



**MOZAMBIQUE POLICY ANALYSIS AND PLANNING CAPACITY FOR  
IMPROVED FOOD SECURITY AND NUTRITION OUTCOMES  
(MOZCAPAN)**

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**October 01, 2012 – September 30, 2016**

**Final Report**

## Executive Summary

This is the Final report of the Mozambique Capacity for Improved Agricultural and Nutrition Policy and Planning (MOZCAPAN). MOZCAPAN was originally awarded as a five year (October 01, 2012 through September 30, 2107) associate award under the Food Security III Cooperative Agreement, implemented by Michigan State University (MSU). MSU's activities under MOZCAPAN were conceived as one part of an overall five-year \$6,000,000 program of support by USAID Mozambique to build agricultural and food security policy analysis and formulation capacity within the country, consistent with the USAID-Mozambique Country Development Cooperation Strategy (CDCS), particularly Development Objective (DO) 2.

CEPPAG started slower than had been hoped and faces major challenges in building sustainable capacity to respond to policy analysis needs in the country, but made substantial progress across a wide range of fronts once it was approved by the UEM Council. Long-term partnering with one or more international research organizations will be needed to provide an initial funding horizon of sufficient duration and reliability for the center to build the staff it needs to maintain a core analytical agenda and reliably respond to government needs for policy analysis and design. Establishing a track record with a strong team in this way, CEPPAG would have the possibility of then continuing to gain the funding necessary to maintain a core team.

MSU dedicated much time and effort to supporting the CAADP process. The support to CAADP/PEDSA and PNISA included innumerable meetings, consultations, data analysis as input to working groups, hiring of consultants and development of their TORs, and other efforts to move the process along. Unfortunately due to reasons explained in the report, the progress was less than had been hoped. We see meaningful progress in three areas, to which MOZCAPAN made substantial inputs. First, unlike the previous planning instruments, the current five year plan, and the annual plan and budget, both reflect the objectives established in PEDSA and PNISA. Consistency across different planning instruments is a fundamental aspect of effective government programmatic development. Second, MSU efforts under MOZCAPAN were instrumental in mainstreaming nutrition issues into the programs of a wide range of public sector agencies. Third, the capacity that now exists in MASA/DEST to design, collect, and clean data from national agricultural sample surveys is a fundamental building block for any program that wishes to base its design on empirical information and monitor the likely impact of its actions.

MSU provided substantial support to the Monitoring and Evaluation (M&E) for Mission's the Feed the Future activities. During the life span of MOZCAPAN, two Gross Margins (GM) surveys were successfully conducted. A key accomplishment is that, by 2014, the training component of survey implementation had been transitioned fully to ANSA. Until this time, MSU had always led this activity.

Over the course of MOZCAPAN, MSU worked with partners in Mozambique to carry out research and outreach in four topic areas, leading to the production of 31 research papers, an additional 11 policy briefs were produced on a range of topics relevant to CAADP/PNISA investment decisions. The four topic areas were: a) Farmer supply response to high price environment and assessment of the determinants of smallholder crop commercialization; b) Conservation Agriculture; c) Research on Agriculture, Income

Diversification, Food Security and Nutrition, and Agrifood Systems Transformation and d) Smallholder Land Access and Issues in Commercial Agriculture and Development Interventions.

We highlight six lessons learned during the implementation of MOZCAPAN.

- First, policy process – in addition to policy itself - matters;
- Second, an obvious point that is too often overlooked, there must be local buy-in if policy process is to improve, and it can be too easy in program design to under-estimate the difficulty of obtaining it;
- Third, these first points suggest the importance of operating from a base that allows engaging flexibly with various “pressure points” in the system in order to achieve change. Engagement needs to be most intense with policy nodes that are most open and able to achieve change;
- Fourth, if local capacity to carry research and policy analysis is to be sustainable, there is a need to motivate personnel (adequate personal remuneration, resources for action, and a clear link in people’s minds between their performance and their rewards);
- Fifth, while the Mozambican public sector in general struggles mightily with these issues, there exists substantial variation in capacity and interest across governmental units that can be taken advantage of with the proper programmatic design.
- Finally, resources and time-frame matter. MOZCAPAN was envisioned as a five-year program that would be complemented by half-again as much USAID money to directly strengthen the food security and nutrition network. Though only one of several constraints that the program faced, the lack of complementary funding and one-year reduction in time frame reduced the progress that could be made in establishing a dynamic policy network.

Looking ahead to where USAID can make the greatest contribution in these areas, MSU continues to believe in the essential wisdom of the vision behind CEPPAG and REPPAG – a core investment in an organization outside a public line ministry, which would strategically link to multiple policy nodes within the public sector, and be guided by a board that includes representatives from the private- and civil society sectors, in addition to public sector. Medium-term linkages with multiple international organizations would be ideal, whether or not all such linkages are paid by USAID; the prospects for longer-term funding need clearly to be open, subject to agreed performance metrics and evaluation procedures.

Complementary elements of a USAID contribution would be a component of experimentation (with formal impact evaluation) with programmatic approaches to raising farm productivity; and continued improvements in the public data systems on which all those working for agricultural and broader economic development in Mozambique depend.

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## LIST OF ACRONYMS

AgRED	Agriculture and Rural Development Donor Working Group
ANSA	Associação Académica de Nutrição e Segurança Alimentar
CAADP	Comprehensive Africa Agricultural Development Program
CDCS	Country Development Cooperation Strategy
CEPPAG	Centro de Estudos de Programas e Políticas Agroalimentares
CESE	Centro de Estudos Socioeconómicos
DE	Direcção de Economia
DEST	Departamento de Estatísticas
FSG	Food Security Group
FSN	Food Security and Nutrition
FSP	Food Security Policy Innovation Lab
FY	Fiscal Year
GCFSI	Global Center for Food Systems Innovation
GOM	Government of Mozambique
IFAD	International Fund for Agricultural Development
IR	Intermediate Result
LWA	Leader with Associate Award
MAFS	Modernizing Africa Food Systems
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MEF	Ministry of Economy and Finance
MIC	Ministry of Industry and Commerce
MINED	Ministério da Educação
MOZCAPAN	Mozambique Policy Analysis and Planning Capacity for Improved Food Security and Nutrition Outcomes
MSU	Michigan State University
PAMRDC	Plano de Acção Multissectorial para a Redução da Desnutrição Crónica
PEARL	Program for Emerging African Research Leaders
PNISA	Programa Nacional de Investimento Agrícola
PRONAE	Programa Nacional de Alimentação Escolar
RENAPRI	Regional National Agricultural Policy Research Institutes
REPPAG	Rede de Estudos sobre Políticas e Programas Agroalimentares
SAN	Segurança Alimentar e Nutrição
SETSAN	Secretariado Técnico de Segurança Alimentar e Nutrição
SIMA	Sistema de Informação de Mercados Agrícolas
USAID	United States Agency for International Development
USG	United States Government
WP	Working Paper

