

Mozambique: Desk Study of Extension and Advisory Services

Developing Local Extension Capacity (DLEC) Project
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ACRONYMS

ADRA	Adventist Development and Relief Agency
AET	Agriculture Education and Training
AGRA	Alliance for a Green Revolution in Africa
CARE	CARE International
CAT	Technology Follow-up Committee
CLW	Community Livestock Workers
DANIDA	Danish International Development Agency
DFID	Department for International Development
DFTT	Department of Training and Technology Transfer (Departamento de Formação e Transferência de Tecnologias)
DLEC	Developing Local Extension Capacity
DNEA	National Directorate of Agricultural Extension (Direcção Nacional de Extensão Agrária)
EAS	Extension and Advisory Services
ECA	Empresa de Comercialização Agrícola
ETG	Export Trading Group
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FEWSNET	Famine Early Warning Systems Network
FFS	Farmer Field School
FOSEM	Forum of Extension Services in Mozambique (Fórum de Serviços de Extensão de Moçambique)
FRELIMO	Mozambique Liberation Party (Frente de Libertação de Moçambique)
FRI	Farm Radio International
GDP	Gross Domestic Product
GFRAS	Global Forum for Rural Advisory Services
HICEP	Hidroeléctrica de Chokwe, Empresa Pública

HNI	Human Network International
IAM	Cotton Institute in Mozambique (Instituto de Algodão de Moçambique)
ICT	Information and Communication Technology
IFAD	International Fund for Agriculture Development
IFPRI	International Food Policy Research Institute
IIAM	National Agricultural Research Institute (Instituto de Investigação Agrária de Moçambique)
IITA	International Institute for Tropical Agriculture
IMF	International Monetary Fund
ISPG	Instituto Superior Politécnico de Gaza/ Polytechnic College of Gaza
ISPM	Instituto Superior Politécnico de Manica/ Polytechnic College of Manica
JICA	Japan International Cooperation Agency
MASA	Ministry of Agriculture and Food Security (Ministério da Agricultura e Segurança Alimentar)
MIC	Ministry of Industry and Trade (Ministério de Indústria e Comércio)
MEAS	Modernizing Extension and Advisory Services
MERCADO	Mozambique Expansion of Rural Cattle and Dairy Opportunities
NCBA/CLUSA	National Cooperative Business Association/Credit League of the United States of America
NPK	Nitrogen-Phosphorus-Potassium Mix Fertilizer
OGE	State Budget (Orçamento Geral do Estado)
PAPA	Action Plan to Boost Food Production (Plano de Acção para a Produção de Alimentos)
PEDSA	Strategic Plan for the Development of the Agricultural Sector (Plano Estratégico para o Desenvolvimento do Sector Agrário)
PAEI	Agriculture Policy and Implementation Strategy (Política Agrária e Estratégia de Implementação)
PITTA	Integrated Program for the Transfer of Technology (Programa Integrado de Transferência de Tecnologias)

PNISA	National Investment Plan for the Agricultural Sector (Plano Estratégico de Investimento no Sector Agrário)
POCA	Operational Plan for Agricultural Marketing (Plano Operacional de Comercialização Agrícola)
PODA	Operational Plan for Agricultural Development (Plano Operacional de Desenvolvimento Agrário)
PROAGRI	Agricultural Sector Public Expenditure Program Project (Programa Nacional de Investimento no sector da Agricultura)
PRONEA	National Agricultural Extension Program (Programa Nacional de Extensão Agrária)
PRSP	Poverty Reduction Strategy Plan
PSP	PRONEA Supporting Project (Projecto de Suporte ao PRONEA)
RAMA	Resilient Agriculture Market Activities
RBL	Lower Limpopo Irrigation Scheme (Regadio do Baixo Limpopo)
RENAMO	Mozambican National Resistance (Resistência Nacional de Moçambique)
REPETE	Periodic Review of Technologies (Revisão Periódica de Tecnologias)
SADC	Southern African Development Community (Comunidade de Desenvolvimento da África Austral)
SDAE	Economic Activities District Services (Serviços de Actividades Económicas)
SISNE	National Agricultural Extension System (Sistema Nacional de Extensão Agrária)
SPER	Provincial Extension Services (Serviços Provinciais da Extensão)
SSTP	Scaling Seed Technology Partnership Project
SUE	Unified Extension Services (Serviços Unificados de Extensão)
T&V	Training and Visit
TVM	Television of Mozambique (Televisão de Moçambique)
USAID	United States Agency for International Development

INTRODUCTION

Agriculture contributes more than one fourth of Mozambique’s gross domestic product (GDP) as well as employs 80 percent of the total labor force. Most farmers operate at a subsistence level with chronic food insecurity, due mainly to low productivity. The country also suffers from climate shocks and natural disasters, such as floods, droughts and cyclones. Mozambique does have great potential to eventually become a major food producer in Southern Africa since only 16 percent of the 36 million hectares of land suitable for farming is currently cultivated. Mozambique’s location and access to world markets, with its ocean ports, raises its potential to play a role in regional food security and international markets. These ports are the nearest for neighboring countries to reach international markets with their commodities and products. Also, Mozambique, with the agriculture potential it has, could be a supplier of commodities in the region, but the transformation from a subsistence-agriculture environment to a commercially-oriented system will not be an easy or quick process¹.

The objective of this diagnostic report, written for the Feed the Future Developing Local Extension Capacity (DLEC) project, is to assess Mozambique’s EAS system and to recommend areas for potential investment by government, donors, nongovernmental organizations and the private sector. The DLEC project measurably improves extension programs, policies and services by creating locally-tailored, partnership-based solutions and by mobilizing active communities of practice to advocate for scaling proven approaches. The five-year (2016-2021) project is designed to diagnose, test and share best-fit solutions for agricultural extension systems and services across the Feed the Future countries. Led by Digital Green in partnership with Care International, the International Food Policy Research Institute (IFPRI) and the Global Forum for Rural Advisory Services (GFRAS), DLEC is an action-oriented, evidence-based learning project that generates evidence through diagnostic studies and engagement activities, which in turn are used as a catalyst for mobilizing global and country-level communities of practice to advocate for improved extension and advisory services (EAS). The first stage of DLEC’s work includes conducting diagnostic assessments of local EAS contexts and capacities in Feed the Future and aligned countries.

CONCEPTUAL FRAMEWORK

DLEC uses the adapted best-fit framework (Birner et al., 2009) shown in Figure 1, to guide analyses and to determine EAS areas of focus for on-the-ground activities that are within DLEC’s manageable interests. We use the framework to guide DLEC’s learning agenda because it outlines EAS system parameters and identifies the levers of change within it. In each country, the levers of change will differ. The best-fit framework allows us to analyze a country’s EAS system, begin conversations with local stakeholders to understand the state of their EAS system and where the critical levers for change might be, and analyze and recommend systems change. The framework also enables us to compare across countries and connect country-specific cases to broader learning

¹ <https://www.usaid.gov/mozambique>

on EAS, to advance overall learning and apply this to other donor and government programs and priorities.

The framework identifies characteristics of EAS systems on which policy decisions must be made, and the frame conditions to be considered when making decisions. The frame conditions include: the political economy, the business/market and civil society environments, agroecology and the agricultural innovation system. The framework suggests an impact chain approach to analyze the performance and impact of EAS.

Key for DLEC are the EAS characteristics shown in the framework. Referring to Figure 1 below, the **governance structures and policy environment** variables (box F) refer to institutional set-up of EAS, or the “rules of the game.” The **organizational and management capacities and cultures** variables (box G) refer to capacity for provision of advisory services, and way in which the services are managed within the respective governance structures. These are essentially the “players” of the game, their abilities and the way they play.

Advisory methods (box H) are used by EAS field staff in interactions with farmers. Advisory methods can be classified according to various aspects, such as the number of clientele involved (individuals, groups); the types of decisions on which advice is provided (specific to the production of certain crops or livestock; managerial decisions; group activities, etc.); and media used (radio; internet, etc.).

Market engagement (box I) refers to the market elements that EAS can use to better serve farmers, such as aggregation, finance, price discovery, and input and output markets.

Livelihoods strategies (box J) refers to how EAS develops content to meet the unique needs of clientele and how gender roles impact farming strategies. **Community engagement** (box K) refers to EAS services based on local social institutions, mechanisms to articulate demand and community psychosocial characteristics.

The frame conditions (boxes A-E) are outside DLEC’s manageable interests. The “manageable” outcomes of this framework include the system-level performance areas (box L). The outcomes and ultimate impact at the farm household level (boxes M and N) are outside the core DLEC leader award manageable interests.

Further, the building blocks for EAS are also useful in framing recommendations for engagement. They are as follows:

- ◆ Customer – farmers and their unique needs
- ◆ Content – knowledge being shared
- ◆ Methods – how information and knowledge is shared
- ◆ Provider – who shares information and knowledge

This report also addresses cross-cutting EAS issues, such as women and youth engagement, climate change resilience, food and nutrition security, and use of information and communication technologies (ICTs).

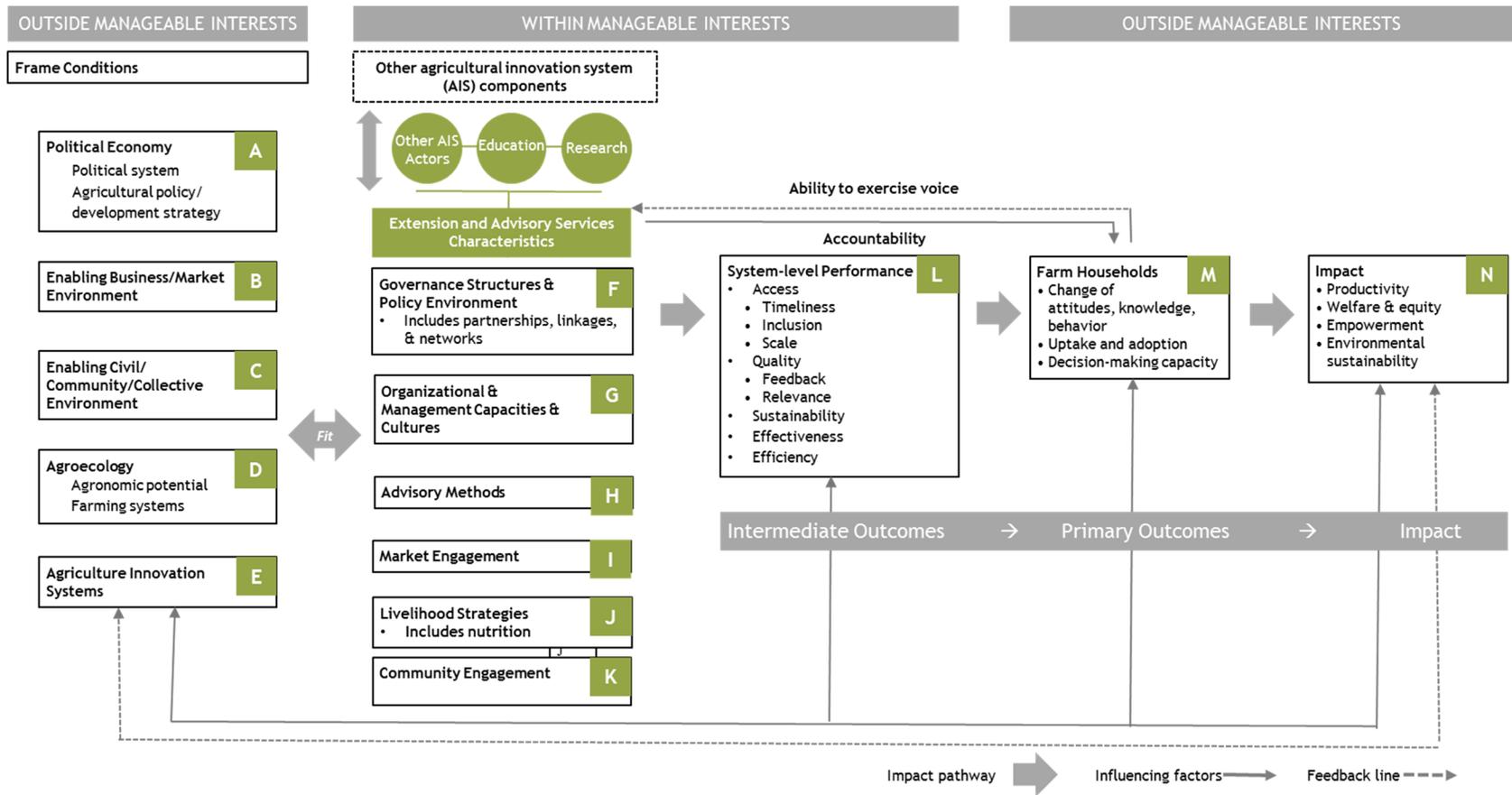


Figure 1. Conceptual Framework for the Study

Source: Adapted from Birner, et al., 2009.

