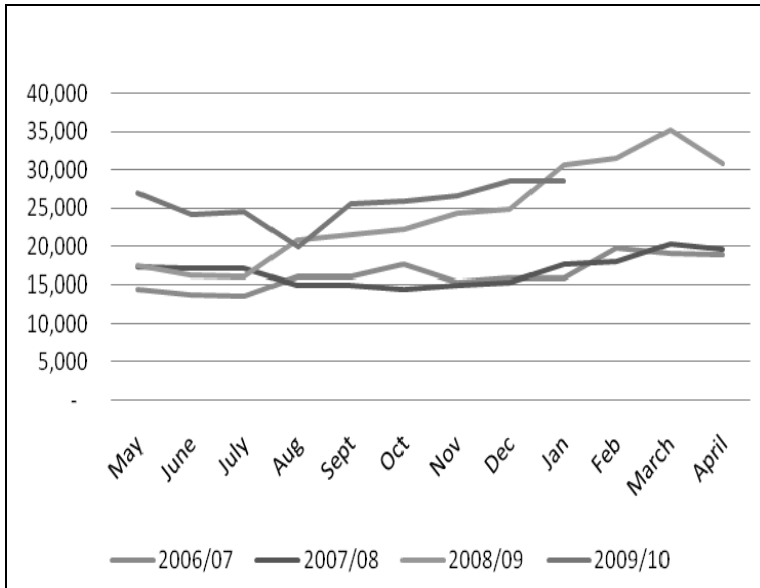
In theory, a financial crisis should lead to decreasing prices for fuel and for food as demand falls sharply, but this phenomenon did not occur in

70 Foreign Direct Investment (FDI) inflows declined from US\$ 1,323.9 million (in 2007) to US\$ 938.6 million (in 2008) and also Foreign Portfolio Investment recorded an outflow of US\$ 6.1 million in 2008 from an inflow of US\$ 41.8 million in 2007.

71 In addition to the fact that the government of Zambia made large and unnecessary concessions to the mining sector which reduces its options for an active tax policy (Green 2009, 2)

Zambia, as the price inflation for food products in 2009 were still high, compared to times before the crisis (Zamstats 2010, 5 f.), and the prices for inputs (such as fertilisers) stayed high. In fact, food prices stayed high and did not go down again until 2010, by which time the mining sector had already completely recovered.

Figure 9: Maize prices for maize from 2006–2010



Source: FEWS NET (2010, 3): Zambia – Food security Update, USAID

As smallholders could not afford the high input prices, they spread the subsidised or too little quantities of fertilisers over larger areas, which consequently reduced the agricultural productivity.⁷² Another effect of the financial crisis is reflected by shifting employment patterns, from the decline of the mining sector, to an increased interest of former miners to practice agriculture. However, by lacking access to land titles and inputs, these workers could hardly become successful smallholders, but rather

⁷² Moreover, Zambia’s agricultural potential is further diminished by still existing high indirect costs for agriculture such as taxes or costs from macroeconomic distortions (WB 2008, 37).

served as skilled or unskilled labourers, mostly on large-scale farms (FAO 2009a, 38).

In addition to these effects, the impact of the financial crisis is also crucial for those smallholders, who are net consumers of food, due to the inflation of food prices. Inflation increased to 15.9 % in April 2009, from 10.1 % one year before. Moreover, the maize prices in 2008 was said to be 24 % higher in real terms than in 2007. As poor households only have a limited set of potential alternatives, some relied on support from their extended family, reduced the number of meals they consumed, ate less-nutritious, less expensive food, saved on healthcare and education, or even sold their livestock (FAO 2009a, 37; WFP 2009, 2).

With regard to suitable policy responses to the financial crisis by the GRZ, the Economic Association of Zambia (EAZ) expressed its dissatisfaction: While the effects on Zambia were denied and trivialised at first, the government finally accepted that Zambia was affected by the global downturn (EAZ 2009). In January 2009, a meeting (a so called Indaba) was held with 500 participants from economic institutions and a ten-point plan was developed on how to handle the crisis. However, the GRZ never published the plan and the implementation of these strategies failed due to a lack of political will.

5.2.3 Improving resilience of agriculture to economic shocks

In Zambia, external economic shocks manifest themselves mostly through price fluctuations for produce, either for export products (due to appreciation or depreciation) or for food crops (due to inflation). Import prices for agricultural inputs and/or fuel have also fluctuated, but these effects were mostly not passed on to the producers, when a decrease was suggested. Input prices tended always to stay high.

All in all and despite of the fact, that external economic shocks would have hit the agricultural sector even more, if it had been more developed, the damage to Zambian farmers was still pronounced.

As pointed out in the AFRCE Economic brief (2007, 9), the appropriate policy response to price shocks depends very much on their duration and nature – permanent shocks should influence consumption; temporary shocks should affect savings, while keeping consumption intact.

In general, the Real Exchange Rates (RER) in developing countries are three times more volatile than the RER in industrialised nations, thus economic shocks are more frequent in developing countries (Cali / te Velde, 2007, 3 f.). The lack of instruments to insure for risks, prevent fiscal policy from being more responsive and counter cyclical to risky revenue. The record in developing countries has also been poor in terms of generating public savings by taxing windfalls or spending the higher revenue on the budget. In Zambia, windfall taxes are low and always an issue for discussion. Since most mining companies are in foreign hands, only a very small proportion of windfall revenues actually flow into Zambian, into public hands.

Smallholders, whether net producers or consumers, have always been worse hit than other parts of the population, and they could never benefit from adverse side effects. This is due to the nature and generally short duration of these shocks. Smallholders could neither benefit from high food prices, nor from low input or fuel prices. Either, because they were not passed down to them, or they were irrelevant, because they never used a lot of such inputs. Mostly, there was too little time to react in terms of raising productivity, or other productive adaptation measures.

Net consumers on the other hand, were also negatively affected, as they had to spend still more on food stuffs at the end of the season, than they would have anyway. Thirdly, the negative effects from kwacha appreciation were more pronounced for smallholders. Their cash crops, such as cotton and tobacco, were hardest hit by the higher export prices, whereas commercial crops were excluded from more severe effects. One reason for this was the low diversity in the supply markets for cotton and tobacco, a situation which can be changed.

In order to buffer such fluctuations better in future, smart policies and measures at all levels are required.

The most important policies at the macro level are such ones to stabilise the currency. This should be combined with diversified traditional and non-traditional tradable sectors, sub-sectors and supply markets. In concrete terms, the non-traditional tradable sectors such as agriculture, manufacturing and tourism should be fostered much more than in the past, but the sub-sectors should also be diversified, for instance, the mining sector should also exploit other minerals, i.e. cobalt. Within the agricultural sector, variety and crop

diversification is crucial, but also the re-engagement in animal husbandry and new branches of agriculture (e.g. *Jatropha* and fisheries). Market diversification should emphasise on regional markets towards COMESA members, as this is the most expansive, and also free market, right outside of Zambia's door.

But as a matter of fact, all price fluctuations have negative as well as positive effects, and because of this complexity it is very difficult to put in place the right policies, also because what is right for the one part of population, might be wrong for another. Further, effects of policies are also sometimes very difficult to predict and can sometimes also be the opposite of what was originally intended.

In the following, some policies to stabilise the currency are listed. As these policies should be implemented at the national level as an enabling framework for the agricultural sector, they stand more or less by themselves. Adaptation measures within the agricultural sector will then be outlined further in chapter 6.

- The most well-known measure to prevent currency appreciation is to take money out of the circulation (of the supply market for investments), e.g. by shifting it into a sovereign wealth fund, which can then for instance balance out times of low revenues. The IMF suggests creating such a fund.
- Another important policy is to diversify the supply markets for agricultural products, e.g. towards different regional markets within COMESA (Fynn / Haggblade 2006, 58).
- In the long run, it is also crucial to develop the processing and manufacturing industries (e.g. textile, oil processing) in order to process and/or to manufacture the raw products, creating a domestic market and/or developing the capacity for manufactured or processed exports. They are of higher value and less volatile in price.
- It would buffer risks, if Zambia would re-establish its fertiliser factory and produce its own fertilisers. This would lower the extremely high fertiliser prices and so increase the profit margin of production.

In addition there are the examples of policies from Chile and Botswana, that show that there are several effective policies, by which currency appreciation and the degradation of non-traditional sectors, i.e. agriculture, can be avoided (Simumba, 2008, 6):

- Revenues from the traditional tradable sector (here copper) can partly be kept separately (in such funds as mentioned above), partly saved and partly absorbed and/or reinvested into the non-traditional sector (agriculture/manufacturing).
- The created funds could fulfil several tasks: They can smooth out fluctuations, but also themselves generate additional financial resources, by building financial assets, as was done in Chile with the stabilisation funds, development funds and public dept services.
- Benefits of the lower import prices and benefits from windfall revenues can be passed on to the population.
- Policies on spending and saving have to be balanced, pursuing a counter-cyclical policy in the managing foreign exchange reserves.
- Progressive adjustments to the exchange rates can be made to encourage other sources of foreign exchange earning.
- Windfall revenues can be taxed higher, and the surplus funds spent for the advantage of agricultural producers to promote economic diversification (Fynn / Haggblade, 2006, 5).
- Windfall revenues should be used for re-investments into infrastructure, agriculture and creating a better environment for foreign investments.

Aside from these possible measures, of which none were put in place in Zambia, the International Monetary Fund (IMF) plays an important role in providing countries with macroeconomic policy advice on how to better prepare for shocks and how to respond once they have happened. Currently, the degree of preparation for shocks varies considerably. A systematic focus in supervision and the design of Fund-supported programmes could help countries prepare for shocks more effectively. In the aftermath of a shock, the IMF can help countries select the ideal policy responses (see IMF 2003, 3).

In the following chapter, some policies and measures will be further outlined and then integrated into a comprehensive package, together with actions in order to develop the agricultural sector in a pro poor and sustainable manner and at the same time to adapt to economic shocks and climate change.

6 Findings from case studies and recommendations at regional to local levels

6.1 Results of case studies

In all studied cases, resilience to shocks, agricultural productivity and total production are very low. All farmers in the sample were very poor and/or vulnerable, with less variation depending on the farm type – smallholder or emergent – and the region, i.e. the different natural conditions under which farms are managed, than expected. In all provinces, farmers complain most about the limited amount and the late supply of fertilisers through cooperatives. Less so, but occasionally still, do they complain about the fact that only some of them benefit from fertiliser distributions. Some of the excluded farmers stated, that they could not afford the membership fees for cooperatives. Others did not know why they were excluded. Because of the bad coverage of the subsidy programme, 70–80% of smallholders would have to buy fertilisers in commercial shops (with prices three times higher), which they cannot afford. Thus, fields are mostly left without fertiliser or any other manure.

In all provinces, the lack of other fundamentals at farm level, such as the limited access to markets, a very bad access to credits and technologies, a lack of workforce, weak and often one-sided soil, crop and water management are to be lamented. These constraints in buffer capacity are similarly prevalent in all Provinces. One of the reasons for this surprising result might be that poor infrastructure and communication networks impact all provinces in almost equal measure (Southern Province being the worst and Central being the best, but both being very weak). Fact is that no matter in which province, immediately after turning off the main road into the out-back, the situation everywhere is very similar: no more roads, no more transport and no more communications. Thus places can already be remote, that are only 20 kilometres or less from towns and/or Lusaka.

Also the **degree of organisation** among farmers is very low in all provinces. They usually do not form groups for storage and transport of produce together, they usually do not form micro credit groups and/or they do not know about, or are not motivated to form water user associations, for instance in order to irrigate their fields with surface water. Farmers rarely exchange ideas or help each other. Some women's groups may be the

exception, but also not widespread. Most farmers struggle by themselves and alone instead, which they say is due to mistrust and rivalry. Many farmers have had bad experience with cooperatives, experiencing corruption, having been disadvantaged in terms of fertiliser distribution or other services, which were cut back.

Also **adaptive capacity** for change in social, economic or climatic terms is not developed among farmers. The evidence is an assortment of various factors: the complete reliance on the state (except farmers in North-Western Province, who never received much, so they also do not expect anything), not having much say as an individual; lack of experience with other institutions or the private sector; no choices because of poverty; poor education; and sometimes because of relying on religious faith („It is Gods plan“). All in all farmers and the rural population seem to have a very “pronounced ability to suffer”, which hampers them from trying to escape poverty or to even complain about their situation. The self esteem of farmers seems to be low, they look for a leader, rather than creating participation. The individual motivation for change is also very low. This is the case, because the individual farmer knows, that he/she cannot get far, as solo attempts are culturally not inacceptable. Promising individual attempts to escape poverty are usually discouraged by family members, either by threatening to use magic, or through other means, i.e. claiming a financial share. In rural Zambia, this culture is still common and very pronounced, not also within families and between clans, in particular, when persons from underrepresented tribes try to succeed.

6.1.1 North-Western Province

North-Western Province with its roughly 600.000 inhabitants is the most sparsely populated province in the country.⁷³ The Lunda (Mwinilunga) and the Kaonde (Solwezi) are the main ethnic groups in these districts and are originally hunters-gatherers, until 80-100 years ago, the most widespread livelihood.

Today, agriculture is in a process of transition from shifting cultivation (slash and burn) to permanent axe and hoe cultivation, with a fallow period that currently only lasts for three years. The amount of cultivated land is

73 In North-Western Province, interviews were conducted in of districts Solwezi and Mwinilunga.

usually three Lima,⁷⁴ although there is abundant land available. Since fallow periods are decreasing and mostly neither fertilisers or lime, nor manure or compost are applied, soil fertility is decreasing. Thus it becomes necessary to cultivate more and more land in order to harvest enough – which is not possible when only using hand tools and when there are only few family members who can work.

North-Western Province has a sub-humid climate and a long rainy season, lasting for eight months or more. Soils are partly acidic, with a pH below 4.5. Because of the amount of rain, nutrients are washed away, and as they are not replaced, decreasing soil fertility is a major problem in this region. The main crops grown are maize (Solwezi) and cassava (Mwinilunga). Beyond that, farmers also grow beans, potatoes, soya, sorghum and millet in Solwezi and sweet potatoes, rice and pineapple in Mwinilunga. Animal husbandry has a subordinate role, only poultry and goats are sometimes part to the farm household. This also means that animal traction is not used.

Farmers ranked threats from pests and crop diseases in North-Western Province as low, apart from the cassava mosaic in Mwinilunga, and the occasional locust. People are not being responsive towards these problems – nothing is done against locusts, and while new varieties that are virus-resistant do exist, they are not being distributed. To the contrary, cuttings from sensitive cassava plants are used for multiplying, so the disease can spread further.

Regarding the sale of farm produce, there are differences between Solwezi and Mwinilunga. Solwezi is a booming town at the moment, with the recent exploration of a new mine. The demand for food crops is growing among the miners and their families. Also, the town and the mine offer the possibility for off-farm activities besides agriculture. Additionally, there is cross-border trade with the Democratic Republic of the Congo (DRC) – Zambian farmers have difficulties satisfying the massive demand existing across the border. So far, the full potential of this has not been tapped. This is partly due to the above mentioned factors, but also due to export bureaucracy, bad roads, low degree of organisation of traders and uncertainty about export opportunities (erratic bans and/or prices).

Mwinilunga does not have any kind of markets within its reach. There is a cross-border market with Angola, but to a much lesser degree than in Sol-

74 1 Lima = a quarter hectare

wezi. This is due to extremely poor infrastructure. But when it comes to problem ranking, the farmers in Solwezi do not see themselves to be in a better situation than farmers in Mwinilunga.

Climate change is being recognised in the form of too much rain and an extended rainy season, as well as occasionally occurring floods and storms. Late rains lead to water-logging and cause maize and even cassava to rot before they are mature. This impacts erosion and rising ground water levels. Though farmers perceive increasing temperatures, these do not pose a threat, because of the relatively cool climate. What causes the changing climatic conditions, is completely unknown to the farmers (“it is God’s plan”).

External economic shocks are marginal in the region, especially in Mwinilungwa, where people only now begun to think in terms of money cycles. The strongest burden on farmers is the late and/or insufficient supply of fertilisers. But farmers also know that the effect of fertilisation on their soils is very limited. This is due to the soils’ low pH, which would have to be balanced out through the application of lime. But as a matter of fact, lime is completely unavailable in the region.

Other key constraints in North-Western Province are the lack of a workforce, a lack of capital, missing infrastructure and the lack of facilities for storage and processing. Farmers expect an input support programme that functions better in terms of timing, quantity and quality. Especially that lime is not included in the FISP is a major deficiency. They also say that better storage and processing, insurance schemes, more training and access to credits and technology would help solve their problems.

Box 1: Example: Pineapples in Mwinilunga

The district Mwinilunga is home to a remarkable pineapple production and used to have a pineapple processing plant that closed down due to mismanagement late during the Kaunda area. It is a typical cash crop but is now only being sold on the local market, due to lack of transport, traders and processing. The full potential and current production of pineapples can not be absorbed by such a small market, thus pineapples are rotting away unprocessed. Despite this, the Ministry of Agriculture encourages the growing of pineapples – which results in even more rotting fruits because of the lack of processing and is an example for the low adaptive capacity at the macro level.