# 1. Summary of the MOZCAPAN proposal

## 1.1. Background and Context

Three elements formed the essential background and context for the development and funding of MOZCAPAN. First, despite extremely rapid and sustained growth in per capita GDP of nearly 6% per year over the previous 10 years, Mozambique had seen very limited progress on poverty reduction. A fundamental reason for this disappointing result was reliance on highly capital intensive sectors such as aluminum processing and energy development, with insufficient investment in rural areas and in agricultural productivity.

Second, the international food price crisis that started in late 2007 focused the attention of government and international donors on agriculture. In Mozambique, this attention resulted in the completion of the Multi-Sectoral Action Plan to Reduce Chronic Undernutrition in 2010; the Action Plan for Reducing Poverty (PARPA); the Action Plan to boost Food Production (PAPA); and the Strategic Plan for Agricultural Development (PEDSA) in 2011. PAPA was a short-run response to the crisis while PEDSA took a longer-term view. Among donors, the crisis led to the formulation of the Feed the Future Program (FTF) by the United States; the FtF Multi-Year Strategy for Mozambique (2011-2015), which stated that the USG in Mozambique would support FTF objectives through cross-cutting investments in policy analysis and advocacy, as well as research and technology transfer; the Grow Africa initiative from the World Economic Forum working in collaboration with the African Union; and the G-8 New Alliance for Food Security and Nutrition. Together, these elements appeared to harken the arrival of an improved environment for making real progress in agriculture. All of these initiatives emerged as governments across Africa were beginning to pursue a growth-oriented agricultural development agenda through the CAADP initiative under NEPAD, with public-private agricultural investment plans at its center.

Third, across East and Southern Africa, several autonomous agricultural policy research centers had been formed over the previous five- to ten years, some of which (IAPRI in Zambia and Tegemeo in Kenya) were beginning to have some influence on government policies. These were seen as an attractive model for building sustainable capacity to contribute to the conception, design, and monitoring of improved agricultural policies and programs. Finally, Eduardo Mondlane University (UEM) by this time had transitioned into new leadership that made it a potentially attractive institutional home for such an effort.

With hard lessons learned from past experience regarding the difficulty of building sustainable capacity for policy analysis at this point in Mozambique's public sector, a decision was made to focus efforts in a new phase on creating a new center within UEM and linking it with public sector decision makers, as well as with the private- and civil society sectors.

## 1.2. Objectives and approach

MSU's activities under MOZCAPAN were conceived as one part of an overall five-year, \$ 6,000,000 program of support by USAID Mozambique to build agricultural and food security policy analysis and formulation capacity within the country, consistent with the USAID- Mozambique Country Development

Cooperation Strategy (CDCS), particularly Development Objective (DO) 2<sup>1</sup>. The USAID program, in turn, was envisioned to be the foundation of a multi-donor effort in the same area, with support from other donors to be generated through Agriculture and Rural Development Donor Working Group (AgRED), the donor coordination group for agriculture in the country.

Complementary objectives and activities anticipated under MOZCAPAN were as follows:

1. Support the development and implementation of the CAADP/PEDSA Agricultural and Food Security Investment Plan: This objective revolved around helping GOM to define (a) programmatic priorities for investment and (b) a policy agenda in support of the National Agricultural Investment Plan (PNISA). It also called for:
  - a. Integration of food security and nutrition in the PNISA
  - b. Contribute to defining the institutions arrangement for coordination of PNISA
  - c. Assist defining PNISA – Monitoring and Evaluation System
  - d. Contribute to PNISA implementation
2. Support Monitoring and Evaluation for the USG Feed the Future (FtF) Food Security Initiative: This activity involved developing a baseline and a system for monitoring performance of selected Feed the Future indicators; key among these were farmer gross margins and technology adoption. More broadly, MSU was to provide advisory support to the \$AID/BFS Feedback contractor in the development of the full FtF M&E system.

MOZCAPAN itself was to be funded at a level of \$3,899,648 over the period October 1, 2012 to September 30, 2017. In addition to the complementary objectives listed above, this funding, together with the remaining funds under the overall \$6 million USAID program and hoped-for funding from other donors, was to allow MSU to play the central role of partnering with the an emerging center for policy research at UEM to build an agricultural, food security, and nutrition policy *network* capable of driving an inclusive, evidence-based policy and program formulation process in the country in pursuit of economic growth, poverty reduction, and improved food security and nutrition. The center at UEM was to be the hub of the network, and joint research, formal capacity building, and joint policy outreach were to be the foundations of the program and the means of strengthening the center and building the network around it.

Nodes within the network were to be the policy units in the Ministry of Agriculture and Food Security (MASA); Mozambican Agricultural Research Institute (IIAM), Ministry of Economy and Finance (MEF) and Ministry of Industry and Commerce (MIC).

The policy network was to have four key design features. First, it would feature a balance between policy research and policy outreach. Second, the center at UEM would be independent of line ministries but institutionally linked to them - in particular to the policy nodes mentioned above - through a variety of mechanisms. Key among these mechanisms was researchers from the center at UEM dedicating a share of their time to training personnel in the public sector policy nodes, providing policy advice in

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<sup>1</sup> Resilient, Broad-based Economic Growth Accelerated (IR 2.1. Increased Agricultural Sector Growth and Food Security; IR2. 2. Improved Business Climate to attract investment and create jobs and IR 2.3. Improved Management of Natural Resources.

those ministries, and undertaking applied research with them that was relevant to those ministries' mission and mandate.

Third, the center at UEM would attract financial support from government and a range of donors, and would establish research and outreach links with local and international organizations. Included in this international partnering was an emerging network of policy research centers in East and Southern Africa – ReNAPRI, the Regional Network of Agricultural Policy Research Institutes; the center at UEM was anticipated to join this network. Fourth, capacity building at the center would be built around policy research, with students in various universities in the country involved in center research.