METHODS

This report is based on reviews of existing documentation on EAS in Mozambique as of May 2017 as well as interviews with various role players involved in EAS throughout the country (see Annex 1). The modified DLEC best-fit conceptual framework (Figure 1) structures and focuses the DLEC project and this report. The documentation is from the National Directorate of Extension (DNEA, for its Portuguese acronym) within the Ministry of Agriculture and Food Security as well as various extension studies on Mozambique and developing countries. Several face-to-face interviews were conducted with supervisors of extension officers, DNEA staff and donors (USAID). We also looked at data from the national agricultural surveys to assess trends in the access to extension services and other agricultural indicators. The national agricultural surveys are designed to be representative of the population at the provincial level and agroecological zones. The sample sizes range between 5,000 and 7,000 households. Data from the national agricultural surveys are publicly available² from the Ministry of Agriculture and Food Security.

RESULTS

Frame Conditions

Mozambique became independent from Portugal in 1975 after about a decade of colonial war. The transition of power to Mozambicans was all, but smooth. When the Portuguese left Mozambique after independence, the social and economic status of most of the population was very low. For example, illiteracy rates were extremely high, and there were very few Mozambicans with formal education. This trend, unfortunately, continues today with the average rural household head having only four years of formal education as of 2015. The country made ties with and received a lot of economic and military support from the USSR and Eastern Bloc Countries on condition of becoming a socialist country. The one-party state that resulted because of the assistance from the communist bloc of countries sparked protests within Mozambique, resulting in a civil war that erupted a year after independence that ended with the peace accords signed in 1992.

In the process of peace talks, development aid and support started coming from the West in 1989. Prior to this, only emergency food aid had been provided. In 1987, the World Bank and the International Monetary Fund (IMF) demanded that the country adopt a structural adjustment program to liberalize the economy as a condition of their support. Privatization of previously state-owned companies followed and the economy became more market-oriented.

To address the rural poverty so prevalent following independence, Mozambique implemented two poverty reduction strategies, the first from 2001 to 2005 and the second from 2005 to 2009. Since then, Mozambique has drafted and implemented various other agricultural strategy documents, each building on previous ones, such as *Revolução Verde* (Green Revolution), Strategic Plan for the Development of the Agricultural Sector (PEDSA, for its Portuguese acronym), National Plan for Investment in Agricultural Sector (PNISA, for its Portuguese acronym), Operational Plan for

² Data can be obtained from the Directorate of Planning and International Cooperation through a formal request to the director.

Agricultural Development (PODA, for its Portuguese acronym) and Operational Plan for Agricultural Marketing (POCA, for its Portuguese acronym), just to name a few. These poverty reduction strategies were implemented with the idea that the macro-economic reforms changing a controlled economy to a market-based one would lead to economic growth that would trickle down to the poor and lift them out of poverty. Mozambique has enjoyed solid economic growth since these strategies have been adopted, but how successful these strategies have been for those in rural areas is open for debate.

Unfortunately, after more than two decades of peace, the country has fallen back to armed conflict, and this has had a significantly negative effect on the economy since 2013. Traffic on the main highway, Estrada Nacional #1, linking Maputo to the rest of the country, and a few other highways were only passable twice a day with escorts provide by the army. Also, during this resurgence of violence, many schools were closed and households displaced, especially in the central provinces of Sofala, Manica, Tete and Zambézia, thus having an impact on economic activities in these areas. In April 2017, the country's ruling party Mozambique Liberation Party (FRELIMO, for its Portuguese acronym) and Mozambican National Resistance (RENAMO, for its Portuguese acronym) agreed to uphold a peace accord indefinitely, so all armed conflict has ceased, thus allowing for the return to normal economic activities and life that was there before the return of armed conflict in 2013. But there are no guarantees that this peace will last and the possibility continues to exist of REMANO taking up arms again.

An additional predicament is that a total of USD \$2 billion of debt was hidden from the donor community and the public in general, and was discovered in April 2016 when the government admitted this to the IMF. This action is not only illegal, but has led to donors cutting development funds until the results of an independent audit, that was completed in April 2017, are disclosed. At present the Ministry of Agriculture and Food Security, and many other government institutions are negatively affected by this hidden debt, and as a result have reduced their development activities. This discovery has also led to the Mozambican currency, the meticais, being devalued by 45 percent since the start of this crisis, leading to rampant inflation.

The World Bank overview for Mozambique³ said this about the country's economic outlook:

There has been a rapid deterioration of the economy following the revelation of previous undisclosed borrowing. Mozambique's GDP growth rate dropped to 3.3 percent in 2016, down from 6.6 percent in 2015. The World Bank's growth forecast for 2017 has been revised downwards from 5.2 percent to 4.8 percent to factor in the effects of likely fuel shortages and the continued effects of restrictive monetary policy. Official figures highlight a substantial slowdown in growth for most sectors. Foreign direct investment declined by 20 percent indicating a decline in confidence in the economy. Tight monetary policy and high prices also contributed to growth deceleration. The fiscal deficit has fallen from 6.4 percent of GDP in 2015 to 4.7 percent in 2016 on a cash basis, but this masks the accumulation of significant arrears to private creditors and fuel suppliers.

³ <http://www.worldbank.org/en/country/mozambique/overview>

Even in the context of the economic turmoil of recent years caused by civil strife and poor financial management, there is evidence that the pattern of public expenditure in the country concerning agriculture could be improved to help promote rapid growth in agricultural productivity. Mogues and do Rosário (2016) argue that evidence on geographical targeting of agricultural public funds corresponds more closely with theories suggesting that resources are used to sway communities opposed to the ruling party. Rural per capita public expenditures are particularly low in Nampula and Zambézia, two provinces of high agricultural potential that support the ruling party. Between 2004 and 2006 Sofala province, which opposes the ruling party, spent 65 meticais per rural inhabitant whereas Zambézia spent just 18 meticais per rural inhabitant. This is even though agriculture plays a much more important role in the economy of Zambézia (share of agriculture in the GDP is 55 percent) than in Sofala (just 18 percent) (Zavale et al. 2009).

Because of the problems cited above, the fiscal position is likely to remain under stress until the end of the decade. The startup of liquid natural gas mega projects leased to the private sector will not yield significant fiscal revenues before the large external debt obligations fall due. Some respite to government finances might come in the form of mega-project linked capital gains tax revenues, but amounts and prospects are uncertain. Hence, reforms aimed at deep fiscal consolidation will be required and remain a priority for the Government of Mozambique in the medium term.

For 10 years starting in 2004, Mozambique experienced economic growth of over seven percent per year, but this had only a moderate impact on poverty reduction, with little impact on the rural areas. The socioeconomic status of the population and particularly, rural dwellers, is also very low. The 2015 Human Development Index put it near the bottom of the ranking (180 out of 188 countries and territories). The adult literacy rate is only 56 percent, and average life expectancy at birth is 50.3 years.

Mozambique faces other challenges, such as increasing malnutrition and stunting. Malaria remains the most common cause of death, responsible for 35 percent of child mortality and 29 percent for the general population. HIV prevalence among adults shows a downward trend, stabilizing at a relatively high rate of 11.5 percent. The social progress index for access to improved sources of water and sanitation ranks Mozambique 128th and 119th, respectively, out of 135 countries. Indeed, Mozambique has one of the lowest levels of water consumption in the world despite being endowed with a variety of water sources. As a response to such challenges, the Mozambican authorities have considered the social sectors as top priorities and funding has been increasing for those sectors in general as a proportion of the budget.

Mozambique's economy is predominantly dependent on rain-fed agriculture. More than 80 percent of the population is engaged in agricultural activities, even in urban areas, and the agriculture sector represents about a quarter of the GDP. Mozambique has about 2,700 km of coastal line on the Indian Ocean. Being a member of Southern Africa Development Community (SADC) and, given its coastal location, Mozambique has a key role to play in terms of communications and transportation in the region. Landlocked countries such as Zambia, Zimbabwe and Malawi rely heavily on Mozambique for oil and fertilizers that are imported through the Beira and Nacala ports. Such reliance of imports through Mozambique to landlocked countries is not new, and this was exploited by the Portuguese.

During the colonial era, the Portuguese built many roads, but almost all of them were meant to facilitate international trade by connecting the ports to not only domestic production, but also to facilitate trade to and from adjoining countries. This layout poses challenges to the country as the most fertile soils are in the center and in the north but they are not well connected to the south where climate is drier. As a result, the southern provinces end up relying on food imports from South Africa. The irony is that many of the foods the southern provinces import are produced in the center and north of Mozambique, which end up getting exported to Malawi and Zambia. There is a lot of cross-border trade with Malawi and Zambia in addition to South Africa.

The north and south of the country are connected mainly by road, the Estrada Nacional #1, which only recently became fully functional with the construction of the bridge in Caia completed in 2009. When there is political instability, this main road is closed and the only available road connection between the south and the rest of the country is lost. In addition, it is often the case that the connection is lost due to floods.

Agroecology of Mozambique

Mozambique can be broadly divided into three regions: south, center and north (Figure 2).

Mozambique has 11 provinces (Maputo City is considered a province) which then are broken down into 150 districts. These districts are further broken down by 405 administrative posts.



Figure 2. Map of Mozambique

Source: Government of Mozambique (2003)

The southern provinces (Maputo, Gaza, and Inhambane) receive relatively less rainfall than the rest of the country. Households in the south raise more cattle than in the other regions: in 2015 about 26 percent of small and medium-sized farmers in Gaza raised cattle compared with a national average of six percent.

The central provinces receive relatively more rainfall than the southern provinces. Administratively the Central region includes four provinces (Manica, Sofala, Tete and Zambézia), although many scholars consider Zambézia to be part of the Northern provinces due to its economic and cultural ties to Nampula province in the north. The Zambezi River, the third longest river in Africa, cuts through Tete, Sofala and Zambézia provinces. North of the Zambezi River we rarely find cattle in the smallholder farming sector, which has been linked to the presence of tsetse flies in the region. However, a recent study suggests that, in addition to disease pressure, other factors, such as cultural barriers and availability of good quality pasture (known as sweetveld), also play a key role in explaining the absence of cattle farming in the northern provinces (Cunguara et al., 2016).

In addition to Nampula, the northern provinces also include Niassa and Cabo Delgado provinces. Northern provinces also receive good rainfall throughout the agricultural season that is from November to April. The northern provinces also include the high-altitude areas of Gurue, Ribaue, Alto Molocue, Malema, Molumbo and Milange. This part of the country is arguably one of the most productive and dynamic agricultural areas in the country. The four provinces in the Feed the Future Zone of Influence are Manica, Tete and Zambézia in the central provinces and Nampula in the north.

The National Agricultural Research Center (IIAM, for its Portuguese acronym) has done some mapping of the agroecological zones in the country. There are two classifications: the first divides the country into 10 agroecological zones, while the other uses 15 zones. The former is the most frequently used classification. There is also a clear distinction between coastal and interior districts. For example, cashew and groundnut production are concentrated in coastal areas, while soybeans are restricted to high altitude areas in the interior. Maize and cassava are the two most important staple crops throughout the country, and in some districts in Nampula and Zambézia cassava has become a cash crop for beer brewing.

In 2014, Famine Early Warning Systems Network (FEWSNET) combined IIAM's zonation with livelihood patterns in the country, resulting in 26 livelihood zones, which are defined as a geographic area in which households obtain their basic survival needs (food and cash income) in similar ways. Annex 2 provides a map of Mozambique showing the 26 livelihood zones.

Agricultural policies and strategies

Mozambique has experienced significant policy changes in the last five decades. The country had 26 years of almost continuous war (first in the War of Liberation against Portugal (1964–1974) and then, after independence in 1975, civil war (1976–1992) between the FRELIMO Government and the RENAMO rebels). These conflicts have shaped the country's development path. The civil war claimed more than a million lives and displaced more than three million people, a fifth of the population (Cunguara et al., 2012). However, one thing that did not change was the government's key development goal, which has been poverty reduction and agricultural growth.

The Agricultural Policy and Implementation Strategy (PAEI, for its Portuguese acronym) of 1995 was the first policy document in agriculture, adopted two decades after the independence. PAEI aimed to contribute to rural development through the promotion of food security, sustainable economic growth, reduction of unemployment and absolute poverty. The strategy was guided by four pillars: i) sustainable use of natural resources; ii) growth in agricultural production and productivity, with emphasis on agricultural research and extension; iii) institutional reform and development; and iv) human development. While PAEI considered many key development aspects, little importance was given to agricultural marketing.