6.1.2 Central Province

In Central Province, interviews were conducted in the districts of Chibombo and Mumbwa as well as in the provincial capital Kabwe. Central Province has roughly 1 million inhabitants and it is considered to be the breadbasket of Zambia. Farmers are generally better off than in North-Western and Southern Province. Most of the commercial farmers, of whom the majority are white farmers with colonial or European backgrounds, are found in Central Province. And the small-scale and emergent farms here are also considerably bigger, with two to four hectares, and more. The largest part of production is sold, but there are still 10% of food insecure households. Typical crop rotation is maize – cotton – groundnuts, whereas maize makes up by far the biggest portion. Apart from that, soya beans, sun flowers, beans, tomatoes and vegetables, sorghum, cow peas and paprika are grown. The average yield is around 3 tonnes per hectare for maize, which is very low compared to the potential yield of around ten tonnes for hybrid varieties, but high compared to yields in other regions of Zambia.

Central Province has the highest degree of mechanisation/“oxenisation” and irrigation. Farmers’ access to markets and technology are easier due to better infrastructure and endowment with capital and assets, better access to hardware depots and mechanics, and also due to higher presence of lending institutions. Contract farming by private firms not only with cotton and tobacco, but also with horticulture and flowers enable some farmers to at least sometimes benefit from these arrangements. But there are also challenges in contract farming, which are further outlined in chapter 4.6.

Some farmers in Central Province own tractors, the proportion of farmers with oxen is reasonable high, and local and Chinese treadle pumps are available on the market. For marketing, the proximity to Lusaka is a huge advantage, albeit only for those farmers who are situated along the main road. 75% of farmers sell their produce by self-organised transport, but many still remain poor. For maize and cotton there are two monopolies, the FRA and Dunavant, which means little price competition. 30–40% of the maize harvest is bought by the FRA at a fixed price. The FRA buys rather late to ensure a certain level of dryness of the corn, so many farmers sell before that at lower prices to briefcase buyers because of their urgent need for money.

Farmers experience climate change in the form of increasing aridity, decreasing soil fertility and erratic rains, but do not have the adaptive

capacity to come up with ideas to solve the problem. The only solution they could think of when confronted with the question was to receive food aid.

Though the infrastructure in the region is much better than for instance in Mwinilunga, the main constraints for farmers in Central Province are similar to the ones in other regions: lack of capital and credits, lack of inputs, lack of market access and the neglect by the government.

Box 2: Example: Cotton and the Competitive African Cotton Initiative/COMPACI

The average yields for cotton in Zambia have been stagnant at just around 500 to 600 kg per hectare in the last decade, so they are lower than in many other African countries. The reasons are decreasing soil fertility and poor crop management due to insufficient management skills, but also a lack of attention to the crop. The latter can be seen as a result of fluctuating farm gate prices that are only announced shortly before harvest or selling, which leaves the farmers in a very uncertain situation during the season. Thus in Zambia average gross margins for cotton are very low (see table 9), and so the number of farmers growing cotton e.g. for Dunavant in the last few years shrank from 300.000 to around 100.000 in 2009. As a result, the Dunavant ginnery in Mumbwa, one of the largest in the country, ran at only half of its capacity of 30.000 tonnes per season. In 2010, though the prices increased, no major rise in production occurred, since farmers base their decision whether or not they grow cotton always on the previous season. In 2011 more farmers will probably grow cotton again, and a further increase in price is expected.

Following the CmiA pilot project (2005-2008), the Bill & Melinda Gates Foundation (BMGF) and the German BMZ decided to charge the DEG and GTZ with the realization of the Competitive African Cotton Initiative (COMPACI). The initiative was started in order to support cotton farmers in their struggle to generate higher profits. The private sector, represented by local cotton companies, acts as partner in providing more than 1/3 of the financing needed. COMPACI is aiming at improved productivity through better farm management strategies, and promotes more sustainable production systems. Trainings are provided in early land preparation, timely weeding, soil and integrated pest management, but also in better soft skills. During the same time CmiA is aiming at improved value chains for African cotton by opening up more markets in Europe and America. Presuming success, the initiative plans to return some of the benefits to farmers in the form of special premiums, dividends and credits: cottonmadeinafrica.com and COMPACI Newsletter (<http://www.deginvest.de>).

6.1.3 Southern Province

In Southern Province, interviews were conducted in the districts of Choma and Sinazongwe. Southern Province has 1.200.000 inhabitants. Southern Province has been the bread basket of Zambia in the past. The Tonga, who outnumber other tribes in that province, are known for having a lot of cattle – the striking feature of that province. Livestock is thus a very prominent alternative to crop farming in Southern Province. The average farm size is about two hectares and there is a strong focus on maize and monocropping. However, most farmers practice crop rotation on a small scale with cassava, sorghum, groundnuts, millet, sunflower, and cotton. There is a noteworthy percentage of tobacco growers, mainly through contract farming. However, due to poor infrastructure, animal diseases, dry spells and shortening of the growing season, price fluctuations, and a lack of irrigation systems, agriculture has become very difficult in the south, despite the main advantage of enough workforce due to animal draught power.

Here in particular, extension officers are understaffed and underpaid, and do not have sufficient means (in terms of a vehicle or fuel) to visit farmers regularly. Also, extension officers themselves lack the training to sufficiently teach farmers.

The adaptive capacity of the farmers in Southern Province is especially low. Most of the farmers stick to the tradition of ploughing; hence they are very hesitant to adopt new technologies such as conservation farming or agroforestry. If they do, the process of changing mind sets is very slow. However, due to the shortage and high prices of fertilisers, many farmers have switched to using manure and compost. If there is not enough, they collect manure from their neighbours.

Food security is a serious problem in Southern Province, one reason being the bad infrastructure that makes food supply difficult for the most vulnerable. In Sinazongwe for example, 60% of people are food insecure.

The impacts of climate change are most notable in this province. There is a general tendency of too little rainfall and an increasing frequency of dry spells, thus a poor distribution of rain. The rainy season tends to end earlier and rainfall is more erratic. Another important factor is the increasing frequency of floods. Because of higher rainfall in the north of the Zambia, the rivers carry more water southwards after the rainy season, and more frequently break their banks, destroying houses, roads, bridges and crops. In

2010, the Kariba dam had to be opened in order to release some of its water because of the same reason.

There is a lack of irrigation schemes in this province. Even though many donors are active in irrigation, there is no evidence of serious change with an improved situation for smallholders. Most farmers still have to do bucket irrigation which is labour intensive and can only be practiced in a small field. Only very few farmers are equipped with treadle pumps, as well as the occasional farmer using furrow irrigation. These numbers have not led to a significant increase in agricultural productivity in Southern Province. Despite the extensive water resources of Lake Kariba, only those owning land nearby the lake benefit from this source. As mentioned before, water user organisations that could resolve this problem are not formed. In times of drought, all farmers suffer from the shortage of water.

Insects, pests – but particularly animal diseases – are a greater problem in the south than in other provinces.

In terms of marketing, there are too little depots/communal storage facilities in Southern Province, they are far apart, and only 15% of farmers benefit from them (if they manage to have a successful harvest and bring at least a few bags). And if storage facilities are not well maintained, farmers also have to sell their crops early to prevent them from rotting. Also, the provision of credits is by far not sufficient and farmers are reluctant to borrow because they do not have a bank account or collateral.

What is different in Southern Province is that as an adaptation measure, farmers tend to shift to other branches of agricultural production (livestock and fishery) and/or non-agricultural sources of income (working in the mines), rather than to diversify within crop production. In fact, if veterinary services were available, a more pronounced and better organised animal production and/or fish ponds would be a promising way to diversify in this increasingly dry environment.

Box 3: Example: Jatropha

The tree crop Jatropha is used for bio fuels and got much attention from energy companies as well as scientists in recent years. Some see in it the perfect crop for small-scale farmers, as it is easy to grow, resistant to drought, grows on poor soils and provides renewable energy. It can grow with low maintenance costs and can also serve as a wind break and hedge, and on marginal soils. In such situations and/or fields it is in fact a logical crop to grow, as long as there is a buyer of the produce.

But there are also some problems. One of these is that Jatropha fruits are poisonous to humans and animals, and the tree can also become a plague. Thus, awareness and careful handling is necessary.

Especially when Jatropha is grown with commercial interest and under contract, profit is not guaranteed, i.e. the risk for companies when announcing a pre-harvest price is much higher than it already is with annual crops. As Jatropha trees take around 5 years until they can be harvested for the first time, calculations have been based on cash flows for, say 5-10 years in advance. This is very difficult, because the prices for Jatropha fruits highly depend on fuel prices, which are also fluctuating.

An expedient alternative for Southern Province can be the Moringa Olifeira tree, which grows best in dry sandy soil. It is a tree with a variety of potential uses – for highly nutritious food, livestock feed, fertiliser, medicine, cosmetics and also bio fuels. So, if companies do not buy the fruits, there are still alternatives for marketing or use. This tree has the potential to improve nutrition, boost food security, foster rural development, and support sustainable land care.

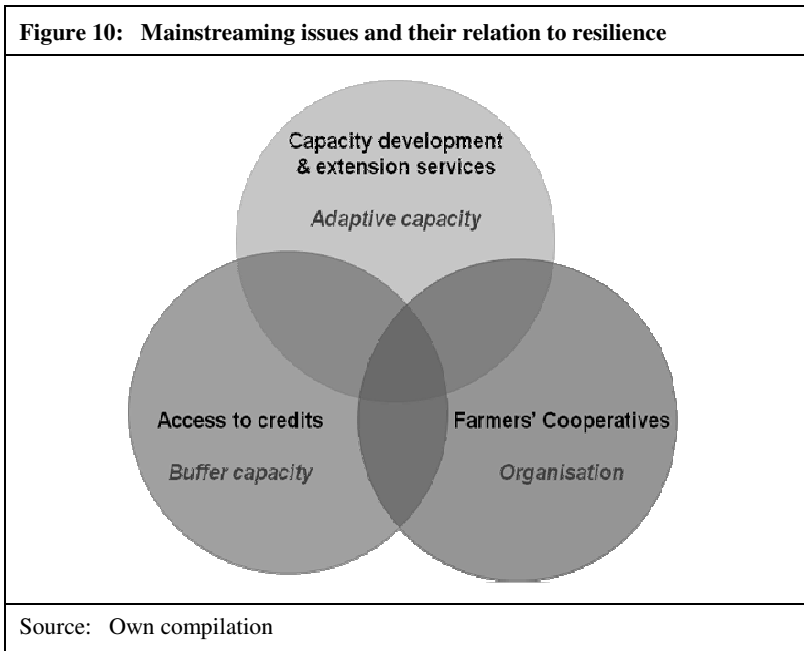
6.2 Mainstreaming dimensions

6.2.1 Mainstreaming issues and their relation to resilience

In addition to the measures recommended in chapter 6.3 with reference to the case studies, there are also several “soft” measures that are crucial to realising every one of the “hard” measures in the agricultural sector. Without these soft measures, development is not possible, as the theory but also Zambia’s history showed us. These features are the reason why they are called cross-cutting or mainstreaming issues here:

- Access to credits/funding
- Capacity development/extension services
- Cooperatives/farmers organisation

Only if all of these mainstreaming issues are considered, the implementation of the suggested “hard” measures can have its expected impact. As was described in the first chapter, resilience can only be achieved if several components can be taken for granted: strengthened buffer capacity, higher degree of organisation, and increased adaptive capacity. These components are reflected in the three mainstreaming issues. Buffer capacity can be strengthened if farmers have access to funds through credit. A higher degree of organisation can be achieved if farmers get organised, either in genuine cooperatives or farmers’ groups. More adaptive capacity means that the farmers are educated about farming methods, soil condition, crop varieties and diversification, etc. – that he/she can react to sudden changes in weather conditions or fluctuating prices. For the farmer to receive this kind of training, a functioning system of extension services is necessary (figure 10):



6.2.2 Access to funding/credits

Zambian small-scale farmers are facing almost no access to funding such as credits or savings, limiting their ability to purchase inputs, draught animals, equipment or food. This is a result of challenges existing to both sides: for the smallholders as well as for the lending institutions, when granting loans.

Challenges for smallholders

As far as savings groups are concerned, most smallholders are not able to deposit enough money, which results in a relevant sum, worth to lend one of them, who can make an investment. Thus, most groups fail after some months. Smallholders did not address this problem but rather decided not to develop a “savings-culture”, relying instead on “hand-to-mouth business”. Therefore, the number of micro savings groups has remained small for many years.

Regarding the access to credits, it was found that smallholders in Zambia often do not hold a formal title to land or own any kind of property that could serve as collateral. Though most farmers have land use rights that are traditionally granted by the elders and which could serve as collateral, a huge amount of bureaucracy has to be overcome for getting the title formalised, which can take up to three years. Some banks therefore ask to provide a third party, who can witness the land ownership, or they ask the farmer for a viable business plan, which for is most farmers very difficult to produce. Because the risks for banks are high, also the interest rates for credits are very high, between 25–35% per annum. Most farmers cannot afford this, and it also usually is above profit expectations.

Around 40% of the credit holders of the Lima Credit Scheme of ZANACO Bank (Zambia National Commercial Bank) are women, who usually borrow in groups. However, mostly the credits are too small to really invest in something which can lift them out of poverty.

A general problem is that smallholders often are not aware of what it means to borrow money and that they have to repay it. That is why there is a need for them to learn to understand the system of lending, and to get it into their “mind-set” (see chapter 3.5).

Giving credit in kind, as equipment or draught animals also encounters difficulties. First of all, the equipment is often not well-maintained, especially as repair costs are high and spare parts are hard to come by. Moreover,

farmers have little capacity to repair the equipment themselves. Secondly, the lack of experience in handling draught animals often results in untrained oxen that cannot fulfil their purpose or even die. In other cases it was reported that smallholders sold oxen, after just being given them. Several credit schemes failed for this reason in the past.

Finally, and this is another major constraint, as of the date of publication, many farmers still do not have access to village banks because of their limited prevalence.

Challenges to lending institutions

Financial institutions face the difficulty of extending sustainable loans, i.e. the interest rates have to reflect the high risk and also should be above the inflation rate. The financial product has to be designed very carefully, so that farmers are able to repay and also benefit, while – at the same time – the bank also has to make a profits in order to stay viable. However, the benefit to the bank can easily become questionable as a result of huge costs for the maintenance of credits. Not only do the credits have to be followed up, but also the handling of equipment, which must be serviced by the lending institutions themselves. Finally, the outreach of the banks into the remoter areas is limited. They have high transaction costs for visiting farmers and to evaluate, whether he or she can be a reliable client.

Taking the aforementioned challenges into account, a multi-level approach for accessing funds could consist of the following:

At the micro level (community and farm)

Regarding savings:

Extension officers at provincial and district levels should encourage farmers to form groups according to the “Rotating Savings and Credit Association (ROSCA)” or “Accumulating Savings and Credit Associations (ASCA)” approach. The latter was introduced by SIDA through the Agricultural Support Programme in Zambia. The difference between these two informal microfinance groups is as follows: Within ASCA, one member is assigned to manage the group’s funds, whereas the task rotates among the members in the ROSCA. The group should have the following features: (1) There should be membership fees in order to increase the ownership among the group members and also to raise financial funds. (2) From these funds, members can borrow money for their individual business. (3) Repayment is

regulated within the group. (4) Profits from individual businesses can be used for personal livelihood, while surplus funds should flow back to the savings account for future investments (for more information on ROSCA or ASCA see Bouman (1995, 371).

Regarding credits:

Wide-spread information about lending conditions and financial products should be given out to farmers by (micro) credit banks, extension services or NGOs. To raise awareness, agricultural information services or the media (radio, newspapers) could include such information in their portfolio. Advisory services should inform farmers on how to apply for a loan. Before the money is paid out to an individual or a group, the applicants have to undergo two months of training in order to learn about the credit structure, and how and why to repay a credit. Advice and training should particularly target women since they are still underrepresented within the group of credit recipients.

To gather information about the reliability of potential creditors, including their assets, income and liabilities, the heads of the community could be directly contacted for information in order to build up databases and reduce the high transaction costs due to long distances. Banks could get upfront information from the chiefs about the financial sustainability of the applicants.

Moreover, farmers must organise themselves in groups in order to better access agricultural finance. This is especially true for farmers who do not benefit from subsidised fertilisers. In addition, farmers as a group can reinsure each other. If one fails to repay, the others are held accountable. The minimum group size should be 20 people, but there is no maximum limit.

To meet farmers' different needs, a range of financial products should be offered (group lending, agricultural equipment loans, dairy loans, small livestock loans, savings products) as done by some institutions (e.g. Micro Credit Bank).

Regarding interest rates, the credits should be affordable to smallholders and therefore be subsidised by the government or a donor or NGO. As for a credit scheme for draught animals of Dunavant, an interest rate of 12–15% per annum still seems affordable to some farmers, i.e. the other 12–15%, which are necessary in order for the scheme to stay sustainable, should be

covered by organisations, as it is done for instance by the DEG (Deutsche Investitions- und Entwicklungsgesellschaft) in the case of Dunavant.

In order to solve the problem of collateral, small-scale farmers can also be endowed with semi formalised or witnessed land titles for the fields they cultivate. Moreover, a guarantor like a community elder could give a collateral guarantee, ensuring the reliability of the creditor in order to reduce the portfolio risk for non-performing loans. Given that a low lending risk of below 5% is attained by the collateral guarantees, the lending institutions can work financially sustainable. Both the availability of banks for farmers living in remote areas and the accessibility of the farmers to bankers still hinder the extension of credit coverage.

Another possibility is to abandon the option of collateral and instead ask for a detailed business plan, through which farmers can prove themselves eligible. This model is applied by Dunavant. However, this approach requires close follow up that is also cost intensive, but on the other hand it seems to be successful as stated by Dunavant representatives. According to their experience, closely following up is absolutely necessary to achieve repayment and eventually adequate benefits for both, farmers and companies.