By the end of the five-year MOZCAPAN program, the following results were expected:

- An applied policy analysis and dialog network will have been established under the leadership of the center at UEM;
- The center at UEM would have:
  - o Adequate experience and capacity to compete for and receive and manage USAID and other donor funds;
  - o Capability to manage and coordinate a research program in collaboration with local and foreign research and academic institutions;
  - o Effective linkages with MINAG, MPD, MPF, MIC and other government agencies as needed that include provision of advisory and training services; and
  - o Ability to engage the private sector, civil society, academia, and government in policy debates and policy formulation.

### 1.3. Key changes in the program

Three major changes occurred over the life of MOZCAPAN. First, in October 2013 (one year after the start of the program), USAID requested that MSU directly fund start-up costs for the center at UEM, which had been named CEPPAG (Centro de Estudos sobre Políticas e Programas Agroalimentares). Originally these start-up costs were to be funded from other USAID funds meant for the food security policy program, or from a combination of those funds and funds from other donors. Second, USAID asked MSU also to fund the annual Gross Margins Survey from year 2 forward. MSU had designed this survey as part of its M&E support to the mission, but it was to be paid directly out of mission funds by contracting with ANSA, a local organization that had developed substantial experience in such surveys through previous experience with MSU and others.

The total anticipated cost (direct and indirect) of these two changes was \$1,783,763: \$608,026 for CEPPAG installation and start-up and \$1,175,737 for four years of the Gross Margins survey including MSU assistance to ANSA in learning to properly implement the survey. On this basis, and at USAID request, MSU on September 24, 2014, submitted a request to the mission for “Budget Ceiling Increase to Recover CEPPAG Year 2 Costs and GM Years 2-5” in the amount of \$1,783,763. This proposal would have increased the total budget for MOZCAPAN from \$3,899,648 to \$5,683,411 (See Annex A for a copy of the narrative of this request). These monies were to be added to the existing MOZCAPAN associate award under the Food Security III Leader-with-Associate Cooperative Agreement.

The third change is that, after extensive delays, it was established that it was not legally possible to add money to MOZCAPAN because the FSIII leader award had expired. With the total award thus capped at the original award amount, three actions were taken: (a) USAID agreed to forego the gross margins survey for years 3-5, (b) USAID requested that MSU prepare a budget realignment reflecting the new realized expenditure patterns including CEPPAG and one year of the gross margins survey by ANSA, and (c) the end date of the program was changed from September 30, 2017 to September 30, 2016 (a 12 month reduction in total duration) due to the unanticipated costs.

## 2. Accomplishments

### 2.1. Build capacity of a Mozambican agricultural/food security/nutrition policy network

The summary assessment of this core area of work for MOZCAPAN is that CEPPAG started much slower than had been hoped, made substantial progress across a wide range of fronts once it was approved by UEM leadership, but faces major challenges in building sustainable capacity to respond to policy analysis needs in the country.

Work on what became CEPPAG began in mid-2011, when MSU worked intensively with Dr. Tostão and other potential stakeholders to conceive a policy research center as a hub for a policy analysis network. By October of 2011 the structure and function of the center and network that would eventually be approved was developed. What followed was a nearly two-year process of review and eventual approval of a center at the university level within UEM, which occurred in mid-2013. MSU was in regular contact with Dr. Tostão during this time but could do little more than wait, and plan its assistance to be ready once the center was approved. Another more than two years elapsed before the official launch of the center, on October 27, 2015, at the ReNAPRI annual conference held in Maputo.

Progress started well before the official launch. By the end of MOZCAPAN, key accomplishments for CEPPAG were:

- The establishment of CEPPAG as a semi-autonomous center at the university level within UEM. This level of creation, rather than being placed within a Faculty, gave UEM much greater prominence and flexibility of action;
- Provision by UEM of core support to CEPPAG in the form of ample office space, administrative support, and salary support (normal UEM salary) for the CEPPAG director to function full-time in that role. This support was critical to the sustainable operation of CEPPAG, to free it from utter reliance for its existence on outside grant funding;
- Provision by MOZCAPAN of office equipment and six months of supplementary salary support for CEPPAG. Note that UEM salaries provided a base of support but would be insufficient to maintain a well-known PhD in the position of Director, since specialists in Mozambique and all other African countries now operate in a global market for such skills;
- Formation and use by CEPPAG of an Advisory Board that included representatives of the Ministry of Agriculture and Food Security (MASA); Ministry of Industry and Commerce (MIC);

and Ministry of Economy and Finance (MEF). Thus, the advisory board was the first step in creating the policy analysis network that was envisioned – referred to as REPPAG in the proposal, for *Rede de Estudos sobre Políticas e Programas Agroalimentares* – when CEPPAG was conceived;

- Integration of CEPPAG into ReNAPRI, which provided regional research contacts and access to a broader pool of funding for research work. As a key contributor to the creation of ReNAPRI, MSU was instrumental in securing CEPPAG’s entry into the network. The Director of CEPPAG most recently completed a one-year term as the head of ReNAPRI;
- Definition of a broad research agenda to guide CEPPAG activities and discipline the purposes to which external funding was put, in support of an organizing vision for the center. The 2015-19 Research Agenda, approved by the CEPPAG board, guides the design of Annual Research Plans. In the 2016 Research Plan CEPPAG worked on: (i) Monitoring Food and Agricultural Prices (with FAO), (ii) Emergent Farmers and Agricultural Land Dynamics (with Michigan State University and the University of Pretória), (iii) Land Titling in Mozambique (with IFPRI), (iv) Adoption Pathways to Sustainable Agricultural Intensification (with CIMMYT), and (v) Agriculture and Energy Nexus in Mozambique and Southern Africa (with UNU-WIDER), and (vi) work on ReNAPRI’s 3rd Agricultural Outlook for Eastern and Southern Africa.
- The winning of research grants by CEPPAG from MSU, IFPRI, UNU-WIDER, FAO, and CIMMYT, among others; engagement with MSU in research on changing land holding patterns and transformations in the downstream agrifood system within Mozambique;
- Support by MOZCAPAN to the training of senior academic staff at CEPPAG and more broadly at UEM in international standards regarding the use of intellectual property. This training built on similar training that MSU had done at the University of Zambia in response to serious concerns about deep and widespread plagiarism among students; upon investigation, similar patterns were found among students at UEM, giving rise to the proposal, welcomed by CEPPAG leadership, to conduct training on ethical standards and practical approaches to properly citing others’ work.