In 2000 the Ministry of Industry and Trade (MIC, for its Portuguese acronym), launched the Agricultural Marketing Strategy (2002-2004), and a similar strategy for the subsequent period up to 2009. Both marketing strategies were drafted by MIC, without strong implementation of the proposed activities and weak collaboration with the Ministry of Agriculture. As a result, the marketing strategy did not have the desired effect of stimulating market participation.

Four years later after the implementation of PAEI, another agricultural development program was launched in 1999. The USAID-funded Agricultural Sector Public Expenditure Program Project (PROAGRI, for its Portuguese acronym) envisaged improving the access by smallholder farmers to the necessary inputs and tools to reduce food insecurity and poverty. PROAGRI also foresaw improving smallholder farmers' access to agricultural services and finance, and build capacity within the Ministry of Agriculture in order to improve efficiency and efficacy of their staff. Such emphasis on making agricultural institutions more efficient came at the cost of direct support to smallholder farmers. PROAGRI's intervention was unbalanced between making institutions right and smallholder farmers' support. The other weakness of PROAGRI was also its blind focus on agricultural production without interventions on markets, credit, rural infrastructure and agro-processing.

In 2001, the Government of Mozambique adopted the Poverty Reduction Strategy Plan (PRSP) for the period up to 2005. PRSP was not necessarily an agricultural development strategy, but a national strategy to reduce poverty. One of the weaknesses of PRSP was its lack of recognition of the regional differences (south, center and north) in terms of climate, soils and infrastructure, just to name a few. PRSP was an ambitious national plan, with the same set of activities being implemented in each region despite the regional differences.

The end of PRSP's implementation period coincided with the beginning of PROAGRI II, which intended to reduce the main challenges faced by its predecessor. The vertical nature of PROAGRI interventions meant that many intervention plans were not rooted on the demand to solve specific issues faced by smallholder farmers. In turn, PROAGRI II focused more on decentralization of some of the roles of the Ministry of Agriculture using a results-based approach. Given the lack of a clear strategy in PROAGRI II to support smallholder farmers, access to agricultural services declined considerably (for example, access to extension services and receipt of market price information); the use of improved agricultural technologies also declined.

In 2006, the Government of Mozambique launched PRSP II. Similarly, to its predecessor, PRSP II focused on economic growth as means of reducing poverty incidence and sought to reduce poverty incidence from 54 percent in 2002/2003 to 45 percent by 2009. The program was not successful; official poverty estimates for 2009 indicate that poverty incidence has risen to 55 percent. This rise led the Government of Mozambique to launch a Green Revolution Strategy, Rural Development Strategy, and the Investment Fund for Local Initiatives to address these problems.

Early in 2008 food prices skyrocketed, which resulted in food riots. As a result, the Government of Mozambique launched the Action Plan to Boost Food Production (PAPA, for its Portuguese acronym). PAPA included input subsidies in five provinces, reaching about 20,000 smallholder farmers out of a total of about four million.

In 2011, the Government of Mozambique launched PESDA, the most comprehensive strategy in the agricultural sector to date. This strategy serves as an umbrella of previous development strategies, such as the Green Revolution Strategy, Irrigation Strategy, PAPA, Research Strategy, Reforestation Strategy, Action Plan and Food Security and Nutrition Strategy, just to name a few.

Other country policies focused on agricultural development include:

- ◆ National Strategy of Adaptation and Mitigation of Climate Change/Estratégia Nacional de Adaptação e Mitigação de Mudanças Climáticas
- ◆ PNISA
- ◆ POCA
- ◆ PODA
- ◆ Action Plan for Aquaculture Development/ Plano de Acção para Desenvolvimento da Aquacultura

The Agricultural Innovation System

The Mozambican agricultural innovation system consists of several public research institutes, agricultural education institutions, donor organizations and international research and development institutes, and the public, private and civil society sector advisory services. Farmer organizations appear to play a limited role within the system.

The main domestic agricultural research institutions include:

- ◆ IIAM
- ◆ Instituto de Algodão de Moçambique/ Cotton Institute of Mozambique (IAM, for its Portuguese acronym)
- ◆ Eduardo Mondlane University
- ◆ UniLúrio University
- ◆ UniZambeze University
- ◆ Catholic University
- ◆ A Politécnica – Observatório do Meio Rural/ Rural Areas Observatory
- ◆ Instituto de Investigação Pesqueira/ Fisheries Research Institute
- ◆ Instituto Superior Politécnico de Gaza/ Polytechnic College of Gaza (ISPG, for its Portuguese acronym)
- ◆ Instituto Superior Politécnico de Manica/ Polytechnic College of Manica (ISPM, for its Portuguese acronym)
- ◆ Chobela Research Center
- ◆ Agricultural technical institutes throughout the country

IIAM employs most of the agricultural researchers and focuses on crops, livestock, forestry, and natural resources (Flaherty and Nhamusso, 2014). Five higher education agencies also conduct agricultural research, including three faculties at Eduardo Mondlane University, the Polytechnic University of Manica and Polytechnic University of Gaza. Research conducted by the nonprofit and private-for-profit sectors in Mozambique is minimal (Flaherty and Nhamusso, 2014). The main funding sources for agricultural research are the Government of Mozambique and donor agencies.

The Eduardo Mondlane University, ISPG, ISPM, Catholic University, and UniLúrio and UniZambeze universities are the main public universities providing higher education in agricultural-related degrees. Eduardo Mondlane has many M.Sc. programs and a few Ph.D. programs. Eduardo Mondlane even has an international M.Sc. program on agricultural economics, with students from

many African countries. Catholic University and Universidade Pedagógica also offer master's degrees. Agriculture schools such as the Instituto Agrário de Chimoio or Instituto Agrário de Boane give degrees, which are equivalent to a high school diploma. Some graduates from such schools are recruited as extension staff.

Many donor organizations, international research centers (e.g., the CGIAR consortium members), international NGOs and universities also work on agricultural projects. Those projects related to extension are detailed below.

Having set the frame conditions, we now move on to talk in detail about the extension and advisory services system of Mozambique.

Extension and Advisory Services System

Governance Structures and Policy Environment

Extension in Mozambique has been guided by a series of master plans and programs. The first Extension Master Plan (1999-2004) was formulated to enhance research-extension linkages, downward accountability to farmers on services delivered, multiple extension service delivery systems, social inclusion and quality staff at different levels. The Ministry of Agriculture's Extension Master Plan (2007) called for a twofold approach: the adoption of Unified Extension Services (SUE, for its Portuguese acronym) encompassing crop production, livestock and natural resource management, in which all agricultural services operated through a single extension officer contacting farmers in a particular area of operation. The plan also envisioned the development of an integrated National Agricultural Extension System (SISNE, for its Portuguese acronym), with functional partnerships between public and private extension services, including the development of public contracts with non-government service providers. Moreover, the plan also calls for increased linkages with other institutions, such as research, agricultural services and marketing institutions; and mentioned the possibility for cost recovery from farmers served by public extension services.

Unfortunately, this has not come to fruition. Based on interviews with extension supervisors, the SUE and SISNE programs are not very functional. There are no incentives for cooperation among providers, so the government, private sector and NGOs are not integrating their resources and programs, but continue just implementing their own programs rather than trying to work together. The concept was a good one, but the implementation was not successful.

Following an extensive consultation and backed up by the formulation of the vision for the agricultural sector, the first extension master plan was reviewed and a new extension master plan was drafted, focusing more on: the implementation of different extension approaches in support of the decentralization process; improved efficiency and increased multi-service provider coverage through the out-sourcing of some extension services. The second master plan (2007-2016) is in line with the formulated National Agricultural Extension Program (PRONEA, for its Portuguese acronym) both in terms of vision, strategic objectives and timeframe, and it was developed with support from the International Fund for Agricultural Development (IFAD) (Republic of Mozambique, 2007).

The Extension Master Plan provides the strategy of the Ministry of Agriculture for agricultural extension for the period 2007-2016. The base documents for the current extension master plan have been further based on the positive and negative lessons learned during the implementation of the

Extension Master Plan 1999-2004 and indeed the lessons learned during the implementation of PROAGRI I, such as the generally recognized need for a paradigm shift on agricultural extension in the country due to recent developments such as decentralization, participatory planning, monitoring and evaluation and the widespread introduction of multi-stakeholder approaches in agricultural innovation systems and value chain developments.

As the current Extension Master Plan has expired, a new Extension Master Plan 2018-2027 is being drafted. The government is also updating its overall ICT Strategy, but it is not known when this will be completed.

Major EAS Providers

The main actors in extension in Mozambique are public, private and NGOs, and they tend to be complementary to each other, as explained below, while not necessarily coordinating. According to the Extension Masterplan 2007-2016, the public extension service focus is on smallholder agricultural production with an emphasis on improving food security and nutrition as well as transforming the mainly subsistence characteristics of smallholder farming into a more market-oriented production system. Private sector tends to focus on specific crops, usually cash crops, and NGOs on both small and medium-sized farming households.

Public Sector

The national public extension system in Mozambique was established in 1987, but it did not become operational until the peace agreement was reached in 1992 (Gemo et al., 2016). Within the Ministry of Agriculture and Food Security, the National Directorate of Agricultural Extension has been responsible for implementing PRONEA since 2007, which is in essence the operationalization of the extension master plan for the period 2007-2017. PRONEA is implemented under the PRONEA Supporting Project (PSP).

Public extension in Mozambique is guided by three main government objectives:

- ◆ to improve the capacity of the Ministry of Agriculture and Food Security to implement extension programs within a pluralistic and participatory framework;
- ◆ increase the technical and managerial capacity of farmers in the planning, monitoring and evaluation process, and in-service provision; and
- ◆ provide extension services at provincial and district levels for the promotion of agricultural productivity growth and sustainable use of resources.

The main objective of PSP is to contribute to poverty reduction and improved livelihoods, especially among subsistence farmers and female-headed households, through improved access to extension services, and promoting and strengthening farmers' associations with a value chain approach. This is accomplished through three key activities:

- ◆ Supporting and strengthening of both public and non-public (NGO/private sector) extension services in terms of planning and implementation of agricultural extension activities.

- ◆ Promoting and training of farmers’ associations to increase their participation in the planning process and implementation of agricultural extension programs at the local level.
- ◆ Training farmers’ groups and associations to transform and make them more profitable enterprises playing a key role in basic service provision to support the production and marketing in rural areas.

The main sources for funding public extension services are from the State Budget (OGE, for its Portuguese acronym), Austria, IFAD and PSP/Project Management Unit. There were other donors in the past, but as of 2017 they are no longer supporting extension due to the donors pulling back because of the government’s hidden debt. The Annual Agricultural Activity Plan provides budget shares and contributions from each of the sources, but this document has not been made available.

The organigram of the government extension system at the National Level is shown in Figure 3. The dotted lines suggest a weak link and not direct supervision. Also, the Deputy Director has never been appointed.

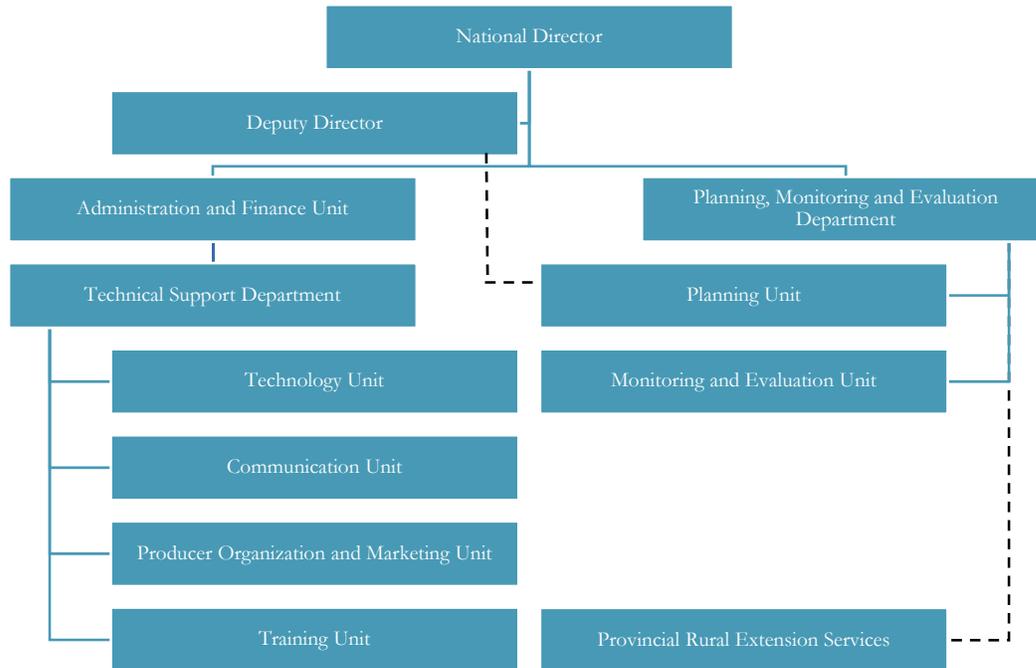


Figure 3. The Extension Organizational Structure at the National Level

Note: Dotted lines indicates that higher-level unit does not directly supervise the lower-level one

Source: DNEA (2015)

The interaction with farmers takes place at the provincial and district levels. The organigram for both is shown in Figures 4 and 5.