Credits should be insured, so that the money is returned to the credit holder or a relative, in case of the death of the creditor or, for instance, the demise of the animal, which was bought on the basis of the credit. Possible options include a step by step payment, upfront payment in full or upfront payment of 50% of the insurance costs where the rest is paid after having received the loan.

At the meso level (provincial and district)

Regarding credits:

Banks and private lending institutions should extend their geographical coverage by increasing the number of local affiliates in all Provinces. Currently, Lima loans, for instance, are only given to maize farmers as sale of their produce is guaranteed through the Food Reserve Agency. As a measure for scaling up, further crops should be incorporated in the system to increase farmers' access to loans, such as rice, millet or cassava. The bank can itself come in as negotiator for an agreement with a guaranteed buyer. As for maize, the repayment should be extended until the end of December in case farmers depend on the FRA to pay the money.

In addition, linking small-scale farmers to markets through the system of warehouse receipts and selling through the Zambia Agricultural Commodity Exchange (ZAMACE) could take care of the necessary sales guarantee. Therefore, it is necessary to significantly improve the agricultural infrastructure, especially in storage systems.

Finally, private companies or donors can offer mechanisation credits, accompanied by maintenance service and repair training for farmers, as it is done by Dunavant for draught animals and tractors. Banks and other private lending institutions should insure credits against inflation risks and offer conditions agreed on in advance, while the insurance rates for credits should also be renegotiated with the Zambian Insurance Company in order to keep them low.

At the macro level (national and international)

Regarding credits:

It is necessary for the GRZ to enforce relevant laws – such as the Agricultural Credit Act of 2004 – to improve the investment climate for investors and private actors to engage in the field of (micro) lending to small-scale farmers. Consistent policies with regard to i.e. export and import bans are also necessary.

International donors could act as shareholders for privately-run lending institutions that offer agricultural finance, providing funds, enhancing their internal structure, systems and staff and – if necessary – transform them into financial institutions regulated accordingly (upgrading). An example of such a shareholder system is the Micro Credit Bank, whose donor shareholders are the EU, Danida, Oxfam, Selfhelp Africa, Africanow and others. Another example is the Rural Finance Programme of the International Fund for Agricultural Development (IFAD), aiming at generating savings and access of small loans for rural communities through village banks. Activities include developing community-based financial institutions as well as new and existing financial service products, promoting rural banking services and contract-farming for smallholder production. At the same time, the policy and institutional framework for rural finance could be strengthened (Ifejika Speranza 2010, 197; IFAD 2010). After setting up the banks, donors can slowly withdraw from the operations, accompanied by constant capacity building and training of local staff (see, for example, Access Banks

in Madagascar or Tanzania). Another option is to establish and manage new small business banks.

Donors could also cover the difference between an interest rate that is profitable for the lending institution and one that is affordable to farmers, by financing it.

6.2.3 Cooperatives/Farmers organisation

At the community level, around 25% of smallholders are organised in cooperatives, mostly centred around a certain crop, chiefly maize. Around 20 farmers belong to one cooperative, which is in turn organised within the District Cooperative Union (DCU). The DCUs are assembled under the Provincial Cooperative Union (PCU). All PCUs are represented at the national level by the ZCF. Farmers register with a cooperative for a fee of around 50.000 kwacha per year, which is often more than many can afford, and which in consequence is also the reason why many are not registered.

For most registered farmers the purpose of the membership is to get access to fertilisers, as the subsidies are only granted to members of cooperatives. The cooperatives thereby became mere suppliers for fertilisers, although the official agenda of the DCUs is much broader, such as the improvement of production, selling and processing of farmers' produce. Another problem is mistrust among farmers and a lack of initiative as well as the need for leadership, not just participation from the farmers.

Because they live very scattered, the mobilisation and organisation of smallholders is a prerequisite for agricultural development and particularly crucial for improved marketing and increased bargaining power of smallholders. As cooperatives provide this organisational structure only to a very limited extend so far, there is an urgent need to strengthen them, and to widen their practical activities. This can only be successful, if it goes hand in hand with increased accountability and trust building measures.

If cooperatives were strengthened in this way, they could

- serve as a link between the government and farmers,
- provide extension services more effectively through cooperatives,
- distribute scratch cards for an e-voucher system, which then would work through private shops,

- provide information on suitable varieties and crops, markets and prices,
- provide transport to markets,
- provide training on conservation agriculture and farming techniques,
- provide training on “farming as a business”,
- help to bulk produce and buy it from farmers and sell it to the FRA or other off-takers/buyers,
- act as community lending groups or provide loans,
- organise storage at village level,
- organise processing at farm level (e.g. through the provision of milling plants),
- foster organisational and adaptive capacity, empower farmers and enable their participation, and
- thus increase (social) resilience.⁷⁵

Cooperatives should consider themselves business entities that can eventually become autonomous and survive without the incentive of being distributors for fertilisers. Privatisation of cooperatives could be a solution – by offering services to farmers, but also taking into account very poor farmers that can not afford their fees. Private banks, NGOs or for example the Zambia Agriculture and Agribusiness Technical Assistance Centre (ZAATAC) could step in to provide grants to cooperatives in order to bridge economic shortages. In order to fulfil those functions, and to make cooperatives more effective and sustainable, strengthening them is a crucial measure for the implementation of all recommendations given in this study.

6.2.4 Capacity development and extension services

Capacity development is a multi-dimensioned and integrated empowerment process that enables partners to find the right solutions to the problems they are facing, without further external interference. It is a highly complex undertaking that evolves in a non-linear fashion.

75 “Social resilience may be defined as the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change” (Kajoba 2008, 1).

From the viewpoint of a holistic development process, capacity development measures have to be geared at systems as a whole (micro, meso and macro levels) in order to avoid the loss of capacities in a quickly changing political environment, and to ensure a coherent and sustainable strategy instead. Accordingly, a sound capacity development in the Zambian agricultural sector needs to target all stakeholders, such as government institutions, civil society organisations, private sector enterprises, farmers groups, and finally farmers themselves. These target groups need to receive policy advice, assistance in institutional reform processes, support for networks and training, and support in creating a framework that favours change processes and creates opportunities for sustainable development.

At the **macro level**, MACO needs to build capacities among its staff, particularly those engaged in extension, which is an inherent weakness of the Zambian agricultural sector. This requires training and reorientation to innovative and market-oriented farming. It furthermore has to include the improvement of technical skills and knowledge in alternative technologies and farming methods (i.e. conservation farming, adequate storage), development of extension packages for the different types of farmers and their specific requirements, as well as outreach and mobility to improve service orientation of extension. Moreover, they require the skills to conduct Training of Trainers (ToT, in particular for lead farmers), field and farmer training as well as demonstrations and field day skills. Apart from that, there is also a financial aspect to the improvement of extension services, since offices on the ground are chronically underfinanced and understaffed, which severely limits their outreach.

In addition, networking capacities need to be strengthened within MACO in order to improve coordination and cooperation with other ministries and institutions, such as the Ministry of Energy and Water Development in the sub-sector of irrigation. In the long run, this will also improve the absorptive capacity of the governmental institutions for funding inflow and lead to a meaningful division of tasks between them.

At the **meso level**, farmer organisations require technical, managerial and agri-business skills in order to improve their support to farmers and increase their organisational capacity. In addition, their networking capacities have to be strengthened to foster exchange and combine the promotion of existing local capacities of different organisations with the

development of new capacities. An increase in support to farmer organisations also promotes empowerment of those farmers associated with and participating in them.

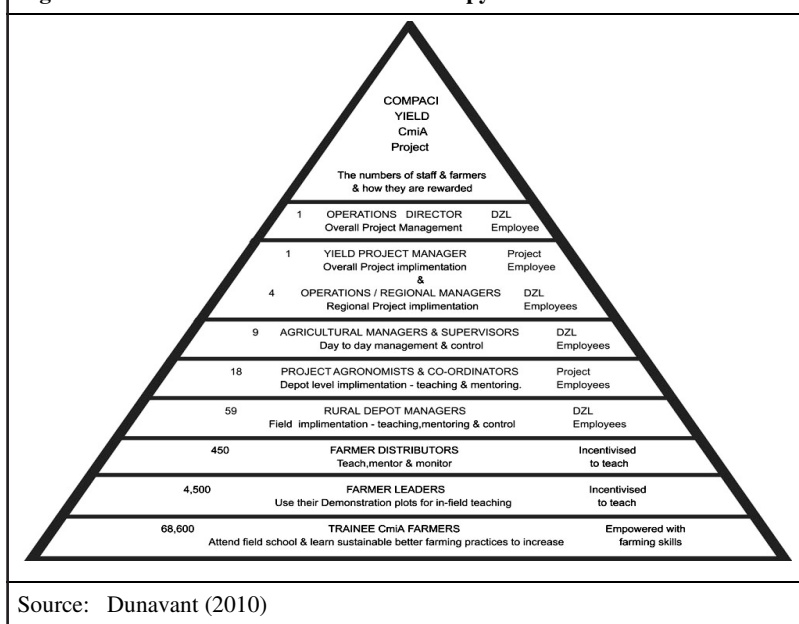
Another important group of actors at this level are research institutions. They require funding, staff and capacities to generate and disseminate improved technology packages that are user-friendly and affordable, develop more varieties tolerant to drought and longer rainy seasons, as well as to spread information.

Small and medium enterprises that function as intermediaries in the agricultural sector require capacity building to improve processing, packaging, storage and general market orientation, in order to develop a sprawling agricultural economy and to enable them to get engaged in export-oriented business transactions.

At the **micro-level**, the most important group of actors are farmers and particularly smallholders, who need training in crop management, post harvest loss control, soil conservation (i.e. ridges, basins, ripping, crop rotation) and building up structures for the incorporation of livestock. Moreover, capacity building measures for farmers should be business-oriented. They have to include the application of new technologies (i.e. irrigation, draught animal power), farming methods (i.e. conservation farming) and small-scale processing. Furthermore, small-scale and emergent farmers require organisational and networking skills in order to improve the marketing of their produce, regulate water use, and their exchange of knowledge (i.e. in learning groups), as well as to enable them to access credits and/or accumulate savings to access working capital. Moreover, the most vulnerable among them need special support, which particularly accounts for women farmers.

Dunavant developed a very effective extension pyramid to be able to train as many farmers as possible. Figure 11 shows the structure of the extension system as an example.

Figure 11: Dunavant COMPACI extension pyramid



6.3 Development and adaptation policies and measures

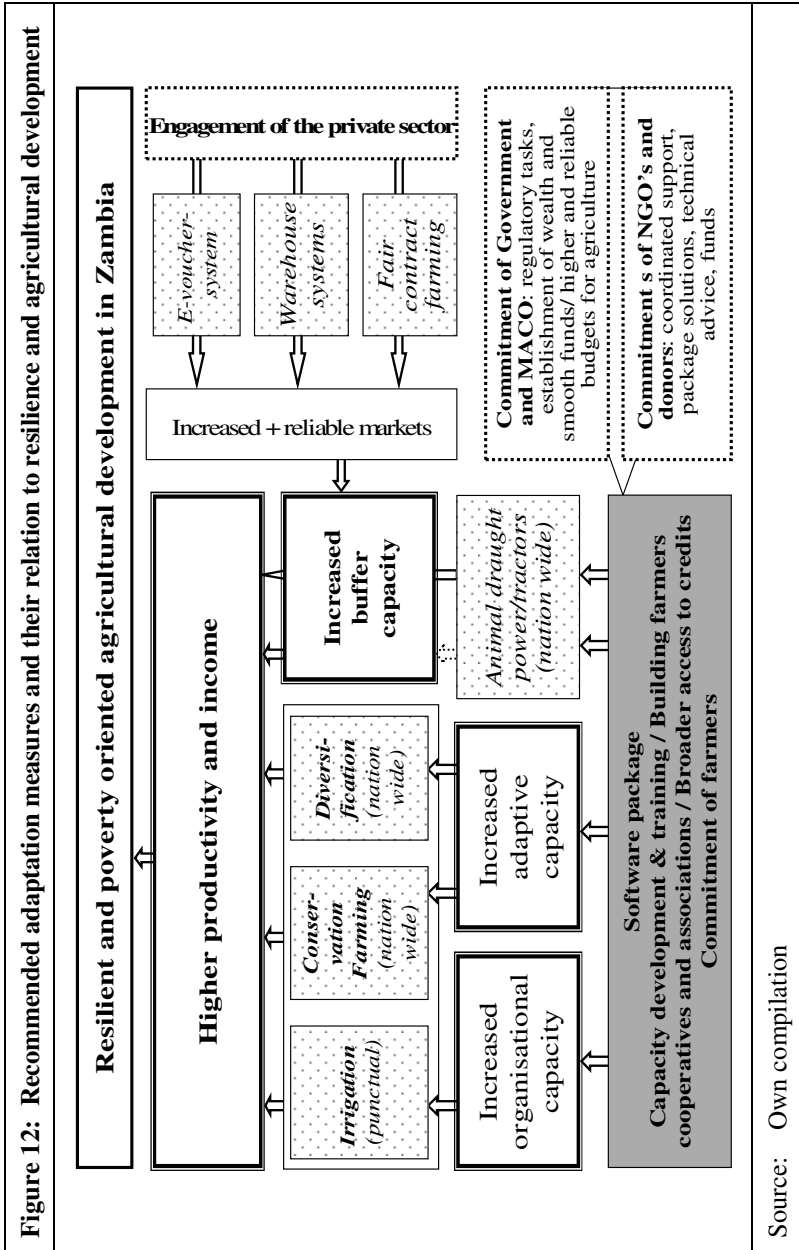
6.3.1 Selection of adaptation policies and measures

In recent years, several general international reports, e.g. the World Development Report (WB 2008) focused on agricultural development showing a new interest in this complex and often neglected sector. In addition to that and during the last five years, a vast amount of literature was produced about possible adaptation measures mostly directed at climate change, but also to economic shocks. This study complements the already existing literature and still fills a significant gap:

1. Agricultural development and measures for adaptation to climate change and economic shocks have to be interlinked and cannot be implemented independently, if they aim to foster both adaptation to crises and agricultural development as such. Not many studies consider these interlinkages and thus, the policies and measures suggested in the following are, if not new, then newly combined, processed and embedded in the agricultural context of Zambia.

2. Policies and measures to foster agricultural development must take the reality into account, which, in the case of Zambia, might sound very basic, e.g. food storage or animal traction, but nevertheless these developments cannot be left out or assumed as given. In fact, there is no way to achieve food security or agricultural development without these measures. This is why in this study the “how” of achieving these developments is more elaborated than “what” to do.
3. Economic shocks and climate change are often chosen as central themes in the current literature, but they are rarely combined. However, as a somewhat surprising result of this study, it can be shown that adaptation measures to climate change and economic shocks are very much overlapping and complement each other very well. This is most obvious in the example of suitable adaptation measures to climate change, such as conservation farming and crop diversification, which not only strengthen the buffer capacity of soils or cropping systems, but also of input price fluctuations or economic production risks. Nevertheless, most policies and measures originate from, and probably also have a more pronounced effect in one of the two fields. But, and this is also an outcome of this study, as far as the results of this study are concerned, they never counteract each other.
4. Many of the existing studies on policies and measures for adaptation to climate change only mention measures in an unsystematic way, e.g. taking the micro level into account without considering, what has to be put in place at other levels to provide the preconditions and the actual implementation. This study tries to fill this gap by relating each policy and measure to various levels at the same time.

However, the following suggested policy and adaptation measures are not complete. Rather, they point out the most crucial measures (written in *italics* in figure 12), in order to achieve both agricultural development and increasing resilience. The selection was based on criteria such as relevancy and effectiveness in order to achieve the goals. In addition to that, all suggestions are based on a reality check, i.e. they are taken from already existing debates and concepts in Zambia, at national or farm level as well as from the donor or NGO community.



6.3.2 E-voucher system

1. The problem

a) *Description*

In Zambia, fertilisers and, more recently, other agricultural inputs (seeds, pesticides) are subsidised and distributed by the government through cooperatives (FSP / FISP). The problems connected to this Fertiliser Support Programme are inaccurate targeting, low quantity, inadequate application, wrong timing, high dependency, fraud.

b) *Elements and causes of the problem*

1. The system encourages a black market: Farmers get more benefit from subsidised fertilisers, if they sell them to other farmers or even across the border.
2. Fertilisers are given out without considering the specific requirements of different soils and without training (inadequate application).
3. Fertilisers often arrive far too late in the growing season, so that the fertilisers' response to the soil is far below potential.
4. Fertilisers are limited to maize and the amount subsidised is not enough (only half a sack per farmer (that is for ½ hectare) in 2009).
5. Fertiliser subsidies make farmers dependent on government support and prevent them from becoming active and responsible for increasing their own production (undermining adaptive capacity).
6. Outreach of cooperatives, who sell the subsidised fertilisers, is very limited. Some farmers have to walk long distances or are not able to reach places where fertilisers are sold at all.
7. Many cooperatives were formed only in order to receive fertilisers, with the effect that there are thousands of cooperatives that are not legitimate, and only exist for this purpose. This causes a huge administrative work load for MACO staff at district level where there is hardly any money to monitor cooperatives and verify whether they were legitimately formed.
8. Too many funds of the government have been allocated to subsidies in form of the FSP / FISP as well as for the FRA (60–70% of the agricultural budget). These expenditures have not resulted in higher agricultural pro-

ductivity and came at the expense of other important development work in the agricultural sector.