CEPPAG has fallen short of lofty expectations in several areas. Most important among these is CEPPAG’s inability yet to constitute a core team of full-time analysts to carry on the center’s work. Lack of sufficient core funding of long-enough duration is the key reason for the inability to put together such a team. Until CEPPAG is able to gain at least one large, multi-year award to accompany the multiple smaller and shorter awards it has already obtained, it is unlikely to be able to make progress on this front. Yet the lack of a strong core team will hinder its efforts to gain such funding.

Our conclusion is that long-term partnering with one or more international research organizations – CEPPAG already has strong relations but limited funding WITH MSU, IFPRI, and UNU-WIDER – will be needed to provide an initial funding horizon of sufficient duration and reliability that the center can bring on full-time analysts. Establishing a track record with a strong team in this way, CEPPAG would have the possibility of then continuing to gain the funding necessary to maintain a core team.

## 2.2. Support to CAADP/PEDSA and AFSCIP

The Comprehensive Africa Agriculture Development Programme (CAADP) is Africa’s policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth and prosperity

for all. In Maputo, Mozambique in 2003, the African Union (AU) Summit made the first declaration on CAADP as an integral part of the New Partnership for Africa's Development (NEPAD).

The principles and values that informed the implementation of CAADP in the first decade (2003 – 2013) will continue to guide the implementation modalities in the next decade (2015-2025). These include: African ownership and leadership; accountability and transparency; inclusiveness; evidence-based planning and decision making and harnessing regional complementarities. In addition, the sets of principles and values important to CAADP include: people-centered; private sector driven development; building of systemic capacity; subsidiarity; and peer learning and multi-sectorialism.

CAADP has four pillars to guide its investments:

**Pillar 1:** Land and water management

**Pillar 2:** Rural infrastructure and marketing (trade, market access)

**Pillar 3:** Increasing food supply and reducing hunger

**Pillar 4:** Agricultural research, technology dissemination, and technology adoption

MSU through MOZCAPAN was involved in the CAADP principle of evidence-based planning and decision making and harnessing regional complementarities. MSU participated in the stocktaking exercise that led to the design of the Strategic Plan for the Development of the Agricultural Sector (known as PEDSA) and the Mozambican CAADP Compact, which established a vision for a "prosperous agrarian sector: competitive, equitable and sustainable". The National Agricultural Sector Investment Plan (PNISA) was designed to reach that vision with five strategic objectives:

- 1) Increased agricultural production, productivity, and competitiveness
- 2) Improved infrastructures and services for markets and marketing
- 3) Sustainable use of land, water, forest and wildlife resources
- 4) Conducive legal framework and policies in place for agricultural sector growth
- 5) Strengthened agricultural institutions

Both CAADP and PEDSA with PNISA strive to enhance the contributions of agriculture to income growth and food security for millions of smallholder farmers and households living in poverty, while creating a dynamic private sector capable of moving technology and markets forward.

### Activities undertaken

MSU's support to CAADP fell into two broad areas. First, MSU directly supported activities for the design and implementation of the CAADP Compact, and of the PEDSA and PNISA. Second, MSU worked to create local capacity to generate the needed evidence to assist decision making and planning, particularly in the area of improving the agribusiness environment. We first explain the types of direct support that MSU provided to the CAADP/PEDSA/PNISA process, then highlight the capacity building activities that MSU undertook.

Direct MSU support to CAADP included the following:

- Working with representatives of the agricultural sector in defining indicators to track PNISA, and integrating these into a Results Framework. Due to slow progress on PNISA, the Results Framework has not yet been approved.
- MOZCAPAN contributed to the definition of the terms of reference of the Agriculture Sector Coordination Committee (Comité de Coordenação do Sector Agrário, CCSA) and the Joint Sector Review (JSR) for the CAADP Process. Unfortunately, neither of the two mechanisms for the coordination and mutual accountability have been formally established.
- MSU led a coalition of partners to ensure that the issues related to nutrition and food safety that are not clearly spelled out in PEDSA, were reflected in the National Agricultural Sector Investment Program (PNISA). MSU joined with others to successfully advocate for the inclusion of nutrition in agricultural programs and plans through the design of advocacy strategies of the Working Group for Plano de Acção Multisectorial para a Redução da Desnutrição Crónica (PAMRDC) and Scaling Up Nutrition (SUN). Partly as a result of this work, currently almost all public sector agencies with the potential to influence nutritional status take into account nutrition sensitive activities. MSU also contributed to the definition of the National School Feeding Program and to the training of key staff under the Department of School Feeding and Nutrition of the Ministry of Education and Human Development.
- The project worked with the ministry of agriculture and IFPRI to organize three annual national policy dialogues through multi-stakeholder Conferences. These policy dialogues were attended by government officials; non-government organizations; development partners; academia; and producers. Topics related closely to core areas of focus of CAADP, such as investment priorities in agriculture; the role of agricultural research and extension; strategies for increasing agricultural productivity, and strategies for promoting Mozambican agribusiness response to rapidly growing urban markets for value-added food.

MSU support to capacity building included formal training, mentoring and coaching in various areas, particularly those related to data handling and analysis. Activities included:

- MSU supported DE and CESE/IIAM in several value chain, profitability, adoption and other studies, and provided training in the social sciences in agricultural research, data analysis, and benefit-cost analysis. With assistance from MSU, CESE staff completed six (6) reports on two main topics: value chain analysis of charcoal and potatoes; and profitability analysis of rice, maize, and poultry. MSU also supported X formal training sessions for CESE staff (AND OTHERS??) covering use of stata for data handling, basic econometrics, PLEASE COMPLETE THE LIST.
- Under the supervision of MSU researchers, four DEST staff completed their BSc (Licenciatura) thesis. This represents 80% of the total senior staff serving under DEST. Completion of the *Licenciatura* by DEST translated into better handling of data processing, witnessed by much cleaner TIA data even in its “version zero”.
- Training on the use of Stata, and mentoring also extended to the Zonal Centers (e.g., *IIAM's Centro Zonal Centro*), INE, UEM, and continuous engagement with DAP/MASA. MSU reviewed and edited DAP's studies on the action plan to boost food production (PAPA) and the Agricultural Technology Transfer Integrated Program (PITTA).