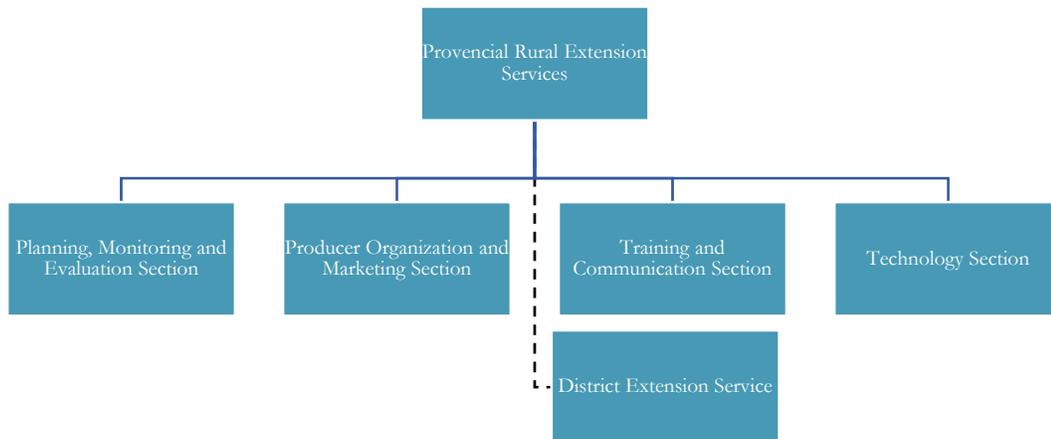


Figure 4. Organizational Structure at the Provincial Level

Note: Dotted lines indicates that higher-level unit does not directly supervise the lower-level one

Source: DNEA (2015)

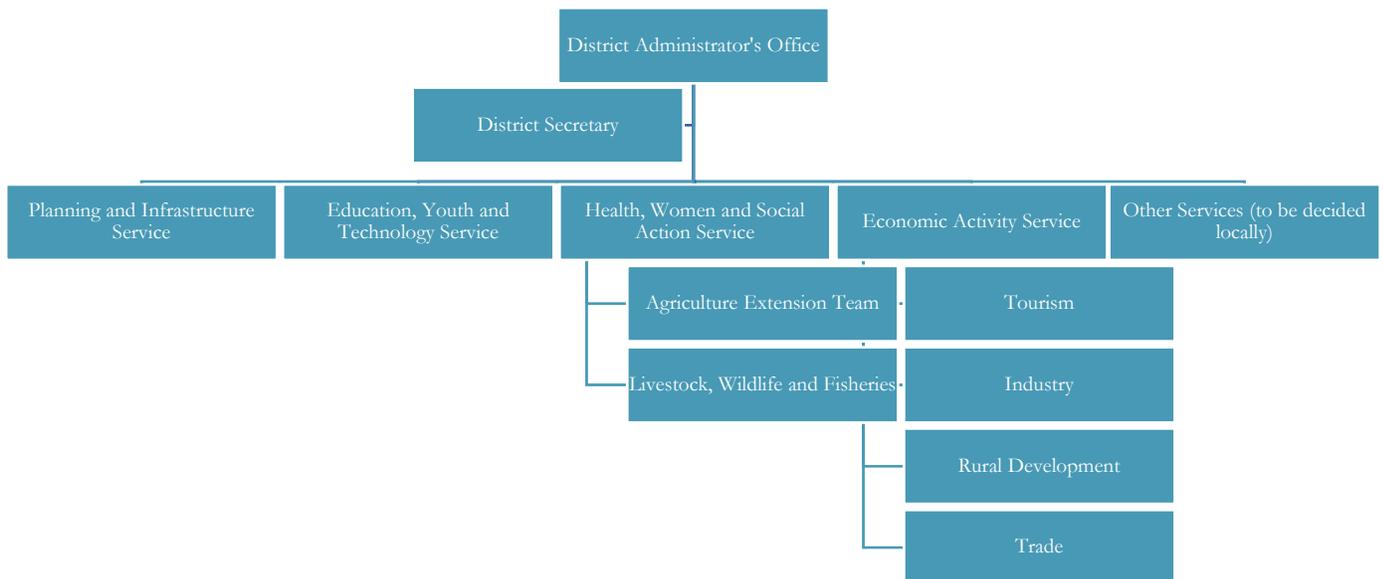


Figure 5. Organizational Structure at the District Level

Source: DNEA (2015)

In terms of geographical coverage, public extension covers almost all districts, although PSP only covers 141 out of 150 districts, or 94 percent. Since part of urban dwellers are also engaged in

agricultural production (e.g., horticulture production in Maputo city), public extension also covers cities, although in smaller numbers (e.g., 28 extension agents in Maputo city) (Table 3).

Table 1. Geographical Coverage of Public Extension by Province and Maputo City

Provinces	Cities		Districts		Administrative Posts	
	2014	2015	2014	2015	2014	2015
Maputo city	1	1				
Maputo	1	1	7	7	19	19
Gaza	5	5	11	11	44	44
Inhambane	2	2	12	12	26	26
Sofala	2	2	13	13	38	38
Manica	1	1	10	10	37	37
Tete	1	1	12	14	27	27
Zambézia	6	6	17	22	45	45
Nampula	3	3	18	20	65	68
Cabo Delgado	1	2	16	16	55	55
Niassa	1	2	16	16	37	40
Total	24	26	132	141	393	399

Source: DNEA (2015)

The ratio of public extension agents to households is quite small (1,304 extension agents to cover 4.2 million rural households) (Table 3). This distribution means that each extension agent would have to assist more than 3,000 households in order to cover the whole rural population. The number of female extension agents is even smaller, about 15.6 percent of the total.

Table 2. Number of Extension Agents in the Public Sector (based on 4.2 million households)

Province	Number of Extension Agents		Total
	Male	Female	
Maputo city	12	16	28
Maputo	62	24	86
Gaza	87	19	106
Inhambane	95	25	120
Sofala	100	14	114
Manica	93	12	105
Tete	62	8	70
Zambézia	159	38	197
Nampula	170	11	181
Cabo Delgado	136	12	148
Niassa	125	24	149
Total	1101	203	1304

Source: DNEA (2015)

As Table 4 shows, the percentage of households receiving extension visits from the government extension agents is small and declined considerably between the years 2002 to 2015. Reasons for this likely include:

- ◆ *Short-term contracts:* Many extension workers are on annual contracts, thus encouraging productive agents to seek jobs (sometimes non-agriculture related) with NGOs and the private sector (Eicher, 2002);
- ◆ *Poor housing and transport:* In Mozambique, extension services face numerous constraints, such as the ‘unacceptable housing and transport conditions for front line extension workers’ (World Bank, 2004, p. 15). Poor transport would encourage extension workers to target farmers located close to a tarred road, who are usually among the relatively wealthy;
- ◆ *Budget cuts:* These would also contribute to extension workers targeting farmers located close to a tarred road, leaving the majority of smallholder farmers unvisited (Mather, 2009).

Table 3. Households Receiving Extension Visits by Province and Year (percentage of 4.2 million households)

Province	2002	2003	2005	2006	2007	2008	2012	2015
Niassa	10.6	9.2	13.7	23.1	12.1	8.9	7.2	4.9
Cabo Delgado	18.7	14.2	15.6	11.4	5.8	6.8	6.3	10.3
Nampula	16.1	16.5	18.7	9.8	8.5	10.9	7.9	4.4
Zambézia	9.5	8.6	10.3	9.7	11.6	6.6	4.4	1.9
Tete	19.9	16.3	16.0	13.4	13.5	12.8	9.4	9.7
Manica	14.9	8.9	11.6	14.9	10.9	7.5	3.4	5.3
Sofala	19.8	24.0	21.1	16.9	14.4	10.2	10.2	4.6
Inhambane	4.6	9.9	7.8	6.6	7.4	4.6	7.7	4.1
Gaza	10.4	18.4	22.2	15.3	7.7	4.0	8.0	1.1
Maputo	11.0	14.5	11.0	9.8	19.9	6.8	3.8	1.0
Total	13.5	13.3	14.8	12.0	10.1	8.3	6.6	4.3

Source: Ministry of Agriculture and Food Security (2016)

Non-governmental Organizations and the Private Sector

NGOs and the private sector provide substantial extension services. The geographical location of NGOs and private extension varies considerably, depending on their areas of intervention. In Maputo province, there were about 20 local and international NGOs working in both agricultural and non-agricultural activities during 2016/2017. There are 48 NGO extension agents in total (17 women/35 percent) in Maputo. In Gaza province, there are 13 NGOs, seven private enterprises working on extension, and one cooperation partner (Food and Agriculture Organization of the United Nations (FAO)). The private enterprises are engaged in rural finance activities, such as GAPI in the horticulture and cassava value chains. Chokwe Hydroelectric Company (HICEP, for its Portuguese acronym) and Lower Limpopo Irrigation Scheme (RBL, for its Portuguese acronym) are managing the irrigation scheme in Gaza province. There is considerable variation in the number of extension providers over time, as well. For example, the number of NGOs declined from 22 in 2015/2016 to 13 in 2016/17. The number of technical staff also declined from 118 to 64.

NGOs providing extension services include the Adventist Development and Relief Agency (ADRA), National Cooperative Business Association/Credit League of the United States of America (NCBA/CLUSA), CONCERN, Japan International Cooperation Agency (JICA), and Action Aid, just to name a few. Some of them work on microcredit (e.g., Emilia Nexus Romagna in Zambézia Province), selected staple crops (e.g., JICA works with rice), conservation agriculture and many other areas.

The Mozambique Government conducted a survey in all the provinces of NGO and private sector extension in 2015. A summary of this is shown in Table 5.

Table 4. NGO and Private Sector Extension as of 2015 by Province

Province	NGOs	Private Sector	# of Extension Agents	# of Farmers Assisted	Areas of Involvement
Niassa	15	2	286	78,317	microcredit, livestock, horticulture, rice, small scale irrigation, fruit, association development, agroforestry, savings and credit, agriculture commercialization, soy
Cabo Delgado	6	2	72	18,776	conservation agriculture, mitigation of human conflict, crop and livestock production, agroforestry, linking farmers to markets, food security, local seed production, promoting community development committees, cotton, banana
Nampula	22	11	67	75,074	agroforestry, cotton, commercialization of agriculture, sisal
Zambézia	15	21	297	73,807	agriculture commercialization, livestock, microcredit, rice, association development, food security
Tete	15	2	262	52,699	beans, association development, conservation agriculture, seed production, agroforestry, food security, livestock, soy, orange sweet potato, dam construction, cotton, tobacco
Manica	23	10	59	15,968	goats, association development, grains, conservation farming, farmer field schools, agroforestry, orange sweet potatoes, seed production, sesame, horticulture, maize, credit, livestock, tobacco
Sofala	11	2	122	13,593	community development, association development, health, registering land, credit, agriculture production, sunflower
Inhambane	34	3	204	30,403	did not list
Gaza	25	7	62	8,705	agriculture production, association development, seed distribution, input fairs, agro-processing, credit, technical assistance, livestock, inputs, natural resource management, cereals, rice, animal health
Maputo	20	0	48	9,894	did not list
Total	186	60	1,479	377,236	

Source: DNEA (2015)

Even though the above cannot be considered an absolute complete picture of what the NGOs and private sector are doing in the various provinces, it is probably the most complete picture there is, and more detail than available in most countries.

Other than in Zambézia, NGOs outnumber the private sector in all provinces. The number of NGO and private extension agents is relatively equal; the total for NGOs is 750 and for the private sector 729⁴. This occurs because Mozambique Leaf Tobacco, which is very active in Zambézia, has a lot of extension agents. What is not known is how, if at all, the government, NGO and private sector work together. Based on discussions with interviewees, the chances of much coordination occurring is low.