9. There is no mechanism to investigate, which farmers have already benefited from fertiliser subsidies and which have not. Additionally, it is almost impossible to trace which farmers are more vulnerable than others, and rely on input subsidies (no targeting).
10. Even though the FSP has been revised and turned into the more broad FISP, the essential problems, of equitable and more effective distribution, have not been tackled.
11. Though there are also private shops for fertilisers, prices are far too high for poor farmers (around 125,000 kwacha per sack which is five times higher than subsidised) and outreach of shops is limited.

2. E-voucher for agricultural inputs as a solution

a) Expected positive impacts, side effects

- With the e-voucher system, farmers will be registered electronically in order to check who received fertilisers and who did not. Therefore, the e-voucher system makes the development of a black market very difficult, distribution more equal and the process more transparent. Eventually, organisational capacity can be increased.
- The system allows farmers easier access to receive fertilisers and other inputs.
- The system allows better timing of application and a higher flexibility to buy the product and quality that is really needed. Thus, this results in higher productivity and can reduce soil degradation due to better nutrition management.
- Farmers do not have to form a cooperative in order to receive fertilisers, but can just go to the closest shop or agro-dealer.
- Where there is demand for inputs, private shops/dealerships have to be created to supply the needs to the farmers, hence the participation of the private sector will be increased.
- When there are many shops/agents/dealerships in place, competition will be stimulated and the price for inputs will come down.

- Farmers become active participants in the system because they have to actively get involved in receiving their inputs rather than waiting for the government to deliver. Consequently, the ownership of farmers will be strengthened.
- Transaction costs can be reduced through the electronic system, because all the information goes into a database which can provide instant reports. Management costs can be reduced.
- If inputs are given out together with training, farmers could learn how to increase their yields, sell more crops on the market and use the surplus cash on education, etc.
- The e-voucher system would take away a high budgetary burden for the government because it introduces a ‘smart subsidy’ input programme that can stimulate growth and rural development and at best, increase the demand for commercial distribution of inputs in the long run.
- The e-voucher system can result in a diversified agriculture, because farmers are able to receive a variety of inputs (for example cash crops).
- Eventually, the e-voucher system, if implemented correctly can increase agricultural productivity, reduce household-level food insecurity and lower the level of rural poverty.

b) *Relevance for pro-poor development, climate change and economic shocks*

- The e-voucher system can foster a vibrant economic climate through the development and expansion of private trader businesses.
- Farmers can become more resilient against climate change, if they use adaptation measures, such as the right crop and the right crop variety for their specific conditions. All of these should be available at the private shop.
- Economic shocks are buffered by subsidies – which level out the specific vulnerability of the poorest.

3. Objectives

In 2009, under the leadership of MACO, the ACF put together an expert team from key institutions in the sector to go on a study tour to Malawi, Tanzania and Kenya, to learn about their fertiliser and input distribution system. In 2009, the ACF/FSP study team came up with a policy advisory

note on the proposed reform of the FSP, as well as a roadmap for the introduction and implementation of a Farmer Input Support and Training Program including with an electronic input voucher. The e-voucher system has already been implemented by PROFIT, CFU, WFP, CARE taking the programming costs in 14 districts in Eastern, Central, Western, Southern Province and Lusaka, and adapted to their specific programme requirements. However, so far the government has not yet decided whether to implement the system and will probably not do so before the elections.

The idea behind subsidised fertilisers is that only those who cannot otherwise afford fertilisers, are eligible to pay a reduced price for two consecutive years (first year: 50% reduction, second year: 25% reduction). After that, farmers have ideally succeeded, and can buy their fertiliser on an open market. The selection process for beneficiaries of subsidy is crucial in this system. Instead of leaving it to the camp officer, members of the community could agree on a selection process. This has already worked well in the 1950s with Community Welfare Assistance Committees (CWACs). For those farmers, who cannot even afford subsidised fertilisers (vulnerable but viable) should be eligible to receive the Food Security Pack that could also be part of the e-voucher system.

Donors are essential in the implementation phase of the system, because they provide the MACO with the necessary resources to internalise the system. Additionally, there should be a fund that is not connected to either the government or the private sector, but could be facilitated by NGOs or donors. This fund could be exclusively used for the establishment of the expensive system of agro-dealers.

4. Scaling-up

A scaling up the pilot phase of the e-voucher system to the national level can only be implemented, if the private sector will be crowded in. In order to develop the private sector, a network of agro-dealers has to be set up. It needs to be made sure, that agro-dealerships are always fully stocked. The agro-dealers should be organised and managed by the private sector and not by DACOs. Agro-dealers could be linked to financial institutions with the lower interest rate of banks.

As agriculture is a wide-ranging issue, other ministries should also be involved; inter-ministerial cooperation is necessary to implement the e-voucher system that could also be expanded to other sectors (health, education).

5. Key challenges and trade-offs

- In order to make use of the e-voucher system, farmers need to be registered and have an NRC number.
- The Camp officers are usually in charge of choosing the beneficiaries of subsidies for two consecutive years. However, there is no mechanism that can assure that the most vulnerable will benefit.
- It is a challenge for government to change from a distributor of fertilisers to a facilitator of a new system such as the e-voucher system. The e-voucher system can only work, if private agents and shops are available and within walking distance for all farmers. This requires logistical efforts to cover all areas of Zambia, especially the remote ones.
- Farmers will only adopt the system if they receive training and understand how it works, because many farmers do not perceive fertilisers as an investment. Training for the e-voucher system is necessary at all levels (national, provincial, district, village) and can also be offered by private extension officers.
- The private sector should be encouraged to import/manufacture all required fertilisers for the country, in order to lower the costs for fertiliser.
- Even though transaction costs would go down, over-all costs could be increasing in the short term while initialising the system.
- The cooperation of different stakeholders in the implementation of such a system is crucial. Harmonisation of the process is necessary to prevent different institutions from implementing different systems and thereby creating parallel structures.
- It should be assured that beneficiaries of subsidies would receive their scratch cards directly from the government (through camp officers) and can approach any agro-dealer for whatever input they need.
- The network of private agro-dealers needs to be upgraded. Fertiliser and seed companies are expected to deliver the inputs directly to agro-dealers in order to encourage a competitive market. Agro-dealers must be trustworthy and therefore need specialist training in order not to misuse their positions.
- Monitoring is necessary at all levels to learn about possible pitfalls of the system and in order to prevent fraud.
- MACO is hesitant to implement the system before the elections and is not in favour of an abrupt change of the system.

Table 10: Multi-Level-Chart: E-voucher system			
Level	Components of the “what” and the “how”	Relevant actors and special measures for vulnerable groups	Relevance to resilience and mainstreaming issues
Micro (community and farm level)	<p>a) Training for all farmers, and special training for farmers (also women farmers) who are not aware of such a system:</p> <ul style="list-style-type: none"> • Variety of inputs (crops, fertilisers, herbicides, pesticides). • How to use different inputs. • Learn more about which crops and which inputs are best suitable for which environment <p>b) Establish a credit system for those farmers who cannot even afford subsidised fertilisers or other inputs.</p> <p>c) Farmers should inform each other and organise better to exchange ideas and also technology.</p> <p>d) Extension services could also be organised privately by agro-dealers in combination with selling inputs.</p>	<p>a) Private agents</p> <p>b) Cooperation of the private sector with DACO staff.</p> <p>c) CFU</p> <p>d) Donors for an initial facilitation phase (also financial contributions).</p> <ul style="list-style-type: none"> • Private agents and camp officers should inform farmers about the system and give out lists with NRC numbers to let the farmers know who qualifies for subsidies and who does not. <p>Additionally, those farmers who qualify for subsidies but can still not afford to buy inputs should be identified and supplied with a Food Security Pack.</p>	<p>a) Capacity development</p> <p>b) Access to credit</p> <p>c) Organisation</p> <p>d) Strengthening of adaptive capacity</p>
Meso (Provincial and district level)	<p>a) Agro-dealers</p> <ul style="list-style-type: none"> • A network of agro-dealers needs to be established that will be equipped with cell phones and is trustworthy enough to qualify for taking part in the voucher system. 	<p>a) Private agents</p> <p>b) DACO and PACO staff</p> <p>c) Genuine cooperatives</p> <p>d) NGOs and donors</p>	<p>a) Capacity development</p>

Table 10: continued		
<p>Macro (National and international level)</p>	<ul style="list-style-type: none"> • Agro-dealers can be private agents, existing shops or institutions such as cooperatives, if they are legitimate and business-oriented. They have to make sure to receive input stocks from fertiliser and input companies. • Agro-dealers could also provide extension services to teach the farmers the right use of inputs. Therefore, agro-dealers need to have training on the system and also on extension services. <p>b) PACOs and DACOs</p> <ul style="list-style-type: none"> • Training for PACOs and DACOs on the implementation of the system. <p>Changing the FISP into the e-voucher system.</p> <ul style="list-style-type: none"> • Cooperation of all stakeholders in the agricultural sector is important to establish one e-voucher system and avoid parallel structures and different ways of implementation. • The facilitation of the implementation of the system from the highest level is necessary. This includes providing a better business environment, such as infrastructure and private sector development as well as providing credit facilities and a reform of the system of cooperative. 	<p>DACO and PACO staff should identify key constraints that hinder the implementation of the e-voucher system and try to solve those:</p> <ul style="list-style-type: none"> • Provide a business environment to make the agro-dealer network possible • Ensure credit schemes • Improve public transportation and infrastructure
		<p>Capacity development</p>

Table 10: continued		
	<ul style="list-style-type: none"> • MACO staff (at all levels) and non-governmental actors need to be trained on the implementation of the e-voucher system. • Donor and MACO funding can target the most vulnerable farmers (who will be identified through the system) with specific training and productivity enhancement support activities. • Establishment of an exit strategy for input supply subsidies in the long term. 	Access to credit
<p>The financial assistance for the FSP/FISP should be re-allocated to the implementation of the e-voucher system. Eventually, less and less money is needed for the system, because ideally more and more farmers will succeed and no longer qualify for subsidies. Under MACO leadership, donors, NGOs and other stakeholders can come in, to support and help facilitate the process with technical or financial contributions.</p>		
Source: own compilation		

6.3.3 Warehouse system

1. The problem⁷⁶

a) *Description*

Both the lack of storage and access to credits force farmers to sell their produce at a time in the marketing season when prices are low. This prevents the farmers from benefiting from selling the produce at high market prices at the end of the marketing season. Consequently, the farmer's income is lower, particularly for smallholders lacking market access and with limited bargaining power towards traders.

b) *Elements and causes of the problem*

- Many farmers have lost the traditional knowledge on using specific means of storage in order to achieve food security. Storage at the community level rarely exists, and if so, it is mostly not working properly to allow joint marketing, e.g. through a cooperative. Warehouses for agricultural products have been promoted since the late 1990s, but they are now used for other business purposes outside of the agricultural sector.
- FRA depots could also be used by private warehouse operators. However, in the early 70s storage infrastructure was erected mostly in the maize growing areas (central and southern Zambia). Due to the change in rainfall patterns the northern regions of the country are beginning to have consistent rainfall suitable for maize production. This has created the need for more storage infrastructure nationwide.⁷⁷
- Farmers are lacking marketing opportunities, particularly farmers in remote areas. So called "briefcase traders" provide them with access to markets, but prices are often low due to high transaction costs (e.g. transport and time: they claim that it takes them at least 3-4 days to put together a 30 tonne load). Moreover, they can take advantage of farmers' lack of market access and their lack of information on market prices. Moreover, farmers are being cheated on weight and quality of the produce (there is a poorly developed system of standard grades and measures).

⁷⁶ The discussion on warehouse systems is based on MACO (in GRZ 2004).

⁷⁷ Storage capacities in Zambia amount to 2 million tonnes. Today, only 1.1 million tonnes are used (500.000 tonnes by the FRA and 600.000 tonnes by the private sector), as stated by government officials.

- This is aggravated by the fact that farmers often do not trust each other or they have had bad experiences with the accountability of cooperatives. Otherwise, cooperatives could allow farmers to bulk their produce and to offer it directly to millers, who only accept produce in shipments over a certain amount (the minimum is 30 tonnes which is one truck load).

c) Regional specifics

- The problem exists countrywide but is more pronounced in remote areas with little infrastructure (e.g. North-Western, but also Southern Province).

2. Community storage and ZAMACE certified district warehouse systems as a solution

a) Expected positive impacts, side effects and spill over effects

Storage at the community level provides both proper storage facilities for farmers in times of low market prices and helps farmers to improve their marketing opportunities by increasing their bargaining power towards grain traders through lower transaction costs (particularly transport). Thus farmers can achieve higher incomes.

Moreover, a warehouse receipt system should be promoted at district level: By stocking their produce in a warehouse (for a certain fee), farmers receive either a certain amount of the crop's value in cash or get a receipt which documents the farmer's property. The farmer has the choice to sell his produce at any time or to take it out of the warehouse. The warehouse operator uses the stored produce as collateral. Through this approach, farmers can use the money for their urgent financial needs (inputs for the next growing season, tuition fees etc.) or exchange the receipt for products that are recognised by the receipt system (e.g. particularly agricultural inputs). This approach reduces the pressure on farmers to sell their produce in times of low market prices.

Other expected effects are:

- Community storage improves community's food security.
- Warehouses can make markets more transparent, particularly for smallholders regarding price information, but also for traders and millers that are interested in large amounts of agricultural commodities.
- It provides a point of intervention for post-harvest quality and post-harvest extension services.
- By linking smallholders and the private sector (traders, millers etc.) through warehouses, value chains can be improved by a better timing in marketing and improved post-harvest management.

b) *Relevance for pro-poor development, climate change and economic shocks*

- In general, storage can help to mitigate the effects of economic price fluctuations, regardless if it is an internal or an external effect on the market.
- Storage allows higher food security and improved marketing for small-scale farmers and thereby increases their income
- It can serve as a buffer for food shortages caused by droughts.

3. Objectives

Community storage is being established all over Zambia, and cooperatives play an active role in that. This needs to be supported through sound extension services by the DACOs and financial capital from a special fund (like the rural investment fund in the 1990s).

In cooperation with the private sector (traders and millers), the FRA establishes a partnership for the joint use of FRA depots to rent warehouses. Moreover, the establishment of further private warehouses needs to be promoted.

Storage facilities and warehouses can be promoted for all cash crops.

4. Scaling up

Private sector actors are the driving force in establishing a comprehensive storage system in Zambia. The foundation for scaling up is, however, a sound legal framework which is still to be implemented by the GRZ, particularly by the Ministry of Justice (MoJ). Given this legal framework, the private sector is said to carry out the main work of establishing the necessary storage infrastructure.

However, the government also needs to play a complementary role to create the right environment for a functioning storage system: farmers and cooperatives need to be supported through extension services for improved farming as a business and for enhanced community marketing. Moreover, a rural investment fund, established by the MACO, could support the access of cooperatives to finance to create and maintain community storage facilities.⁷⁸ This would be complementary to credits provided by private sector banks (such as the Lima credit scheme by the ZANACO Bank).

5. Key challenges

The confidence of farmers in the storage system is the key to their participation. Fees for using a warehouse need to be reasonable in order to make it profitable for farmers, and farmers need to be convinced that they can achieve higher profits. Farmers need to trust the warehouse system and the validity of the receipts needs to be guaranteed by cooperating partners.

Other challenges:

- There are costs for establishing and maintaining a community storage facility, which requires joint financial efforts.
- Farmers and cooperatives need to have the know-how to manage their storage facilities and avoid post-harvest losses.
- Standard grades and measures should be established in community storage facilities to reduce fraud and ensure the quality of the produce. Moreover, standards need to be guaranteed for warehouses to be attractive to the private sector.

78 This should be a revolving credit fund to improve its sustainability.

Table 11: Multi-Level-Chart: Warehouse system

Level	Components of the “what” and the “how”	Relevant actors and special measures for vulnerable groups	Relevance for resilience and mainstreaming issues
<p>Micro (community and farm level)</p>	<ul style="list-style-type: none"> a) Identify and establish community storages b) Cooperatives should play an active role, particularly by bulking the produce for increasing the bargaining power towards traders and in order to reduce transaction costs. It is crucial that farmers trust each other. 	<ul style="list-style-type: none"> a) Farmers / ZAMACE b) Cooperatives 	<ul style="list-style-type: none"> a) Buffer capacity b) Organisation
<p>Meso (Provincial and district level)</p>	<ul style="list-style-type: none"> a) Funding and extension services need to be provided to farmers and cooperatives for management of community storage and for information on markets. Moreover, the concept of farming as a business needs to be promoted with the aim to achieve better record keeping, improved business plans and higher productivity. b) Provision of credits for establishing community storage, e.g. via group lending (example: Lima credit scheme by ZANACO) c) Establishment of district warehouses, either by constructing new warehouses or using FRA depots. Integration of a warehouse receipt system (with validity of the receipts guaranteed by cooperating partners). 	<ul style="list-style-type: none"> a) MACO, ZAMACE/ZNFU b) Financial institutions c) FRA, ZCF, private actors such as ZAMACE, providers of inputs and banks 	<ul style="list-style-type: none"> a) Capacity Development, Adaptive capacity b) Access to credits c) Access to credits

Table 11: continued			
	<p>d) Capacity development and extension services for warehouse operators regarding post-harvest management (fumigation) and grading of the produce. The operator should be someone who is well known in the community to create the required trust among farmers.</p> <p>e) Market analysis (particularly regarding specific value chains) supports the market development of a specific district or province. Storage facilities and warehouses assist in these analyses as markets are being made more transparent and formalised. These results should be elaborated in cooperation with traders and processors to improve market linkages.</p>	<p>d) MACO and ZAMACE</p> <p>e) MACO and PACO, in cooperation with traders and millers</p>	<p>d) Capacity Development</p>
<p>Meso (Provincial and district level)</p>	<p>f) Ensuring quality of warehouses through verification by an independent, non-governmental institution.</p> <p>g) Market access for remote areas needs to be ensured by the FRA through decentralised depots. These warehouses can also be rented by private traders and millers.</p> <p>h) Laboratory services and weighing bridges need to be provided for reasons of quality (sound standard grades and measures).</p> <p>i) Insurance coverage for warehouses</p>	<p>f) ZAMACE</p> <p>g) FRA, private sector</p> <p>h) ZAMACE, ZBS (Zambia Bureau of Standards)</p> <p>i) Insurers and brokers such as Diamond/Alexander Forbes</p>	

Table 11: continued		
Macro (National and international level)	<p>a) Sound policies on the promotion of storages need to be established and implemented. The Agricultural Marketing Act seeks to bring structure to the agricultural sector and would also provide a legal framework for licensing operators for the warehouse receipt system.</p> <p>b) The Agricultural Credit Act should be amended to recognise the warehouse receipt as a document of title (this amendment is pending since 2004). The revised version of the Securities Act recognises a warehouse receipt as a financial instrument.</p> <p>c) Development of a Commodities Act to govern the operations of commodity exchanges.</p> <p>d) The FRA should adopt policies for establishing more decentralised depots</p> <p>e) Establishment of a new rural investment fund with the specific aim of providing credits to the cooperatives for the establishment of community storage facilities</p>	<p>a) GRZ</p> <p>b) GRZ (particularly MACO/MoI)</p> <p>c) GRZ</p> <p>d) FRA policies</p> <p>e) GRZ (particularly MACO/CEEC) and cooperating partners</p>
Source: Own compilation		

- “Briefcase traders” play a crucial role in providing market access to farmers in remote areas. They need to be integrated into a system linking community storage facilities and district warehouses, particularly where there is a lack of alternative trading opportunities.
- Farmers in remote areas are disadvantaged due to higher transaction costs for market access. Therefore, the GRZ needs to take on its responsibility of setting up the necessary rural infrastructure to facilitate marketing in remote areas. The FRA needs to remain active in assisting these farmers, without distorting the markets where the private sector is engaged. The FRA can work with the private sector as it did in its early years.