- MOZCAPAN Senior staff mentored several local scientists particularly those attached to the National Agricultural Research Institute and Directorate of Economics within MASA. The Department of Statistics (DEST) of MASA is now able to conduct independently the field operations of rural household income data collection, along with data entry and initial cleaning. This required an enormous effort, patience and persistence from MSU staff. Training, coaching and mentoring in areas such as data collection, data entry, data cleaning, data analysis using the Statistical Package STATA were conducted.
- MSU gave formal mentoring to three women researchers attached to CESE, under the African Women in Agricultural Research and Development (AWARD).
- Over 260 individuals received USG support for short term training in agricultural enabling environment under MOZCAPAN.

Indicator	Disaggregation	FY13	FY14	FY15	FY16
Number of individuals who have received USG supported short term agricultural enabling environment training	Male	69	40	40	50
	Female	10	15	20	25
Number of Studies		12	10	11	5

### Summary of accomplishments:

MSU dedicated much time and effort during the first two years to supporting the CAADP process, as described above. This included innumerable meetings, consultations, data analysis as input to working groups, hiring of consultants and development of their TORs, and other efforts to move the process along. In the end, there is no question that, due in large measure to unfavorable working conditions in MASA, the progress was less than had been hoped: as noted above, the PNISA Results Framework has not yet been approved; and neither the CCSA nor the JSR have been formally established.

Yet meaningful progress was made to which MOZCAPAN made crucial inputs. We highlight three of these. First, unlike the previous planning instruments, the current five year plan (Plano Quinquenal do Governo or PQG) and the annual plan and budget, both reflect the objectives established in PEDSA and PNISA. The objective of the new Government Five Year Plan (PQG 2015-2019), finalized in May 2015, is to improve the living conditions of the Mozambican people. It is partly based on the internationally agreed development goals, such as the MDGs, and Sustainable Development Goals (SDGs). The programmatic areas are: 1. Consolidate National Unity, Peace and Sovereignty; 2. Human and Social Capital Development; 3. Promote Employment and Improve Productivity and Competitiveness; 4. Economic and Social Infrastructure Development; 5. Ensure Sustainable and Transparent Management of Natural and Environmental Resources. MASA has identified its contributions to the new PQG 2015-2019, specifically programs 2, 3 and 4, and has adapted its strategy and sector investment plan.

Second, and as discussed in more detail above, MSU efforts under MOZCAPAN were instrumental in mainstreaming nutrition issues into the programs of a wide range of public sector agencies. Third, the

capacity that now exists in MASA/DEST to design, collect, and clean data from national agricultural sample surveys is a fundamental building block for any program that wishes to (a) base its design on empirical information and (b) monitor the likely impact of its actions.

### 2.3. Support to M&E for the mission/FTF

#### MSU engagement prior to MOZCAPAN

MSU has provided support to M&E activities of the mission since the year 2000. From then up to 2010, the focus was on measuring changes in rural incomes of households that received interventions from USAID-funded NGOs. MSU developed a methodology in 2000 that was revised in 2006, to estimate proxy measures of income using model and data collected using household surveys that the partner NGOs could quickly implement and analyze. This method became known as INCPROX.

For impact evaluation purposes, the surveys were also administered to households that did not receive direct interventions from the partner NGOs.

In 2008 MSU assumed responsibility from the NGOs for the field implementation of the INCPROX surveys. Starting in 2010, MSU sub-contracted the Food Security and Nutrition Association (ANSA) to implement these surveys. The reason for this change was to build local capacity for such work by transferring implementation to a local organization and working closely with them in the initial years on design and implementation.

After the launch of the Feed the Future Initiative (FTF) in 2010, MSU was tasked with generating the FTF agricultural performance indicators using data collected from households that receive interventions through the mission's partner NGOs. This involved more indicators than those obtainable through the INCPROX surveys. In particular, the new indicator scheme required estimation of the actual crop income component of household income between target- and control groups. As in INCPROX, beneficiary and non-beneficiary households were both sampled to allow for this comparison. A separate analysis was also undertaken to compare statistics from these two groups with a sub-sample of the households in the national agricultural survey in the same districts.

#### Activities and accomplishments during MOZCAPAN

The two main activities carried out during the implementation of MOZCAPAN were the Gross Margins Surveys of 2012 and 2014. The 2012 sample included 1696 beneficiary households and 521 non-beneficiary households in selected districts in Nampula, Zambezia and Manica provinces. The area is collectively referred to as the FTF Zone of Influence (ZOI). The beneficiary households came from 4,125 associations with a membership of over 87,000 farming households that received assistance from Agrifuturo, the Adventist Relief and Development Agency (ADRA), Save the Children and World Vision.

The 2014 sample included 1067 current/future informal beneficiary households. It was drawn from 1024 associations/groups with a total membership of more than 34,000 households. All but 67 groups were covered by Agrifuturo. The rest worked with CIAT, CIMMYT, ICRISAT, IFDC and IITA. Agrifuturo's operations were suspended for part of the year 2013 as they underwent the contract renewal process and they resumed only after the start of the 2013/14 agriculture season. Though it was anticipated that interventions received during the season may not be adequately reflected in the 2014 outcomes that were studied, USAID made the decision to pursue the survey given the huge overlap in member associations from the 2012 frame.

A key accomplishment under this portion of MOZCAPAN is that, by 2014, the training component of survey implementation had been transitioned fully to ANSA. Until this time, MSU had always led this activity. ANSA also hired technical staff from the Directorate of Economics of the Ministry of Agriculture involved in doing the National Agricultural Survey (IAI) to assist in training the enumerators and preparing the plan of operations. These Ministry staff had been recipients of the capacity building efforts of MSU in survey implementation since the late 1990s, testifying to the effectiveness of that earlier training within MINAG. Later discussions within MSU also identified CEPPAG as a future potential implementing organization for this type of survey.

Additionally, MSU presented very useful feedback from our own review of the sampling frame as well as survey staff field reports to USAID staff on issues relating to the completeness and quality of sampling frame, adequacy of monitoring activities, and comparability of beneficiaries and attribution of outcomes. USAID emphasized how helpful this feedback was in their

## 2.4. Conduct of policy relevant research and outreach

Over the course of MOZCAPAN, MSU worked with partners in Mozambique to carry out research in four topic areas, leading to the production of 31 research papers. An additional 11 policy briefs were produced on a range of topics of relevance to CAADP/PNISA investment decisions. In this section we summarize key research results for each topic area, and provide brief summaries of results from each paper. Annex A provides summaries of every report. Here we provide overall summaries for each topic area.

