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The Structure and Trends of Public Expenditure on Agriculture in Mozambique

Helder Zavale, Gilead Mlay, Duncan Boughton, Adriano Chamusso and Pius Chilonda

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Acronyms

AgPER	Agriculture Public Expenditure Review
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultural Tropical
CIMMYT	Centro Internacional de Mejoramento de Maiz y Trigo
CIP	Centro Internacional de la Papa
COFOG	Classification of Functions of the Government
DNPDR	National Directorate for Promotion of Rural Development
FDA	Agriculture Development Fund
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
GoM	Government of Mozambique
GPZ	Zambezi Regional Development Authority
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IIAM	Institute of Agricultural Research of Mozambique
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
INE	National Institute of Statistics
INGC	National Institute for Management of Natural Disasters
MADER	Ministry of Agriculture and Rural Development
MINAG	Ministry of Agriculture
MZN	Metical (international abbreviation of the Mozambique's currency)
NARO	National Agricultural Research Organization
NEPAD	New Partnership for Africa's Development
PAEI	Agricultural Policy and Implementation Strategy
PAPA	Action Plan for Food Production
PARPA	Action Plan for Reduction of Absolute Poverty
PDSP	Plan for Development of Fisheries Sector
PEDSA	Strategic Plan for the Agriculture Sector
PPEI	Fisheries Policy and Implementation Strategy
PQG	GoM's five-year program
PROAGRI	Agriculture Sector Public Investment Program
R&D	Research and Development
SSA	Sub-Saharan Africa
TIA	National Agricultural Survey
USAID	United States Agency for International Development
ZRC	Zonal Research

Currency

Metical (MZN)

Exchange rate as of April 13, 2009US$1.00 = MZN26.5

Executive Summary

The fight against poverty remains the key development goal of the Government of Mozambique (GoM). Success in the transformation of the agriculture sector is considered a necessary condition for meeting the goal because agriculture and poverty are closely related. About 80% of the population heavily depends on agriculture as their primary source of livelihood, and about 73% lives in rural areas. Currently, the level of agricultural productivity is low compared to that in other developing countries, including southern African countries. The low level of crop productivity is not surprising given the dependency on rain-fed agriculture and the limited use of fertilizers and improved seeds. Results of the National Agricultural Survey (Portuguese acronym TIA – *Trabalho de Inquerito Agricola*) indicate that, in 2007, only about 4% of smallholder farmers used fertilizers, 10% used improved maize seeds and 4% used pesticides.

Investments in agriculture and complementary rural infrastructure, health, education, and institutional mechanisms are needed to promote sustainable agricultural growth. According to the World Bank (2007), sustainable agricultural growth requires a holistic strategy consisting of policy reforms, institutional innovations, and well-targeted investments aimed at boosting agricultural productivity and stimulating competitiveness. Empirical evidence (Fan et al. 2000, 2004; Benin et al. 2008) has shown that expenditure on public goods is the major driver of agricultural growth, competitiveness, and poverty reduction. Broad-based agricultural growth cannot take place without government's commitment to providing agricultural research, extension services, institutional mechanisms, transport and market infrastructure that are essential in promoting agricultural productivity gains and ultimately in poverty reduction (David and Inocencio 2000; Haggblade 2007). In recognition of the importance of public investment in agriculture, the heads of states and governments of the African Union assembled in Maputo in 2003 and resolved to implement the Comprehensive Africa Agriculture Development Programme (CAADP) by committing to adopt sound policies for agricultural and rural development growth and to allocate at least 10% of the national budgetary resources to agriculture by 2008. This commitment, referred to as the "Maputo Declaration," is expected to enable implementing countries to achieve a 6% annual growth in agricultural GDP.

This paper examines the trends in public expenditure on agriculture and the structure (composition) of public expenditure, and how the composition of public expenditure has changed over time. In addition, it makes a preliminary evaluation of the quality of public expenditure in terms of the functions of government and spatial allocation. This paper also assesses the extent to which the structure of public expenditure is aligned to the sector's policies and strategies.

The specific questions addressed in this paper include: What is the overall share of agriculture in total public expenditure and how is Mozambique progressing towards satisfying NEPAD's Maputo Declaration? How does the provision of public goods fare in the overall government expenditure on agriculture? Is the spatial expenditure on agriculture aligned with sector-strategic targets and objectives?

The public agricultural financing profile considered in this study comprises the following dimensions:

- *Funding agents:* Ministry of Finance, donors, Agricultural Development Fund (FDA), and local governments.

- *Service providers:* Ministry of Agriculture (MINAG), Ministry of Fisheries, National Directorate for Promotion of Rural Development (DNPDR) in the Ministry of Planning and Rural Development, Zambezi Regional Development Authority (GPZ), National Institution for Management of Natural Disasters (INGC) and Ministry of Public Works and Housing.

Economic classification and Classification of Functions of the Government (COFOG) are used for the analysis. The use of COFOG is limited to data collected from MINAG and is based on the following functions: support to production; extension, knowledge and information; research and development; small- and large-scale irrigation; marketing, food safety and food quality; sustainable land management; and food security and vulnerability.

The national accounts are the principal source of data, complemented by data from public service providers whenever the disaggregation required is not satisfied by national accounts data. In order to minimize data inconsistencies the study only covers the period 2001 to 2007.

Main Results and Policy Implications:

1. For the period 2004 to 2007, the priority sectors in terms of public spending are education (19%), infrastructure (15.2%), health (11.8%), good governance (7.9%) and agriculture (7.8%). These sectors accounted for an average 54% of total public spending per year. The budget allocation to agriculture has not maintained a consistent upward trend. The allocation was above 10% in 2003, 2004 and 2007 with an average of 9.7% per year. However, in terms of actual spending, the share going to agriculture has remained below 10% over the whole period with an average annual spending share of 6.8%. Between 2003 and 2005, actual spending going to agriculture showed an upward trend rising from 7.9% in 2003 to 9.6% in 2005. Thereafter, the share has declined, falling to 7.1% in 2007. The values show that resource allocation and actual spending for agriculture have not maintained a steady increase in line with the Maputo Declaration of 2003, which commits member countries to increase the share of spending to reach the target of 10% by 2008.

2. While the level of spending is important, where the spending is effected will determine to what extent this will contribute to efficient resource allocation and growth. Trends analyses based on the classification of the functions of the government and special allocations were constrained by the lack of disaggregated data. The functional classification is based on data from MINAG, Ministry of Fisheries, DNPDR and GPZ, and covers the functions of research and development (R&D), extension, production support (including subsidies, emergency distribution of inputs and farm implements, sanitary services), institutional support, small- and large-scale irrigation, land rights and management. The relative shares in spending among the abovementioned functions between 2005 and 2007 show that the largest share was accounted for by small- and

large-scale irrigation (43% per year), followed by institutional support (25%), production support (14%), research (10%), extension (5%), and land rights and management (3%). The rehabilitation of the Massingir Dam and the Chokwe irrigation scheme accounts for the large expenditure on irrigation. Although there has been a substantial increase in spending for research since 2004, when the Institute of Agricultural Research of Mozambique (IIAM) was created, spending for technology development and transfer remained relatively low.

3. Investment on agricultural research remained below 0.4% of agricultural GDP between 2001 and 2005. Walker et al. (2006) recommended that public expenditure to agricultural research should be at least 2% of the agricultural GDP if Mozambique is to be able to generate/adapt technologies to sustain annual growth rates of at least 6%.

4. The financial records of MINAG show that, between 2001 and 2007, an average of 53.2% of MINAG's total spending per year was accounted for by spending in the provinces, attaining a maximum share of 59.1% in 2007. The ranking of the provinces in terms of the average share of provincial expenditure per year of funds from MINAG between 2004 and 2006 is as follows: Nampula (14%), Niassa (11%), Inhambane (11%), Sofala (11%), Zambezia (10%), Gaza (10%), Cabo Delgado (9%), Manica (9%), Tete (8%) and Maputo (8%). In terms of expenditure per rural capita Maputo ranks first, followed by Niassa, Sofala, Manica, Inhambane, Gaza, Cabo Delgado, Tete, Nampula and Zambezia. Ranking in terms of expenditure per holding follows a similar pattern. Ranking by expenditure per unit of agricultural GDP, Niassa occupies the first position (3.2%), followed by Maputo (2.8%), Gaza (2.1%), Tete (2.1%), Manica (2%), Sofala (1.9%), Inhambane (1.6%), Cabo Delgado (1.5%), Nampula (1%) and Zambezia (0.6%). *These percentages show that the provinces contributing most to total agricultural GDP or with the largest rural population are least favored in terms of spending of funds from MINAG*. Further analysis to better understand the underlying reasons for the observed patterns will help MINAG define objective criteria for provincial allocation of resources and/or improve budget execution at the provincial level.

5. The structure of budget allocation and spending is a good indicator of "real" policy priorities and therefore helps evaluate the extent to which policies are aligned to actual resource allocation and utilization. The projected budget for the implementation of the Action Plan for Food Production (Portuguese acronym PAPA – "*Plano de Acção para Produção de Alimentos*") is analyzed to see how resources are matched with products and provision of public goods. The action plan budget for 2008 indicates that the four priority products are rice (39.3% of the budget), maize (38%), wheat (8.9%) and chicken (6.9%). According to Walker et al. (2006) the crops with the highest total production value and the highest potential to reduce poverty are cassava (30%), maize (29%), groundnut (6%), sweet potato (4%) and rice (4%). The low priority given to cassava and the basis for identifying wheat as a priority crop for public resource allocations are not clear. In terms of budgeted funds by areas of intervention, extension occupies the second position behind irrigation. The two functions account for 56% of the budget. The budget for research, on the other hand, is only 2.6 % of the total budget. The allocation of this small research budget is only partially consistent with budget allocation by product. Rice has the largest

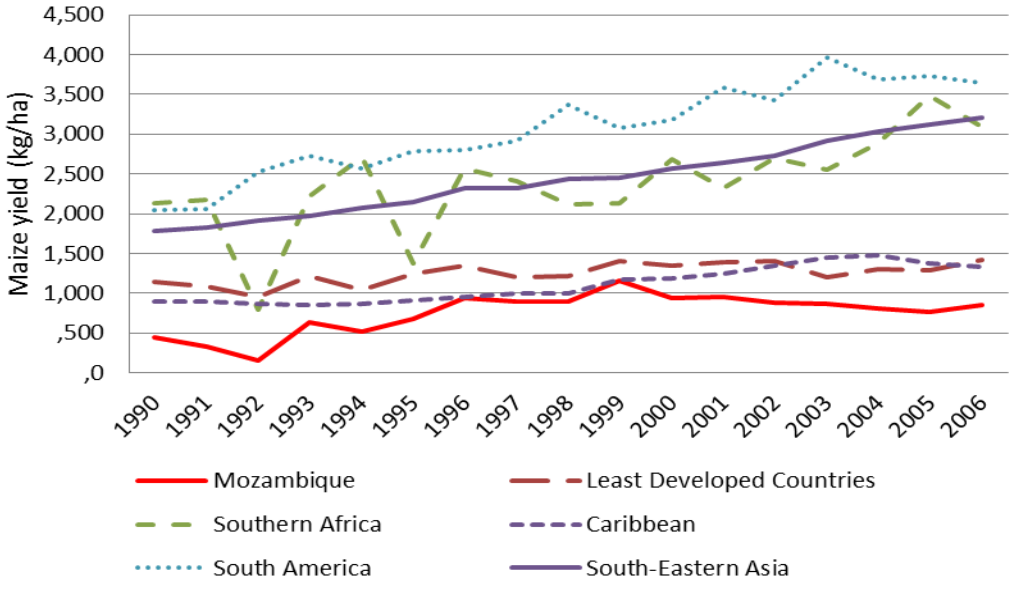
share (48.4%) followed by Irish potato (38.8%). In terms of budget allocation by product, Irish potato occupies the seventh position with 1% of the budget.

6. If technology is to be an engine of growth as envisaged by the green revolution strategy and the Strategic Plan for the Agricultural Sector (PEDSA), then the governments need to reevaluate the criteria for resource allocation to guide public investment allocation between functions of the government. Specifically, there is a need to improve institutional capacity in the generation/adaptation and transfer of agricultural technologies. There is also a need to assess the criteria for spatial distribution of funds according to population and agricultural potential to optimize the rate of growth and poverty reduction from public expenditure on agriculture.

1. Introduction

In spite of considerable decline in the share of the population living below the poverty line from 69% in 1996/97 to 54% in 2002/03, poverty remains widespread and concentrated in rural areas in Mozambique. The fight against poverty remains a key development goal for the GoM, and the success in the transformation of the agriculture sector is considered a necessary condition in meeting this goal. The second Poverty Reduction Strategy Paper (PRSP), also called Action Plan for the Reduction of Absolute Poverty (Portuguese acronym PARPA II – "*Plano de Acção para a Redução da Pobreza Absoluta*") launched in 2006 and the second Agricultural Sector Public Expenditure Program (Portuguese acronym PROAGRI II – "*Programa Nacional de Desenvolvimento Agrário*") recognize the importance of agriculture as an engine of economic growth, poverty alleviation and, specifically, the need to increase agricultural productivity as a means for sustainable growth. The GoM launched its green revolution strategy in 2008, which among other factors emphasized the need to address the constraints to sustainable increases in agricultural productivity.

The emphasis on agriculture by the GoM is not surprising due mainly to two factors. First, agriculture and poverty are closely related as about 80% of the population heavily depends on agriculture as their primary source of livelihood and about 73% live in rural areas. Second, despite the prominent role of the agriculture sector in Mozambique's economy, its productivity is relatively low compared to other developing countries, including southern African countries (see Figure 1). The low productivity is not surprising because of high dependency on rain-fed agriculture and limited use of fertilizers and improved seed as shown in Table 1. Results of the National Agricultural Survey (TIA) indicate that in 2007, only about 4% of smallholder farmers used fertilizers, while 10% used improved maize seed, and 4% pesticides.



Source: FAOSTAT 2009
Figure 1. Maize yield in Mozambique and selected regions.

Table 1. Small and medium holdings using agricultural inputs (%).

Item	2002	2003	2005	2006	2007
Chemical fertilizers	3.8	2.6	3.9	4.7	4.1
Pesticides	6.8	5.3	5.6	5.5	4.2
Animal traction	11.4	11.3	9.5	12.8	12.0
Irrigation	10.9	6.1	6.0	8.4	13.2
Use of improved seed					
Maize			5.6	9.3	10.0
Rice			3.3	4.0	2.9
Groundnut			2.0	4.2	6.4

Source: TIA 2002 to 2007.

The high reliance on agriculture for livelihood and the fact that the bulk of the population lives in rural areas suggest that economic growth and poverty alleviation require productivity gains in agriculture. In fact, the World Bank (2005) reports that, among all sectors, the agriculture sector contributed the highest to poverty reduction in Mozambique. Changes in poverty of households whose heads engage in agriculture as their main occupation accounted for the reduction of 11 of the 15 percentage points in poverty incidence between 1996/97 and 2002/03.

Investments in agriculture and complementary rural infrastructure, health, education, and institutions are needed to promote sustainable agricultural growth. According to the World Bank (2007), sustainable agricultural growth requires a holistic strategy consisting of policy reforms, institutional innovations, and well-targeted investments aimed at boosting agricultural productivity and stimulating competitiveness. Empirical evidence (Fan et al. 2000, 2004; Benin et al. 2008) has shown that expenditure on public goods is the major driver of agricultural growth, competitiveness and poverty reduction. Broad-based agricultural growth cannot take place without government's commitment to providing agricultural research, extension services, institutional mechanisms, transport and market infrastructure that are essential in promoting agricultural productivity gains and ultimately poverty reduction (David and Inocencio 2000; Haggblade 2007). Because supplying public goods is often beyond the capacity and interest of the private sector (as they cannot internalize all the benefits resulting from the investment), this sector will usually underinvest in key factors characterized by public-good attributes necessary to accelerate agricultural growth.