While there are many examples of extension provided by NGOs and the private sector, we highlight some of them focusing on those using various methodologies with potential for increasing household income and food security.

One issue in EAS literature is the number of farmers for which an extension agent should be responsible. Table 6 breaks down the ratio of agents to households in each province. Note that the total number of extension agents reported in Table 6 is higher than the one previously reported in Table 3 because it includes private and NGO extension agents.

Table 5. Ratio of Public, Private and NGO Extension Agents to Rural Households

Province	# of Extension Agents	# of Households Assisted	# of Rural Households per Extension Agent
Niassa	286	78,317	274
Cabo Delgado	72	18,776	261
Nampula	183	144,016	787
Zambézia	297	73,807	249
Tete	262	117,429	448
Manica	59	15,968	271
Sofala	122	13,593	111
Inhambane	204	30,403	149
Gaza	62	8,705	140
Maputo	48	9,894	206
Total	1,595	510,908	320

Source: DNEA (2015)

The average comes to 320 rural households per extension worker. The Mozambique government's rule is that each extension agent should have 200 farmers, which is a very high number. Assuming groups of 25 farmers on average, this would mean that an extension agent could visit each group almost once a week if necessary, seeing a group in the morning and another in the afternoon during the busy agriculture season, but would have no time for doing anything else (e.g., administration, vehicle maintenance, meeting with other service providers or planning).

We now move on to discuss international projects, mainly donor-funded, that provide extension services via NGOs and other organizations.

⁴ This figure is underreported because Zambézia province did not report the number of extension agents in the private sector.

Projects Providing Extension Services

Extension Multimedia Project

NCBA/CLUSA⁵ has partnered with the Human Network International (HNI), Farm Radio International (FRI), Vodacom Mozambique, the Ministry of Agriculture and Food Security and private stakeholders to implement the Extension Multimedia project (also referred to as the e-Extension project). The project aims to contribute to food security and poverty reduction among smallholder farmers in central and northern Mozambique through the provision of extension services using ICT. The project promotes improved agricultural technologies, good agricultural practices, and market information for maize, soybeans, cassava, pigeon pea, sesame and orange-fleshed sweet potatoes. The project collaborates with the Scaling Seed Technology Partnership project (SSTP), a Feed the Future program that works both with CLUSA and the Alliance for a Green Revolution in Africa (AGRA). This project is funded by USAID's Feed the Future Program, UKaid, Bill & Melinda Gate Foundation and IFAD from 2016 to end in 2019.

CLUSA provides overall assistance in administration, management of the monitoring system of the e-Extension project, evaluation and training and guidance in the development of technical material to be disseminated through 321 SMS services⁶, radio broadcasts and online services (www.321online.org). The 321 SMS service provides digital information about selected value chains, available using the Vodacom network. HNI facilitates the launch and maintenance of 321 services working in collaboration with Vodacom. FRI facilitates radio broadcasts, strengthening the messages that are disseminated through the 321 service.

Since the period of implementation of the multimedia extension project is 2016-2019, some of the activities have not started. The communication among various extension providers will be done through Technology Follow-up Committee (CAT) that will include the Ministry of Agriculture, NCBA/CLUSA, SSTP, private sector and farmers' groups.

Resilient Agricultural Market Activities Project

Another project being implemented in central and northern Mozambique is the Resilient Agricultural Market Activities (RAMA) project funded by USAID. RAMA is supposed to test new extension systems, which should work closely with public extension and agro-dealers and link farmers to markets. Agro-dealers will be trained in extension because they provide support to farmers in choosing the appropriate seeds, chemicals and other inputs. RAMA is currently in negotiations with extension networks, with the intention to pilot in the 2017/2018 agricultural season, and scale in the subsequent three seasons. Winrock International is responsible for the implementation in the Nacala corridor and Land O'Lakes in the Beira corridor. The total RAMA budget is USD \$16 million with the project being implemented from 2017 until 2021.

⁵ The information provided here was kindly shared by Tiana Campos, and this is a summary of the Extension Multimedia project.

⁶ By dialing *321# a menu of value chains pops up and the user can select the information that is available.

Mozambique Expansion of Rural Cattle and Dairy Opportunities Project

Land O'Lakes and Tillers International are into the third iteration of a dairy project. The first two periods were for three years each (2009 – 2012 and 2013 – 2016) and this final period (2016 – 2021) is for five more years. When the initial project began, dairy was considered a new technology since there was no organized smallholder dairy production selling into a market.

The goal of Mozambique Expansion of Rural Cattle and Dairy Opportunities (MERCADO) project is to continue to build the capacity of dairy producers, cooperatives, and processors to improve their productivity, as well as their milk quality and business practices. The project aims to increase agricultural productivity in the dairy sector by training dairy producers on improved dairy practices and farm management, expanding access of dairy inputs, and facilitating access to finance for dairy producers and input suppliers to enable them to invest in and expand their business. This expansion will be accomplished by training producers and processors on improved post-production practices, scaling aggregation models of delivery of raw milk, facilitating access to finance to aggregators, processors and retailers, and improving the policy and regulatory framework through a dairy association.

There was a lack of dairy technical know-how and no private sector extension was present, so Land O'Lakes trained their own extension agents as well as made the training available to those extension agents at the provincial and district levels who were interested in learning about dairy. Tillers provided draft power training to as many farmers as possible. Tillers staff would contact extension agents when they were in their area to reach as many farmers as possible and paid the per diems of the agents who were interested in the training or providing assistance, such as introducing them to the farmers they worked with. Tillers realized that even though NGOs do not want to pay per diems to government workers, if they had not done this, very few would have participated. This is an issue with many of the NGOs working with government staff in Mozambique.

During the first phase, the project also trained several Community Livestock Workers (CLWs). The training consisted of a two-week, hands-on course that covered the basic needs of animal husbandry and the issues most common that affect the animals. The training included spraying livestock for tick prevention, dealing with mastitis, births, easily diagnosed illnesses and wounds, in other words, most of the issues affecting the animals. The CLWs run independent businesses, but they are linked to cooperatives. The challenges for CLWs is that they do not make a lot of money for their services, they lack transport and there often is a lack of products/inputs for livestock. The hope is that by linking CLWs to cooperatives, this provides them a base of potential clients that can also pay them for their services.

The first and second phases were similar, but there are significant changes in the present phase. First, the project is piloting a different approach to extension, which is to try and build the capacity of the government extension. Now that it is proven that dairy can be a success because of the ability of smallholders to produce milk and a strong local market for dairy, the government extension can take over more of a role than they played in the past when some were not sure that dairy would work. The project is also looking to train the private sector and cooperatives that want to provide extension. The project also has a more commercial farming focus than previously and will not work with smallholder farmers who still have only one cow after eight years.

Third, animal traction training has been eliminated and dairy is now the focus. Fourth, the project is no longer focused on training as many people as possible, but on working more intensively with a smaller number of farmers. A major emphasis will be on helping them grow and prepare their own feeds.

AgDevCo

AgDevCo is a non-profit social impact investor that supports small and medium-sized enterprises involved in farming, agri-processing and logistics with the aim of creating jobs and income-earning opportunities for African farmers. They provide technical advice as well as debt and equity investments that are on a repayment schedule. The United Kingdom's Department for International Development (DFID) is the main funding agency.

AgDevCo Mozambique made an investment into the private-sector firm, Empresa de Comercialização Agrícola (ECA), which has been successful in establishing a maize out-grower scheme, due to their in-house extension program. This program has brought affordable inputs, technical training, working capital credit from a local bank and reliable market access to rural farmers in the Barue District of Mozambique in Manica province.

The extension team is headed by a two and a half percent shareholder in ECA and a key member of the team since inception. The current agronomy team of four extension technicians is based strategically within the growing areas, where they live and interact directly with the farmers who supply ECA. The number of farmers contracted has gone from 863 to over 3,000 over the last five years, and they have succeeded in an average farmer credit recovery rate of 85 percent in this same period. ECA's success is based on two key activities that make the farmers comfortable with the partnership to repay their loans and avoid side selling. First, ECA has invested heavily in training its extension technicians, who live with their families within the farmer communities and are always on hand for assistance. Since these extension technicians are using their own fields as demonstration plots, it is being done under the same conditions that the neighboring farmers will also operate under. Second, the company also encouraged farmers to organize themselves into credit groups that become responsible for each other's repayments. This step reinforces the concept of the group being responsible for repayments rather than the individual.

ECA offers farmers three input packages for maize production on 0.25 hectare that allows them to grow with the business and avoids situations in which they become over indebted: a basic package of seed, a medium package of seed and urea fertilizer and a complete package of seed, urea and ammonium nitrate fertilizer with expected yields of 0.8, 2 and 4 ton/hectare respectively.

The use of the packs has increased from 800 in 2011 to 8,417 in 2015 and the numbers of farmers contracted, from 1,147 in 2012 to 3,003 in 2015. Maize yields have tripled from 0.8 ton/hectare to 2.5 ton/hectare. Also at least 20 percent of farmers in the program are now using hybrid seeds. Farmers see a real income opportunity from the ECA relationship and believe that investing into improved production practices will have an overall benefit.

Once the maize has been produced, ECA collects the farmers and their maize and transports them to the mill, where the farmers participate in the weighing of the maize, calculation of all credit values

due, receive cash in hand and then are transported back to their villages. Farmers are paid a price premium on the maize supplied, due to improved quality and for being non-GMO.

Coordination of EAS

There is limited coordination of agricultural extension players and related institutions in Mozambique. For the government, there is collaboration between research and extension for the development of extension messages. The messages are usually developed by the National Agricultural Research Institute through its Department of Technology and Transfer. The National Directorate of Agricultural Extension in Maputo usually meets with IIAM to discuss the technologies being disseminated, and this takes place during Periodic Review of Technologies (REPETE, for its Portuguese acronym) meetings, usually at the beginning of the agriculture season.

REPETE meetings provide a platform for DNEA to give feedback to IIAM about the strengths and weaknesses of the technologies that were developed and disseminated. REPETE meetings are usually attended by DNEA, IIAM, NGOs, and the private sector. However, due to budget constraints, REPETE meetings to review the technologies packages being disseminated are rare, which leads to extension providers, especially the public sectors, providing little feedback to the content creators, the IIAM. In addition, because of budget constraints of the public-sector extension, field trips are rarely done with those putting together the content of extension messages and programs.

Public agricultural extension has concentrated on the districts with higher agricultural potential and will likely continue to do so since there are no incentives to change this practice. They also increasingly intend to play a complementary role to NGO and private-sector extension due to budget constraints. Public agricultural extension gives specific priority to strengthening the demand for and access to agricultural extension services, based on principles of producer empowerment and inclusiveness, such as for female farmers, female-headed households and disadvantaged groups such as HIV/AIDS affected households (Republic of Mozambique, 2007).

Private extension is usually focused on certain crops that the company is interested in buying from smallholder farmers, such as tobacco (Mozambique Leaf Tobacco in Milange, Gurue, Tsangano and other tobacco producing districts), soybeans (Hoyo-Hoyo in Lioma/Gurue), Murrimo Macadamia focusing on macadamia production (Gurue) and sugar cane (Tongaat Hullet/Açucareira de Xinavane and Companhia de Sena). They tend to be profit-oriented and usually work with farmers in out-grower schemes.

In contrast, public extension varies in terms of focus, whether market- or production-oriented. It depends on the location and crop. For NGOs, their focus is on the deliverables of their project. For some that could be improving productivity or marketing of a specific commodity and for others it could be promoting a way of farming such as promoting the use of conservation farming.

Public, private, and NGOs usually work independent of each other, even within the same district, but those organizations working in the same sector (e.g., agriculture) are required to provide joint quarterly reports to Economic Activities District Services (SDAE, for its Portuguese acronym). SDAE is run by the Ministry of Agriculture and Food Security (MASA, for its Portuguese acronym) and provides various services at the district level to facilitate economic growth. This could be in agriculture, fisheries, forestry or whatever intervention has the best possibility to succeed in the area.

The model followed by almost all NGOs is that they rely on their own staff for extension needs rather than using government staff as is practiced in some African countries. In discussions with various NGOs, their interaction with government extension is usually limited since they do not think that extension has much to offer. There are some NGOs though who are trying to include government extension more by offering training and to include them in their project as much as possible. For example, as mentioned above, Land O' Lakes and Tillers International are making a concerted effort to work with and train government extension so they can provide extension once their project ends. However, the overall environment consists of very little coordination between public extension and extension provided by NGOs and the private sector.