### Topic 1. Farmer supply response to high price environment and assessment of the determinants of smallholder crop commercialization (16 reports)

**Summary:** As discussed earlier in this report, very slow growth in agricultural productivity has been a major problem in Mozambique and a key contributor to the country's poor performance on poverty reduction over the past two decades. As such, the large increase in commodity prices beginning in 2008, and programmatic responses to it, provided a natural opportunity to study the impacts of the new environment on farmer behavior. Key questions were whether farmers responded with higher output, and what mix of extensification and intensification was present in the response. A key basis for several analyses in this area was the "partial panel" survey that MSU conducted immediately prior to the start of MOZCAPAN. This survey revisited farmers from the 2008 national agricultural survey (TIA) in Nampula, Zambezia, and northern Sofala and Manica provinces during 2012. Using these data and others, MSU and its colleagues produced 16 research papers and policy briefs grouped around the topic of smallholder productivity and crop commercialization (X of these were reprints of papers produced by MSU under other funding that were judged relevant to Mozambique).

Synthesizing across these studies, the following conclusions stand out. First, nearly all crops saw increases in productivity and in farmer commercialization over the study period. Second, some of these increases was driven by farm intensification, not extensification. These findings were not commonly appreciated in Mozambique, where the perception of a stagnant rural sector is strongly embedded among most observers. Second, some crops such as pigeon pea and (in more restricted areas) soybean saw very large increases in production in response to strong market demand. Third, this progress, though real, has been too slow to raise large numbers of farmers out of poverty or to reduce Mozambique's productivity gap compared to its neighbors.

Fourth, receipt of market information substantially increases market of smallholder farmers, and this participation has significant impacts on farming productivity; increased provision of market information may contribute to behavioral changes that lead to higher productivity among poor Mozambican farmers.

Finally, despite some progress, the fundamental challenges for Mozambican smallholder agriculture remain what they were a decade ago: improve the availability and use of improved seeds and fertilizers, promote use of animal traction in areas that have a history of such, and continue to improve market access through improved rural infrastructure and market information.

## Topic 2. Completion of Research on Conservation Agriculture (five reports)

**Summary:** Increasing agricultural productivity remains a priority to reduce poverty in Mozambique. In fact, this is the main conclusion from the country's last two national poverty assessments. One approach to raising productivity that has garnered persistent attention from donor and government agencies, and NGOs, is conservation farming (CA). Yet uptake by farmers often remains unimpressive despite apparently favorable economics for the smallholder farmer. Under this topic we conducted five studies that map all the stakeholders involved in the promotion of conservation agriculture in the country; provide an inventory of the technologies being promoted; review scientific literature and project reports in order to better assess what is known about CA in Mozambique; and examine the role for farmers' participation in locally adapting conservation agriculture and the challenges researchers and development agencies face in using innovation networks for CA adaptation.

Four conclusions stand out. First, manual CA systems of reduced tillage predominate, but CA inputs such as herbicides and equipment such as rippers, jab planters, and direct seeders are generally unavailable. These technologies have the potential to increase agricultural productivity but must be locally adapted. Second, smallholder farmers tend to use different CA components separately, and only a few combine them; few use what researchers and promoters consider a full package of CA techniques. Third, research gaps include both biophysical (e.g., lack of basic agronomic studies for the different agro-ecological zones) and socio-economic studies to better understand farmer decision making and the profitability and riskiness of CA relative to the conventional system of production. Fourth, the majority of stakeholders working on CA agree that i) CA is useful for most smallholders in Mozambique but needs to be adapted to local conditions through research that is closely linked with farmers' reality; and ii) manual forms of CA are seen as the most immediately relevant to smallholders.

## Topic 3: Research on Agriculture, Income Diversification, Food Security and Nutrition, and Agrifood Systems Transformation (seven reports)

**Summary:** Achieving nutritional changes through agricultural interventions is complex, and there is a need to understand the various mediating relationships in the nutrition-agriculture linkage. For example, nutritional status is lower in northern Mozambique, a region of higher production than in the south. Nutritional status is also linked to diet transformation that is unfolding in many developing countries. Given the complexity of these linkages it is important to think beyond advocating for a single approach and to instead think about building a larger, coherent strategy that comprises many varied approaches. Income diversification makes farmers more resilient to climatic shocks as the income from nonfarm activities can either be invested in agriculture to achieve higher productivity that can improve nutritional status, or can be reinvested in businesses to ensure continuing income from them, also with potential nutritional benefits.

Under this broad topic a total of seven studies were conducted. The main conclusions are the following. First, analysis of data from agricultural surveys shows that food insecurity increased between 2002 and 2008, and this coincides with a period of little progress in poverty reduction. To achieve broad-based food security in rural Mozambique, interventions may need to focus on addressing these drivers to increase agricultural productivity while enhancing resilience to price and weather shocks. Interventions must also be spatially targeted and tailored to each segment of the population.

Second, the results suggest that as long as incomes in ESA continue to rise at levels near those of the past decade, the transformation of their economies is likely to advance dramatically. Key features will be: sharp decline in the share of the workforce engaged in farming even as absolute numbers rise modestly, sharp increase in the share engaged in non-farm segments of the agrifood system, and an even sharper increase in the share engaged outside the agrifood system

Third, the results indicate that there is a need to use a range of instruments in a multisectoral manner in order to achieve a significant reduction in malnutrition, especially chronic malnutrition. Increasing the production and availability of food is an important step but food and nutritional security also require investments in human capital that can lead to behavioral changes that improve food security status.

#### Topic 4: Smallholder Land Access and Issues in Commercial Agriculture and Development Interventions (three reports)

**Summary:** Mozambique uses no more than 15% of its 36 million hectares of arable land. Data from agricultural surveys show that farmers believe they could obtain more land if they wanted too. It is thus puzzling that the average cropped area per household hovers around 1.5 hectares, quite small for a country considered to be land-abundant. There is much scope to increase agricultural production either through extensification, intensification or a combination of both, and its link with commercial agriculture.

Under this topic we conducted three studies: one examined the potential for smallholder area expansion using animal traction, another evaluated the impact of activities related to ‘improving land access in urban hotspot areas’, and the final one focused on spillover effects from large farm investments in Mozambique.