In addition to the public-good characteristics of the key drivers of agricultural growth; land cultivation, use of fertilizers and pesticides, and plant and animal diseases usually generate externalities that require interventions in terms of policies and regulations. When externalities arise, the private sector will generally underinvest in preventive measures as is the case with public goods. On the other hand, agricultural production is intrinsically characterized by production and price risks normally beyond the control of smallholder farmers who often lack capital to implement risk management strategies. Yet insurance and credit markets to minimize risks and uncertainties in agriculture are either missing or imperfect due mainly to asymmetric information and moral-hazard problems.

To address market failure, create a conducive environment to stimulate private investment, alleviate poverty and achieve other developmental goals, a wide variety of policies, institutional

mechanisms and public investment are put in place. These require public expenditure to finance their design, implementation, monitoring and evaluation. However, policy instruments and regulations alone will have little impact on agricultural growth and, ultimately, on economic growth, unless they can be converted to implementable action plans supported by appropriate institutions and public spending.

In 2003, the heads of states and governments of the African Union assembled in Maputo and resolved to implement the CAADP by committing to adopt sound policies for agricultural and rural development growth and to allocate at least 10% of the national budgetary resources to agriculture by 2008. This commitment referred to as the "Maputo Declaration" if implemented, is expected to enable a 6% annual growth in the agricultural GDP.

The report examines trends in public expenditure on agriculture and structure of public expenditure, and how, over time, the composition of public expenditure has changed in Mozambique. In addition, it makes a preliminary evaluation of the quality of public expenditure in terms of the classification of the functions of government and spatial allocation. It makes a preliminary assessment of the extent to which the structure of public expenditure is aligned to the policies and strategies, and the implications for attaining the goals implied by these policies and strategies.

The specific questions to be addressed by this paper include: What is the overall share of agriculture in total public expenditure and how is Mozambique progressing towards satisfying the NEPAD's Maputo declaration? How does the provision of public goods fare in the overall government expenditure on agriculture? Is the spatial expenditure on agriculture aligned with sector-strategic targets and objectives?

The remainder of the paper is structured as follows: the following section presents an overview of sectoral policies and strategies while section 3 describes the data and methods of analysis employed. Section 4 presents the main findings and section 5 summarizes the main results and draws some policy implications.

2. Overview of Sectoral Policies and Strategies

Development of the agriculture sector in Mozambique is directed by a variety of sectoral policies, strategies, programs and plans among which the most important are the Agriculture, Policy and Strategy for Implementation (Portuguese acronym PAEI – "*Politica Agrária e Estratégia de Implementação*"), Fisheries Policy and Implementation Strategy (PPEI), PROAGRI II, the Green Revolution and the PAPA.

The sectoral policies, strategies and programs are articulated with national policies, strategies and plans such as the 5-year government program (Portuguese acronym PQG – *Plano Quinquenal do Governo*) that is presented at the beginning of the mandate of a new government and PARPA. The current PQG is for the period 2005-09 and PARPA II is for the period 2006-2009. The main sectoral policies, strategies and plans are summarized below.

Agricultural Policy and Implementation Strategy (PAEI)

The Agricultural Policy and Implementation Strategy (PAEI) approved in 1995 is the only post-independence agricultural policy document. This policy strategy covers crops, livestock and forestry. The PAEI states that the agriculture and fishery sectors would contribute to the GoM's development objectives by promoting (i) food security, (ii) sustainable economic growth, (iii) reduced unemployment rate, and (iv) reduced levels of absolute poverty.

The PAEI delineates areas of interventions aimed at transforming the agriculture sector to ensure food security through production, diversification, integration into the food value chain, promotion of exports, and sustainable use of natural resources with equitable distribution of the country's income. The PAEI sets four key pillars to stimulate agricultural development: (i) sustainable use of natural resources, (ii) increased agricultural production and productivity with emphasis on research and extension, (iii) institutional development and reform, and (iv) human capital development.

Program on Public Expenditure on the Agriculture Sector for 1999-2004 (PROAGRI)

Up to the late 1990s, about 90% of public expenditure on agriculture had been donor-financed through various projects. In recognition of the limitations of the donor-supported funds channeled through projects to develop the agriculture sector in Mozambique, PROAGRI I was designed in 1998 by the GoM with donor support.

PROAGRI I was designed within the framework of the PAEI and was intended to serve as an instrument to achieve the agricultural policy objectives. The main objectives of PROAGRI I were to (i) reform and modernize the public institutions servicing the agriculture sector; (ii) increase agricultural production and productivity through improved public service delivery (extension, animal husbandry and research), and (iii) promote sustainable access and management of the natural resource base through provision of good practices in forestry and wildlife, and land management.

The main purpose of PROAGRI I was to increase the impact of public expenditure on agriculture to secure an enabling environment for a sustainable and equitable growth of the rural economy. The program meant to (i) reform and strengthen the Ministry of Agriculture and Rural Development (MADER) to be able to formulate and advocate policies that stimulate smallholder and private-sector development, (ii) support public-service delivery (extension, animal husbandry, and research), and (iii) stimulate sustainable use of the natural resources base.

PROAGRI I was designed with eight pillars, namely: (i) institutional development, (ii) agricultural research, (iii) agricultural extension, (iv) support to agricultural production, (v) livestock, (vi) land, (vii) forestry and wildlife, and (viii) irrigation. Each pillar had its own objectives and strategies clearly stated. These pillars matched the structure of the MADER at the time of the PROAGRI's design. At that time, MADER consisted of eight National Directorates, each responsible for one of the eight pillars.

There is general agreement that PROAGRI I has placed too much emphasis on institutional capacity (planning and financial management systems) and less emphasis on ensuring this improved institutional capacity was used to effectively improve delivery of public services that, in turn, contribute to increasing smallholders' agricultural productivity and income, which would

ultimately have an impact on reducing poverty and food insecurity. An external evaluation done in 2002 pointed out this weakness of PROAGRI I and recommended considering a new approach for the design and implementation of the second phase of the program.

Program on Public Expenditure on the Agriculture Sector for 2005-2009 (PROAGRI II)

Unlike PROAGRI I, PROAGRI II is conceived as a horizontal program with three major components, which are supporting smallholder farmers, commercial farmers, and natural resources management. The main objectives of PROAGRI II were to:

- Support smallholder farmers to develop agriculture and enhance their livelihoods.
- Stimulate (i) increased productivity and production to ensure domestic production to meet basic needs of all citizens and (ii) the export of the country's main crops, complemented with the promotion and development of agro-industries that add value to the country's agricultural products for domestic and export markets.
- Guarantee sustainable natural resources management which brings economic, social and environmental outcomes based on appropriate management and conservation plans, education, information, and monitoring systems involving communities, and the public- and private-sector interests.

PROAGRI II has six pillars: (i) development of input and output markets, (ii) rural finance, (iii) development of infrastructure, (iv) technology, (v) management of natural resources, and (vi) enabling environment for smallholder and private-sector development.

Strategy for Green Revolution (SGR)

The GoM, through the MINAG, designed its *Strategy for Green Revolution* (SGR) in 2008. The SGR is seen as an instrument to place agriculture-related activities within the broader context of the rural development framework as established in PQG. The main objective of SGR is to combat poverty and hunger in Mozambique by promoting competitiveness of the agriculture sector and sustainable growth in agricultural production and productivity. Increased use of improved agricultural inputs including improved seeds, fertilizers, pesticides, mechanization and animal traction, and irrigation are expected to lead to increased agricultural production and productivity. SGR also envisions that the promotion of agriculture-sector productivity and competitiveness should be complemented with adequate interventions which stimulate linkages between the agricultural and nonagricultural rural economies.

Based on the value chain framework, SGR comprises five pillars: (i) natural resources (land, water, wildlife, and forestry), (ii) enhanced agricultural technologies, (iii) markets and market information systems, (iv) provision of financial services, and (v) strengthening of social and human capital. The strategy also lays down a set of actions that should be taken by different players under each pillar in order to fulfill its objectives. Financing of the strategy is expected to come from the government budget.

Action Plan for Food Production for 2008-2011 (PAPA)

The action plan was prepared in response to the 2007-08 world food crisis and is intended to enable Mozambique to eliminate deficit and reduce dependency on food imports. PAPA covers

the following products: maize, rice, wheat, cassava, potato, sunflower, soybean, cotton, groundnut, chicken and fish. For each of these products, PAPA sets out objectives, targets and strategic areas of intervention. PAPA`s objective of eliminating food deficit and reducing reliance on food imports is expected to be attained through increased productivity and cultivated area in districts selected based on their biophysical suitability. Therefore, PAPA interventions are intended to improve the supply and access to improved seed, fertilizers, irrigation, mechanization (animal traction and tractors) and storage. Subsidies on inputs and credit are key components of the plan to enhance access to inputs and credit.

Fisheries Policy and Implementation Strategy (PPEI)

The PPEI launched in 1999 has the following objectives: (i) to increase the capacity of the fisheries sector to supply the internal market and reduce part of the food deficit by increasing fisheries output and reducing losses after fishing; (ii) to increase foreign exchange earnings from the fisheries sector by ensuring permanent access to international markets of domestic fishery products, especially prawns; and (iii) to improve living conditions of the fishing communities by increasing profitability of the fishing activities and creating jobs within the fish value chain.

PPEI sets out areas in which the state has to play a key role in the implementation of this policy. These areas include: (i) increased delivery of public services (quality control, licensing, research and extension), (ii) increased competitiveness in the sector, (iii) diversified ranges of fishery products for exports, (iv)promotion of aquaculture for exports, and (v) promotion of environmental sustainability through integrated management of the marine and coastal environment that protects important ecosystems.

Plan for Development of Fisheries Sector for 2002-2006 (PDSP)

PDSP was designed in 2002 as a vehicle to make the fisheries policy operational and therefore has the same objectives, namely to (i) improve the domestic supply of fisheries products to reduce domestic food deficit, (ii) increase export earnings, and (iii) improve the living conditions of fisheries communities.

PDSP consists of six components: (i) artisan fishing, (ii) semi-industrial fishing, (iii) industrial fishing, (iv) processing industry, (v) aquaculture, and (vi) public administration. Each component focuses on regulations and laws, research and extension, infrastructure, financial services, human resources, and management and monitoring systems. The PDSP presents specific activities and indicators and provides estimated costs for its implementation.

All the policy, strategy and plan documents cited above recognized the importance of sustainable increase in productivity, making the agricultural products competitive, sustainable use of natural resources and improving market access. The role of the government in creating enabling conditions in the form of policies, laws, regulations, and supply of public goods such as research and extension and infrastructure in order to make agriculture competitive is also recognized.

3. Methods of Analysis and Data

System for Tracking Public Expenditure on Agriculture

The definition of agriculture used in this study is drawn from the guidance note for the implementation of the tracking system for expenditure on agriculture in African countries developed by NEPAD under the framework for agricultural development in Africa as established in CAADP. According to the guidance note, agriculture includes crops, livestock, forestry, and fisheries. In the context of the CAADP definition of agriculture, regardless of the public institution or agency providing agricultural services, all spending on these services whose primary purpose is to restore, improve or maintain agriculture is defined as public expenditure on agriculture.

Based on CAADP's definition, public expenditure on agriculture is budgeted and accounted for under more than one entity. As illustrated in Table 2, funds in the agriculture sector flow from primary funding sources to funding agents and then to service providers. Table 2 also shows that the total amount of funds disbursed by funding sources is equal to the total amount released by funding agents, i.e., G.

Table 2. Flow of funds between entities.

Funding agents or recipients	Primary/original funding sources				
	S1	S2	S3	S4	Total
1	A	B			A+B
2	C				C
3		D	E		D+E
4				F	F
Total	A+C	B+D	E	F	G

	Funding agents				
Service providers	1	2	3	4	Total
I	V		W		V+W
II		X			X
III			Y		Y
IV				Z	Z
Total	V=A+B	X=C	W+Y=D+E	Z=F	G

Source: Govereh et al. 2008.

The public agricultural financing profile considered in this study comprises the following dimensions:

- *Funding agents:* Ministry of Finance, donors, Agricultural Development Fund (FDA), and Local governments;

- *Service providers:* Ministry of Agriculture (MINAG), Ministry of Fisheries, National Directorate for Promotion of Rural Development (DNPDR) in the Ministry of Planning and Rural Development, Zambezi Regional Development Authority (GPZ), National Institution for Management of Natural Disasters (INGC), and Ministry of Public Works and Housing.

As this profile suggests, expenditure on agriculture in Mozambique is channeled through a number of entities. Some of them, for example, the MINAG, Ministry of Fisheries and GPZ perform purely agriculture-related functions. Others have mandates that are not purely agriculture-related, but perform agricultural-related activities as they implement their mandates. These include the Ministry of Planning and Rural Development through its National Directorate for Promotion of Rural Development (DNPDR), the National Institution for Management of Natural Disasters (INGC), and the Ministry of Public Works and Housing. The latter allocates a budget to cover expenditure for the Massingir Dam which supplies water for irrigation.

The CAADP definition of agriculture also recommends that expenditure on agriculture should include spending on projects with multi-sectoral objectives only if 70% or more of the costs of the projects are related to the agriculture sector.

Given that expenditure on agriculture involves many institutions, a task force was created involving MINAG, Ministry of Planning, Ministry of Finance, Ministry of Fisheries, the World Bank and Re-SAKSS. The creation of the task force was necessary to guarantee availability and validation of data to be used in the analysis and buy-in of the results by target institutions. The task force was led by the Directorate of Economics of the Ministry of Agriculture.

The study uses both economic classification and COFOG for the analysis. The national accounts do not use COFOG and therefore an impartial analysis is done using data collected from MINAG and the Ministry of Fisheries. Based on data availability, the Agriculture Public Expenditure Review (AgPER) task force approved the following classes of government functions: support to production; extension, knowledge and information; R&D; small- and large-scale irrigation; marketing, food safety and food quality; sustainable land management; and food security and vulnerability.

Description of the Data

Our analysis of public expenditure is restricted to the period 2001-2007 because of large data inconsistencies and discontinuities in earlier years as a result of changes introduced in the national accounts and changes in the organizational structure of the public agencies. The national accounts constitute the principal source of data and are complemented by data from public

service providers whenever the level of disaggregation required is not satisfied by data on national accounts. The case in point is the analysis based on COFOG which is restricted to data on expenditure collected from MINAG since such data are unavailable from the national accounts and other agencies.

Reducing the period of analysis did not resolve all the data problems. Data provided by individual spending agents do not normally correspond to the data available from national accounts prepared by the Ministry of Finance. The discrepancies between different sources of data may be a result of the high dependency on donor funds and the preponderance of off-budget funds. Considerable amounts of donor funds are not captured by the national accounts. The portion of the aid funds that is not captured by the government account is classified as off-budget and can potentially lead to double counting.

The economic classification presents two main categories of government expenditure in Mozambique: *funcionamento* and *investimento*. Funcionamento expenditure is made up of any operating costs related to ongoing and routine tasks, while investimento expenditure consists of costs of capital formation in nature. Under this budget classification, some investimento expenditures are recurrent in nature, but they are still classified as investimento. For instance, wages and salaries paid to personnel hired to build an irrigation scheme are documented under investimento expenditures. On the other hand, wages and salaries paid to permanent staff are recorded under funcionamento expenditures. For our analysis and in line with the national accounts, we consider funcionamento as recurrent expenditure and investimento as investment expenditure.