Donor-funded projects have found it difficult to partner with public extension. USAID projects usually consider the farmers as the beneficiaries for input support while public extension through the Integrated Program for the Transfer of Technology (PITTA, for its Portuguese acronym) has demonstration plots where the extensionist owns the plot. The extensionist being a government employee cannot be a direct beneficiary of USAID projects and therefore cannot host a demonstration in these projects. This challenge impedes collaboration between USAID projects and PITTA and makes it difficult for PITTA to have access to the required inputs since they do not have the budget to acquire these inputs.

A potentially important coordinating mechanism is the Forum of Extension Services in Mozambique (FOSEM), which was founded in 2015 by the Ministry of Agriculture, National Directorate of Extension, and is based in Maputo. The Forum comprises 16 institutions active in extension. FOSEM aims to stimulate agricultural development through the creation of an environment conducive of dialogue, information flow and cooperation among the various stakeholders in agricultural extension.

Since its creation in 2015, FOSEM has held meetings in all provinces with the Provincial Extension Services (SPER, for its Portuguese acronym) to explain their vision and mission. But many of FOSEM's members have changed as many Ministries were restructured, donor-funded projects have ended and some international organizations have left Mozambique. These changes have contributed to the lack of active participation of FOSEM in the development of extension activities in Mozambique.

Organizational and Management Capacity and Cultures

For public extension workers, there are few incentive structures at the district level, but at the national level the best extension officer nationwide receives a prize annually. The criteria for selecting the best extension officer includes the number of demonstration plots and farmers assisted, as well as the adoption rate of the technologies that were demonstrated.

Regarding extension agent performance, each year government employees are evaluated by the head of their department, based on performance indicators, such as completion of all tasks, absenteeism, and dedication to work, among others. However, interpretation of the exact meaning of the indicators is subject to each one's perspective. The head of the department gives a total score to the employee, and this ranges from 0 to 20. The employee with the highest score among all departments

receives the prize as the best employee from each Ministry Directorate. The prize usually comprises a certificate of honor and a few gifts such as a microwave, depending on resource availability.

In prior years, candidates for an extension worker position would have had training from an agriculture school, such as the Instituto Agrário de Chimoio or Instituto Agrário de Boane, before being admitted as an extension worker. Many would have had degrees from these schools in agriculture equivalent to a high school diploma. This rigor in hiring new extension officers has been lost because MASA needed to hire many more staff and could not find staff with the required credentials at the salaries offered. Thus, MASA dropped their standards to bring more staff on board. Other challenges to management include budget cuts and the geographical expansion of coverage of extension services.

Davis et al. (2008) looked at the formal post-secondary education training in Agriculture Education and Training (AET) in Mozambique. Various reforms and experiments in AET were being tried and two agriculture polytechnics had been established in the preceding decade, but the impact of these changes had no lasting effect on the state of extension in Mozambique since it still is faced with the same challenges noted above. The quality of the agriculture education at all levels is very weak. The curriculum is outdated and lacks business training.

Extensionists in government extension services are supposed to receive in-service training, but this has been a challenge for the Ministry of Agriculture in particular, and other government institutions in general. Lack of finances and high turnover of staff are key problems. The public sector is unable to compete with the private sector and NGOs for salaries, and extension workers and other public servants after receiving in-service training they leave the government for better paid salaries in the private sector. This implies that the Ministry of Agriculture must constantly train new staff. Incentive policies to retain staff in the public sector does not exist or is non-functional.

Public extension finds it quite difficult to target certain groups of smallholder farmers, due to constraints they face. One of the constraints is the lack of technology messages, mainly due to a weak link with agricultural research, which is perhaps the weakest link in the 'agricultural knowledge triangle' of research, extension and higher agricultural education (Eicher, 2002). A second major constraint is a shortage of research staff, both in terms of quantity and quality. According to Coughlin (2006), Mozambique has less than one agricultural researcher per 50,000 people, compared with 1:2,500 in neighboring South Africa, and 1:400 in developed countries. The few good extension officers that exist are also constantly tempted to find new jobs due to low wages in the agricultural sector, particularly in the public sector.

Budget cuts have also caused the government extension service to focus their intervention in terms of crops to prioritize. PEDSA considers seven main value chains: rice and other cereals; roots and tubers; fruits (emphasis on citrus); cattle; poultry; horticulture and pulses. Depending on the value chain, there is a mix of market-oriented and production-oriented activities.

Advisory EAS Methods

Extension agents usually use mixed methods when providing services. In 2011, the National Agricultural Extension Services launched PITTA. In this program, the extension officer cultivates his/her own field where demonstration units are set and farmers are mobilized to follow the

demonstration across the agricultural season. The program is usually divided into crop and livestock PITTAs. PITTA is also known as “one extension officer, one hectare,” the rationale being that every extension officer should cultivate at least one hectare and use it as a demonstration plot for farmers.

In addition, in selected locations extension officers would receive 2,000 chicks, construct a chicken pen, and use them for poultry demonstrations. However, it was unclear whether extension officers received the chicks and construction material on credit or as a gift. The same applies to the one-hectare program that they were supposed to cultivate involving inputs, but again it was unclear as to whether they had to pay for these inputs. Many extension officers did not clear their land because they understood that the Ministry of Agriculture and Food Security would support them in land preparation and provide free seeds and other inputs. However, such inputs and support in general never came, and the full potential of PITTA was not achieved. PITTA was a pilot project that received a lot of criticism.

Where there is no PITTA, extension officers rely on demonstration plots of a farmer usually along main roads. These can include home gardens, chicken pens, fish tanks for aquaculture (usually tilapia), improved granaries, application of chemical fertilizers and crop varieties, among others.

The DNEA adopted the training and visit (T&V) extension model in 1988, and modified it in 1992 in the light of the shortcomings uncovered under local conditions (Eicher, 2002). The modified T&V model was in use at least till 2006 (Coughlin, 2006) and was based on a participatory rather than a top-down approach, with a focus on interventions in the farming system, which include both crop and livestock production. Nevertheless, extension services remain predominantly top-down in orientation and were not geared toward responding to farmer needs on community requests (DANIDA, 2002).

Although there are several approaches to extension, Mozambique was a late comer in adopting the farmer field school (FFS) approach. This approach was first introduced in the 2003–04 agricultural season in Namacurra and Nicoadala, two districts of Zambézia province (Dzeco et al., 2010). Farmer field schools (or farmer field and life/business schools) are widely used as a learning approach by public and NGOs extension agents. Public extension also relies to some degree on farmer field schools. One potential issue with FFS is their average composition of 40 members, which is double the optimal size. There have been cases where the extension workers had poorer agricultural knowledge than the group of farmers, and perhaps due to budget constraints, the number of visits to farmers is quite small. FFS cannot receive money directly from donors because they are not a formal entity, so under Mozambican law they cannot open a bank account for the same reason, and they lack an accountability mechanism.

The goal of public extension is usually technology transfer, since agricultural productivity in general remains extremely low. For example, in 2002, Mozambique achieved average maize yields of about 0.58 ton/hectare, compared with the Malawian average of 2.76 ton/hectare (Dzanku et al., 2015). The technologies to be transferred are agricultural technologies conducive to agricultural productivity growth and post-harvest technologies to limit losses during storage.

However, the private sector and NGOs sometimes also focus on activities other than technology transfer and increasing agricultural productivity. These other activities may include adult literacy, marketing, or health and sanitation, depending on the needs of their clients.

One targeting approach in place is to focus on selected districts of high agricultural potential, but in the target districts some households are more likely to receive extension services than the others. Coughlin (2006) argues that “to a great extent, even within the target districts, the extension system assists the same farmers in the same villages year after year while permanently ignoring others” (Coughlin, 2006, p. 32). Thus, “most farmers in rural Mozambique get no extension services, directly or indirectly” (Coughlin, 2006, p. 30). Cunguara and Moder (2011) argue that households located near a tarred road are more likely to be reached by extension services because it is easier to get in touch with them given the resource constraint (vehicles and fuel). On the question of scaling, or “How do you reach more farmers,” the public extension system is using the following three main approaches: produtores de contacto (contact farmers), community radio and farmers’ associations. Less focus is given to associations because only two and a half percent of smallholder farmers belong to an association, as discussed in Table 9.

Both public and NGOs extension services rely more on contact farmers, who are usually wealthier and have influence or power in the community. Contact farmers are usually male, better off and often, the village chief, who are then trained and are supposed to assist their neighbors, usually between five and ten people for each contact farmer, but the target set by extension services is ten. In some places, FAO supports contact farmers from public extension services by offering them bicycles to increase their mobility under the input voucher program. The idea of contact farmers is that by reaching one influential farmer extension services are indirectly reaching five to ten smallholder farmers.

The Database of Agriculture Extension Service Providers (Gemo, 2016) is a multipurpose tool that provides a list of the agricultural extension and advisory services providers in Mozambique, principally in the four provinces (Manica, Nampula, Zambézia, Tete) of the Feed the Future Zone of Influence. The extension methods that appear most frequently throughout the database, in order of importance, include:

- a. T&V model
- b. On-farm demonstration plots, including the Contact Farmer Approach
- c. Training of trainers
- d. Field days
- e. Farmer field schools
- f. Exchange of experience
- g. Training for farmers’ associations

Gemo (2016) also found that many organizations providing extension activities are using the traditional T&V extension method as the database indicates, with few innovative and alternative extension options occurring. All the extension service providers are providing more than one type of intervention thus suggesting that institutions experience higher success when combining different extension methods.

The database also shows that the target groups vary. Small-scale farmers are the principal target audience, but commercial farmers, extension agents and agro-dealers were sometimes specifically targeted by certain organizations. There is also a trend of working with and supporting farmers' associations, instead of individual smallholder farmers.

ICTs are being used to complement current extension methods and approaches with almost half of the extension providers using at least one type of ICT in their agricultural extension programs, to either collect information, promote technology transfer and adoption or to provide relevant agricultural information.

Radio is perhaps the most used ICT in Africa. Public extension services usually sign contracts with community radio stations to broadcast their messages. In places like Gurue, the community radio usually seeks advice from extension services and asks for new messages to be broadcast. In 2015, a total of 450.2 hours of agricultural programming on community radio were broadcast nationwide, compared to just 28.5 hours of TV broadcast, and 74 hours through the national radio channel, Rádio Moçambique. Part of the community radio messages are developed by IIAM/DFTT (Department of Training and Technology Transfer). They received training from the Social Communications Institute in Mozambique. This year, however, they did not have funds to develop new messages due to budget cuts.

A “rapid appraisal” of the use of ICT was done in relationship to agriculture extension in Mozambique by the USAID-funded project Modernizing Extension and Advisory Services (MEAS). Their key findings were the following (Gilot, 2016):

- a. *With a penetration rate of 84 percent, mobile phones are the most promising option to reach rural areas.*

However, most rural farmers view their mobile phones simply as a communication tool, and not yet as a technology to access information. Past and current initiatives incorporating mobile phones in extension tend to rely on short message services to deliver relevant agricultural information to farmers. These messages mainly provide weather conditions, market prices, directories of agro-dealers and agricultural input suppliers, the correct timing for agricultural practices and so forth.

- b. *Radios are the most widely used method for disseminating news and agriculture information to rural communities.*

When it comes to extension and advisory services, radios generally address topics that can improve agricultural productivity, they announce ongoing events related to the agricultural season or they inform about any upcoming changes that may affect farmers' activities.

- c. *Computers are not widespread, but the number of internet users has exploded during the last two years with a penetration rate of 60.5 percent. Internet is used widely with mobile phones.*

In agricultural extension and advisory services, computers and internet are being used within institutions to send newsletters, to share expected tasks and to disseminate updates and upcoming activities. More donor-funded agriculture projects are introducing tablets as monitoring and data collection tools, which will locate extension agents and

farmers and collect information on rainfall, soil types, production areas, GPS coordinates and farmer field progress.

- d. *It is estimated that Televisão de Moçambique (TVM) reaches less than 20 percent of the Mozambican population, but it does play an active role in agriculture extension for its viewers.*

TVM broadcasts interviews with public officials dealing with the agricultural campaign from the beginning of the season to the harvesting period. It also reports field days and the “Day of Farmers,” in which government and other institutions invite small-scale and commercial farmers, agro-dealers, agribusinesses, input suppliers and other relevant stakeholders to exchange agricultural information on improved practices and technologies. Video projections are also used for training purposes. Table 7 shows the ICT methods used in association with other types of extension methods.