6.3.4 Oxenisation/Mechanisation

1. The problem

a) *Description*

Limited workforce is one of the most, and in some provinces even the very most, determining factor that limits agricultural production and the amount of land cultivated per household in Zambia.

b) *Elements and causes of the problem*

- In 1986 a policy and programme was launched by the government in order to enhance animal draught power countrywide. As a result of this, the Parabana Training Centre was established and had covered the whole country by 1989. In the early 90s, 60–90% of the cultivated land was ploughed using animal draught power and around 20–30% of households used draught animals. Donors supported the programme financially, particularly the Netherlands. Most extension officers received training on animal draught power, and instructed farmers, who again trained other farmers. This approach was successful, but did not include providing adequate animals.
- Later on, some institutions were founded in order to provide farmers with animals. This part of the activities failed, as animals very often died, and the farmers, who still had animals, did not look after them adequately.

- During Chiluba's presidency, all services (including veterinary) were cut back. From the early 90s on, as a result of a number of diseases among draught animals such as corridor disease, their previously growing population declined sharply, and in some districts almost all animals were wiped out. This resulted in a general decline in agricultural production, countrywide and until today.
- Several donors were active in the field of animal draught power during the past decade: IFAD/FAO, GTZ, IRDP, but most of these programmes focussed on training, which is not the key challenge to scaling up.
- Later on, a redistribution programme was launched by the government supported by donors, but it also largely failed. There were no selection criteria for donations for animals, no repayment modalities, and the fund itself was never fully realised. Furthermore, farmers who had received draught animals, were not supervised. Veterinary services were also not available at the time, despite the fact, that the private sector was engaged. Again, most animals died.
- Draught animals are very expensive (3,000,000.00 ZMK to 13,000,000.00 ZMK per ox),⁷⁹ so that smallholders usually have no chance of buying one. Smallholders see draught animals as a key tool in order to increase their chance of eventually becoming emergent farmers.
- Several projects, in which it was tried to distribute animals through cooperatives, completely failed. Most experts agree that animals have to be owned individually.
- Today, most smallholders are not even able to hire animal draught power services, as these are scarce and therefore very expensive (280,000.00 ZMK per hectare for ploughing, 125,000.00 ZMK for ripping). Further, because they are overbooked, the service providers often arrive too late, which results in lower yields. The scarcity of draught animals limits their use to soil preparation only, i.e. the potential other uses of animals (transport or weeding) are not utilised (0% of Zambian farmers use oxen for weeding, whereas it is 20–40% in Zimbabwe).

79 1.00 US\$ was equivalent to 4,683.00 ZMK = 2010.

c) *Regional specifics*

- The lack of labour force is most pronounced in Northern and North-Western Province, as the population density there is low and animal husbandry as well as animal draught power was never part of the local livelihoods.
- The use of animal draught power was a common feature in all other Provinces, especially in Southern, Western and Central Province, where animal husbandry in general is also an important part of the tradition.

2. Oxenisation as a solution

a) *Expected positive impacts, side effects and spill over effects*

Since the amount of work for a pair of oxen in traditional full tillage systems is around 10 to 20 times greater than that of a single human being, the lack of labour force in agriculture could be more than compensated by animal draught power.

- Oxenisation allows expansion of land under production for smallholders and assures self sufficiency and can increase their income.
- Availability of animal draught power allows timely planting and weeding and manuring, and so increases productivity.
- The multi-purpose function of cattle can provide additional income from milk, meat and breeding.
- Oxen can be used as a means of transportation
- For very poor farmers and/or farmers affected by HIV/AIDS, the use of donkeys is possible. There has been good experience with donkeys in Zambia and neighbour countries (Botswana). They are much less expensive, are more resistant to diseases, and they are easier to handle than oxen. The disadvantage is, that their reproduction rate is slow.
- Women sometimes also prefer using donkeys rather than oxen.
- The implementation of Conservation Agriculture can be facilitated by animal draught power, if training programmes and credit schemes promote such techniques and technology together.

b) *Relevance for pro-poor development, climate change and economic shocks*

- The use of animal draught power is a prerequisite for smallholders producing a regular surplus and so achieve food security and minimum income.
- Through oxenisation, the resilience to climate and economic shocks can be increased indirectly, e.g. through higher incomes, the effects of droughts can be compensated for a short while.
- Since the use of animal draught power facilitates the implementation of conservation farming as well as diversification, it indirectly helps in practising the basic measures of adaptation against such shocks.

3. Objectives

At least 10–20 Percent of the farming households throughout the country should own draught animals, so that all farmers have access at least to the services, which could then be provided at the right time. Oxenisation could be established quickly (up to 10 years) in provinces, where animal draught power had already been practised before. In contrast to this, in provinces where animal draught power was never used before, oxenisation needs more time (up to 25 years).

4. Scaling up

A recent promising approach comes from DUNAVANT Cotton Company, a credit scheme, which was initially funded by the German Investment and Development Company (DEG). After several trials to scale up draught animal power in Zambia, they redesigned their approaches and together with the NGO PROFIT, they launched a new programme in 2008. The innovative idea behind the scheme is that no collateral has to be given, just the business plan of the farmer influences the decision of PROFIT. The follow-up and monitoring of beneficiaries by DUNAVANT is rather strict and close, so that losses in terms of animal deaths etc. can be prevented.

1. Selecting farmers, who already work with DUNAVANT and who have the skills to handle draft animals and to act as service providers (assessed by PROFIT)

2. These farmers get training in “farming as a business”, animal health, nutrition and handling
3. The farmers are linked to veterinary services – the costs have to be included in the repayment plan
4. Animals are insured against death (reporting has to be done by farmers)
5. Interest rate is 12,5 % (which is very low – below the inflation rate – but still too high for farmers). In order to assure the sustainability of the credit, the difference down to around 6% is to be covered by donors
6. The same scheme was put in place for tractors and it worked very well (K 175,000 per hectare for ripping and around K 350,000 for ploughing). So the service provided for tractors is just slightly more expensive than for oxen, but it is much faster, the timing is better, and the productivity rises more, according to the experiences reported

The amount of credit is around 5 Million kwacha. This includes a plough, veterinary services, insurance, blocks for feeding, and one pair of oxen.

Possible disadvantage of the approach: The credit is linked to cotton. If prices drop and a farmer wants to drop out, he might have a problem with the creditor. DUNAVANT’s purpose and/or motive of for this credit scheme is to raise productivity of cotton farmers in order to increase countrywide production.

5. Key challenges and possible trade offs of oxenisation

Supply of veterinary services and a broad access to credits are both key challenges. Familiar approaches to scaling up, such as the “pass on” approach, where farmers pass on the outcome (e.g. calves) to the next farmer, did not work in the past, and has even had negative impacts: Diseases can be easily spread that way.

Thus, the scaling up depends largely on the right design of credit schemes, payment and repayment modalities (e.g. rates or gradual payment after harvest). In remote areas, that have no tradition of keeping animals, intensive training and an improved availability of spare parts for equipment are also challenges.

Table 12: Multi-Level-Chart: Oxenisation/Mechanisation

Level	Components of the “what” and the “how”	Relevant actors and special measures for vulnerable groups	Relevance for resilience
<p>Micro (community and farm level)</p>	<ul style="list-style-type: none"> • Veterinary services must be assured. • Training for all farmers in animal draught power (ADP), equipment, multi-use, health, feeding, husbandry is necessary. • Special training for those (incl. women), who have never used ADP before. • Credits and training on ADP should be linked to the introduction of minimum tillage systems (CF) and equipment. Establishing village repair services and training for local craftsmen are necessary. • Participatory technology development should be initiated at community level. • If extension services/training are not assured, private extension services could get involved. 	<ul style="list-style-type: none"> • Parabana Training Center and KASISI Agricultural Training Center • Dunavant as private company and provider of ADP credit schemes • CFU • NGOs (Care Int., Africare) <p>For very poor farmers:</p> <ul style="list-style-type: none"> • Establishment of cooperatives that provide ADP services for very poor and HIV/AIDS affected farmers. • If budgets do not allow the purchase of oxen, donkeys can be used. 	<p>Capacity Development</p> <p>Pro-poor development</p> <p>Organisation</p> <p>Adaptive capacity</p>
<p>Meso (Provincial and district level)</p>	<p>Extension officers and special cooperatives should be trained in the use of draught animals, Vet and multi-use.</p> <p><i>Credit schemes designs</i> along specific needs</p> <ul style="list-style-type: none"> • Insure credits against crop failure, disease/death of animal and death of credit holder should be possible 	<ul style="list-style-type: none"> • Financial products should be designed along the special needs and experiences as well as different starting points for each province (restocking of lost animals in Southern, Western and Central 	<p>Extension services / Capacity building</p>

Table 12: continued		
	<ul style="list-style-type: none"> • Access to credits and training should be facilitated. • Group lending as well as individual lending. Cash as well as in kind lending and repayment. • Credits and training can also be provided through the private sector, that contracts farmers (e.g. Dunavant as cotton companies) 	<p>Province, and introduction of new draught animals in North-Western and Northern Province.</p> <p>Community – Private partnerships in the rural areas should be promoted to bridge the gap between the individual producer and available services (financial, technical, information and logistical).</p>
Macro (National and inter-national level)	<ul style="list-style-type: none"> • Putting more emphasis on ADP development in Zambia (financially and personnel-wise). • Agricultural Consultative Forum (ACF); Restocking: Along with ACF, this should target the very poor farmers and be implemented through the Ministry of Community Development and Social Services (MCDSS) via NGOs as is the Food Security Pack (FSP), if the Heifer model is followed. • ADP and Livestock extension services and centres as well as a faculty on livestock development at UNZA need to be revitalised. 	<ul style="list-style-type: none"> • ACF: ADP should go together with livestock dev. • ACF: Taxation incentives to small-scale producers should be given as for large-scale producers. • ACF: Functional barrier through the establishment of Community Service Centres that are responsible for animal disease control should be equipped with all means (transport and communication) to do so.
Source: Own compilation		Capacity development

- If land use becomes more intensive through the use of oxen, soil fertility will rapidly decline, when no other measures (fertilisation and/or manuring, conservation farming) are put in place at the same time.
- The use of animal draught power should not result in more ploughing, but rather more ripping to avoid further erosion (conservation farming).
- The use of animal draught power can be the starting point for livestock development, which could also raise soil fertility through animal manure.
- If weeding using draught animals becomes an issue, the woman's job (weeding manually), might become a man's job (animal draught weeding), if women are not trained to use oxen.

6.3.5 Diversification

1. The problem

a) *Description*

The promotion of maize as the main crop in Zambia resulted in one-sided agriculture. And maize is also grown in areas where the agro-ecological conditions do not necessarily suit it. In addition to that, the changing climatic conditions threaten the old production patterns, and in some areas yields are often far below their potential. Complete losses of harvest can occur after heavy rains, floods or droughts. Food insecurity is most pronounced in these areas. This makes diversification of agricultural production mandatory as a coping strategy. Different crops (e.g. cassava, groundnuts or vegetables) as well as varieties (e.g. early and late maturing) need to be tolerant to drought and wet conditions, and ideally extend the productive agricultural season and there should ideally be good and reliable market for it.

b) *Elements and causes of the problem*

A positive example of diversification used to be Southern Province. In pre-colonial times, there was a very diversified range of crops. Maize, sorghum, pulses, sweet potatoes, groundnuts, ground beans, pumpkins and millet, combined with the use of cattle for milk, meat and manure, secured relative food security and a quasi-resilience of Tonga communities.

After colonial rule, the Tonga seem to have neglected the cultivation of other crops – as a result of the national government’s agricultural policy of 1964 and onwards, that promoted the nationwide commercial production of hybrid maize, to the exclusion of other food crops. This policy made rural society in all of Zambia more vulnerable, as it was solely on relying one cereal as a staple, and thus contributed to vulnerability in that they created a culture of dependency on massive state intervention that has become difficult to change.

c) Regional specifics

The need for diversification is most pronounced in North-Western and Southern Province. These areas are not suited for growing the most common maize varieties in the first place, because of climatic and soil conditions. In Southern Province, which became drier in the last decade, with shorter rainy seasons, early maturing maize varieties are needed. Furthermore, other crops are needed that are better suited to short rainy seasons, dry-spells and even droughts. This could be cassava, sorghum, certain tree species such as citrus, neem, maringa oleifera, acacia or jatropha, and many other crops.

In North-Western Province, with its heavy and long rains, there is a need for late maturing maize varieties that have a long growing period and can thus tolerate longer rainy seasons. Again, other crops are needed to reduce the dependency on maize – for instance, these could be cassava, rice or palm trees.

2. Diversification as solution

a) Expected positive impacts, side and spill over effects

- Through early and late maturing maize varieties, production and buffer capacity can be enhanced both in drought-prone and wet areas
- Diversification with suitable crop species lowers production risks, peak workload and levels out the availability of food, and can thus enhance food security and income
- Crop diversification can open up new markets and so enhance income, especially with high-value crops

- Particularly products from trees can be used for multiple purposes, e.g. as oil, food, medicine or cosmetics. Furthermore, they increase soil fertility, and can serve as wind breaks and hedges (link to Conservation and Organic Agriculture)
- If combined strategically with an e-voucher system and information, farmers are empowered to make their own choices of what to plant and where to sell it, and depend less on maize inputs and the marketing of maize
- Soil fertility can be improved through intercropping, crop rotation, agroforestry and the use of legumes (link to Conservation and Organic Agriculture)
- Providing differentiated foods rich in nutrients and proteins for all Zambians is important, but it is essential for persons infected with HIV/AIDS for antiretroviral treatments to work

b) *Relevance for pro-poor development, climate change and economic shocks*

- Diversification is a prerequisite of agricultural development for small-scale farmers in general. Only with diversification, can subsistence farmers produce a regular surplus, and so earn money, in addition to achieving food security
- Through diversification, the resilience to climate change and economic shocks can be increased directly, for instance through higher yields and fewer losses, the effects of weather events as well as fluctuating prices can be compensated

c) *Main Objectives of diversification*

All small-scale farmers in Southern and North-Western Province should have access to different varieties and crops that are suitable for their agro-ecological conditions. That way, food security could be achieved, and buffer capacity against climate change and also production risk improved.