Key conclusions from the three studies are the following. First, there is a strong significant negative effect of disease pressure on animal traction ownership, but that this is much reduced in villages with access to vaccination. Any efforts to promote animal traction in the north of the country would not only need to assess the level of trypanosomiasis prevalence and provide access to treatment, but would also need to consider how the additional constraints could be met prior to any cattle restocking promotion.

Second, the results of the baseline data analysis presented in this report provide a picture of the status of surveyed households in study areas of Nampula city and Monapo across three broad categories: a) socio-economic characteristics (i.e., demographics, sources of income, asset holdings, and access to credit; b) land characteristics (i.e., land ownership, land markets, land investments, perceptions on tenure security and knowledge about land law and rights); and c) welfare characteristics (i.e., level of income, consumption and expenditure).

Third, the number and area of large farms within 25 or 50 kilometers of these investments raised use of improved practices, animal traction, and inputs by small farmers without increasing cultivated area or participation in output, credit, and nonfarm labor markets. The limited scope and modest size of the estimated benefits point toward considerable unrealized potential.

## Policy Syntheses of Research Relevant to the CAADP/PNISA Process (11 briefs)

**Summary:** MSU has conducted many studies on agricultural development, poverty reduction, food security and nutrition, just to name a few topics. In order to make all these studies more accessible to the general public, we summarized findings of all studies into four policy briefs, each covering one of the four CAADP pillars: i) extending the area under sustainable land management and reliable water control systems; ii) improving rural infrastructure and trade-related capacities for market access; iii) increasing food supply, reducing hunger, and improving responses to food emergency crises; and iv) improving agricultural research, technology dissemination and adoption.

1. [Investment in Research and Extension: An Imperative to Increase Agricultural Productivity](#). Rafael Uaiene, Raul Pitoro and Jaqueline Massingue. July 2013. *Flash* Nº65 E.

To reach the annual agricultural growth envisaged by PEDSA, research, innovation and the adoption and diffusion of improved technologies are fundamental. The research and innovation system requires strengthening of human, financial and material capacity so that it can substantially improve its performance. Technical innovation in agriculture will not happen without organizational innovation. This flash analyzes the current situation of agricultural research and extension as key pillars of PEDSA. It presents the main findings of various studies and provides policy recommendations to improve the performance of agricultural research and extension, and consequently the agricultural sector as a whole.

2. [Food Availability and Quality of Diet in Mozambique: Linking Agriculture to Nutrition](#). Jaqueline Massingue, Cynthia Donovan and James Garrett. July 2013. *Flash* Nº 64E.

Even with the economic growth in recent years in Mozambique, the agricultural sector is still not exploiting its full potential to reduce poverty and food and nutrition insecurity. The food system is limited in its contribution and needs multisectoral responses to address the crisis. Within the food system, there is a need to improve productivity, efficiency, value chains, and the quality and diversity of food for consumption. In collaboration with the private sector, the public sector can invest in various interventions. This Flash focuses on interventions for the following objectives: 1) agricultural productivity, especially for products of high nutritional value, 2) greater efficiency and less market losses, 3) availability of more nutritious food in markets, and 4) increased diversity of products in the diet; 5) increase in income opportunities for vulnerable households, and 6) general education and nutrition. Multisectoral action at all levels is needed to ensure that economic growth results in food security and nutrition, which is the challenge of CAADP Pillar III.

3. [Agricultural Marketing and Development in Mozambique: Research Findings and Policy Implications](#). Rui Benfica and David Mather. June 2013. *Flash* No.63E.

Increasing smallholder participation in food and cash crop markets in Mozambique and improving the performance of these output markets are vital for achieving the goals of rural poverty reduction and household food security. This Flash synthesizes key empirical research findings from Mozambique related to factors associated with smallholder participation in food and cash crop markets, food and cash crop market performance, and implications of these findings for state investments and policy. Key investments required to improve smallholder market participation and market performance are needed in the following areas: rural road infrastructure; development/dissemination of improved inputs; improving the spatial coverage and targeting of SIMA price data; improving local storage capacity; expanding the electricity grid. Key policies include: improve competition and introduce incentive based monitoring systems for out-grower schemes; facilitate smallholder inclusion in sugar cane development; phase out

the VAT applied to imported maize grain and/or solve problems related to VAT in agriculture and agricultural imports; if the state chooses to use its grain reserve for price stabilization, it must adopt a rules-based, predictable and transparent approach to state operations in markets so that the private sector understands the specific market conditions that will trigger government interventions.

4. [Sustainable land and water management in Mozambique](#). Benedito Cunguara and Rafael Uaiene. July 1, 2013. *Flash* N.º62E.

This flash summarizes findings from previous studies on Mozambique that cover CAADP Pillar I about sustainable land and water management. The authors find that both land and water are used inefficiently and far below their potential. Access to agricultural services is low and decreasing, as well as the use of modern agricultural inputs. The role of the public sector in agriculture has not been very proactive, contributing to reduced investments both by the public and the private sectors. Better use of land and water is a necessary condition to reduce poverty, and entails reducing the gap between potential and the actual production and productivity levels. More than any other development stakeholder, the Government has enormous responsibility in stimulating agricultural growth through the design and implementation of agricultural policies and investments that are favorable and conducive to public-private partnerships that would benefit about four million smallholder farmers in rural Mozambique. We provide some examples of such investments.

5. [Factors influencing the use of improved inputs by smallholder farmers in central Mozambique, 2010/11](#). Bordalo Mouzinho, Benedito Cunguara, Eunice Cavane, and Cynthia Donovan. January 2015. *Flash* N.º71E. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN; CEPPAG through Cavane)

This flash looks at the factors influencing the use of improved inputs, using data from a survey on Price Dynamics carried out in central and northern Mozambique in 2011. Findings suggest that at present the use of inorganic fertilizers is only closely tied to growing crops with higher economic value and an assured market. In addition, households with higher asset levels or headed by males are more likely to access fertilizers. Extension, credit and price information were strongly linked with the use of improved maize seeds. Given the importance of these inputs in increasing productivity and their limited use among most smallholder farmers, a greater emphasis should be placed on improving the access to information and input markets. This includes various options. First, there should be continued efforts to improve smallholder access to inputs through financial market development and strategic programs, including vouchers and credit. Second, increased market opportunities for cash crops and staple crops help to ensure farm income and investment options. Third, greater public and private investments should be made to improve the existing roads by expanding and refurbishing them, in addition to improvements in the access to electricity. Livestock may contribute to the assets available to the household for obtaining inputs. Given the potential contribution to soil fertility with manure, ensuring livestock health is another area for public and private investments.