4. Aggregate Public Expenditure on Agriculture

Reviews of public expenditure on agriculture seek to address three fundamental issues relating to what is spent on the sector, and where and when the amount is spent. While the first issue is related to the amount spent on the sector over time, the second one is related to the quality of spending in terms of functions of the government and geographic distribution. Where the amount is spent matters as much as the amount actually spent. Resources should be directed towards functions and regions that can potentially enable a country to have a more productive and competitive agriculture sector. On the other hand, due mainly to the seasonality of the agriculture sector, the timing of the expenditure is as important as the size and destination of expenditure on agriculture. Delays in the execution of agricultural practices such as irrigation and weeding can seriously compromise agricultural production and productivity.

This study addresses issues related to the size and destination of expenditure on agriculture. It does not, however, consider the timing of the expenditures due to data unavailability.

This section is structured as follows. The first subsection shows the relative importance and performance of the agriculture sector by linking allocation and expenditure on agriculture with the contribution of the agriculture sector to the economy. The second and third subsections describe trends in budgetary allocation and expenditure on agriculture, respectively. The fourth

subsection addresses issues related to the deviation between budget allocation and actual spending. The last four subsections discuss concerns associated with the quality of spending in terms of composition, functions of the government, technology development and spatial expenditure.

Trends and Composition of Agricultural GDP

Table 3 summarizes trends in total GDP, agricultural GDP and its components, growth of agricultural GDP, and percentage share of agricultural GDP in total GDP. It shows that both total GDP and the agricultural GDP have been trending upwards during the 2001-07 period. Real total GDP rose considerably from MZN95 billion in 2001 to MZN151 billion in 2007, representing an increase of about 60% over the 7-year period. Between 2001 and 2007, real agricultural GDP rose from MZN19 billion to MZN39 billion, which is equivalent to an increase of 105%.

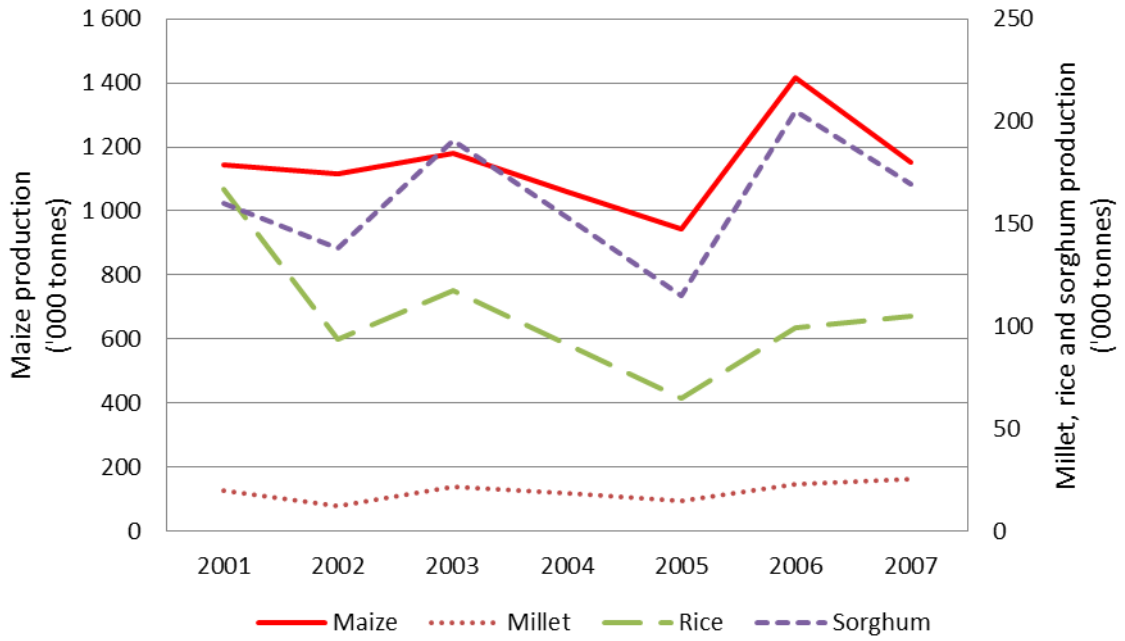
Table 3. Trends of real agricultural GDP (2003 = 100).

Year	Total GDP (million MZN)	Agricultural GDP (million MZN)	Annual growth of agricultural GDP (%)	Agricultural GDP as % of total GDP
2001	95,404	19,124	-	20.0
2002	104,212	26,492	38.5	25.4
2003	110,973	28,132	6.2	25.4
2004	119,722	29,662	5.4	24.8
2005	129,764	31,752	7.0	24.5
2006	141,030	35,878	13.0	25.4
2007	150,933	39,164	9.2	25.9
Average	121,720	30,029	12.4	24.5

Source: National Institute of Statistics (INE).

Despite an increasing trend in general, real agricultural GDP experienced a reduction of about 16% in 2000, falling from MZN21 billion in 1999 to MZN18 billion in 2000. This decline in real agricultural GDP was a result of a devastating flood that hit the country in 2000 and shows how vulnerable the agriculture sector is to extreme weather changes.

Table 3 also indicates that between 2001 and 2007, annual growth rate of the agricultural GDP has no apparent trend, fluctuating considerably between 5% in 2004 and 39% in 2002. The large fluctuations in growth rates are due to large fluctuations in production as a result of floods in 2001/02 and the drought in 2005. As seen in Figure 2, production of all major cereals declined substantially in 2005 which was a drought year.



Source: FAOSTAT 2009.
Figure 2. Cereal production in Mozambique

Given the limited use of improved inputs and consequently low agricultural productivity, the high agricultural GDP growth is essentially driven by expansion in cultivated area. With the end of the 16-year civil war in 1992 and subsequent demining, many people returned to rural areas to engage in agriculture. As a result, cultivated area and production expanded considerably over the years, while agricultural productivity still remains low.

While agriculture employs about 78% of the labor force, and 80% of the population depends on agriculture for their livelihoods, the sector accounted for only about 25% of the real GDP per year over the period 2001-2007. The low share of agricultural GDP coupled with a large percentage of the population depending on agriculture is mainly due to the few large mega-projects and not due to structural transformation.

Table **4** summarizes the structure of real agricultural GDP between 2001 and 2007, and indicates that, on the one hand, the real crops, livestock and forestry GDP showed an increasing trend between 2001 and 2007, growing from MZN17 billion in 2001 to MZN37 billion in 2007. Crops, livestock and forestry GDP more than doubled from 2001 to 2007. On the other hand, fishery GDP in 2003 real terms did not show an evident trend over the period of analysis, fluctuating between MZN1.7 billion in 2001 and MZN2.2 billion in 2007. Over the same period, fisheries GDP averaged MZN2 billion, while crops GDP averaged MZN28 billion.

Table 4. Structure of real agricultural GDP (2003 = 100).

Year	Crops, livestock and forestry GDP (million MZN)	Fisheries GDP (million MZN)	Crops, livestock and forestry as % of agricultural GDP	Fisheries as % of agricultural GDP	Growth of crop livestock and forestry GDP (%)	Growth of fishery GDP (%)
2001	17,486	1,638	91.4	8.6	9.6	-8.5
2002	24,626	1,866	93.0	7.0	40.8	13.9
2003	26,007	2,126	92.4	7.6	5.6	13.9
2004	27,574	2,088	93.0	7.0	6.0	-1.8
2005	29,799	1,954	93.8	6.2	8.1	-6.4
2006	33,679	2,199	93.9	6.1	13.0	12.6
2007	36,975	2,189	94.4	5.6	9.8	-0.5
Average	28,021	2,008	93.13	6.87	13.28	3.32

Source: INE.

Table **4** also shows that the share of crops, livestock and forestry in real expenditure on agriculture rose from 91% in 2001 to 94% in 2007. The average contribution of the fisheries subsector to agricultural GDP was 7% between 2001 and 2007.

Trends in Budget Allocation

Government budget allocation to various sectors reflects policy and development priorities, on the one hand, and political compromises, on the other. Table 5 provides a summary of the total government budget allocated to the agriculture sector between 2001 and 2007.

Table 5. Government budget and agriculture allocation (million MZN).

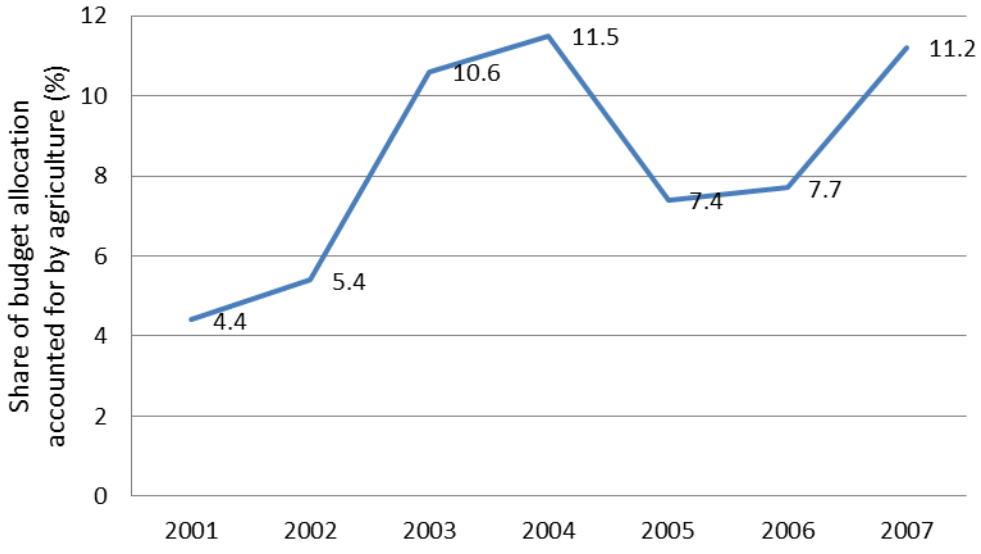
Year	Nominal total government budget	Nominal budget allocated to agriculture	Real total government budget (2003 = 100)	Real budget allocated to agriculture (2003 = 100)	Share of budget allocated to agriculture in %
2001	23,944	1,055	27,076	1,192	4.4
2002	28,467	1,537	29,822	1,610	5.4
2003	29,213	3,106	29,213	3,106	10.6
2004	30,745	3,532	28,607	3,287	11.5
2005	39,988	2,956	34,204	2,528	7.4
2006	47,199	3,643	36,931	2,851	7.7
2007	59,477	6,669	43,314	4,857	11.2

Average	37,005	3,214	32,738	2,776	9.7[a]

Source: National accounts.
[a] This represents the average for the 2003-2007 period.

The total government budget has been increasing in real terms except in 2003 and 2004 when it declined. The budget allocated to agriculture increased in real terms between 2001 and 2003, rising from MZN1.2 billion in 2001 to MZN3.3 billion in 2004. It is important to note that when the total budget declined in real terms between 2003 and 2004, the budget allocated to agriculture during the period increased by about 100%. From 2005 to 2006, the budget allocated to agriculture declined below MZN3 billion and rose to MZN4.9 billion in 2007. The 2 years of reduction of the budget for agriculture coincide with the first 2 years in office of the new government and may indicate a shift in priorities relative to the previous government.

Table 5 also shows the share of total government budget allocated to the agriculture sector between 2001 and 2007. These shares are plotted in Figure 3, which shows that the share allocated to agriculture in the total government budget has not shown any noticeable trend between 2001 and 2007. When the Maputo Declaration was signed in 2003, the agriculture sector accounted for 11% of the total government budget which increased to 12% in 2004. Between 2005 and 2007, the share of public budget allocated to agriculture declined by about 5% and then increased to 11% in 2007.



Source: National accounts.
Figure 3. Share of government budget accounted for by agriculture.

There are two plausible explanations for the 5% decline in the share of government budget for agriculture in 2005. First, a new president came into office with a new government program (5 year government program). Second, some donors including the World Bank, the US Agency for International Development (USAID), and the Government of the Netherlands did not commit

any funds to support the implementation of PROAGRI II in 2005, while other donors released only the leftover funds from the previous year. This reduction in the donor-financed funds to support PROAGRI II directly influenced budget allocation to the agriculture sector in 2005.

We now shift our attention to budget allocation to the subsectors of agriculture, namely crops, livestock, and forestry and fisheries. Further disaggregation of crops, livestock and forestry subsector was not possible for lack of data. Table 6 provides a summary of trends and relative shares of the budget for agriculture allocated to the two subsectors. Table 6 shows that, on average, the budget allocated to the crops, livestock and forestry subsectors was about 77% per year between 2001 and 2007, with the highest allocation achieved in 2003 (90%). From 2005, the budget allocation to the crops, livestock and forestry subsector has shown a declining trend in favor of fisheries.

Table 6. Allocation by subsector (million MZN).

	Allocation for agriculture			
Year	Crops, livestock and forestry	Fisheries	Total	% of allocation for agriculture, crops, livestock and forestry
2001	755	299	1,055	71.6
2002	1,145	391	1,537	74.5
2003	2,796	310	3,106	90.0
2004	2,559	973	3,532	72.4
2005	2,380	576	2,956	80.5
2006	2,776	867	3,643	76.2
2007	4,718	1,951	6,669	70.7
Average	2,447	767	3,214	76.6

Source: National accounts.

Although budgetary allocations reflect the government's intentions and political commitments, budget allocations are not necessarily translated into spending due to a variety of reasons. First, allocated funds may not be released as planned due to delays in and shortfalls on the disbursement of donor-financed funds and discrepancies between government revenue collections and projections at the planning stage. Second, deviation between released funds and actual spending may exist due to reasons associated with the capacity to spend released funds effectively and budget accounting, reporting and auditing procedures. We now turn our attention to sources of funds which are an indication of budget predictability.

Budget Predictability

Planning and implementation of activities in the agriculture sector to deliver public services can only be executed in a systematic way if the agricultural service providers have a good indication of when funds allocated to them will actually become available and what portion of the allocated funds will actually be released. One measure of budget predictability is source of funds. Figure 4 summarizes budget allocation to the investment budget by source for the period 2005 to 2007, the period for which data are available by source of funds. We only present a budget breakdown

for the investment budget because national accounts do not provide information on recurrent budgets by source.

Source: MINAG, Ministry og Fisheries, DNPDR, INGC and GPZ.
Figure 4. Allocation for investment budget by source of funds (%).

Figure 4 shows that the main source of government funds allocated to investment spending in the agriculture sector was external, averaging about 76% per year of the total investment budget allocated to agriculture. The erratic nature of donor funding commitments and low levels of actual disbursement of funds as a result of complex procurement procedures normally followed by donors make the investment budget unpredictable and unstable. As Govereh et al. (2006) argued in the case of Zambia, many problems are associated with donor-financed projects. These include lack of sustainability, poor monitoring and evaluation, overlapping interests, diversion of public-sector officials' time away from core government activities, and a lack of effective coordination with other projects and the national development agenda.

Recurrent and Investment Budgets

The distinction between recurrent and investment budgets should be interpreted with caution as the cutoff point between them is not always clear. As indicated earlier, the economic classification used in the presenting of national accounts and the budget leaves the impression that the investment budget receives the largest share of the allocation. This happens because the investment budget includes salaries covered by the external funds. Table 7 provides a breakdown of the total allocation to investment and the recurrent budget.

Table 7. Budget allocation for the recurrent and investment budget (million MZN).

Year	Nominal investment	Nominal recurrent	Real investment (2003 = 100)	Real recurrent (2003 = 100)	% Investment in total allocation
2001	858	197	970	222	81.3
2002	1,280	257	1,341	269	83.3
2003	2,768	338	2,768	338	89.1
2004	3,070	462	2,857	430	86.9
2005	2,446	510	2,092	436	82.7
2006	2,960	684	2,316	535	81.2
2007	5,781	889	4,210	647	86.7
Average	2,737	477	2,365	411	84.48

Source: National accounts.