3. Key challenges and trade-offs

- Diversified farming systems are more labour intensive, but can stretch peaks in workload, when practised along an appropriate plan
- The provision of seeds, and the availability of new crop seeds, and seeds of other maize varieties needs to be improved
- The prices of seeds of suitable varieties are too high. Especially late maturing and drought tolerant varieties are very expensive, often five times the traditional varieties
- Diversified farming also creates diversified diets, which can, however, only evolve slowly
- Know-how on farm management practises in relation to new varieties or/and crop species has to be spread through information and training
- The funding of institutions responsible for research and distribution need to be augmented
- There do not yet exist stable markets for crops other than maize. The prices for cash crops are influenced by the world market, and the domestic market within Zambia is stagnant
- A lack of coordination between the different stakeholders and programmes needs to be tackled
- For each crop the following has to be checked: the requirements in labour, marketing (possibilities for added value, out-grower schemes etc.), the level of inputs required, including availability of credit schemes, the income prospects, the risk involved, and the area suitability

Table 13: Multi-Level-Chart: Diversification

Level	Components	Implementation and relevant actors	Relevance for resilience and mainstreaming issues
Micro (Community and farm level)	<ul style="list-style-type: none"> a) Access to crops other than maize (and also to higher value crops) b) Access to varieties most suitable for their agro-ecological zone c) Access to information, d) Access to training e) Access to credits 	<ul style="list-style-type: none"> a) Establishment/reform of cooperatives that provide <ul style="list-style-type: none"> - information/training - organisation of transport - distributing systems b) Training for farmers on <ul style="list-style-type: none"> - crop suitability, different varieties - markets, prices - farming techniques (early land preparation, timely weeding etc) - conservation farming - storage - processing - nutrition, utilisation c) Establishment of community lending groups 	<ul style="list-style-type: none"> a) Organisation link to irrigation b) Capacity development Link to warehouses c) Access to credits adaptive capacity
Meso (Provincial and district level)	<ul style="list-style-type: none"> a) Access to and provision of information b) Access to and provision of training c) Seeds to be produced locally in the rural areas, instead of overseas c) Intensify seed production at farm level 	<ul style="list-style-type: none"> a) Allocation of sufficient funds for extension officers, especially for transport, fuel and communication b) Training of extension officers c) Augmenting the National Agricultural Information Services (NAIS) for providing more information on diversification 	<ul style="list-style-type: none"> a) Capacity development Organisation

<p>Macro (National and inter-national level)</p>	<p>d) Improve distribution at district level (e.g. using the Seed Delivery System For Rural Areas developed by SCCI or the Smallholder Seed Multiplication Programme under HIPC) e) Improvement of seed testing facilities at the provincial level f) Creating markets for crops other than maize</p>	<p>d) Creating incentives for farmers to become seed growers e) Fostering of Seed Associations to multiply seeds f) Strengthening the spread of out-grower schemes/contract farming g) g) FRA to buy not only maize but also other crops, depending on regions (e.g. rice vs. cassava) h) Cooperation with private seed companies, ZARI, NGOs, ZNFU</p>	<p>f) Link to contract farming g) Buffer capacity</p>
	<p>a) Shifting the “maize-only” policy towards also promoting other food and cash crops b) Breeding varieties that are suitable for storage (double/triple crossing), drought-tolerant, late/early maturing and disease/virus resistant, local as well as hybrid c) Improve high quality research into different varieties and crops other than maize + setting and certifying standards d) Better coordination of all relevant stakeholders, especially between Seed Associations and ZARI</p>	<p>a) Full implementation of the Plant Varieties and Seed Act of 1995 b) Agricultural Diversification and Food Security Project (EU) c) Encourage links between the public and the private sector (e.g. with seed companies) d) Creating incentives/an attractive environment for the private sector e) MACO should facilitate the link between farmers and out-grower companies. f) Providing ZARI and SCCI as institutions with adequate funding and capacity development, Foundation Seed Section for existing varieties by ZARI for the commercial production of basic seeds</p>	<p>Capacity development</p>
<p>Source: Own compilation</p>			

6.3.6 Conservation agriculture

1. The problem⁸⁰

a) *Description*

Conventional farming methods practised by small-scale farmers are unsustainable and have contributed to severe land degradation, declines in yields and productivity.

b) *Elements and causes of the problem*

When practising conventional agriculture, farmers depend on increasingly costly inputs such as inorganic fertilisers. The lack of these inputs – or the fact that small-scale farmers mostly cannot afford them – restricts them in their agricultural activities while also degrading the soils as a result of insufficient or wrong fertilisation and low organic matter contents in the soils. This can also be due to ploughing, which often causes severe erosion and moisture loss. Consequently, conventional farming methods result in land degradation and declining productivity. Smallholders often become dependent on food aid, caused by temporary or chronic food insecurity or – in the worst scenario – they have to migrate to other areas, even if this includes deforestation. Furthermore, they are highly susceptible to the consequences of climate change, including unpredictable weather patterns, the unreliable rainfall and climatic hazards in the form of floods and droughts.

c) *Regional specifications*

Regional challenges are the appropriate adaptation of conservation agriculture to different rainfall patterns in each particular agro-ecological zone. For instance, analysing a number of interviews (perceptions) came to the conclusion that digging basins is the wrong approach in high rainfall areas, whereas the ripper can be used under all climatic conditions. However, field trials of CFU have shown no benefit of planting in CA permanent ridges over planting in CA basins in Mpika Agro-Region III (average rainfall: 1,000mm). This is because basins are re-filled to the rim and weeding is

80 The elaboration on conservation agriculture is based on the following sources: Twomlow / Howe (2006); Simasiku (2010); Aagaard (2010); Bwalya (1999).

done along the rows of crops, so there is no indentation. Also, RIII soils drain rapidly. In recent years, there is also no longer a correlation between cumulative annual rainfall and Agro-regions. In 2007/08, wide areas of Region IIa received between 1,200mm and 1,500mm of rain. This year, Choma already received 1,314mm, whereas 700-800mm would be normal. Long term rainfall averages can be very misleading. Therefore, context-oriented practices and training are indispensable for the successful introduction of CA.

2. Conservation agriculture as solution

a) Expected positive impacts, side effects and spill over effects

- CA conserves and improves the soil structure and fertility through restricted or minimum tillage, retaining crop residues and planting of suitable legumes and trees. Minimum tillage, for instance, uses fertilisers, lime, manure, compost or combinations of these inputs more efficiently. Thereby, CA raises the productivity and contributes to sustainable agricultural development.
- It reduces soil exposure, run-off and erosion.
- As ploughing is forbidden in order not to disturb the soil, the period of water availability to the crop is extended.
- For very poor farmers, who cannot afford to buy fertilisers, or those who do not benefit from fertiliser subsidies, it can increase their yields by using legumes, animal manure and compost.
- In drought-prone areas, basin tillage offers the opportunity for vulnerable small-scale farmers with limited or no access to animal draught power (for ploughing the field) to cultivate the fields in a timely manner and produce higher yields per hectare. The basins can be dug using hand hoes.
- As a mitigation measure conservation farming contributes to a reduced release of carbon into the atmosphere by applying minimum tillage and avoiding the use of chemicals.
- It facilitates the introduction of animal draught power, as it promotes the use of manure, and by also being less laborious when cultivating the land using ADP.

- CA goes hand in hand with diversifying the crops and crop varieties planted, as well as with management measures such as early planting and timely weeding.
- Since the land can be prepared before the onset of the first rains, the intensity of the workload is not significantly higher than for conventional farming methods.
- The provision of relevant equipment could be managed via the e-voucher system, saving transaction costs and easing the adoption of CA.
- Moreover, the environment is regenerated rather than exploited by agricultural activities.

b) *Relevance for pro-poor development, climate change and economic shocks*

Conservation agriculture has the potential to increase farmers' yields by 60-70 percent, and diversify their production base. Apart from contributing to agricultural development, farmers are liberated from depending on food aid and/or external inputs.

Through conservation farming as a core adaptation measure, the buffer capacity against droughts and heavy rainfall is increased. For instance by only tilling down to a minimum level, the majority of the moisture is contained within the soil and – at the same time – the soil cannot be washed away. An adequate level of production can be sustained, regardless of changing weather patterns.

Conservation agriculture also buffers economic shocks, because the dependence of farmers on increasingly expensive inputs is partly reduced.

3. Objectives

Objective: Training small-scale farmers to practise conservation agriculture should be extended to all farming households throughout the country. It should be ensured that the adoption rate is constantly increasing, finally reaching every small-scale farmer targeted.

Of course, it will take time to change the mind set of farmers, who often want to receive inorganic fertiliser through the FISP, even if they have access to animal manure or compost. As conventional farming methods are often considered as the only farming option, smallholders have difficulties

in changing cultivation techniques, from ploughing to ripping. However, in Zambia, there are already 9000 rippers in the hands of farmers, allowing CA to take off.

4. Scaling up

A scaling up of CA can be achieved by a better coordination and networking at higher levels among the organisations promoting CA. Farmers and other stakeholders often lack knowledge of the biological and ecological context and abound with misconceptions on CA. Every organisation promotes different ways of practising CA. It is therefore important to better organise the diffusion of consistent information on CA, as it applies to each agro-ecological zone, and to provide perfect and integrated demonstrations on correct practices in CA, as implemented by small-scale farmers. High quality education for trainers of farmers should be provided by the private sector, supported by research and extension services (MACO). More high quality information and literature on CA should be available to farmers.

5. Key challenges and trade-offs

- CA involves laborious activities such as composting and weeding, and is considered by farmers to be labour intensive, particularly in the first years when the hand hoe is used. After a few years, CA should not be more or less labour intensive than conventional farming. Field trials have, however, shown that the benefits of CA arising from accurate seeding, timely planting, rapid and even crop emergence, more precise application of nutrients and rainwater harvesting can increase crop yields by 25% to 100% in the first year, depending on the farmers' starting point.
- On the other hand, CA can also make farming easier, because of it needs less manual and/or mechanical energy for ripping, compared to ploughing. CA can also spread peak workloads as ripping can be done before rains start.
- In the eyes of farmers, digging basins is also labour-intensive. This perception results from the fact that in the past, prior to changing to basins, they used to either have oxen that were then lost to Corridor disease, or asked neighbours to plough for them as service provision. These farmers have shifted back from a traction-based, to a hoe-based system and are therefore a client group for contract ripping.

- In fact, labour input for the basin system in the first year after the adoption of CA can be 10% higher than ridge splitting as a result of the need break through compact layers of soil. By year 2 the labour demand for digging basins should be equal to or less than ridge splitting, and much less than digging everywhere, of course.
- No matter how high the labour input for CA during certain labour peaks really is, it is important to notice that farmers nonetheless have the impression of CA, that it is labour intensive. Farmers are conservative and only adopt new ideas slowly. As long as they have this preconception, it will keep them from adopting CA. Any alternative measure should account for this challenge.
- Promoting oxenisation as an alternative could also ease the workload intensity during certain times. At the same time, training programmes and credit schemes should come with the introduction of animal draught power, to smooth out the first years of adaptation. While the maximum area of land possibly cultivated using hand tools is 4 ha (basins) (taking into account the average family workforce), with animal draught power a total of up to 15 ha can be cultivated.
- Ox farmers who own their own animals and are early ploughing in weeds, gain about a 14 to 18 day advantage on weeds. However, at least 100,000 farmers wait to hire animals, and have to then plough through tall weeds, lock up nitrogen, and plant anything from 14 to 30 days late, loosing the equivalent of one 50kg bag of maize in yields for each day. These farmers often experience total crop failure. As a solution, privately-owned mechanised ripping services could offer tractors for ploughing and harrowing.
- The effective time window for ploughing is roughly 14 days, and for ripping, it is 5 to 6 months. So ripping is suitable for contracting and allows more effective use of scarce oxen. Ripping takes 4hrs/ha, ploughing 14hrs/ha. In very compacted soils ripping may need to be done twice in the first year. After that, ripping along the same lines each year is possible, so concentrating applied nutrients in planting zones such as basins (i.e. controlled traffic system).
- Households headed by women, or households affected by HIV/AIDS and/or other diseases might be discouraged from conservation farming

due to the peaks in workload when it comes to weeding. Special support measures could be put in place for them.

- The increased use of herbicides, when CA is practised in a modern, labour saving way, can have also some negative health and environmental side effects – at least depending on the herbicides. These side effects can be reduced by applying the right amount of the right environmentally friendly herbicides. Another solution can be the use of mechanised weeding methods (as used in Organic Agriculture).
- One other issue, as discussed at the MACO workshop, is top soils. There has not been enough biomass to support an activity and livestock feed.
- Another bottleneck is the inadequate supply with appropriate CA equipment and inputs such as seeds.
- Finally, the same kind of marketing challenges arise as in conventional systems. They become even more severe, since farmers face a three-year labour-intensive period without CA paying off yet. When higher quantities are produced, marketing has to be corresponding.

Table 14: Multi-level Chart: Conservation agriculture			
Level	Components	How to implement and relevant actors	Issues for mainstreaming
Micro (community and farm level)	<p>a) Training for farmers on conservation farming/agriculture (CA) methods, including several key principles to increase yields and adaptive capacity of farmers (see chart on the right)</p> <p>b) Provision of the relevant equipment (e.g. seeds, mechanisation inputs in the application of minimum tillage such as ripper, sub-soiler, ripper-planter, environmentally friendly herbicides) including repairs and maintenance</p> <p>c) Buffering the investment period of the first three years through a smoothing fund</p> <p>d) At community level, the number of demonstration fields for conservation farming should be increased, allowing more farmers to actively experience its benefits</p> <p>e) Investments in and/or credits for and in the form of livestock (goats, cattle) or restocking of cattle to ensure that farmers have local access to inorganic fertilisers</p>	<p>a) CFU, Palabana Farm Management and Mechanisation Centre, KASISI Training Centre</p> <p>b) Other NGOs (Care International, Africare)</p> <p>c) Donor support, adaptation fund</p> <p>CA methods should include the following key principles:</p> <ul style="list-style-type: none"> • Disturbing the soil as little as possible by minimum or zero tillage (planting in basins, furrows or contoured ridges) • Keeping the soil covered with crop residues or other organic matter as much as possible • Timely planting and weeding (by using environmentally friendly herbicides or other mechanised weeding methods, as used in Organic Agriculture) • Preparing and using animal manure or compost as organic fertiliser 	<p>Capacity development</p> <p>Link to diversification</p> <p>Adaptive capacity</p> <p>Buffer capacity</p> <p>Link to oxenisation</p>

Table 14: continued		
<p>f)</p> <ul style="list-style-type: none"> • Reducing the workload intensity in peak seasons when it comes to weeding: <ul style="list-style-type: none"> • Promotion ADP/oxenisation, including special training programmes and credit schemes (land preparation e.g. rip planting furrows, timely planting, animal drawn weeders, transport for weeding and also for animal manure) • Special support programmes targeting households headed by women and households that are affected by HIV/AIDS and/or other severe diseases diminishing labour force • Introducing environmentally friendly herbicides or mechanised weeding methods, as used in Organic Agriculture 	<ul style="list-style-type: none"> • Mixing and rotating crops (using legumes, trees such as <i>Faidherbia albida</i>, maize, cotton etc.) • Diversifying crops and/or crop varieties <p><u>For very poor farmers:</u> Establishment of cooperatives that provide relevant equipment, ADP services for very poor farmers and those affected HIV/AIDS (along the model of the Raiffeisen Bank)</p>	Capacity development
<p>Meso (Provincial and district level)</p>	<ul style="list-style-type: none"> a) Extension officers and special cooperatives should be trained in teaching CA methods b) The private sector could jump in also within the framework of contract farming and build up extension services that farmers would have to pay for 	<ul style="list-style-type: none"> a) CFU b) Kasisi Training Centre

Table 14: continued

	<p>c) Create strong market linkages with warehouse systems/storage</p> <p>d) Investments will be required for increasing the number of field staff, ensure regular trainings, and on-time arrival of inputs (linked with e-voucher system) as well as more efficient monitoring support visits.</p> <p>e) Financing and support of agro-dealer inventories to account for increased demand for inputs and equipment</p> <p>f) Support of artisans for maintaining CA equipment</p> <p>g) Further development and research on improved tillage/soil management systems, conservation tillage technologies and integrated pest/disease management packages</p> <p>h) Developing more information on CA (media, advertisements) to reach more farmers</p>	<p>c) Private sector, Dunavant</p> <p>d) Credit institutions, investors</p> <p>e) ZAMACE</p> <p>f) Donors</p>	<p>Link to e-voucher</p> <p>Link to warehouses</p>
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Table 14: continued		Capacity development
<p>Macro (National and inter-national level)</p>	<p>a) Putting more emphasis on conservation agriculture financially and in terms of personnel while, also including necessary equipment into the e-voucher system</p> <p>b) Making pronouncements to improve the perception of conservation farming among the population and give incentives to investors and private actors to engage in the field of CA</p> <p>c) Setting up teaching programmes and courses at university about CA to upscale the outreach</p> <p>d) Capacity building for MACO staff in the field of farm management (and also for e-voucher system/oxenisation) to ensure that CA message is passed on to provincial, district and local level</p>	<p>a) MACO</p> <p>b) GRZ</p> <p>c) Donor community through training centres such as CFU, KASISI Training Centre</p>
Source: Own compilation		

6.3.7 Irrigation

1. The problem⁸¹

a) *Description:*

Zambian agriculture is predominantly rain-fed and access to irrigation infrastructure among small-scale and emerging farmers is extremely limited, although irrigation could be a determining factor in boosting agricultural production and food security.

b) *Elements and causes of the problem:*

Access to full irrigation for horticulture and/or winter crops (green maize) is still limited among small-scale and emergent farmers. Government plans as part of the Fifth National Development Plan to promote irrigation have severely lagged behind and need to be revised for future strategies, particularly with a view to financing irrigation schemes, as the designated Irrigation Credit Fund has largely failed to put as much land area under irrigation as intended. There is currently no regulating authority dedicated to irrigation, although a National Water Authority is being discussed as part of the Water Bill that is supposed to be enacted soon.

c) *Regional specifications:*

Especially in semi-arid/relatively dry areas, where dry spells are becoming more frequent and unpredictable, being entirely dependence on rain-fed agriculture is leaving smallholders prone to crop failure and food insecurity. Particularly in those areas that experience shortened rainy seasons and/or more dry spells (parts of Central and most notably Southern Province), supplementary irrigation becomes necessary.

In many cases, suitable water resources have to be developed to fulfil the full demand for irrigation. While in Southern Province water from the river Zambezi and other sources of surface water can be tapped, a comprehensive survey of the groundwater is missing. In Central Province on the other hand, where 20% of small-scale farmers already have access to irrigation, groundwater resources are quickly depleted and technologies for seasonal water harvesting and storage become more important.