Table 6. ICT Methods Used with Traditional Extension Methods

Agricultural Extension Methods	Mobile Phones	Radio	Television/Video	Internet	Tablets
Lead/Contact Farmer	X	X			
Training of Trainers	X	X	X	X	
T&V	X	X	X		X
Exchange of Experience		X	X		
Field Days		X	X		

Source: Gilot (2016)

Key conclusions from the MEAS rapid assessment were the following (Gilot, 2016):

- ◆ Integrating ICTs in agricultural development improves access to information, but by no means is it an indication of the use of the agricultural information or of the actual technology adoption. Despite hearing new tips on farming and agricultural practices via ICTs, farmers were not applying them in their plots, unless the extension agent followed up.
- ◆ A methodology to monitor and evaluate the impacts of ICTs in agriculture must be in place to support agricultural extension and advisory services. Tablets and smartphones are appearing in the agricultural setting to collect data from farmers in the field. Combined with internet access, these tools not only provide a source of information, but also enable the monitoring of farmers’ and agents’ activities. The addition of satellites and GPS-tracking tools allow the development of location-specific and relevant information to better respond to the needs and demands of the surrounding farming communities.
- ◆ Past ICT projects have proven to be unsustainable, largely depending on project funds. ICT systems require a significant amount of resources to start and to be maintained. The exit strategy for many of these projects is for the cost to eventually fall on resource-poor farmers after they learned the benefits of having access to information, but a combination of the costs, the poor infrastructure and illiteracy remain barriers for the poor.
- ◆ To successfully incorporate ICTs in agricultural extension and advisory services, all major relevant stakeholders must collaborate. Existing ICT projects have shown the

importance of partnerships by involving several partners, such as the donor, the telecommunication operator, the content provider and local organizations.

There are still challenges in Mozambique preventing the full use of ICTs, but the government does see its importance and is revising and updating the ICT policy to act more strategically. New infrastructures are being introduced, such as data, voice and image communications. Further communication and coordination between relevant extension agents and agencies will promote the potential of the ICTs in the enhancement of agricultural extension and advisory services.

Market Engagement

Market engagement in the context of EAS is concerned with farmers' access to credit, market-related advice, market linkages, quality inputs, group development and output markets.

As seen earlier, Mozambican agriculture is still predominantly subsistence farming with little to no use of external inputs. Participation in the market is low (e.g., less than 20 percent of smallholder farmers who grow maize sell their surplus). At this stage of agricultural development, the focus of the Ministry of Agriculture and Food Security and other stakeholders is to increase agricultural production and productivity.

Officially, Mozambique has a “no-subsidy” policy for agricultural inputs, in contrast to its neighbors. However, in response to high food prices observed in 2008 and 2009, Mozambique has allowed donors to fund subsidy programs. In 2011, under PAPA, the European Union funded a voucher program whereby farmers received a 70 percent subsidy on fertilizer and seed purchases. The program benefited about 20,000 households in five provinces in central and northern Mozambique. This number represents only a small fraction of a total of four million rural households. PAPA was an effort to increase food production, and the program was implemented for two agricultural seasons.

In the 2015/2016 agricultural season, the FAO launched an e-voucher program in Manica Province, which offered a 70 percent subsidy on a pre-determined package of inputs of improved maize or rice seeds and one bag of urea and nitrogen-phosphorus-potassium mix (NPK) fertilizer. This program will be expanded to include Zambézia, Nampula and Sofala Provinces. However, distance to markets (for both inputs and outputs) results in high transportation costs and low profitability despite the use of improved technologies. Data from the national agricultural surveys show that between 2002 and 2012 the average distance to the nearest agro-dealer for fertilizer and seed purchase reduced from 45 km to 34 km, and 25 km to 22 km, respectively. This data suggests little agricultural transformation in a decade, and that the average distance to the agro-dealer remains very high. This FAO program will run until 2018, when it is then planned for the government to take over.

High transaction costs result in high input prices and therefore low use of fertilizers. For example, Table 8 shows that less than three percent of smallholder farmers used chemical fertilizers in 2012. Benson et al. (2013) compare the average international export price for the period August 2010 to July 2011 for urea (ex-Arabian Gulf) of USD \$381 per metric ton with local Mozambique retail prices (average of prices from retailers in several market centers) for urea of USD \$827. The seed

sector is also very weak, with only four or five seed testing laboratories nationwide to ensure standards and quality, and none of them fully operational.

Table 7. Use of Chemical Fertilizers by Province and Year (percentage)

Province	2002	2003	2005	2006	2007	2008	2012
Niassa	7.5	11.6	17.7	15.0	7.2	9.8	8.3
Cabo Delgado	2.6	0.0	0.2	4.5	1.1	2.8	0.4
Nampula	3.3	0.3	2.8	2.8	2.3	2.7	1.9
Zambézia	0.7	0.7	0.0	1.6	1.1	0.4	0.1
Tete	15.1	12.1	16.5	17.7	21.3	14.9	10.0
Manica	3.0	2.8	2.3	0.8	1.1	4.7	1.8
Sofala	0.7	1.5	0.5	1.6	1.1	0.6	1.9
Inhambane	1.7	1.8	1.0	2.3	3.8	2.3	4.0
Gaza	5.1	2.1	3.9	2.3	1.9	3.8	1.6
Maputo	3.5	3.1	6.1	6.1	11.6	9.1	3.8
Total	3.7	2.5	3.8	4.6	4.1	4.1	2.6

Source: Ministry of Agriculture and Food Security (2016)

In recent years, farmers have also gone from traditional cash crops, like cotton and tobacco, to emerging crops, such as pigeon pea, soybeans and sesame, in response to market demands. Pigeon pea is sold mainly to India. Traders regularly visit rural Mozambique, and they usually set up camp and assemble agricultural produce, until they have a sufficient amount to fill a shipping container. Other than tobacco, cotton and sugarcane, almost all crops in Mozambique are sold without a contract into the open market.

Despite the challenges EAS, and particularly government EAS, has been facing in Mozambique, there are marketing initiatives that have been successfully in helping smallholders overcome the challenge of great distances within the country to reach various markets.

The first of these is aggregation, which is crop specific. Buyers face the problem of low volumes and the need to deal with many sellers. In the case of pigeon pea, traders' successful aggregation initiative is to set up purchasing units in various villages and wait until they have enough products to fill a truck and drive to a port. Only a small fraction of pigeon pea is processed locally because the price premium for locally processed pigeon pea does not justify the effort. Export Trading Group (ETG) is the biggest pigeon pea exporter, and they have various warehouses in rural Mozambique (Walker et al., 2015).

A second successful initiative concerns timing of harvest of pigeon peas. The biggest advantage that Mozambique has over India and Myanmar, the other major producers of pigeon pea, is that harvesting of newly available medium-duration varieties in Mozambique takes place when pigeon pea prices in the main importing countries are at their peak. The choice of these varieties, which mature in 130 to 180 days, usually results in better output prices, and extension services can relay this information and facilitate the adoption of such varieties.

Better coordination is needed between extension services and buyers to identify the main production sites and harvesting periods to make this part of the pigeon pea value chain more efficient.

Extension has continually pushed the use of quality inputs. The quality of the product starts with the quality of the seed. As mentioned above, the seed sector is very weak. Less than 10 percent of smallholder farmers use improved maize seeds according to official Ministry of Agriculture and Food Security statistics, and even what is called “improved seeds” may contain a mix of varieties.

The major milling companies in the country (e.g., Companhia Industrial da Matola) rely on maize imports because they can get uniform grain size that allow for a more efficient milling operation. Sometimes seed suppliers sell grain as seed, and there are no fines or penalties from the government for selling grain as certified seed. The extension services play a role advising farmers on the best quality seed to purchase. They advise farmers not to mix various seed varieties of the same crop in the same plot because later when they want to sell, farmers can get higher prices, if they managed to separate crop varieties.

Among the limited number of farmers who use chemical fertilizers (less than 5 percent), there is still a lack of knowledge about the most appropriate fertilizer to use and the correct dosage. Urea and NPK⁷ (12-24-12) are practically the sole fertilizer types readily available, regardless of soil composition and crop. Extension services play a role in refining fertilizer messages and underscoring the need for some soil testing using even basic soil testing kits for smallholder farmers. The time of application or input availability in general is also another critical factor for increasing crop productivity. Improved seeds that are only made available to the farmers after the optimal planting period will not achieve their full potential.

Improving access to credit can greatly help increase input use. The use of financial services is quite limited in Mozambique. Data from the national agricultural survey show that in 2015 only 0.6 percent of farmers received formal credit. Access to credit was highest in tobacco producing provinces (2.4 percent in Tete, 1.9 percent in Niassa, and 1.2 percent in Manica) and lowest in Cabo Delgado and southern provinces in general. Since 2006, the government of Mozambique introduced the Orçamento de Investimento a Iniciativas Locais (Local Investment Initiative Budget) as a poverty reduction tool to finance local projects for income generation and food production. Each district received a total of about USD \$200 million dollars in 2006 to invest in local development through credit. Extension can help identify prospective beneficiaries and help these potential beneficiaries draft an investment project. One of the problems faced by such district investment initiatives is that repayment rates have been so low (less than five percent at the national level), and the repayment funds were intended to refinance other households once the debt was repaid.

Concerning post-harvest technologies, one of the packages disseminated by extension officers is the construction of improved granaries (known as Gorongosa type improved granaries), combined with use of Actellic® insecticide. Traceability for crops produced has not yet emerged as an important issue in Mozambique.

⁷ Nitrogen-phosphorus-potassium mix

Livelihood Strategies

For EAS to improve livelihoods as opposed to simply improving agronomic knowledge, service providers must be aware of the different needs of all types of farmers (men, women, youth, elderly, laborers and pastoralists). At present, this is not the case with extension services in Mozambique. These different needs could include issues such as markets, nutrition, climate resilience, mechanization and others, and also include providing complementary information (for example, on nutrition), focusing on the agricultural activities most common for different types of farmers (for example, poultry rearing or vegetable cultivation with women), or holding different types of events that are particularly engaging or accessible for that type of farmer (for example, women-only events).

While there are a variety of focus areas for EAS providers in Mozambique, including production, climate-smart agriculture, health and nutrition, irrigation, credit, conflict mitigation, association development, animal health and draft power, there is not always a match between the projects and programs providing these and the clientele's needs.

As mentioned above in the Coordination of EAS section, extension messages are usually developed by the National Agricultural Research Institute through its Department of Technology and Transfer. The National Directorate of Agricultural Extension usually meets with IIAM to discuss the technologies being disseminated. In developing the content, extension services use PEDSA as a guide, thus focusing on the seven value chains identified by the strategic plan for the development of the agricultural sector mentioned above. Extension services usually target the wealthier (lead farmer/contact farmer) in those seven value chains. Due to severe budget constraints, extension services usually reach wealthier farmers the most because it costs less money and time. Moreover, wealthier farmers are more likely to implement the technical recommendations, because they are financially more capable of purchasing modern inputs. Furthermore, wealthier farmers are used as models or demonstration farmers (Mather, 2009). Using nationally-representative data from Mozambique, Cunguara and Moder (2011) argue that the impact of the receipt of extension is also greater among wealthier farmers.

Given that widows and the elderly are among the poorest in Mozambique (Walker et al., 2004; Boughton et al, 2006), and that the extension services usually target the wealthier, content development is unlikely to reflect the needs of vulnerable groups.

Community Engagement

Finally, EAS is concerned with community engagement, that is, land size and distribution, education levels, gender roles, demographics (including age), community organizations (e.g., producer organizations) and capacity to collaborate. Here we focus particularly on farmer groups and women farmers with respect to EAS.

Since resources are scarce, one EAS strategy is to use a group approach to stretch the budget. Informal groups appear to be fairly common. For example, Gotschi et al. (2008) identified 73 groups in Buzi District of Sofala Province comprising 1,792 members. However, the percentage of smallholder farmers who belong to a registered association is quite low, two and a half percent in 2015, and declining (Table 9). The extent to which different extension providers work with groups, registered or unregistered, is not known.