In real terms, the budget allocated for recurrent expenditure has moved upward between 2001 and 2007, increasing from MZN222.4 million in 2001 to MZN647.4 million in 2007. On the other hand, allocation for investment spending in real terms fluctuated over the 7-year period without a clear trend. From 2001 to 2004, allocation to investment expenditure in real values grew considerably from MZN970 million to MZN2.9 billion and then declined to MZN2.1 billion in 2005. From 2005 to 2007, the budget allocated to investment spending doubled, changing to MZN4.2 billion in 2007.

Table 7 also shows that more than 80% of the government budget goes to investment. Between 2001 and 2007, the share of budget allocation to agriculture accounted for by the investment budget was 85% on average. It ranged from 81% in 2001 to 89% in 2003. Since the investment budget is generally donor-financed, it makes the whole budget unpredictable.

Trends in Expenditure

The amount of actual expenditure in the sector, where it is spent in terms of functions and spatial distribution, and the timing of the actual expenditure are what determine the performance of the sector. The relationship between budget allocation and actual spending is, in general, an indication of the effectiveness of the budget in allowing agricultural service providers to plan and implement their activities. After looking at trends in budgetary allocation in the previous section, we seek in this section to explore the extent to which government's intents and political commitments reflected in budget allocations are translated into actions on the ground by looking at trends in actual spending.

Table 8 summarizes total government expenditure in some key sectors that influence the rural economy. These sectors include: health, education, infrastructure, agriculture and good governance. The four sectors that accounted for the largest share of government expenditure between 2004 and 2007 are education, infrastructure, health and good governance in that order.

Table 8. Composition of total government expenditure (%).

Sector	2004	2005	2006	2007	Average
Health	10.1	11.7	12.8	12.4	11.8
Service delivery	9.7	10.8	11.8	11.6	11.0
HIV/AIDS	0.4	0.9	1.0	0.8	0.8
Education	19.2	18.2	18.6	20.1	19.0
Primary/secondary education	16.2	15.9	16.3	17.8	16.5
Higher education	3.0	2.3	2.3	2.3	2.5
Infrastructure	14.7	17.4	15.5	13.2	15.2
Roads	9.5	11.0	10.7	8.7	10.0
Water	2.0	3.3	3.6	2.7	2.9
Energy	2.6	2.0	0.5	1.1	1.6
Other public services	0.6	1.0	0.6	0.6	0.7
Good governance	8.9	7.8	7.5	7.5	7.9
Security	5.3	4.3	4.0	3.6	4.3
Law enforcement	2.1	2.1	2.0	1.9	2.0
Public administration	1.5	1.4	1.5	2.0	1.6
Agriculture[a]	8.2	8.9	7.6	6.5	7.8
Other sectors	47.2	42.8	44.9	47.2	45.5

[a] *Agriculture expenditure includes fisheries and related projects.*
Source: National accounts.

On agriculture, public expenditure is channeled through on- and off-budget funds. While national accounts capture donor-financed funds channeled through budget support, exclusion of the off-

budget funding can significantly underestimate government spending in agriculture. Table 9 summarizes off-budget expenditure on agriculture between 2005 and 2007. Data on the off-budget expenditure are obtained from the database of the Official Development Assistance to Mozambique (ODAMOZ).

Table 9. Off-budget and government expenditure, 2003-2000.

Year	2005	2006	2007	Average
Off-budget expenditure (million MZN)	1,906	1,444	1,180	1,510
Public expenditure on agriculture (million MZN)	3,579	3,586	3,842	3,669
Off-budget as share of public expenditure on agriculture (%)	53.3	40.3	30.7	41.4
Off-budget as share of total government expenditure (%)	4.8	3.1	2.0	3.1

Source: National accounts, ODAMOZ.

The ODAMOZ database was initiated in 2007 in an attempt to collect information on development support channeled through development partners, international and national NGOs, and UN agencies. However, organizations and institutions providing development assistance are not obliged to report to ODAMOZ. As a result, the ODAMOZ database does not capture all off-budget expenditure for agriculture.

Table 9 indicates that a considerable amount of expenditure on agriculture is channeled through off-budget items supported by development partners, international and national NGOs, and UN agencies. Between 2005 and 2007, on average, off-budget expenditure on agriculture expressed as percentage shares of public expenditure[1] on agriculture and total government expenditure were 41% and 3%, respectively. During the same period, the share of total on- and off-budget expenditure on agriculture accounted for by off-budget funds was, on average, 29% per year.

Between 2005 and 2007, expenditure on agriculture channeled through off-budget funds averaged MZN1.5 billion, which is equivalent to 41% of public expenditure on agriculture. To avoid double counting because some development partners provide some support through the treasury and the remainder through the off-budget, our analysis of the trends of public expenditure on agriculture does not include off-budget funds collected from the ODAMOZ database despite the significant magnitude of the off-budget funding reported to ODAMOZ.

Table 10 presents trends in total government expenditure and public expenditure on agriculture between 2001 and 2007. The actual spending on agriculture in real terms has been trending upward with an average of MZN2.1 billion per year between 2001 and 2007. It increased from MZN516.5 million in 2001 to MZN2.8 billion in 2007.

[1] Public expenditure on agriculture includes on-budget funds and donor-supported projects channelled through line ministries but not captured by national accounts.

Table 10. Total government expenditure and trends of expenditure on agriculture (million MZN).

Year	Total expenditure	Expenditure on agriculture[a]	Real total expenditure (2003 = 100)	Real expenditure on agriculture (2003 = 100)	Expenditure on agriculture as % of total expenditure	Expenditure on agriculture as share (%) of agricultural GDP
2001	23,944	457	27,076	516	1.9	2.7
2002	28,466	1,698	29,821	1,779	6.0	6.7
2003	29,213	1,635	29,213	1,635	5.6	5.8
2004	30,745	2,507	28,607	2,333	8.2	7.9
2005	39,987	3,579	34,204	3,061	8.9	9.6
2006	47,210	3,586	36,940	2,806	7.6	7.8
2007	59,476	3,842	43,314	2,798	6.5	7.1
Average	37,006	2,472	32,739	2,133	6.4	6.8

[a]*Agriculture expenditure includes fisheries and related projects.*
Source: National accounts.

Between 2001 and 2007, expenditure on agriculture accounted for a small share of total public expenditure, averaging about 6% per year. Over the same period, expenditure on agriculture as a proportion of agricultural GDP averaged 6.8% per year. If we consider only the period 2003 to 2007, the average share per year of total public expenditure accounted for by agriculture and the expenditure on agriculture as a proportion of agricultural GDP rose to 7.4 and 7.6%, respectively. We note from Table 10 that, in 2005, a year of poor agricultural performance due to drought, the expenditure on agriculture as a percentage of total expenditure and also as a percentage of agricultural GDP increased substantially and declined in subsequent years. It is likely that the large increased expenditure is a response to the emergency caused by the drought.

Compliance with Maputo Declaration

A number of consultations have been made to put in place a tracking system for expenditure on agriculture in AU member countries to monitor compliance with the Maputo Declaration. As a result of these consultations, a consultative workshop took place in Johannesburg, South Africa, on September 12-13, 2005. Based on discussions and decisions of this workshop, a technical guidance note was prepared by AU with the assistance of a hired consultant. The technical guidance note recommended the following:

> ***"Actual expenditures (not budgets) are subject of the expenditure tracking system.*** *Original budget numbers submitted to Parliaments and after they are approved (appropriations) in most countries are subject to change because of nonpayment of some of approved budgets due to revenue constraints or additional payments approved by supplementary budgets. Moreover, due to sharp fluctuations between originally budgeted expenditures and actual expenditures in the externally financed operations, the actual expenditures (not appropriations or original budgets) will be subject to this tracking system both in the context of agriculture sector and total government expenditures. In short, governments' actual expenditures are more representative than governments' original budgets for any type of policy analysis, which can only be*

captured through government accounting records and reports. In this way, more realistic, unified, and reliable figures will be prepared and analyzed."

Based on the AU technical guidance note, Table 10 indicates that expenditure on agriculture as a share of total government expenditure is consistently below the target of 10%, varying from 6% in 2003 to 9% in 2005. Between 2003 and 2007, the average proportion of total government expenditure accounted for by agriculture was 7%. The share of expenditure on agriculture in total government expenditure had a slight upward trend, increasing from 6% in 2003 to 9% in 2005, which declined to 7% in 2007. These values show that Mozambique's spending on agriculture is still less than 10% of total government expenditure as recommended by the Maputo Declaration.

Expenditure on Agriculture by Subsectors

Table **11** shows the trends of expenditure by subsectors over the 2001-2007 period, and illustrates that public expenditure on the crops, livestock and forestry subsector increased substantially from MZN432.7 million in 2001 to MZN3.2 billion in 2007. During the same period, public spending on fisheries also experienced an increasing trend, growing from MZN24 million in 2001 to MZN655.9 million in 2007. Spending on agriculture on crops accounted for more than 82% per year of the total spending on agriculture between 2001 and 2007.

Table 11. Trends of expenditures on agriculture by subsector (million MZN).

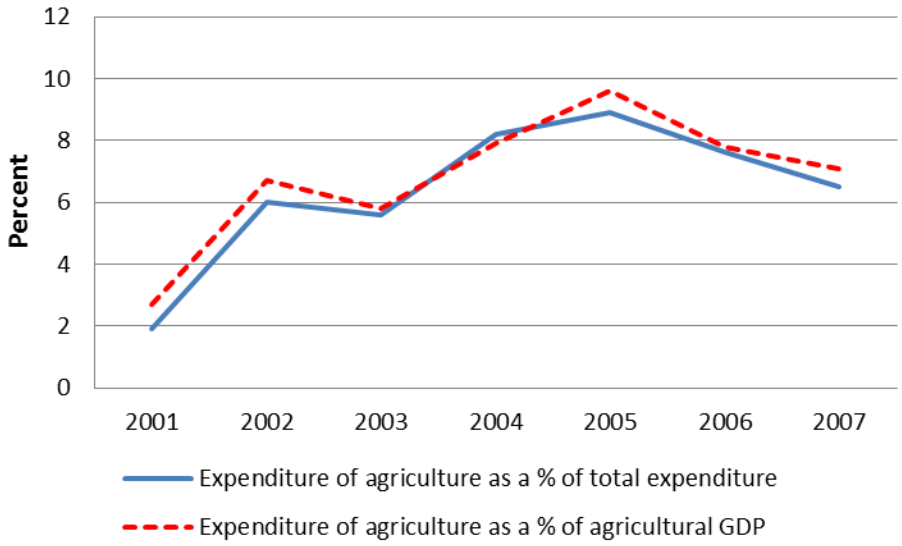
	Expenditures on agriculture			% of expenditure on agriculture in crops, livestock and forestry	Expenditure on crops, livestock and forestry as share (%) of agricultural GDP	Expenditure on fisheries as share (%) of agricultural GDP
Year	Crop, livestock and forestry	Fisheries	Total			
2001	433	24	457	94.7	3.0	0.2
2002	1,569	130	1,698	92.4	11.4	0.9
2003	1,550	85	1,635	94.8	9.2	0.5
2004	2,057	451	2,507	82.0	8.1	1.8
2005	3,217	361	3,579	89.9	11.4	1.3
2006	3,032	554	3,586	84.5	9.5	1.7
2007	3,186	656	3,842	82.9	8.6	1.8
Average	2,149	323	2,472	88.8	8.8	1.2

Source: National accounts.

Over the same period, expenditure on crops as a proportion of agricultural GDP has also fluctuated, ranging between 3% in 2001 and 11% in 2005. On the other hand, a consistent upward trend in expenditure on fisheries as a share of agricultural GDP has been observed during the 7-year period, increasing from 0.2% to 2%. On average, Mozambique spent MZN9 on crops and MZN1 on fisheries for every MZN100 of agricultural GDP over the period 2001-2007.

Intensity of Government Spending on Agriculture

The share of expenditure on agriculture in total public expenditure provides some indication of the attention that governments give to the agriculture sector, but it does not adequately capture how the amount of resources spent on the sector measures up against the size of the sector in the economy. Spending 10% of government expenditure on agriculture may be appropriate in a country where agriculture makes up 10% of the economy, but it is likely to be insufficient in a country where agriculture accounts for 60% of the economy (Mogues et al. 2008). Expenditure on agriculture as a share of agricultural GDP measures government spending relative to the size of the sector in the economy. This measure has been used to evaluate the adequacy of spending on agriculture relative to its size. This indicator is plotted in Figure 5.



Source: National accounts and INE.
Figure 5. Expenditure on agriculture as a share of total expenditure and agricultural GDP.

Over the period under analysis, the share of expenditure on agriculture in total government spending and the expenditure on agriculture as a percentage of agricultural GDP followed similar trends with slight differences in magnitude. For most years, spending on agriculture as a percentage of agricultural GDP is greater than the share of expenditure on agriculture in total government expenditure.

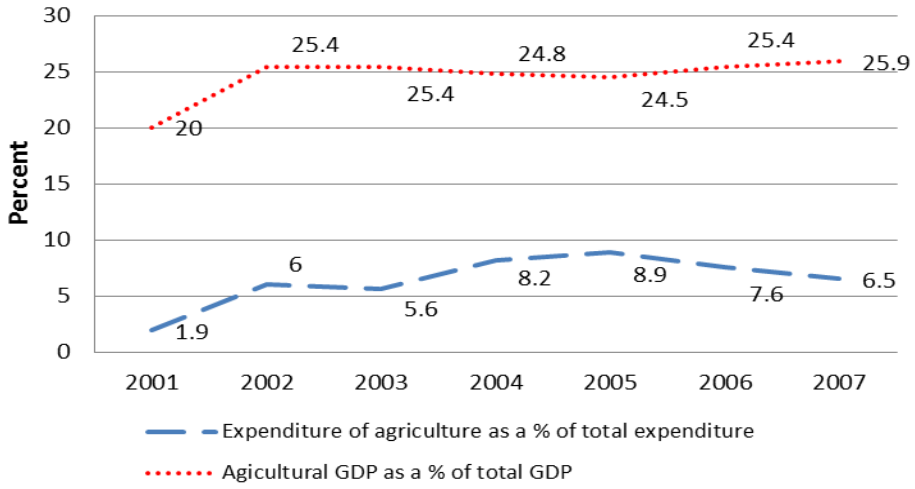
Between 2001 and 2005, the level of expenditure on agriculture relative to the size of the sector moved upwards, changing from 2% in 2001 to 9% in 2005. Then it experienced a slight downward trend, falling to 7% in 2007. Over the past 7 years, expenditure on agriculture relative to agricultural GDP averaged 7%. Table 12 shows that Mozambique's spending on agriculture relative to agricultural GDP (7%) is low, compared with Latin American (12%) and Asian (11%) averages. Although it is comparable with the African average (7%), expenditure on agriculture as a percentage of agricultural GDP is higher in Mozambique than in a number of other African countries including Malawi (6%), Kenya (4%) and Uganda (4%). However, as mentioned earlier, agricultural productivity and the use of improved agricultural inputs are considerably lower in Mozambique than in these countries.

Table 12. Intensity of expenditure on agriculture in developing countries, 2002.

	Expenditure on agriculture as a % of total expenditure	Expenditure on agriculture as a % of agricultural GDP
Africa	4.5	6.7
Mozambique	6.0	6.7
Malawi	5.2	5.9
Zambia	5.9	7.7
Kenya	4.6	4.0
Uganda	4.2	4.2
Ethiopia	4.7	5.5
Cameroon	1.6	0.8
Togo	2.0	1.4
Mali	9.1	8.1
Latin America	2.5	11.6
Asia	8.6	10.6

Source: Fan et al. 2008.