81 Relevant literature on irrigation is GRZ (2005a); GRZ (2006); Kodamaya (2009); Neubert et al. (2007).

Furthermore, in areas with soils that have a low moisture absorption capacity and high water tables (i.e. clay soils in areas of medium to high rainfall), drainage needs to be promoted.

2. Irrigation as a solution

a) expected positive impacts, side effects and spill over effects

- **Food security:** An increase in irrigated agricultural production is expected to result in higher production and productivity levels. Thereby, it can improve the food security of rural households, enable diversified production and consumption patterns and improve the nutrition status among farmers and their families.
- **Income:** The expected increase of production and diversification towards high value crops associated with the introduction of irrigation can help raise the income of farm households, if market constraints can be overcome.
- **Employment:** Aside from the abovementioned positive effects on the household level, irrigation can help create employment in the agricultural sector. This applies to middlemen, processors, traders and suppliers of agricultural equipment and inputs.

b) Spill over effects

- **Promotion of Exports:** An increase in production of high-value crops produced under irrigation for export can boost income, processing facilities and an inflow of foreign exchange. In particular, additional yields in the off-season and the potential for cultivation of niche products help to smoothen supply chains for export-oriented production and processing.
- **Gender aspects:** Along with an intensification of production, the workload as a whole will go up, particularly for women, as they do the bulk of the everyday work. The necessity to walk long distances to fetch drinking water (a traditionally female task) may go away with the construction of irrigation schemes, as communities then take the irrigation water to satisfy their drinking water needs (which can be harmful depending on the water source). Furthermore, if women organise the marketing of product surplus and are allowed to participate in organisations that regulate water withdrawal, there might be a significant push towards women empowerment and a change of their role in rural society.

c) *Relevance for pro-poor development, climate change and economic shocks*

Due to the increasing prevalence of droughts, irrigation and improved water management can be identified as a direct adaptation measure especially tailored to climate shocks. During times of lower or less predictable rainfall, irrigation schemes can contribute significantly to the reduction of the risk of crop failure in agricultural production processes. Growing periods can be extended and dry periods can be bridged by implementing irrigation schemes.

3. Objectives

The under-utilisation of irrigation – in terms of access to and affordability of technology, knowledge, organisational capacity, infrastructure and adequate irrigation schemes – has repeatedly been identified as a major constraint to the development of the Zambian agricultural sector, especially for small-scale farmers. In order to make full use of Zambia's water resources, as well as to improve productivity and livelihoods of farmers, both supplementary and full irrigation during the main season and the off-season should be promoted. In order to achieve a much-needed push towards irrigated agriculture, at least 20% of small-scale farmers should be targeted for getting access to irrigation, whereas in Central Province, where this has already been achieved, expanding to 30% should be the goal.

4. How to achieve the scaling up?

The installation of irrigation infrastructure is very costly. After the failure of the Irrigation Credit Fund in 2005 (see chapter 4.7), a new financial mechanism needs to be put in place. However, as these earlier attempts have shown, it is pointless to do so without an adequate legal framework, established institutions and clear structures for the establishment of funds. Accordingly, once the National Water Authority is operational and a clear division of labour between the relevant institutions established, a new credit fund has to be set up and disbursed in a transparent manner.

For small-scale farmers who have been involved in rain-fed agriculture all their lives, the introduction of irrigation is a technology transfer that requires a significant step forward in skills on the side of farmers. Hence, a far-reaching capacity development programme needs to be set up. This will have to include the issues of irrigation amounts, crop suitability and sustainable water

use, as well as the training of trainers within a system of lead farmers, in order to overcome bottlenecks in governmental extension services, increase acceptance among farmers and allow for a close monitoring of these efforts.

5. Key challenges and trade-offs

- **Organisation:** The development of different water sources usually goes along with a need for organisation among their users. In particular, tapping surface water requires transparent arrangements that also ensure equal access for those farmers that live further away from the water source, while groundwater tapping can also be implemented on an individual basis. However, as the Ministry of Energy and Water Development has been assisting the establishment of Water Users Associations (WUA) for some time, agricultural water use could be closely connected to these existing structures.
- **Sustainability/environmental issues:** If irrigation/water withdrawal is not conducted in a sustainable way, water resources could quickly deplete, particularly in the semi-arid areas of Southern Province. Accordingly, a sustainably balanced water withdrawal is necessary to prevent the existing water resources from being over-exploited. Additionally, unsustainable and excessive use of water can quickly result in a decline in water quality due to contamination through the increased application of pesticides in irrigated systems. Finally, drainage systems need to be constructed in addition to irrigation water supply in order to avoid waterlogging of soils with a low absorptive capacity.
- **Health:** an increase in the use of pesticides, which is usually associated with the cultivation of irrigated crops (particularly vegetables) can have negative impacts on the health of farmers resulting from a lack of knowledge of their correct application and the protection from side effects. On the other hand, access to health services is improving because of rising income.
- **Labour intensity:** The intensification of agriculture that is associated with irrigation typically requires increased labour and could therefore increase the necessity to hire labourers during peak periods. Additionally, since most of everyday work is done by women, intensification of production can have a significant impact on women's workload.

- **Costs:** The construction of irrigation infrastructure is expensive. In Zambia particularly, cement and fuel prices are high, rendering investments in infrastructure potentially contradictory to the expected outcome. Furthermore, the affordability of technology, fertilisers, pesticides, fuel and electricity (in case of motorised pumps) for farmers needs to be ensured and requires low-cost solutions suitable for small-scale and emergent farmers (i.e. treadle pumps, furrow irrigation or gravity assisted delivery wherever possible). As a number of project examples where irrigation systems were given to farmers for free have failed (due to a lack of maintenance or simply non-use), at least part of the investments should be shared by farmers and scaling up of irrigation needs to be demand-based. Additionally, maintenance of irrigation equipment should be followed up on through a lead farmer system that works in close cooperation with extension officers.
- **Marketing:** despite a significant increase in production of high value crops that is made possible through irrigation, marketing remains a crucial factor of agricultural production. Investments in irrigation are only profitable if market access is improved and demand is stimulated.

6.3.8 Other measures to buffer economic shocks and climate change

In this chapter, five other important adaptation measures are summarised briefly. The policies and measures outlined in this chapter concern

- rural infrastructure,
- contract farming and farm blocks,
- market information and price risk management
- insurance.

All being measures, which aim to stabilise economic conditions for farmers, and which help to create and reassure markets.

Table 15: Multi-level-Chart: Irrigation			
Level	Components of the 'what' and the 'how'	Relevant actors and their particular tasks	Relevance for resilience and mainstreaming issues
Micro (Individual farmers, communal level)	<ul style="list-style-type: none"> • Getting engaged in seasonal water harvesting and storage, as well as implementing equal distribution mechanisms for all farmers of one catchment area • Participation in trainings and in farmers organisations that help with marketing and regulation of water withdrawal • Business orientation of farming activities to ensure improved marketing of irrigated products <p>a) Drawing up a business plan for production and marketing, as well as keeping a record of business activities for better oversight, evaluation and revision of activities</p> <p>b) Getting engaged in groups to accumulate savings or access to credits to achieve liquidity and acquire working capital</p>	<ul style="list-style-type: none"> • Communes: Drawing up transparent and equal distribution arrangements for all farmers within the catchment area, including the most vulnerable, such as female headed households • Farmers: <ol style="list-style-type: none"> a) Participation in trainings on irrigation use and professionalisation of their farming activities according to a 'farming as a business' approach b) Forming of and participation in groups that are geared at common marketing activities and regulating water use and distribution 	<p>Gender: Empowerment through participation in water users groups</p> <p>Capacity development, Organisation</p> <p>Funding: Access to affordable credits for groups to purchase small-scale irrigation technology</p>
Meso National Investment Agency (NIA), Extension officers, private sector, ZNFU)	<ul style="list-style-type: none"> • Provision of extension services for farmers on correct application of irrigation systems, sustainability of water withdrawal, correct and safe use of pesticides for vegetable production, seasonal water harvesting and storage etc. 	<ul style="list-style-type: none"> • National Water Authority: providing framework for water use on the ground, coordination of efforts to increase area under cultivation, economic appraisal of irrigation projects, field inspections and monitoring of efforts 	<p>Capacity: Training of trainers within a lead farmer system to ensure sustainability and acceptance</p>

<p>Table 15: continued</p>	<ul style="list-style-type: none"> • Identification markets for irrigated high value products and establishment of joint ventures • Identification, mobilisation and support to irrigation farmers to reduce transaction costs, including help to access funds • Provision of working capital to farmers • Revitalisation and maintenance of existing schemes in addition to the establishment of new ones under the condition of cost effectiveness 	<ul style="list-style-type: none"> • Extension officers: provision of capacity development for farmers on different levels a) Correct use of irrigation to achieve an increase in productivity (watering amounts, crop suitability, sustainable use etc.) b) Support to networks and organizations/water users associations c) Special trainings for female headed households to accommodate their role as particularly vulnerable members of the community as well as their potentially changing role d) Provide training of trainers for lead farmers in order to spread skills, improve networks and monitor implementation processes. In addition, lead farmers could support farmers in maintaining irrigation equipment. • Private sector a) Agribusiness companies: market analysis and identification of demands for irrigated products, provision of services for farmers in the course of business-oriented joint ventures (input supply, land preparation, maintenance of the pumps etc.) 	<p>Organisation: Cooperatives and other farmer organisations need to help farmers get empowered and improve their organisational skills</p> <p>Gender: Equal participation of women in capacity building measures is important to ensure equal opportunities</p>
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<p>Macro (GRZ, MACO, MEWD, donors)</p>	<ul style="list-style-type: none"> Establishment of a National Water Authority (NWA) under the Ministry of Energy and Water Development (MEWD) that works closely with MACO a) as foreseen in the Integrated Water Resource Bill, but including some of the organisational structures outlined for the International Development Agency (IDA) within the National Irrigation Plan of 2005: 	<ul style="list-style-type: none"> b) Banks: provision of loans for production under irrigation at affordable interest rates between 17% and 19% <ul style="list-style-type: none"> Farmer organizations/ZNFU: <ul style="list-style-type: none"> a) Identification of farmers that can participate in and benefit from the introduction of irrigation schemes, including particularly vulnerable small-scale farmers b) Support to farmers who want to apply for funding and credit (both for irrigation access and working capital) in terms of paperwork and dealing with bureaucracy c) Support to marketing by setting up and organizing groups of farmers to commonly market their produce and/or get engaged in small-scale processing, as well as small-scale saving groups 	
		<ul style="list-style-type: none"> GRZ: reassuring its commitment to the fostering of irrigation as an important issue for agricultural development and providing a legal framework by <ul style="list-style-type: none"> a) enabling the relevant acts to establish NWA b) setting up a distinct irrigation fund that assures traceable allocations of irrigation budgets 	<p>Capacity: Improved coordination and cooperation between the ministries requires scaling up of networking skills</p> <p>Funds: Installation of a new credit fund dedicated to irrigation, with transparent and traceable disbursement structures</p>

<p>Table 15: continued</p>	<p>b) reporting to both the Minister of Agriculture and the Minister of Energy and Water Development</p> <p>c) making use of MACO's institutional hierarchy of Provincial Agricultural Coordinator (PACO), District Agricultural Coordinator (DACO) and Block Extension Officer/Camp Extension Officer (BEO/CEO) to play facilitating, awareness raising and technical backstopping roles</p> <ul style="list-style-type: none"> • Establishment of a new Irrigation Credit Fund managed and administered by MEWD that makes allocations for irrigation traceable and transparent and which ensures open accessibility for farmers, farmer organisations, communes, private investors and facilitating organisations. This fund should provide budgets for <ol style="list-style-type: none"> a) financing of small-scale irrigation technology (i.e. treadle pumps) b) improved bulk water supply through mini dams that serve communes c) improved harvesting and storage of seasonal rainwater at household and/or community level d) large-scale irrigation schemes for joint ventures with the private sector e) drainage systems in areas that have soils with low moisture absorption capacity <p>c) creating a favourable investment environment for the private sector by enabling the Agricultural Credit Act which is in the drafting process since 2004</p> <p>d) enacting the Integrated Water Resource Bill (IWRB) of 2006 to regulate water extraction for all users</p> <ul style="list-style-type: none"> • MEWD: taking up the lead role in irrigation by <ol style="list-style-type: none"> a) Creating a National Water Authority b) Managing a new Irrigation Credit Fund c) streamlining environmental and sustainability issues d) regulating the issuance of water rights e) improving cooperation with MACO by getting engaged in a joint oversight and implementation committee for irrigation (including monitoring and evaluation) • MACO: assuming its role as the main institution to lead irrigation promotion on the ground by <ol style="list-style-type: none"> a) providing training for staff members that can be transferred to NWA b) getting engaged in research
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	<ul style="list-style-type: none"> • Enactment of the Agricultural Credit Act in order to improve access to finance among small-scale and emergent farmers, as well as other relevant groups • Provision of capacities among National Water Authority and extension staff in order to improve the absorption capacities of the institutional structure at the meso level • Improve cooperation and coordination among the relevant stakeholders (most notably MACO and MEWD) by creating a joint oversight and implementation committee for irrigation (including monitoring and evaluation) • Strengthening private sector engagement to encourage joint ventures that contribute to irrigation 	<p>c) providing bigger and more reliable budgets for the relevant branches within its structure</p> <p>d) provide capacity development for extension officers on the correct application of irrigation water, sustainability etc. under specific regional requirements in different parts of Zambia</p> <p>e) using its expertise in agricultural marketing</p>	
<p>Source: Own compilation</p>			

Table 16: Measures to enhance pro-poor agricultural development: Scale up for the whole country			
Key Policies	Purpose	Main Challenge	Key Indicator for Resilience
Rural infrastructure and means of transport	<ul style="list-style-type: none"> - better access to markets - raise income 	National funds for infrastructure	Pro-poor development
Contract Farming/out-grower schemes /Farm blocks	<ul style="list-style-type: none"> - Lower transaction costs - raise productivity and assure access to markets 	Achieve fair agreements (fixed pre-planting prices) <ul style="list-style-type: none"> - between private companies and farmers - between private companies and the Government 	Organisation
Price-Risk Management at the meso and micro level	<ul style="list-style-type: none"> - Smooth funds to buffer prices (model: Burkina Faso) 	Financial sustainability of funds	Buffer capacity
Market information by radio and e-systems	<ul style="list-style-type: none"> - Widen choices - Enhance Transparency - Increases income 	Broad mobile coverage, functioning networks	Buffer capacity and adaptive capacity
Insurance in connection with credits and/or smooth funds	<ul style="list-style-type: none"> - Insurance against crop failure - break down of equipment - diseases and death 	Low capacity and literacy of farmers	Buffer capacity
Source: Own compilation			

7 Conclusion

The Zambian agricultural sector holds a huge untapped potential for food security, income and employment generation as well as exports and macro-economic growth. For the majority of the rural population, however, problems are abundant and their livelihoods are at stake. Although the Government of the Republic of Zambia (GRZ) has given agriculture the highest priority on paper, actions were not taken in order to achieve at least some of the goals.

Since Zambia is first and foremost relying on the mining sector, some new policies are needed at the macro level to stop the discrimination of the non-traditional tradable sectors, in particular agriculture. The installation of wealth funds, which can partly be used for reinvestments into agriculture and the transparent handling of national revenues, are among the most important actions to be taken, also to prevent kwacha appreciation, which in the long run not only undermines the growth of agriculture, but also harms the economy as a whole.

In addition to that a major policy change within the agricultural sector is crucial. What is necessary is the installation of a common drive at all levels to develop the sector, starting in the ministry itself. Abrupt policy changes must be avoided in the future and a continuous willingness and a strong commitment has to be built instead, with focused actions towards resilient and pro-poor agricultural development. Another key action for Zambia would be to orient itself more towards regional strategies and policies as suggested by the CAADP and strategies of COMESA and/or SADC.

One important action at the country level would be the exchange of the Fertiliser Support and Input Programme FSIP for the e-voucher system, where farmers can decide for themselves, when and which inputs they need and/or want to buy on a subsidised basis. This would help the poorest farmers to manage their fields, would increase crop diversification and at the same time diminish the fixation on maize, unlock the opportunity for the private sector to step in, and last but not least prevent the waste of a large part of the limited public funds allocated to the sector. As side effects, these changes would release cooperatives from being only supply shops for fertilisers, and – if incentives were given – finally give them the chance to develop themselves into a kind of “empowerment shops” for farmers. Farmers could exchange ideas there and learn how “farming as a business”

works and eventually they would gain the capacity to pull themselves out of the poverty trap. Therefore this would booster their adaptive capacity.

The public funds released from FSIP could then be used for creating the enabling environment, which the private sector needs to develop. In concrete terms, investments into hardware infrastructure would be needed:

- Construction and maintenance of the rural and feeder road and bridge systems
- Extension of the electronic communication networks
- Construction of water infrastructure for irrigation systems, against floods and for water withdrawal

These hardware measures certainly have to be accompanied by the right “software” needed to make these investments promising. Aside from the e-voucher system, the installation of smooth funds and capacity development some of the very important ones would be:

- Implementation of announced programmes and projects (in relation to diversification, conservation agriculture, oxenisation, warehouse systems, irrigation)
- Passage of relevant acts and laws being in the pipeline for several years,
- Creation of a reliable data basis on agricultural, including climate and economic data
- Special programmes and projects to better smooth out economic and climatic shocks (especially for smallholders), and programmes for learning-by-doing

According to the measures suggested in this study, the Government is primarily responsible for capacity development at all levels for MACO staff and extension services, so that these again can train lead farmers, who can then train ordinary farmers. MACO should rethink and also diversify its extension systems in order to increase efficiency. The cooperatives and modern media could play a core role within these systems.