Table 8. Household Membership in a Farmers' Group/association by Province and Year (percent)

Province	2002	2003	2005	2006	2007	2008	2012	2015
Niassa	2.9	0.0	10.6	12.3	9.2	6.3	2.0	1.7
Cabo Delgado	3.9	2.3	4.7	7.2	5.6	3.4	5.0	6.4
Nampula	4.8	6.6	8.1	6.0	10.3	7.1	6.0	3.1
Zambézia	3.0	2.9	4.1	4.9	9.7	9.6	4.0	1.1
Tete	2.7	6.7	7.7	2.8	4.8	5.4	4.6	3.9
Manica	4.2	3.7	4.7	6.0	7.1	6.2	4.2	3.4
Sofala	2.1	3.1	3.0	4.3	7.2	4.2	3.8	4.7
Inhambane	1.6	1.4	2.6	4.8	5.0	9.8	3.1	2.2
Gaza	4.2	9.1	10.0	13.6	10.4	7.8	5.5	1.5
Maputo	11.6	16.1	19.5	13.5	12.9	12.3	4.9	1.6
Total	3.7	4.5	6.4	6.5	8.2	7.2	4.5	2.8

Source: Authors' calculations based on the national agricultural surveys

Land distribution is unequal. Female-headed households own relatively smaller plots than their male counterparts (Table 10). In 2012, on average, male-headed households owned 1.5 hectares compared to 1.1 hectares among female-headed households. Households who received extension visits in 2012 owned 1.7 hectares compared to 1.4 hectares among those who did not receive extension visits. There is no apparent program or effort to target women by the public extension services.

Table 9. Average Landholding Size (hectares) by Gender of Household Head, Year and Receipt of Extension Services

Year	Gender of HH head		Receipt of extension		Total
	Male	Female	Yes	No	
2002	1.9	1.3	2.0	1.7	1.8
2003	1.9	1.5	2.2	1.7	1.8
2005	2.1	1.5	2.3	1.9	1.9
2006	1.8	1.3	2.1	1.6	1.7
2007	1.8	1.4	2.0	1.6	1.7
2008	1.8	1.3	2.0	1.7	1.7
2012	1.5	1.1	1.7	1.4	1.4

Source: Authors' calculations based on the national agricultural surveys

RECOMMENDATIONS

This report has presented a review of the extension and advisory services system in Mozambique based on a literature review and some interviews with key EAS actors. In this section, we list the assets that Mozambique has for improving its EAS system and resulting recommendations. The recommendations are intended for any EAS stakeholder interested to improve extension, be they government, donors, private sector, NGOs or others.

The EAS assets in Mozambique on which to leverage for improving EAS are:

- ◆ Good climate, soils and plentiful land that allows for the production of a variety of crops that if established could provide food security to the region as well as exports to around the world.
- ◆ A well thought out extension strategy that if implemented would provide the support to farmers that is needed.
- ◆ An existing network and structure of NGOs and the private sector that offer the possibility of partnering with the public extension that already has a large network of extension agents in place.
- ◆ Incentive structures that allow the Ministry of Agriculture to hire qualified staff.

The following are the recommendations for each of main areas discussed in this report. The actor(s) who could play a leading role in implementing the recommendation follow in parentheses.

Governance Structures and Policy Environment

1. The Government of Mozambique needs to finalize a new extension strategy. The current extension strategy has expired. The updated strategy should build off the framework of the former one. Implementation is key, since the expired strategy provides a good structure. (Ministry of Agriculture)
2. Donor financing for extension needs to be obtained and the Government of Mozambique should allocate more money to extension. The current conditions in Mozambique because of the hidden debt make for challenges in finding funding. Adopting a more results-oriented approach would help government extension to obtain more funding for extension from donors. (Donors, Ministry of Agriculture)

Organizational and Management Capacities and Cultures

3. Education in agriculture needs to be upgraded at both the Instituto Agrário de Chimoio and Instituto Agrário de Boane, so graduates are better qualified to become extension agents. (Government of Mozambique, schools)
4. Government extension needs to develop a system of ongoing education for its staff. This system would include short-term in-service training, as well as support for formal education. In addition, NGOs and the private sector should be requested or perhaps required to invite public extension staff to their trainings of trainers. This requirement is especially necessary when the

NGO or private sector is promoting a new crop or technology. (Ministry of Agriculture, NGOs, private sector)

5. The contracts of extension agents should be lengthened and salaries raised. Many of them work under annual contracts and usually search for other employment opportunities with better salaries. The Ministry of Agriculture is unable to retain the staff, and as a result continuous training is required given that every year new extension agents are recruited. Improving the quality of the current staff should be the priority over hiring more staff. Higher quality staff will help with the issue of staff retention. (Ministry of Agriculture)
6. Providers should institute feedback mechanisms. In addition to reporting the percentage of adoption and using this as an indicator of success, much emphasis should be placed on understanding the “why” behind a farmer’s behavior. For example, it is critical to find out why a farmer has adopted and why other farmers have not. This step would be accomplished by doing post-training surveys after an appropriate period of time to gain information on adoption rates and to learn why or why not farmers changed their behavior. This information would allow extension personnel to hone their messages to become more effective and provide researchers with feedback on potential problems. These surveys could also provide insight into what kind of support is provided to the adopters to ensure that they do not abandon the technology. (Ministry of Agriculture, donors, NGOs, private sector)
7. Better coordination is needed between NGOs, public extension and the private sector to increase efficiencies along value chains. For example, when NGOs are planning a project proposal, they need to bring in government extension and the private sector as project partners, building them into proposals and subsequently into project implementation. This inclusion would build synergies between extension services of different providers. (Ministry of Agriculture, NGOs, private sector)

EAS Methods

8. Research is needed to better understand if new ICT tools are working, whether they are worth the costs of implementing them and how to make them more effective. There has been a massive increase in the use of tablets and other ICT technologies in extension, but the quality of the extension messages in these new extension tools and their effectiveness in promoting adoption is not known (Ministry of Agriculture, NGOs, private sector)
9. For PITTA and other extension programs, there is a need for a better clarification of the role of the extension agents and who pays for the inputs. Under PITTA each extension agent should cultivate one hectare and use it as a demo plot. Sometimes it is not clear whose harvest from that demo plot belongs to and who is paying for the inputs. Donors cannot pay inputs for an individual farmer or extensionist office, unless they belong to a legal association and the PITTA arrangement makes it difficult for donors to contribute. (Ministry of Agriculture)
10. Having extension agents based in communities should be encouraged as much as possible since the effectiveness of those agents is very high. (Ministry of Agriculture, NGOs, private sector)
11. Those selecting contact farmers should ensure that they are similar in socioeconomic status to the farmers in the area. They should also ensure the recruitment of women and youths as contact farmers. (Ministry of Agriculture, NGOs, private sector)

12. The use of the radio as a method of extension needs to be continued and expanded whenever possible. (Ministry of Agriculture, NGOs, private sector)
13. Since mobile phones are the most used technology by farmers capable of receiving extension messages, this should be the first type of technology used by extension providers, since it will reach the largest number of farmers. (Ministry of Agriculture, NGOs, private sector)
14. Follow-up and reinforcement by extension providers on the ground is necessary for all ICT messages. This step calls for the coordination of messaging by different providers. (Ministry of Agriculture, NGOs, private sector)
15. NGOs need to accept the fact that they are going to have to pay per diems to government workers, if they are going to have them participate and should budget for this. (NGOs)
16. Extension services should continue providing assisting in the construction of improved granaries, and setting up demonstration units. They should also facilitate the acquisition of insecticide by connecting farmers to agro-dealers, and persuading agro-dealers to keep stocks of insecticide in their stores, especially during the main harvesting season. (Ministry of Agriculture)

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17. Extension providers should expand extension training material to include topics such as nutrition and health, adapting to climate change, women-focused issues (promoting women in agriculture leadership positions, land ownership issues, access to finance and inputs), and life skills, such as money management and entrepreneurship. Programs geared toward youth need to be emphasized to train the next generation of farmers. (Ministry of Agriculture, NGOs, private sector)
18. Government extension, as well as NGO and private extension services, need to give more emphasis to targeting women and youth. Emphasis should be placed on the recruitment of female and youth as extension workers, as contact farmers and for any others who engage in the training of women and youths. (Ministry of Agriculture, educational institutions, NGOs, private sector)

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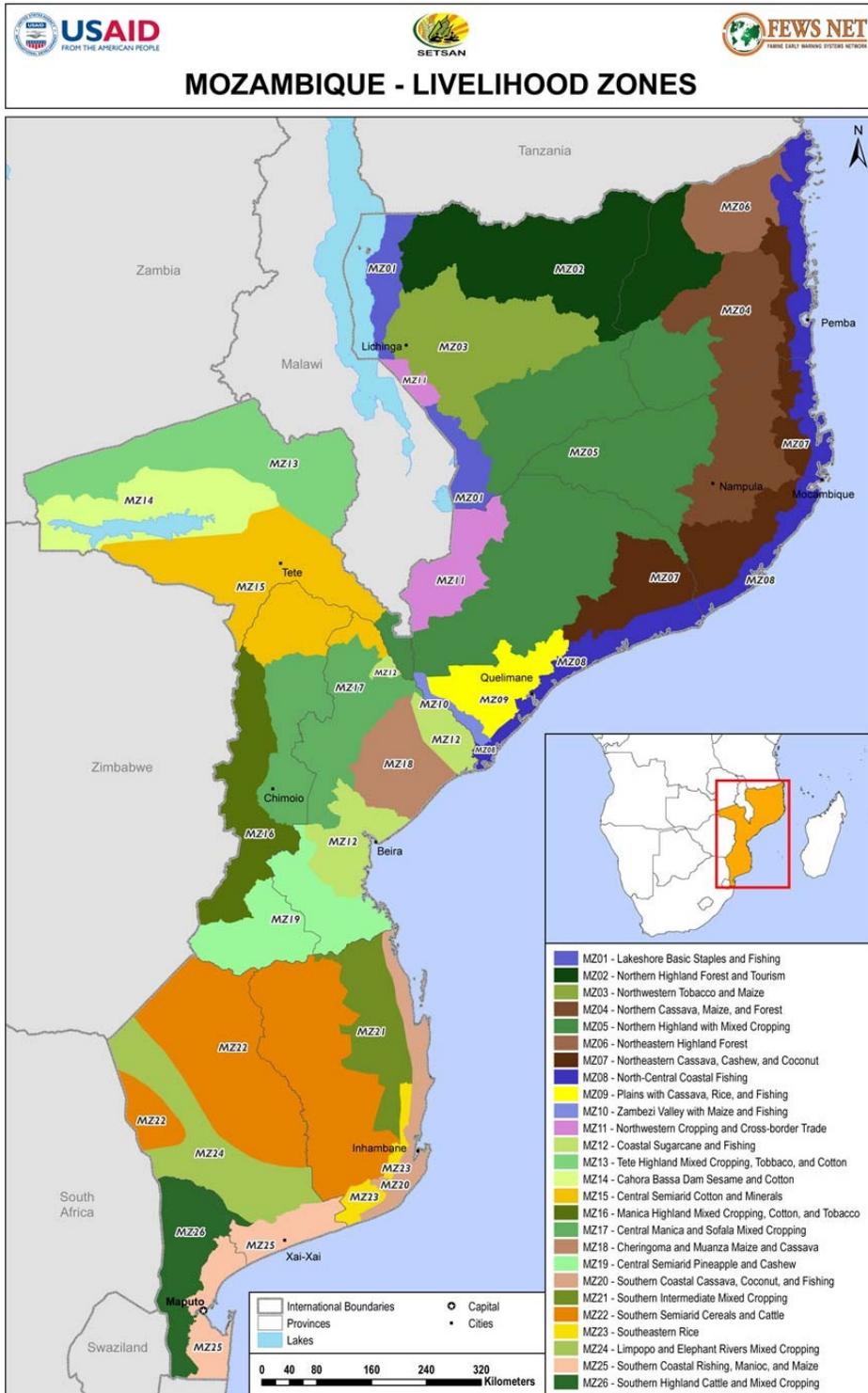
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ANNEX I. KEY INFORMANT INTERVIEWS FOR DLEC MOZAMBIQUE EAS REPORT

Key Informant Interviews for DLEC Mozambique EAS Report

Name	Institution	Occupation
José Manuel	SDAE Gurue	Extension supervisor
Carlos Filimone	DFTTP/IIAM	Researcher
José Dança	DNEA/Maputo	Extension Supervisor
Leitão Isabel	DNEA/Maputo	Extension Supervisor
Joaquim Labiano Gatalina	DPA Quelimane	M&E
Arsénio Candua	SDAE Alto Molócue	SDAE
Higino de Marrule	VUNA	Researcher
Tiana Campos	NCBA/CLUSA	E-Extension Project Manager
Zacarias Isac Mundiara	Save the Children	Researcher
Amanda Hilligas	Winrock	Senior Director, Agriculture & Enterprise
Fidel O'Donovan	Land O' Lakes	Chief of Party
Brian Webb	Tillers International	Chief of Party
Rui Santana Afonso	AgDevCo	Country Director
Paula Pimental	USAID	Responsible for RAMA project

ANNEX 2. LIVELIHOOD ZONES IN MOZAMBIQUE



Source: FEWSNET (2014)