The share of agricultural GDP in total GDP and the share of total public expenditure going to agriculture provide us with further insights into the patterns of expenditure on agriculture. Figure 6 illustrates that total public expenditure and GDP shares of agriculture have followed different trends with different magnitudes between 2001 and 2007. The share of total spending going to the agriculture sector is less than the economic contribution of the sector. Notwithstanding this, agriculture accounts for, on average, one-quarter of total GDP, and public expenditure on agriculture is accounted for, on average, at about 6% of total government expenditure between 2001 and 2007.



Source: National accounts and INE.
Figure 6. Expenditure on agriculture as a share of total expenditure and agriculture GDP as a share of total GDP.

Budget Execution on Agriculture

The deviation between budgeted and released funds can be used as a measure of budget predictability. Due to unavailability of data on released funds, we are unable to capture budget predictability in the agriculture sector by assessing deviations between released funds and budget allocation. Instead, we assess budget execution capacity as the difference between allocated funds and actual spending. However, the results should be interpreted with caution given that several factors could result in the discrepancy between budgetary allocation and actual expenditure. These factors include, among other things, late disbursement of funds by donors, late release of funds as a result of delays in accounting for previous released funds by the implementing agencies, readjustments in budget allocation after the announcement of approved allocations, and shortfalls in government revenue collection.

Table 13 shows that between 2001 and 2007 actual expenditure on agriculture fell below the budget allocated to the sector in 4 out of 7 years. The shortfall could be attributed to four factors. First, frequently donors do not keep their promises made at the time of initial budget allocation, resulting in delays and shortfalls in disbursement of funds supported by them. Second, government tax collections usually fall short of projections at the time of initial budget allocation. Third, actual spending channeled through externally supported funds is underreported. National accounts do not record some donor-supported expenditure although their contribution to initial budget allocation is documented in national accounts. Fourth, low capacity to spend released funds could also be driving this low budget performance.

Table 13. Expenditure on, and budget for, agriculture (million MZN).

Year	Nominal allocation	Nominal expenditure	Real allocation (2003 = 100)	Real expenditure (2003 = 100)	Expenditure (%)
2001	1,055	457	1,192	516	43.3
2002	1,537	1,698	1,610	1,779	110.5
2003	3,106	1,635	3,106	1,635	52.6

2004	3,532	2,507	3,287	2,333	71.0
2005	2,956	3,579	2,528	3,061	121.1
2006	3,643	3,586	2,851	2,806	98.4
2007	6,669	3,842	4,857	2,798	57.6
Average	3,214	2,472	2,776	2,133	79.2

Source: National accounts.

On two occasions (2002 and 2005), actual spending on agriculture exceeded the budget allocated to the sector. This could be due to two factors. First, supplementary funds introduced by the government and development partners in 2002 could have resulted in a higher amount of released funds than allocated funds, leading to higher expenditure than budgetary allocation. The supplementary funds were disbursed to minimize the severe effects of flooding that hit the country in 2000 and 2001. Second, budget reallocation made by the Ministry of Finance after the approval of the budget by the Parliament could also have led to additional funds disbursed to the agriculture sector. This could, in turn, result in higher actual spending compared with the budget allocated by the Parliament.

Table 14 summarizes budget execution rates by subsector between 2001 and 2007. It can be seen that budget execution rates in the crops, livestock, and forestry subsector fluctuated a lot from year to year, varying between 55% in 2003 and 137% in 2002. The average execution rate in the crops subsector was 92% between 2001 and 2007. Actual expenditure on the crops subsector was well below funds budgeted for this subsector in 4 out of 7 years, but above in the remaining 3 years.

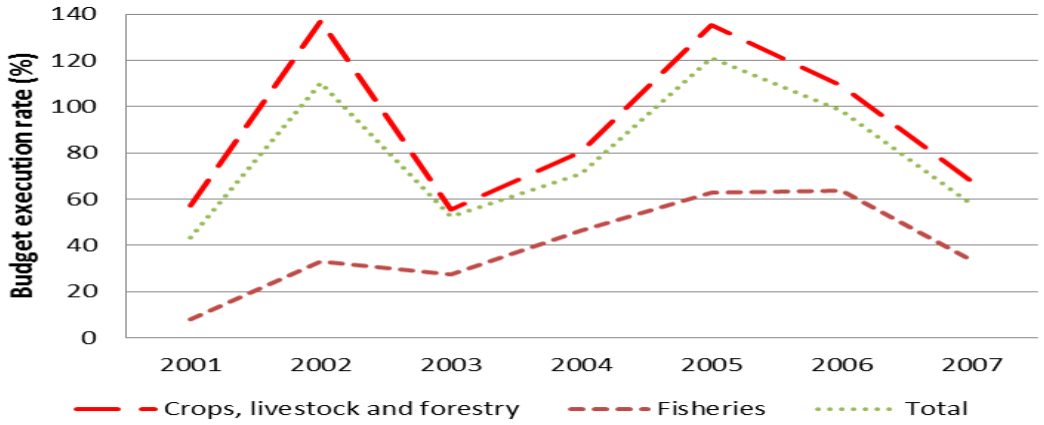
Table 14. Budget execution rates by subsector.

	Crops, livestock and forestry			Fisheries		
Year	Allocation (million MZN)	Expenditure (million MZN)	Expenditure (%)	Allocation (million MZN)	Expenditure (million MZN)	Expenditure (%)
2001	755	433	57.3	299.25	24.06	8.0
2002	1,145	1,569	137.0	391.24	129.59	33.1
2003	2,796	1,550	55.4	309.69	84.68	27.3
2004	2,559	2,057	80.4	973.13	450.90	46.3
2005	2,380	3,217	135.2	575.61	361.27	62.8
2006	2,776	3,032	109.2	867.24	554.49	63.9
2007	4,718	3,186	67.5	1,951.49	655.82	33.6
Average	2,447	2,149	91.7	766.81	322.97	39.3

Source: National accounts.

Between 2001 and 2007, actual expenditure on the fisheries subsector was well below funds budgeted to this subsector. Over the 7-year period, the downward deviation of actual spending on this subsector from the allocated budget was more than 36%, implying that at least 64% of the allocated funds were never spent. Our findings seem to indicate that the proportion of the

allocated budget that is actually spent is significantly higher in the crops subsector than in the fisheries subsector (Table 14 and Figure 7).

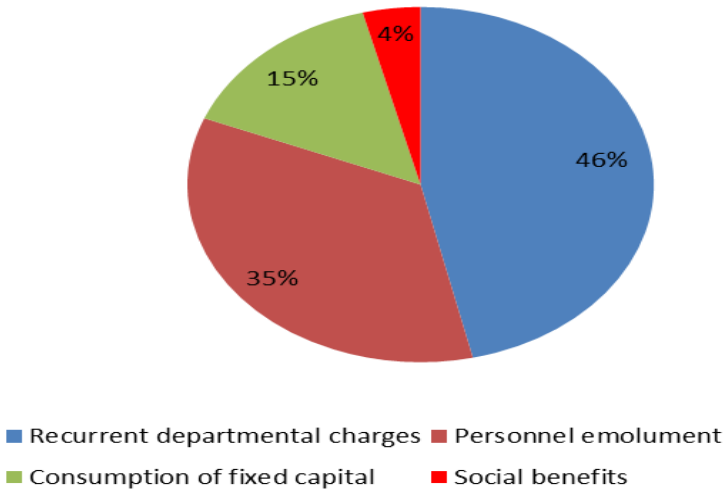


Source: MINAG.
Figure 7. Budget execution rates by subsector.

Composition of Public Expenditure on Agriculture

The composition of expenditure on agriculture matters as much as the amount actually spent on the sector. Investments in different functions of the government can lead to very different outcomes. G.

Figure 8 shows the average share of each major component of actual spending on the agriculture sector over the period 2005 and 2007. In terms of composition by major components, during these years, the largest share of expenditure on agriculture was on recurrent departmental charges accounting for 46% of the expenditure, followed by personnel emoluments with 35%.



Source: MINAG.
Figure 8. Average share of expenditure on agriculture by economic classification, 2005 –2007.

Between 2001 and 2007, expenditure on recurrent departmental charges in real values increased from MZN217 million in 2001 to MZN661 million in 2007. During the same period, expenditure on personnel emoluments in 2003 real terms consistently trended upward, increasing from MZN277 million in 2001 to MZN452 million in 2007. This considerable increase in expenditure on personnel emoluments could be a result of either increases in the public agricultural work force or increases in real wages and benefits. The source of this substantial growth is not clear (Table 15).

Table 15 and G.

Figure 8 indicate that consumption of fixed capital has been the third most important component of actual spending in the agriculture sector, accounting for an average of, 15% of expenditure on agriculture between 2005 and 2007. Between 2001 and 2007, spending on consumption of fixed capital in real terms ranged from MZN97 million in 2005 to MZN256 million in 2002.

Table 15. Composition of expenditure on agriculture by economic classification in real terms (million MZN, 2003=100).

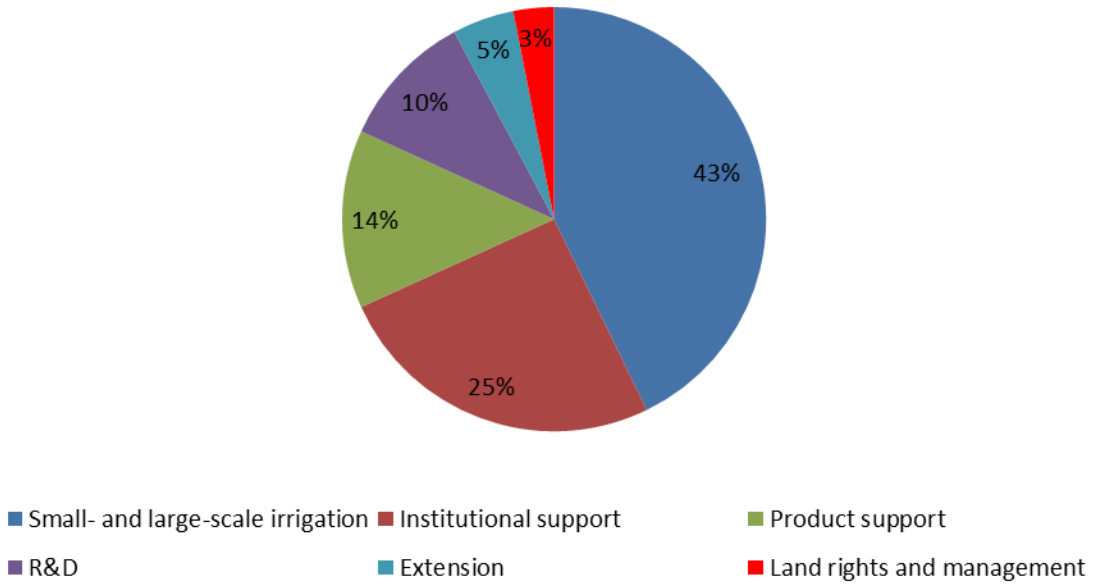
Year	Personnel emoluments	Recurrent departmental charges	Consumption of fixed capital	Social benefits	Total
2001	227.44	217.01	127.37	13.35	585.16
2002	292.86	320.49	255.81	11.79	880.95
2003	355.05	505.34	253.48	19.32	1,133.19
2004	391.96	422.82	146.96	26.16	987.90
2005	370.65	451.00	96.77	43.13	961.55
2006	407.22	553.71	234.08	52.87	1,247.87
2007	451.63	660.68	218.60	45.21	1,376.13
Average	356.69	447.29	190.44	30.26	1,024.68

Source: MINAG.

Trends of Expenditure by Functions of the Government

The functional breakdown of expenditure presented here is only partial because of lack of data. We focus on six functions of the government: small- and large-scale irrigation, institutional support, extension, R&D, production support and land rights, and management. The results are summarized in Figure 9 and Table 16.

Figure 9 shows that between 2005 and 2007 irrigation and institutional support, on average, accounted for 43% and 25%, respectively, of public spending on the six core functions. The high percentage of expenditure on irrigation is a result of large expenditure for the rehabilitation of the Massingir Dam and Chokwe irrigation schemes and not necessarily an indication of sustained large investment on irrigation. Table 16 shows that spending on irrigation grew significantly from MZN58 million in 2001 to MZN1 billion in 2005. However, in 2007, this consistent upward trend not only halted but declined to MZN459 million.



Source: MINAG.
Figure 9. Share of core functions of the government in expenditure on agriculture, 2005-2007.

Spending on institutional support makes up 25% of spending on agricultural investment. Table 16 shows that spending on institutional support has seen an upward trend, increasing from MZN115 million in 2001 to MZN402 million in 2007. On average, the GoM spent MZN348 million per year on institutional support between 2001 and 2007. This increasing trend in expenditure on institutional support can be explained in part by the emphasis given to development of institutions in the agriculture sector by the GoM. The large expenditure on institutional support reflects the priority given to this area by PROAGRI I. In fact, an external evaluation of PROAGRI I in 2002 criticized PROAGRI I for giving too much weight to institutional development (planning and financial management systems) and less emphasis on ensuring that this improved institutional capacity was used to effectively improve service delivery.

Table 16. Expenditure on agriculture by core functions of the government (million MZN).

Core function	2001	2002	2003	2004	2005	2006	2007
Extension	39.95	88.00	56.87	65.62	91.46	56.79	64.64
R&D	33.22	75.48	57.99	116.80	142.46	140.75	179.96
Production support	27.60	67.57	75.19	77.51	118.48	183.87	293.97
Land rights and management	32.91	51.66	41.88	32.12	29.57	63.75	39.66
Small- and large-scale irrigation	58.41	322.39	300.01	477.15	1,045.54	487.99	459.01
Institutional support	115.35	294.00	563.11	339.41	300.40	419.22	401.82
Average	51.24	149.85	182.51	184.77	287.99	225.39	239.85

Sources: MINAG, Ministry of Fishery, DNPDR, GPZ.

Support to agricultural production is the third most important function of the government. This function accounted for an average of 14% of investment spending on agriculture between 2005 and 2007. With an average of MZN121 million per year, spending on production support has consistently moved upward over the last 7 years, having recorded an increase from MZN27 million in 2001 to MZN494 million in 2007.

Production support includes, among other things, the provision of subsidized agricultural inputs such as seeds and fertilizers to smallholder farmers. This provision could be wasteful if its returns are less than its costs. As Haggblade (2007) contends, provision of subsidized agricultural inputs can generate very low returns due mainly to rent-seeking and crowding out of private investment.

Agricultural research and extension accounted for an average of 10% and 5%, respectively, of spending on the six functions between 2005 and 2007. As seen from Table 16, expenditure on research increased substantially beginning in 2004 when IIAM was created; and it maintained an upward trend except in 2007 when there was a slight decline. Spending on extension, apart from being low, has been very erratic. Given the important role of agricultural technology in the transformation of the agriculture sector, and the priority it is given in PARPA II, the green revolution strategy and PAPA, the next section will provide more detailed treatment on technology development and transfer.