Today and in future, not only the internal failures, but also the external drivers of economic and climate change shocks pose further threats to agriculture. Whereas economic shocks mostly manifest themselves in the form of price fluctuations for exports and/or imports, climate change shocks are

mostly evident as a shorter rainy season in the south of Zambia, and a longer rainy season in the north.

On a more conceptual level, this study has shown, that, the suitable adaptation measures to climate change **on the ground, i.e. at a farm or communal level**, are very often also suitable measures for buffering economic shocks, and vice versa. A first explanation for this overlap is that fluctuating prices and fluctuating rainfall patterns both call for the same kinds of more independent and resilient production systems, such as for instance conservation farming, with lower production risks from weather as well as economic conditions. Other such systems are diversification, also with lower production risks, be it prices or weather conditions; better and more modern storage systems, with which the sales-period can be stretched, so as to achieve better prices and smooth out fluctuations and/or prevent food crises.

Concerning climate change, Zambia is predicted to experience greater changes than many other countries, but still Zambia will – in the mid-term – be able to cope with these adversities, and occasionally even be able to turn them to its advantage – in contrast to many other countries, if it takes action in order to adapt now. This estimation is partly due to its suitable and well-endowed starting position, and its geographic location on a high plateau with in parts a fairly cool climate. When adaptation measures are implemented as suggested, most of the consequences of climate change will be manageable. But storms and floods remain as unpredictable emergencies which will probably occur more frequently than in the past and which can only be coped with if the Disaster Management Unit (DMU) works well, is prepared and is endowed with the minimum funds needed.

As most programmes and projects done in collaboration with governmental organisations failed in the past, this study tries to take into account that neither scientists nor donors should repeatedly suggest the same ideas, always hoping again, that this time it will be a success, only to realise later that it has failed again. Therefore, the guiding principle considered for each measure here was to analyse, whether the particular measure could also be channelled through the private sector, in order to make it even more independent of governmental and ministerial actions. But then, that private sector should collaborate with training centres, donors and NGOs in order to implement these measures and to enable farmers to boost their production and productivity. But: There should be no naive thinking that the private

sector will feel responsibility for the very poor. Here, the government has the obligation to enforce the principle systems for the redistribution of wealth through taxes, wages, and incentive creation.

The findings of this study have further shown that there are no one-size-fits-all approaches for agricultural development in Zambia. As a consequence, the measures and policies proposed here require regional and target group-specific adjustments. Hence, they are aimed at creating pro-poor development for the vulnerable majority of farmers, and can also help build resilience to economic shocks and climate change. Furthermore, it is important to implement these measures now in order to achieve development and buffer the negative impacts of external shocks in the future.

In addition to that, it became clear that a further prioritisation or sequencing of the suggested measures is not suitable. They are all crucial for development and resilience building, and they are strongly interlinked. For instance, without animal traction, there would not be much productivity improvement for smallholders, as this is also not possible without conservation farming. The same applies to the creation of markets. Functioning markets are a fundamental precondition for the success of almost all of the suggested measures, be it conservation farming, diversification or irrigation. Therefore, it would be a mistake to only focus on one or two measures; a multidimensional approach with parallel interconnected policies is needed.

As shown and described in detail in chapter 6, several other policies and measures are crucial for agricultural development, which is resilient to climate change and economic shocks. These are, in addition to the measures mentioned above: wider adoption of **conservation agriculture** in order to regain significant productivity levels and to improve soil fertility as well as in order to buffer wetter and dryer weather conditions. Conservation agriculture is strongly connected to **diversification**, which should be initiated according to the geographical conditions and in relation to diversified varieties, crop species, agricultural branches as well as also activities outside of agriculture. In Northern and North-Western Province, it is very important to introduce late maturing varieties of maize, as they can withstand longer rainfalls and do not rot so quickly. In contrast to that, early maturing varieties of maize and other, more drought tolerant crops such as millet and sorghum should be grown in Southern Province. To shift towards fisheries, livestock and sources of income other than agriculture is also a logical reaction. To get the price for seeds down, it is especially important for public-private part-

nerships to foster the seed production (and contract farmers). Until now, **contract farming** is the best way for small-scale farmers to grow cash crops, i.e. cotton, since the system assures markets and inputs are pre-financed. However, it is crucial to strengthen farmers organisational capacity and their negotiation power through their associations towards the cotton companies. Since now, the recently founded Cotton Board can eventually enforce the Cotton Act of 2005, there is realistic hope that a better regulation can lead to reduced side buying and selling as well as to more transparency in price setting and thus enable the expansion of this important sub-sector.

Mechanisation with draught animals and/or tractors is a prerequisite for the successful implementation of the measures above. Today the cost of purchasing a draught animal is far beyond the financial capacity of most small-holders. In order to achieve complete dissemination, at least 10–20% of farmers should own **draught animals**, in order to provide timely services to others and also for different tasks other than land preparation (transport and weeding). This is only possible by the providing special lines of credit in combination with training and veterinary services that together enable farmers to buy such animals and also to maintain them.

The wider implementation of **irrigation** in locations where it is promising, will require more time, as this measure has even more pre-conditions than most other measures suggested here; in particular when rivers or lakes are used as water sources. In addition to the installation of costly irrigation schemes, regulatory systems have to be put in place, which call for a high degree of organisation among farmers (in water user groups and water resources user group). Furthermore, markets have to be developed and thoroughly evaluated, which are able to absorb the supply of higher value crops such as vegetables, rice or winter maize. The marketing problem together with the special conditions necessary with regard to soils and infrastructure have to be identified at the outset. Lastly, a suitable legal framework has to be put in place to assure the sustainability and the pro-poor orientation of the activities. Only then, does it make sense to establish suitable lines of credit.

However, it takes political will and reliable budgets, and the commitment of all stakeholders to adhere to these strategies. Then – and only then – will it be possible to unlock the immense potential of the Zambian agricultural sector and foster development under changing climatic and economic conditions.

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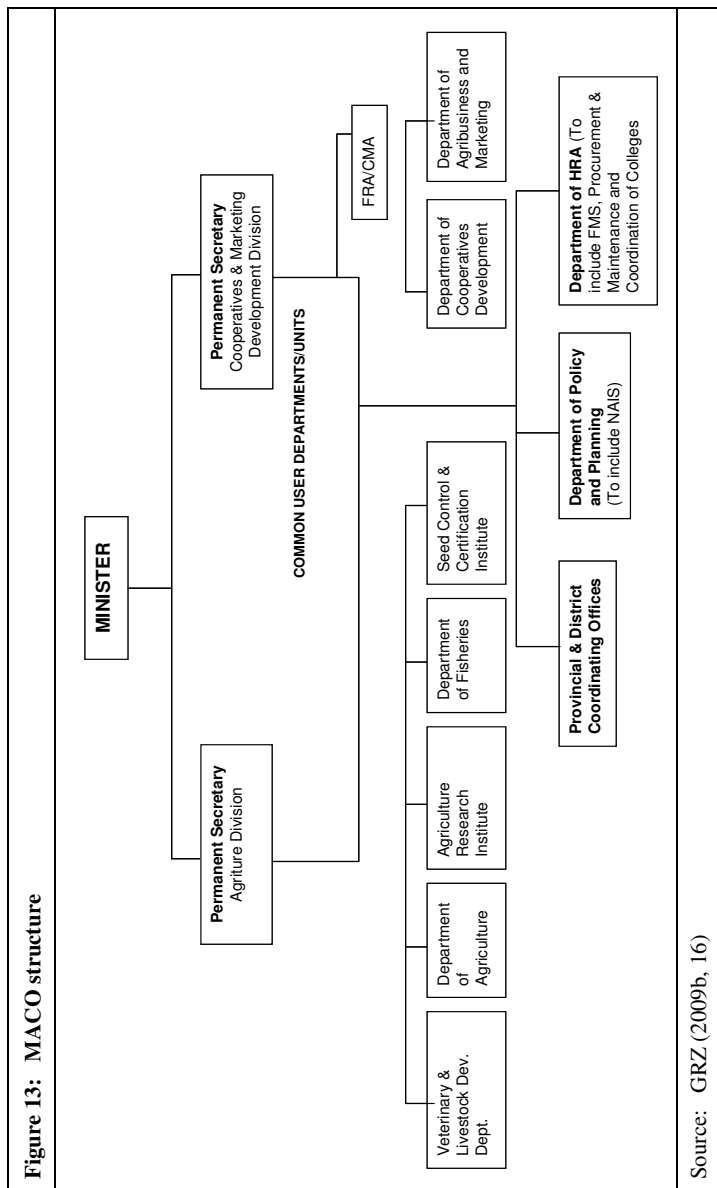
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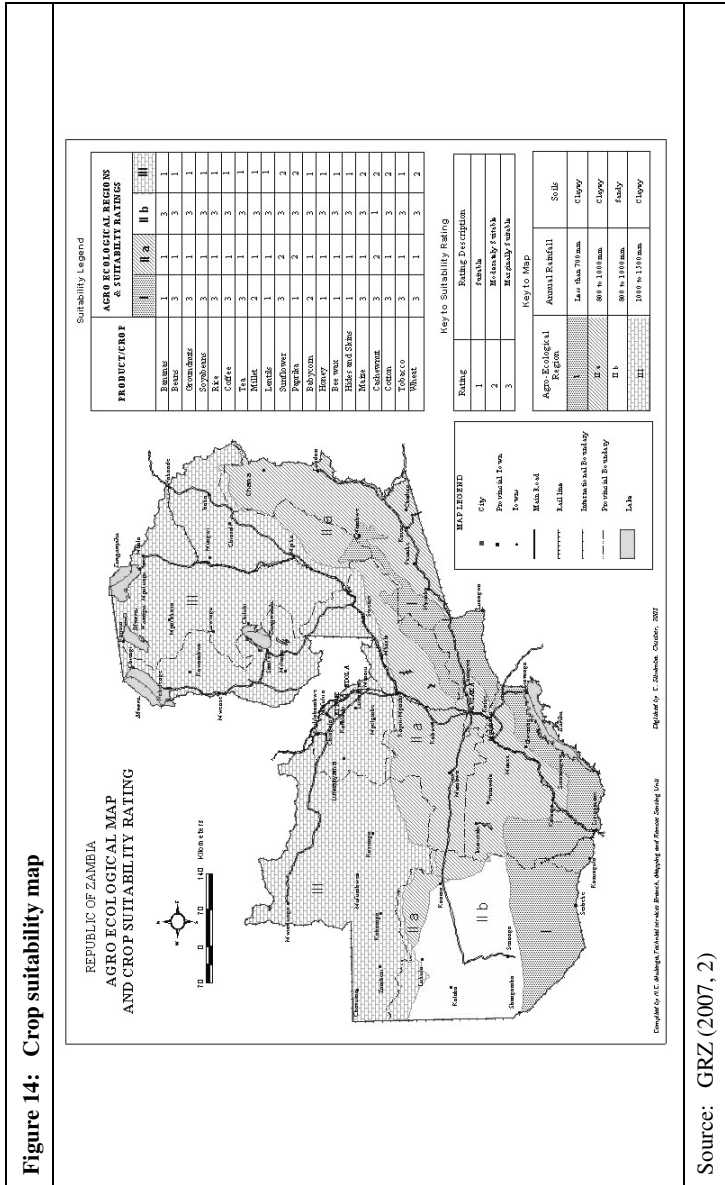
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Annexes

Annex 1: MACO structure



Annex 2: Crop suitability map



Annex 3: Impact of droughts 2004/05 on Zambian farm household production

Table 17: Mean production difference between the agricultural seasons of 2003/04 and 2004/05 per household

Livelihood zone visited		Total cereal production in metric tons of Maize calorie equivalents		
		2003/04 agric. season	2004/05 agric. season	Production difference
Code	Name	(1)	(2)	(3)=(1)-(2)
3A	Mufumbwe-Kasempa	0.826	0.576	0.250
4A	Central Cotton	1.535	0.419	1.115
4B	Chama-Lundazi Rice	0.793	0.445	0.349
5A	Line of Rail Commercial	1.045	0.466	0.579
5B	Eastern Province Cash Crop	0.598	0.308	0.290
6	Sioma Plains	0.516	0.209	0.307
7A	Kazungula-Mwandi	0.839	0.150	0.689
7B	Chongwe-Nyimba	0.839	0.528	0.331
7C	Luano Valley	0.731	0.252	0.479
9	Mulobezi Woodlands	0.878	0.291	0.588
10A	Zambezi West Bank	0.970	0.250	0.721
10B	Zambezi East	0.230	0.116	0.114
11A	Gwembe Valley	0.786	0.126	0.660
12A	Chiawa-Zambezi Low Lands	0.673	0.298	0.375
12B	Mambwe-Petauke Valley	0.687	0.219	0.468
13	Mkushi Commercial Block	0.881	0.271	0.610
14	Zambezi Flood Plains	0.551	0.187	0.364
All zones		0.817	0.361	0.456

Source: ZVAC (2005, 18)

The figure gives an overview and comparison of the cereal production output for the good agricultural season of 2003/04 and the drought season 2004/05 in Zambia. For the places visited by the Zambia Vulnerability Assessment Centre it shows that cereal production dropped by more than half in the southern parts of the country. Zones that experienced the largest drop in production are, for instance, Gwembe Valley (0.786-0.126), Kazungula-Mwandi (0.839-0.150) and Zambezi West Bank (0.970-0.250). Even the least affected livelihoods such as Mufumbwe-Kasempa recorded production drops of 30 %.

Annex 4: Important actors in Zambia's agricultural sector

Table 18: List of actors	
MICRO: farm level	
Village	Smallholders
	Emergent farmers
	Large-scale/Commercial farmers
MESO: district and provincial level	
Governmental	DACO (District Agricultural Coordinator)
	District councils
	FRA (Food Reserve Agency)
	Local government authorities
	PACO (Provincial Agricultural Coordinator)
	Provincial administration
Extension Services	Extension officers
	Subject Matter Specialists (district, blocks, camps)
Private and pressure groups	ACF (Agricultural Consultative Forum)
	AFE (Action For Enterprise)
	Alexander Forbes Risk Services
	Banks (Bank of Zambia, ZANACO)
	CAZ (Cotton Association of Zambia)
	Consultants
	Cooperatives and Associations
	Diamond Insurances
	Dunavant cotton company
	EAZ (Economic Association of Zambia)
	Ginneries
	Input Producers
	KASISI Agriculture Training Centre
	LDT (Livestock Development Trust)
	MBT (Micro Bankers Trust)
	Money lenders
	Munich Advisors Group
	OPPAZ (Organic Producers and Processors of Zambia)
	Palabana Farm Power and Mechanisation Centre
	RuralNet Associates Ltd.
	Southern BioPower
	Traders
	Transport Companies
	ZAMACE (Zambia Agricultural Commodity Exchange)
	ZAMSEED (Zambia Seed Company)

	ZCF (Zambia Cooperative Federation)
	ZCGA (Zambian Coffee Growers' Association)
	ZCTU (Zambia Congress of Trade Union)
	ZEGA (Zambia Export Growers' Association)
	ZNFU (Zambian National Farmers' Union)
	ZWA (Zambian Women in Agriculture)
Research	Central Statistical Office
	Copperbelt University
	CTPD (Centre for Trade Policy and Development)
	FSRP (Zambia Food Security Research Project)
	Institute of Economic and Social Research
	JCTR (Jesuit Centre for Theological Reflection)
	SCCI (Seed Control and Certification Institute)/MACO
	UNZA (University of Zambia (Faculty of Agriculture and Geography, Institute of Economic and Social Research (INESOR)))
ZARI (Zambia Agriculture Research Institute)/MACO	
NGOs	CSPR (Civil Society for Poverty Reduction)
	ZCSD (Zambia Council for Social Development)
MACRO: national level	
Ministries	MACO (Ministry of Agriculture and Cooperatives) & 9 departments
	MTENR (Ministry of Tourism Environment and Natural Resources)
	MOFNP (Ministry of Finance and National Planning)
	MLF (Ministry of Livestock and Fisheries)
	MOJ (Ministry of Justice)
	MOL (Ministry of Lands)
	Department of Water Affairs
	DMMU (Disaster Management and Mitigation Unit)
	Environmental Council of Zambia
	Inter-ministerial Groups
MACRO: international	
Bilateral	Chinese Development Cooperation
	Danida (Danish International Development Agency)
	DFID (United Kingdom Department for International Development)
	German Development Cooperation (GTZ/KfW/DEG/DED)
	JICA (Japan International Cooperation Agency)
	Norwegian Embassy
	SIDA (Swedish International Development Cooperation Agency)
	USAID (PROFIT/MATEP)
Multilateral	AfDB (African Development Bank)
	European Union (SADFSP)

	FAO (Food and Agriculture Organization)
	IFAD (International Fund for Agricultural Development)
	IMF (International Monetary Fund)
	UNDP (United Nations Development Programme)
	UNEP (United Nations Environmental Programme)
	WFP (World Food Programme)
	World Bank
Regional	CAADP (Comprehensive Africa Agriculture Programme)
	COMESA (Common Market of Eastern and Southern Africa)
	NEPAD (New Partnership for Africa's Development)
	SADC (Southern African Development Community)
NGOs and Foundations	Africare
	Africanow
	Bill and Melinda Gates Foundation (COMPACT)
	Care International
	CFU (Conservation Farming Unit)
	CSPR (Civil Society for Poverty Reduction)
	Keepers Zambia Foundation
	Oxfam
	PAM (Programme Against Malnutrition)
	Selfhelp Africa
	SNV Zambia
World Vision	
Source: Own compilation	

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