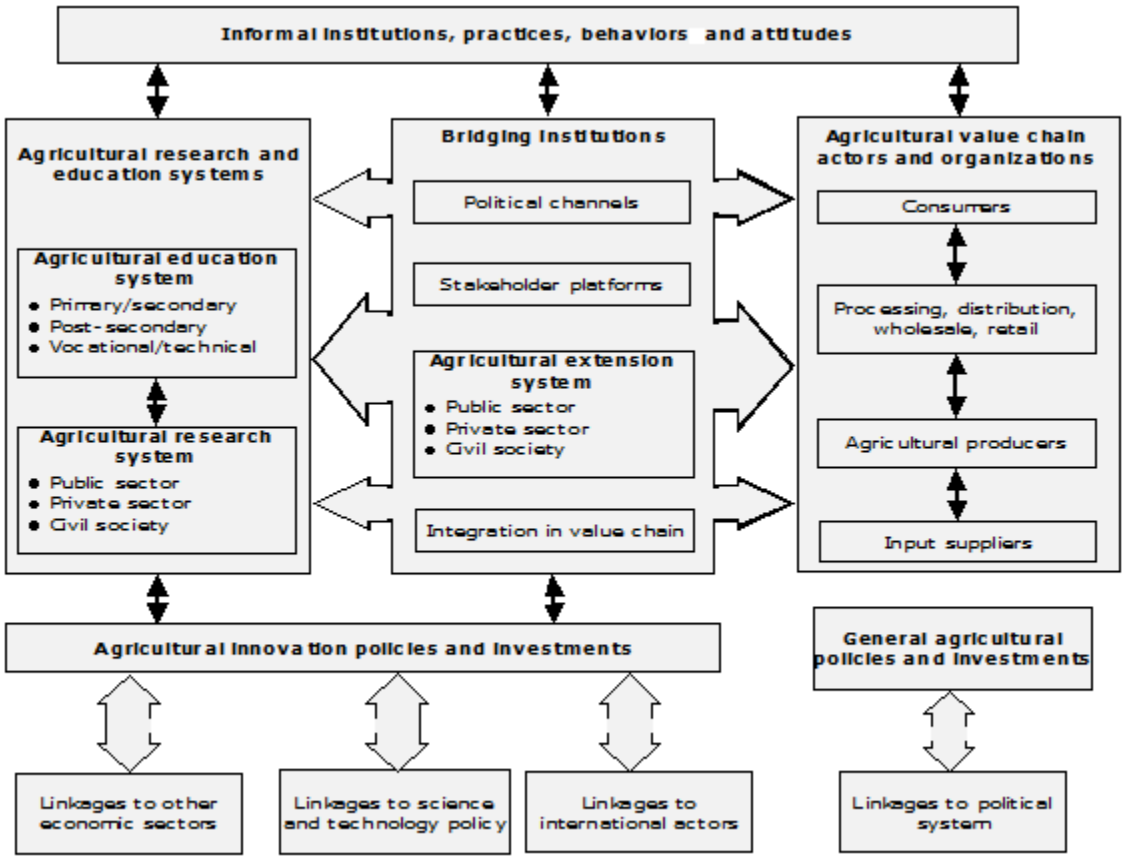
Technology Development and Transfer

Stimulation of rapid and sustainable economic growth, poverty and hunger reduction as well as promotion of structural transformation requires productivity gains in agriculture. Improving agricultural productivity requires the availability and access of new and improved technologies. The effectiveness of agricultural research in influencing productivity gains is dependent on having a well-functioning agricultural innovation system. Apart from R&D organizations, a national agricultural innovation system includes input and output markets, well-functioning infrastructure, financial services, extension services, an enabling environment (policies and institutions) and industry. The framework of the agricultural innovation system is presented in Figure 10. As this framework suggests, gains in agricultural productivity will not be fully realized unless the organizations, services, and institutions complementing agricultural research are put in place and function efficiently.

Spending on agricultural R&D generally has high rates of return, making expenditure on agricultural R&D a cost-effective way for governments to accelerate gains in agricultural productivity. Government's investments in agricultural R&D yield high returns not only to the agriculture sector but also to the non-agriculture sectors including the food industry and consumers as agricultural productivity gains usually lead to increased food supply and lower commodity prices.

Recognizing that investments in R&D yield high returns per dollar spent, NEPAD's Framework for African Agricultural Productivity (FAAP) recommends a doubling of current levels of expenditure on agricultural R&D to enable African countries to achieve an annual growth rate in the agriculture sector of at least 6% by 2015. While increasing the level of expenditure in agricultural R&D is a necessary condition to increasing the supply of productivity-enhancing

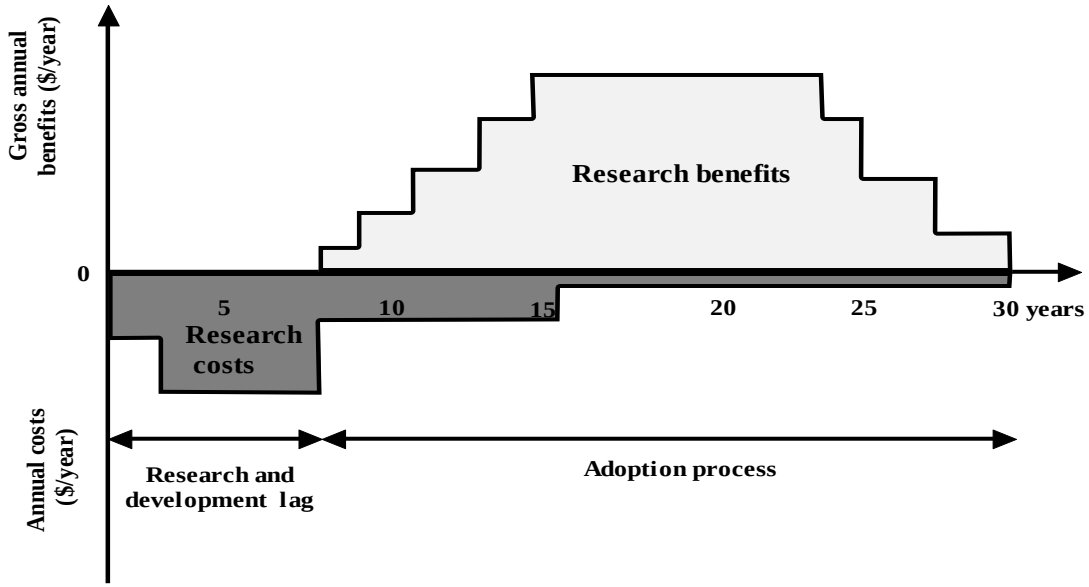
technologies, it is not sufficient. Improving the efficiency of agricultural R&D through better management and planning is equally important.



Source: Spielman and Birner 2008.

Figure 10. Agricultural innovation system: A conceptual framework.

It is worthwhile noting that flow of benefits from agricultural research is normally realized several years after the initial investment on R&D is made due to time lags between R&D, adoption of the research results and complete realization of research benefits. The typical pattern of a successful research program is illustrated in Figure 11. A successful research program normally includes the following stages: R&D of new technology, dissemination and adoption of the research results and realization of its benefits. As Figure 11 shows, spending on agricultural R&D is made without benefits during the gestation; development lag and adoption lag periods. The duration of each one of these periods depends on the nature of the research.



***Source*: Alston et al. 2000.**

Figure 11. Flow of research costs and benefits over time.

The gestation or research lag period can last 3 to 5 years if not longer depending on the nature of the technology being researched. If the research is successful, the new research product has to be developed to make it available to other players in the national agricultural innovation system depicted in Figure 10. This process can result in further delays, leading to development lag periods of several years. After the new research product is fully developed, it has to be transferred to the end users. This stage, known as the adoption lag period, can also last several years. Extension services can play a key role in shortening the adoption lag period so that the research benefits are realized earlier. It takes about 7 years for a new technology to begin to be adopted and about further 8 years (from year 7 to year 15) to be fully adopted (Alston et al. 2000).

Figure 11 also shows that the benefits of the new technology become positive approximately 7 years after the initial investment on R&D. They are maximized about 15 years after the initial investment. Several years after the maximization of its benefits, the new technology becomes obsolete either because it loses its effectiveness or because it is replaced by more productive technologies. This obsolescence leads to a decline in the flow of research benefits.

International research spillovers should also be taken into consideration. Empirical evidence suggests that international spillovers account for a considerable share of the gains in agricultural productivity growth and research benefits. For instance, Maredia and Raitzer (2006) reported that in the late 1990s, the overall estimated adoption of CGIAR-related varieties across major food crops[2] was about 11% of the total planted area, which is equivalent to 50% of the area documented for all improved varieties in SSA. However, the impacts of international spillovers on both agricultural productivity growth and research benefits are difficult to measure although

[2] Major food crops included in their estimation are maize, sorghum, wheat, bean, cassava, millet, potato, rice and groundnut.

these spillovers can substantially influence national distribution of resources for agricultural R&D. Evidence also suggests that spillovers from livestock research are generally greater than those from crops research as livestock production is less constrained by agroecological factors including soils and climate.

The GoM recognizes the pivotal role of agricultural research in promoting economic growth and poverty reduction through its contribution to increased agricultural productivity. In order to harness the agricultural research potential, it is necessary that adequate public expenditure is realized, complemented with improvements in all aspects of management and planning aimed at increasing the efficiency of the national agricultural innovation system. In an effort to increase the efficiency of the public agricultural research resources directed to poverty alleviation, institutional reform was initiated in 2004 when IIAM was created through the fusion of the former National Institute of Agronomic Research (INIA), the Institute of Animal Production (IPA), the Institute of Veterinary Research (INIVE), Forestry Experimental Center (CEF) and the Center for Agricultural Training (CFA). Zonal Research Centers (ZRC) were also created to decentralize agricultural research and make it more relevant to the problems related to the development of local agriculture.

As indicated earlier, although the GoM has been making efforts to place agriculture at the center of economic growth, agricultural productivity in Mozambique is still low compared with that of other SSA and developing countries. While the relationship between the use of improved technologies and productivity is direct, that between technology generation and productivity is less obvious. This is because research has no direct control over the intermediate steps involved in development, dissemination and adoption of research products made available. In some cases, such as low access and use of improved seeds resulting from lack of effective demand, may end up being the main constraining factor.

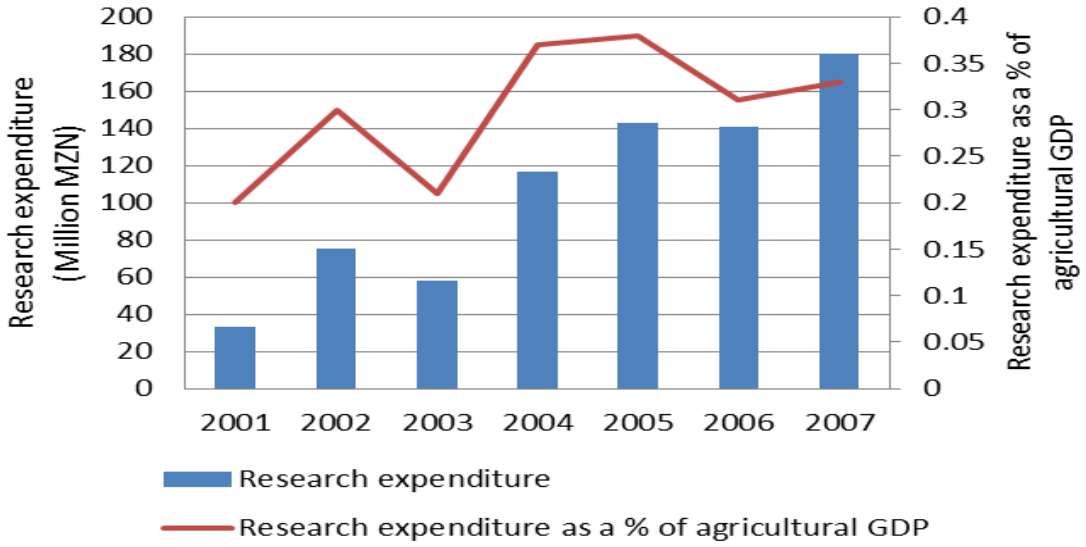
Table 17 shows some of the contributions IIAM has made in recent years in releasing new varieties. IIAM's role in the seed industry is to make basic seeds of improved varieties available to the seed companies. IIAM established a basic seed unit (USEBA) which is charged with the responsibility of producing basic seeds. The capacity to produce basic seed and other technologies partly depends on its human resources and research infrastructure that, in turn, are influenced by the levels of public expenditure on agricultural research.

Table 17. Crop varieties released by IIAM.

Crop	Varieties
Maize	Sussuma, Djandza, Oliga, Hluvukane
Cotton	CA324
Groundnut	Mamane, Nametil, CG 7, JL 24
Millet	Macia, Sima
Bean	IT16, IT18, CAL 143, sugar 131
Soybean	Ocepara 4, 627/5/7
Sesame	Nicaragua
Cassava	Nikwaha, Likonde, Mulaleia
Cashew	4.1AD, 7.10PA, 11.7PA, 5.12PA

Source: IIAM.

We now turn our attention to discussing public expenditure on agricultural research, limiting the analysis to investment expenditure due to lack of data. Figure 12 shows that between 2002 and 2007, total nominal investment expenditure on agricultural research has been trending upward, having increased from MZN90 million in 2002 to MZN180 million in 2007. In real terms, investment expenditure on research did not show any apparent trend between 2002 and 2007, fluctuating between MZN71 million in 2003 and MZN131 million in 2007. Real investment expenditure on research averaged MZN110 million per year between 2002 and 2007.



Source: National accounts and MINAG.
Figure 12. Investment expenditure on agricultural research and its intensity.

In conformity with the FAAP, the IIAM investment plan for 2007-2011 recommends that public expenditure on agricultural research should be at least 2% of the agricultural GDP. The 2% target was proposed by the World Bank in the early 1980s based on investment levels of developed countries at that time. Figure 12 indicates that Mozambique's investment expenditure on agricultural research rose sharply in 2004 and maintained an upward trend except in 2006 when there was a slight decline. The sharp increase in investment expenditure beginning in 2004 coincides with the creation of IIAM and the Zonal Research Centers. Between 2002 and 2007, Mozambique invested, on average, 0.35% of agricultural GDP on agricultural research per year compared with 0.72% for the SSA and 0.53% for developing countries in 2002. Research intensity varies considerably within the SSA countries. Botswana, South Africa, Swaziland, and Zambia all had intensity ratios between 2.2 and 3.7% in the early 1990s.[3]

Alene and Coulibaly (2009) estimated that in SSA, a 1% increase in expenditure on agricultural research would lead to a 0.38% increase in agricultural productivity, 0.95% growth in per capita income and 0.60% reduction in poverty. These high returns assume that investment in research leads to production of profitable technologies that are disseminated and adopted. Table 18

[3] The intensity ratios of agricultural R&D expenditure for the SSA and developing countries were reported by Beintema and Stads (2006).

indicates that increasing total expenditure on agricultural research to, at least, 2% of agricultural GDP would be translated into more than tripling current expenditure levels between 2002 and 2007. This increase in expenditure would require an average additional investment of about MZN612 million per year over the same period.

Table 18. Total expenditure on agricultural research.

Year	Research expenditure (million MZN)	Expenditure needed to meet the 2% target (million MZN)	Additional investment needed (million MZN)
2002	90.91	505.78	414.87
2003	71.23	562.64	491.41
2004	135.03	637.57	502.54
2005	143.90	742.44	598.54
2006	145.79	917.06	771.27
2007	179.90	1,075.55	895.65
Average	127.79	740.17	612.38

National Agricultural Research Organizations (NAROs) in the SSA region implement a considerable number of R&D activities in close collaboration with the CGIAR centers. In fact, the CGIAR system was established in 1971 to mobilize agricultural science and provide financial support to address widespread food security problems in many developing countries.

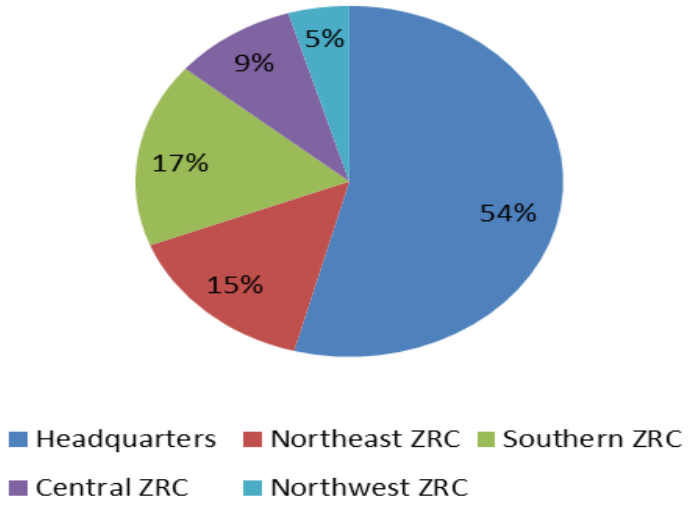
Since its inception, the CGIAR system is estimated to have invested about 40% of its annual total expenditure on various R&D activities in the SSA region. This amounts to US$174 million out of the US$389 million annual total expenditure in the early 2000s (Maredia and Raitzer 2006). The CGIAR centers with offices in Mozambique are ICRISAT, IITA, CIP, ILRI and IIRI. CIMMYT, CIAT and IWMI have been engaged in Mozambique, working with local scientists. Despite this considerable contribution of the CGIAR system to agricultural R&D expenditure in the SSA region, unavailability of data precluded us from including CGIAR expenditure on agricultural R&D into our analysis.

Human Resources

IIAM, the main player in the agricultural public research, has 194 full-time equivalent (FTE) researchers and research assistants of whom only 72 have postgraduate training. This represents an increase of about 60% of the estimated 120 FTE researchers and research assistants in 2006 (Walker et al. 2006). Compared to other NAROs in southern African countries, Mozambique has a relatively high total number of FTE agricultural researchers and research assistants. In 2000, the estimated total number of FTE researchers was 96 in Botswana, 154 in Malawi and 179 in Zambia. However, compared to the NARO in eastern African countries, Mozambique seems to be understaffed in terms of FTE researchers. In 2000, total FTE researchers numbered 822 in Kenya, 524 in Tanzania and 245 in Uganda.

Of the 194 FTE researchers and research assistants working at IIAM, 54% are based at the headquarters located in Maputo, 17% at the southern Zonal Research Center (ZRC), 15% at the northeast ZRC, 9% at the central ZRC, and 5% at the northwest ZRC (Figure 13). Walker et al. (2006) estimated the optimal allocation of research staff to be: northeast ZRC - 40%, central

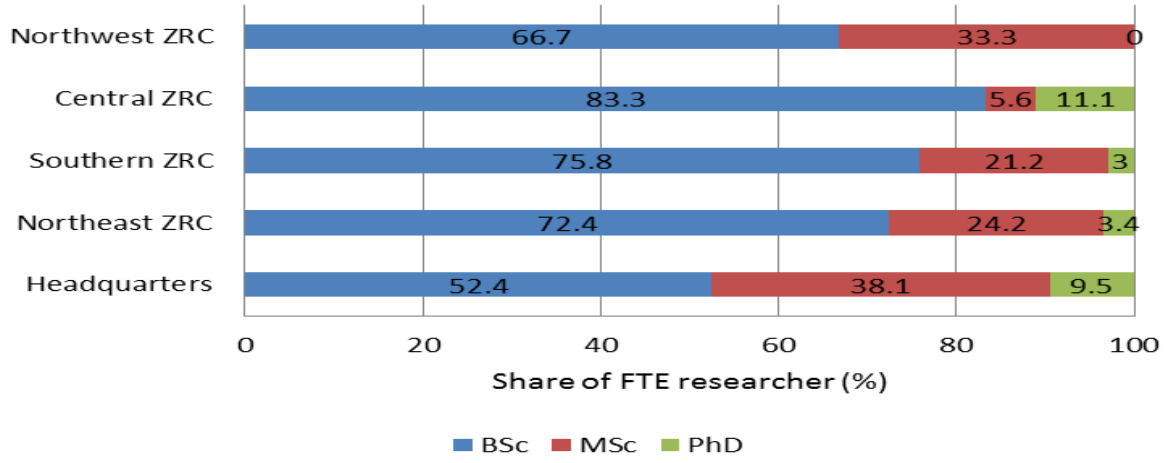
ZRC - 30%, northwest ZRC - 15% and southern ZRC - 15%. The present FTE research staff allocation is: northeast ZRC - 33%, central ZRC - 20%, northwest ZRC - 10%, and southern ZRC - 37%. The concentration of research staff at the headquarters and the southern ZRC is due to availability of better research infrastructure and services compared to the remaining zonal research centers. In order to attract more researchers to the zonal centers more investment in research infrastructure, staff housing, connectivity and social services will be necessary.



Source: IIAM.
Figure 13. Public agricultural research staff.

While Mozambique fares well in terms of FTE research compared to other southern African countries, the same is not true in terms of the level of training. Figure 14 shows that about 30% and 7% of all FTE research staff of Mozambique have completed postgraduate training at MSc and PhD levels, respectively. The share of research staff with MSc or PhD degrees in Mozambique is considerably smaller than the corresponding share of 62% for Botswana, 71% for Zambia, 76% for Malawi, 78% for Tanzania and 85% for Kenya.

The largest share of research staff with PhD or MSc degrees (48%) is observed in IIAM's headquarters. The proportion of FTE researchers holding postgraduate-level degrees varies substantially from one ZRC to another, fluctuating between 33% in the northwest ZRC to 17% in the central ZRC.



Source: IIAM.
Figure 14. Distribution of FTE researchers by degree status.

Expenditure on Research and Alignment with PAPA

In response to the recent crisis on food prices, the GoM designed its PAPA for 2008-2011. The main objectives of PAPA are to eliminate food deficit in the next 3 years and to reduce dependence on food imports by increasing production and productivity for key crops and products. PAPA estimates that additional financial resources are required for different areas of interventions by product, and these are summarized in Table 19, which shows that most financial resources are budgeted for rice (39%), maize (38%), wheat (9%) and chicken (7%). Rice and maize accounted for about 80% of PAPA's annual proposed budget allocation in 2008.

Following Walker et al. 2006 and the IIAM investment plan, the products with the highest potential for poverty reduction are cassava (30%), maize (29%), groundnut (6%), sweet potato (5%) and rice (4%); These percentages do not correspond to ranking in terms of resource allocation under PAPA.

Table 19. Public budget allocation under PAPA (million MZN), 2008.

Item	Budgeted funds	Percentage share
Rice	1,241.55	39.3
Maize	1,199.22	38.0
Wheat	279.73	8.9
Chicken	217.88	6.9
Fisheries	96.03	3.0
Sunflower	69.96	2.2
Irish potato	30.54	1.0
Soybean	20.14	0.6
Cassava	1.65	0.1
Total	3,156.70	100.0

Source: PAPA.

Although cassava is the most important crop in terms of both value of production and potential for poverty reduction, it is given very low priority in terms of percentage share of projected budgetary allocation. Under PAPA budget allocation, the share of budgeted funds accounted for by cassava is far less than 1%.

Table 20 summarizes the PAPA public budget allocation for different areas of interventions and shows that research has been given low priority in terms of the share of total budget allocation. In 2008, public funds allocated to research amounted to MZN30 million, which is equivalent to about 3% of total public funds allocated to different intervention areas. This contribution of research to total public funds is very low compared with contributions of irrigation (36%), extension (20%) and poultry (18%).

Table 20. PAPA public budget for different areas of intervention (million MZN), 2008.

Intervention area	Budgeted funds	Percentage share of total
Irrigation	426.19	36.0
Extension	237.32	20.0
Poultry	217.88	18.4
Seed	193.38	16.3
Animal traction	54.90	4.6
Research	30.34	2.6
Phytosanitary measures	17.08	1.4
Fertilizers	7.12	0.6
Total	1,184.21	100.0

Source: PAPA.

According to Table 21, PAPA proposes that most of the funds allocated to research be spent on rice and Irish potato. These two commodities account for about 87% of the PAPA-projected budgetary allocation for research. Research on cassava accounts for only 1% of total resource allocated to research under PAPA despite the prominent role it plays in terms of value of production and potential for poverty reduction. The low priority given to research by PAPA could be attributed to the fact that PAPA calls basically for increased production of basic seed and direct technology transfer instead of adaptive or comprehensive research.

Table 21. Distribution of funds allocated to research under PAPA, 2008.

	Percentage share of total
Rice	48.4
Irish potato	38.8
Maize	7.7
Wheat	2.1
Sunflower	1.6
Cassava	1.4

Source: PAPA.

Implementation of PAPA places specific demands on IIAM to provide productivity-enhancing technologies including production of basic seeds. Table 22 presents IIAM's estimates of basic seed production for the 2008/09 season and corresponding PAPA targets for certified seeds for the 2009/10 season. Assuming all the basic seed is directed to PAPA, the expected production will meet the target for maize but there will be a deficit for rice, soybean and Irish potato. If the non-PAPA normal growth for improved seed is taken into account, it is likely that there will be a deficit of basic seed for all crops.

Table 22. IIAM production of basic seed production and PAPA targets.

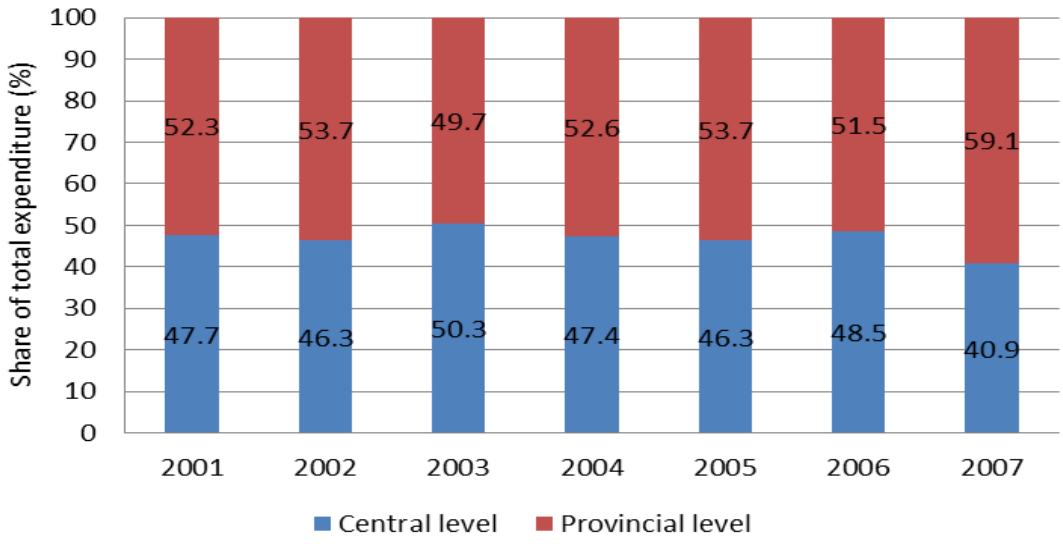
	Maize	Rice	Irish potato	Soybean
Area under basic seed (ha)	80	25	2	18
Potential area under certified seed (ha)	8,000	500	20	300
Estimated certified seed production (tons)	12,000	1,000	200	510
PAPA target for certified seed (tons)	2,000	11,500	5,000	750
Difference between certified seed production and corresponding PAPA target (tons)	10,000	-10,500	-4,800	-240

One of the key mandates of IIAM is to make technologies available in a form that can be used by other agents in the innovation systems such as the extension system and the seed industry. One of the key limitations of IIAM's research visibility is documentation which is critical in technology transfer. In order to improve IIAM's capacity to generate consumable research products, there is a need to strengthen infrastructure and human resources capacity, and research management, particularly in Zonal Research Centers.

Spatial Distribution of Expenditure on Agriculture

This section seeks to shed light on the patterns of public expenditure by province. Prior to 2005, national accounts did not disaggregate data on public spending by province, and at the sector level, only MINAG provides data on spatially disaggregated expenditure. Therefore, the spatial distribution of expenditure on agriculture presented here reflects only MINAG financial records, and excludes spending of funds that reach the provinces from other channels.

Figure 15 shows that the share of MINAG expenditure accounted for by the provinces increased from 50% in 2003 to 59% in 2007. The big jump occurred in 2007 and reflects greater emphasis given to decentralization of power and resources.



Source: MINAG.
Figure 15. Relative contribution of central and provincial spending.

The spatial analysis of spending takes into account the provincial agricultural GDP and the size of rural population. Analysis based on the number of agricultural holdings was identical to that of size of rural population and therefore the results are not presented here. Table 23 shows that the provinces of Zambezia and Nampula are the most populous, accounting for about 43% of the total rural population of the country between 2004 and 2006. Maputo has the smallest share of rural population, accounting for only 3%.

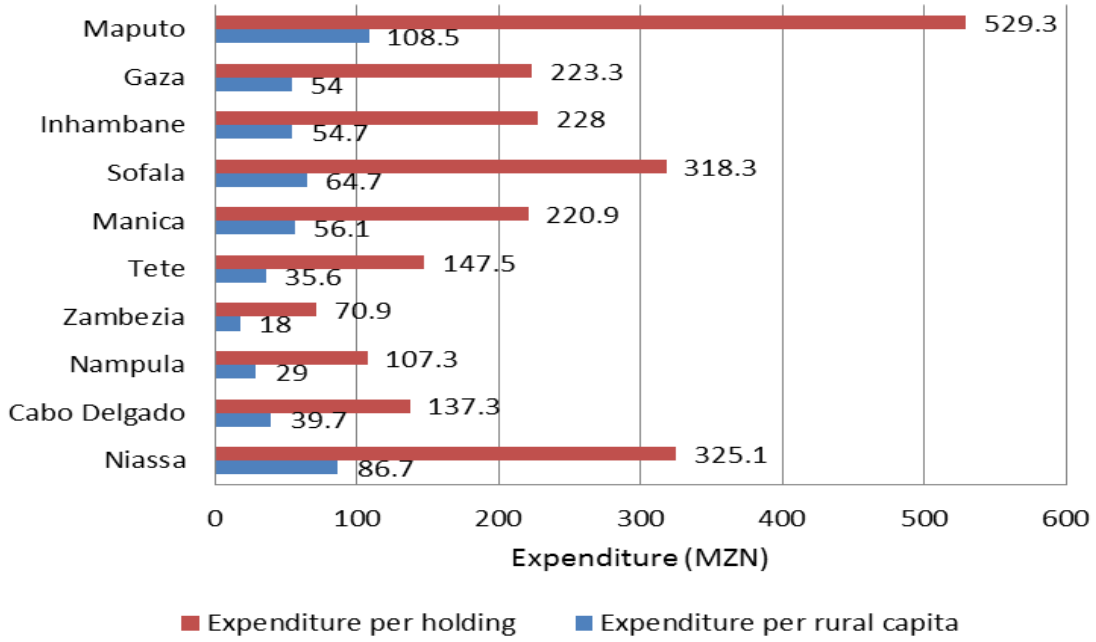
Table 23. Expenditure, GDP and rural population by province, 2004-2006.[a]

	Expenditure (million MZN)	Share of expenditure (%)	GDP (million MZN)	Agricultural GDP (million MZN)	Agricultural GDP share (%)	Rural population	Rural population share (%)
Niassa	62.69	11.1	5,103	1,897	37.3	718,928	5.5
Cabo Delgado	50.13	9.1	7,586	3,404	44.8	1,260,709	9.6
Nampula	77.77	14.0	20,658	7,377	35.7	2,670,281	20.3
Zambezia	54.47	10.0	17,605	9,679	55.0	3,031,893	23.0
Tete	42.99	7.8	9,613	2,071	21.5	1,206,037	9.2
Manica	49.83	9.0	6,994	2,438	34.9	887,187	6.7
Sofala	58.25	10.5	16,976	3,011	17.7	898,812	6.8
Inhambane	61.52	11.1	9,130	3,873	42.3	1,120,690	8.5
Gaza	53.30	9.7	6,880	2,511	36.5	985,380	7.5
Maputo	42.51	7.7	50,768	1,549	3.0	391,490	3.0

Sources: MINAG and INE.
[a] Rural population represents projections based on the results of the Population Census of 1997. These projections are computed using estimates for exponential growth rates at provincial level.

The provinces of Zambezia, Nampula and Inhambane accounted for about 55% of the total agricultural GDP over the period 2004 and 2006, and their relative shares were about 26, 20 and 10%, respectively. Table 23 also shows the relative importance of agriculture in provincial GDP. The provinces with more than 40% of their GDP coming from agriculture are Zambezia (55%), Cabo Delgado (45%) and Inhambane (42%). The Maputo Province has the smallest share of its GDP accounted for by agriculture (3%), where manufacturing is the dominant sector accounting, on average, for 26% of total GDP over the 3-year period. Table 23 also shows how MINAG expenditure is distributed between provinces. From 2004 and 2006, the distribution of average expenditure shares per year ranged from 7.7% for the Maputo Province to 14% for the Nampula Province. The provinces accounting for expenditure shares equal to or above 10% are Nampula (14%), Niassa (11%), Inhambane (11%), Sofala (11%) and Zambezia (10%). The relative expenditure shares can be misleading since they are not adjusted to reflect rural population size or the number of holdings or the size of agricultural GDP.

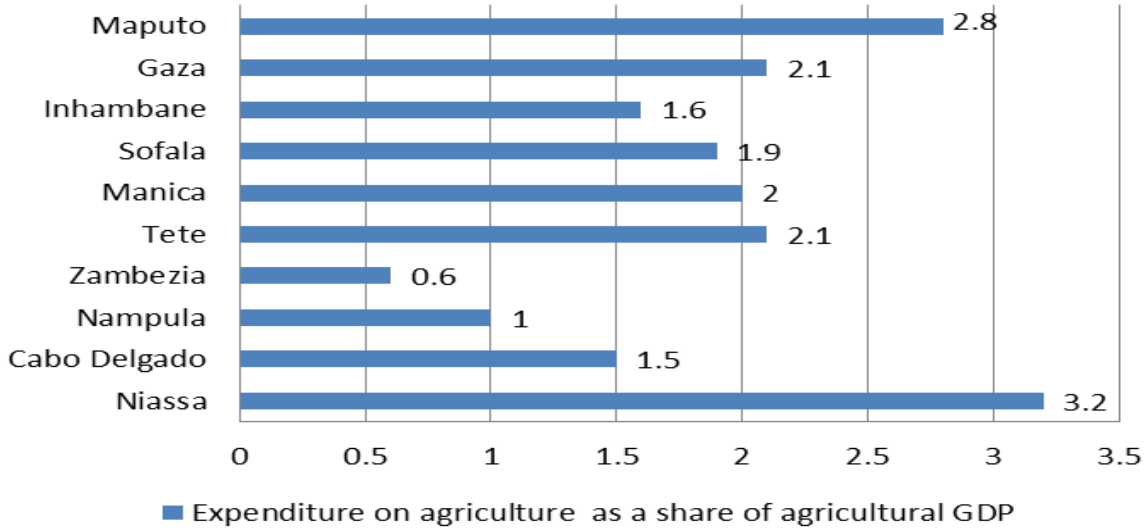
Figure 16 shows the intensity of expenditure in terms of expenditure per rural capita and expenditure per holding.



Source: MINAG.
Figure 16. Intensity of expenditure on agriculture by province, 2004-2006.

These values show that both average spending on agriculture per rural capita and expenditure as a percentage of agricultural GDP are higher in the provinces of Tete, Manica, and Sofala than in the provinces of Cabo Delgado, Nampula and Zambezia despite the fact that the relative importance of the agriculture sector in terms of contribution to GDP is higher in these farther northern provinces (Cabo Delgado, Nampula and Zambezia) than in the central ones (Tete,

Manica and Sofala). For instance, between 2004 and 2006, Sofala Province spent, on average, MZN65 per person living in rural areas and MZN2 on agriculture for every MZN100 of agricultural GDP, while expenditure on agriculture in Zambezia averaged MZN18 per person living in rural areas and MZN0.6 for every MZN100 of agricultural GDP. Nevertheless, the role of the agriculture sector in the economy is much higher in Zambezia (55%) than in Sofala (18%), measured in terms of its contribution to GDP. A similar pattern is observed when expenditure on agriculture per holding is compared across these provinces.



Source: MINAG.
Figure 17. Expenditure on agriculture as share of agricultural GDP by province, 2004-2006.

Furthermore, from 2004 and 2006, average spending on agriculture per rural capita and per unit of agricultural GDP is considerably greater in the provinces of Inhambane and Gaza than in the provinces of Zambezia, Nampula and Cabo Delgado. Between 2004 and 2006, the highest average expenditure on agriculture per rural capita is observed in the Maputo Province, while the highest expenditure as share of agricultural GDP is observed in the Niassa Province. Maputo's average expenditure on agriculture was MZN109 per rural capita, while Niassa spent, on average, MZN3 on agriculture for every MZN100 of agricultural GDP. Figures 16 and 17 seem to indicate that with the exception of Niassa, the farther northern provinces of Cabo Delgado, Nampula and Zambezia have spent disproportionately less on agriculture than the central provinces of Tete, Manica and Sofala and southern provinces of Inhambane and Gaza, measured in per rural capita and units of agricultural GDP terms. Table 23 shows that the role of the agriculture sector in the economy, measured in terms of its contribution to GDP, is greater in the northern and central provinces than in the southern provinces but, on the other hand, Figures 16 and 17 indicate that expenditure on agriculture per unit of agricultural GDP, per rural capita and per holding is lesser in the northern and central provinces than in the southern provinces, with the exception of Niassa. These findings seem to suggest that intensities of expenditure on agriculture in terms of rural population, agricultural GDP and number of holdings are higher in the provinces less dependent on agriculture than in those more dependent on agriculture.

Furthermore, given that the northern and central provinces comprise the agricultural heartland of the country, our findings could also suggest that factors other than contribution of agriculture to GDP and biophysical conditions are driving expenditure patterns at the provincial level. It is worth mentioning that the data on expenditure used in this study are only a partial reflection of provincial expenditure on agriculture and that whether the same pattern would be maintained if complete data were available is not known.

5. Summary and Policy Recommendations

The paper examines trends in public expenditure on agriculture and evaluates the quality of spending in terms of the classification of the functions of the government and spatial allocation. The major questions addressed by the paper are: What is the overall share of the expenditure on agriculture in total public expenditure and what progress has been made in achieving the expenditure target set by the NEPAD's declaration? How does the provision of public goods fare in the overall expenditure? Because of data inconsistencies, the period covered by the study is from 2001 to 2007. National accounts and sector-level data were used for the analysis.

We summarize the main results below:

a) Although Mozambique has made some progress in increasing expenditure on agriculture it is still below 10% of the expenditure target set for 2008 in the Maputo Declaration of 2003. The share of total spending by the agriculture sector showed an upward trend between 2003 and 2006 rising from 5.6% in 2003, reaching a peak of 8.9% in 2005, and declining to 6.5% in 2007. Between 2004 and 2007, the agriculture sector has occupied the fifth position in spending with education, infrastructure, health and good governance in the first, second, third and fourth positions, respectively.

b) The agriculture sector is still heavily dependent on donor-financing. The investment budget which accounts for over 80% of the budget on agriculture, is largely externally funded, and between 2005 and 2007, 70% of the investment budget came from external sources. The high dependency on external financing makes the budget unpredictable because of commitments not honored, low levels of actual disbursement resulting from complex procurement procedures and low capacity to timely account for previously disbursed funds. Between 2001 and 2007 the average budget execution per year was 79% (median 71%) with execution exceeding 100% in 2002 and 2005.

c) Because of lack of disaggregated data, spending by classification of functions of government was limited to six functions: institutional support, small- and large-scale irrigation, land rights and management, production support, R&D and extension. Between 2005 and 2007 irrigation accounted for the largest share of spending among the six functions accounting for 43% of spending. Institutional support and production support accounted for 25% and 14% of spending, respectively. Research and extension accounted for 10% and 5%, respectively, of the expenditure. The high expenditure on irrigation during this period is explained by the large expenditure incurred in the rehabilitation of the Massingir Dam and the Chokwe irrigation scheme; therefore, this high expenditure does not necessarily represent a permanent trend.

d) Investment expenditure on agricultural research increased substantially after the creation of the Institute of Agricultural Research of Mozambique (IIAM) in 2004, but it has remained below 0.4% of the agricultural GDP per year.

e) The resource allocation for the implementation of the Action Plan for Food Production (PAPA) in response to the 2007/08 world food crisis seems not to be based on objective criteria. Cassava which has the highest potential for poverty reduction was budgeted to

receive 0.1% of the PAPA budget for the ten products while wheat which is an insignificant crop whose competitiveness is still highly debatable was allocated 8.9% of the budget, thus occupying the third position. In the distribution of the research budget, crops, rice and Irish potato are allocated more than 80% of the budget.

f) The distribution of provincial spending from MINAG does not show any consistency with rural population size, agricultural GDP and number of holdings.

Policy Implications

The budget allocation and actual spending do not appear consistent with either political pronouncements or priorities defined in the various policy documents and strategies.

a) If technology is to be an engine of growth as envisaged by the green revolution strategy and the strategic plan for the agriculture sector, then the government needs to reevaluate the criteria for resource allocation to improve institutional capacity to generate/adapt and transfer agricultural technologies. Specifically, there is a need for objective criteria to guide public investment allocation between functions of the government.

b) There is need to assess the criteria for spatial distribution of funds to guarantee optimization of growth.

c) There is need for more reflection on how to match resource allocation and products to be promoted. Given the principal goal of poverty alleviation, more resources should be channeled to those products with the highest potential to reduce poverty.

6. References

Alene, A.D.; Coulibaly, O. 2009. The impact of agricultural research on productivity and poverty in sub-Saharan Africa. *Food Policy* 34(2):198-209.

Alston, J.M.; Chan-Kang, C.; Marra, M.C.; Pardey, P.J.; Wyatt, T.J. 2000. *A meta-analysis of rates of return to agricultural R&D: Ex pede Herculem?* Research Report 113. Washington, DC: International Food Policy Research Institute (IFPRI).

Beintema, N.M.; Stads, G.-J. 2006. *Agricultural research and development in sub-Saharan Africa: An era of stagnation.* Background Paper. Washington, DC: Agricultural Science and Technology Indicators (ASTI) Initiative and IFPRI.

Benin, S.; Thurlow, J.; Diao, X.; McCool, C.; Simtowe, F. 2008. Agricultural growth and investment options for poverty reduction in Malawi. IFPRI Discussion Paper 00794. Washington, DC: IFPRI.

David, C.C.; Inocêncio, A.B. 2000. *Key indicators for public expenditure in agriculture, natural resources and the environment.* Discussion Paper Series 2000-26. Makati City: Philippine Institute for Development Studies (PIDS).

Fan, S.; Hazell, P.; Thorat, S. 2000. Government spending, growth and poverty in rural India. *American Journal of Agricultural Economics* 82(4):1038-51.

Fan, S.; Yu, B.; Saurkar, A. 2008. Public spending in developing countries: Trends, composition and changes. In *Public expenditure, growth and poverty in developing countries: Issues, methods and findings,* ed. Fan, S. Baltimore: Johns Hopkins Publications.

Fan, S.; Zhang, X.; Rao, N. 2004. *Public expenditure, growth, and poverty reduction in rural Uganda.* Development Strategy and Governance Division (DSGD) Discussion Paper 4. Washington, DC: IFPRI.

Govereh, J.; Malawo, E.; Jayne, T.S.; Chilonda, P. 2008. *Methodological guidelines for tracking public spending on agriculture with illustrations from Zambia.* Working Paper 5. Colombo: ReSAKSS-SA.

Govereh, J.; Shawa, J.J.; Malawo, E.; Jayne, T.S. 2006. *Raising the productivity of public investment in Zambia's agricultural sector.* Working Paper 20. East Lansing, Michigan: Michigan State University.

Haggblade, S. 2007. *Returns to investment in agriculture.* Policy synthesis. East Lansing: Michigan State University.

Maredia, M.K.; Raitzer, D.A. 2006. *CGIAR and NARS partner research in sub-Saharan Africa: Evidence of impact to date.* Rome, Italy: CGIAR Science Council.

Mogues, T.; Morris, M.; Freinkman, L.; Adubi, A.; Ehui, S. 2008. *Agricultural public spending in Nigeria.* IFPRI Discussion Paper 00789. Washington, DC: IFPRI.

Spielman, D.J.; Birner, R. 2008. *How innovative is your agriculture? Using innovation indicators and benchmarks to strengthen national agricultural innovation systems.* Agriculture and Rural Development Research Paper 41. Washington, DC: The World Bank.

United Nations Food and Agriculture Organization. 2009. Food Security Statistics. http://www.fao.org/faostat/foodsecurity/index en.htm

Walker, T.; Pitoro, R.; Tomo, A.; Sitoe, I.; Salencia, C.; Mahanzule, R.; Donovan, C.; Mazuze, F. 2006. *Priority setting for public-sector agricultural research in Mozambique with the national agricultural survey data.* Research Report 3E. Maputo, Mozambique: Institute for Agricultural Research of Mozambique (IIAM).

World Bank. 2005. *Mozambique country economic memorandum: Sustaining growth and reducing poverty*. Report 32615-MZ. Washington, DC: World Bank.

World Bank. 2007. *World development report 2008: Agriculture for development.* Washington, DC: World Bank.

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Karugia, J., M. Waithaka, A. Freeman, R. Prabhu, B. Shiferaw, S. Gbegbelegbe, S. Massawe, M. Kyotalimye, J. Wanjiku and E. Macharia. "Responding to Food Price Crisis in Eastern and Southern Africa: Policy Options for National and Regional Action." ReSAKSS Working Paper No. 27. 2009.

Govereh, J., Malawo, E., Lungu, T., Jayne, T., Chinyama, K., Chilonda. "Trends and Spatial Distribution of Public Agricultural Spending in Zambia: Implications for Agricultural Productivity Growth." ReSAKSS Working Paper No. 26, Feb 2009

Fan, S.; Johnson, M.; Saurkar, A. and T. Makombe. "Investing in African Agriculture to Halve Poverty by 2015." ReSAKSS Working Paper No. 25. 2009.

Olubode-Awosola, O., P. Chilonda, I. Minde and Y. Bhatt. "Indicators for Monitoring and Evaluation of Agricultural Performance and Shared Goals in Southern Africa." ReSAKSS Working Paper No. 24. 2008.

Legg, C. "A Spatial Analysis of Child Nutrition in West Africa." ReSAKSS Working Paper No. 23. 2008.

Johnson, M.; Birner, R.; Chamberlin, J.; Diao, X.; Fan, S.; Nin-Pratt, A.; Resnick, D.; You, L. and B. Yu. "Regional Strategic Alternatives for Agriculture-led Growth and Poverty Reduction in West Africa." ReSAKSS Working Paper No. 22. 2008.

Diao, X.; Fan, S.; Kanyarukiga, S. and B. Yu. "Agricultural Growth and Investment Options for Poverty Reduction in Rwanda." ReSAKSS Working Paper No. 21. 2008.

Thurlow, J. "Agricultural Growth and Investment Options for Poverty Reduction in Mozambique." ReSAKSS Working Paper No. 20. 2008.