6. [Typology of Horticultural Producers Supplying Maputo](#). Jennifer Cairns, David Tschirley & Isabel Cachomba. November 2013. *Flash* N.º70E. (Key local collaborating institution: IIAM/CESE through Cachomba)

Using data from the 2013 horticultural baseline study conducted as part of the trilateral partnership between Mozambique, Brazil, and the United States, this flash characterizes the smallholder horticultural producers supplying the city of Maputo. Cluster analysis is used to partition households into four groups

based on 32 dimensions of technology endowment, capacity, and behavior. Results of this study indicate that there is a great diversity of horticultural producers in Maputo, ranging from those generally characterized by low land endowment, access to extension or training advice, and diversity of horticultural sales (cluster one) to those with high levels of the same indicators (cluster four). Level of technological capacity among the producers does not correspond with specific geographic regions of our study, as the producers of Moamba and Boane most commonly appear among the least technified farmers (primarily the dispersed producers in these areas), but also frequently appear among the most technified producers (generally those with shared central irrigation systems). Producers in the zonas verdes tend to be more uniform in the level of technology they apply, making up most of the two middle clusters (two and three).

7. [Risk Perception and Behavior in Pesticide Use by the Horticultural Producers of Maputo](#). Isabel Siteo Cachomba, Jennifer Cairns, David Tschirley & Jason Snyder. October 2013. *Flash* N°69E. (Key local collaborating institution: IIAM/CESE through Cachomba)

This flash examines the perceptions of horticultural farmers in the province of Maputo with regard to pesticides, as well as the behavior that these producers exhibit concerning use of these chemicals. The analyses are based on data from a baseline survey conducted within the trilateral project (Mozambique, Brazil and the United States) also known as the horticultural food security project (PSAL). The survey took place from May to June of 2013 in the green belt of Maputo, and in the nearby districts of Boane and Moamba. The results of this study indicate that the most used pesticide among farmers in these areas - Methamidophos - is classified as highly toxic by both the Environmental Protection Agency of the United States (EPA) and the World Health Organization (WHO). Producers in these areas generally hold the perception that almost all pesticides are highly toxic (even those that are less toxic according to the EPA and WHO), yet do not take proper precautions of pesticide handling or use.

8. [Input Use and Channels Among the Horticultural Producers of Maputo](#). Jennifer Cairns, Isabel Cachomba and David Tschirley. October 2013. *Flash* N°68E. (Key local collaborating institution: IIAM/CESE through Cachomba)

Using data from the 2013 horticultural baseline study conducted as part of the trilateral partnership between Brazil, the United States, and the Mozambican Agricultural Research Institute (IIAM), this flash explores producers' input purchase channels in terms of their formality, frequency, location and value, as well as their methods of irrigation. Principal findings are: (1) Among producers of the zonas verdes of Maputo, the most common source for purchases of seed, pesticide and inorganic fertilizer are informal comerciantes ambulantes, (2) seeds are farmers' largest input cost (compared to pesticides and fertilizer) but farmers generally have low levels of knowledge about the varieties of seeds they use or the benefits of these varieties compared to others, (3) farmers with more land under cultivation and more technological capacity (a) use more inputs and (b) are more likely to purchase these inputs in a formal channel rather than an informal channel, and (4) among users of water pumps in Moamba and Boane (58%), spray or drip irrigation is used by less than 4% of households, whereas irrigation with water pumps is nearly nonexistent in the zonas verdes (0.7%). This leads to large labor demands in both of these areas for regular manual irrigation or trench-digging (in the case of gravity-fed irrigation methods).

9. [O uso de fertilizantes químicos pelo sector familiar em Moçambique](#). Todd Benson, Benedito Cunguara e Tewodaj Mogues. Setembro de 2013. *Flash* No. 66P. Original English version published as [IFPRI Policy Note #5](#).

This paper presents the results of a broad study of fertilizer supply to smallholder farmers in Mozambique that was done to assess whether the taxes (explicit or implicit) that are applied at various points along the fertilizer importation and marketing chain, or the absence of key public goods and services, reduces the access that smallholder farmers have to fertilizer. The study involved a review of the literature of fertilizer supply, demand, and use; interviews with key participants in fertilizer importation and marketing in Mozambique; and two surveys—one with farmers and the other with input suppliers—in two farming areas where more fertilizer is used than is the norm for the country as a whole. The results indicate that the government can take two fertilizer-specific initiatives to accelerate use of fertilizer in Mozambique by smallholders: 1) Overcoming information constraints that smallholder farmers who might use fertilizer face. This includes both information on the proper agronomic use of the appropriate types of fertilizer on specific crops under specific agroecological conditions and information on the proper economic use of fertilizer under changing input and output market conditions so that farmers can derive reliable profits from their use of the technology; 2) Regulatory reform needed. The fertilizer regulations currently being proposed for Mozambique, if comprehensively implemented, would be a poor fit for the public benefits sought through the regulations. A considerably lighter regulatory regime would allow more fertilizer into Mozambique, resulting in lower costs for farmers. The Ministry of Agriculture should be judicious in its implementation of this legislation. Efforts to assure the quality of fertilizers in open and competitive markets are best achieved through self-regulation processes tied to sufficient information on product quality for farmers and ample choice in suppliers, rather than through heavy regulation and costly enforcement.

10. [Regional Inequality and Polarization in the Context of Concurrent Extreme Weather and Economic Shocks](#). Julie A. Silva, Corene J. Matyas, Benedito Cunguara. Research Paper 77E. May 2014.

This study examines how extreme weather influences regional inequality and polarization within Mozambique in the context of on-going economic shocks. Utilizing satellite-based estimates of rainfall spatially analyzed within a GIS, we establish a 16-year rainfall climatology and calculate monthly rainfall anomalies for 665 villages. We approximate storm-total rainfall from all tropical cyclones entering the Mozambique Channel, as well as the extent of damaging winds for those making landfall, between 2005 and 2008. We group villages according to tropical cyclone impacts and use hierarchical cluster analysis to group the remaining villages according to shared patterns of monthly rainfall anomalies. Using economic data from the 2005 and 2008 National Agricultural Surveys of Mozambique, we relate weather patterns associated with near normal rainfall, tropical cyclones, flooding, and drought to changes in inequality and polarization by conducting decomposition analyses of the Gini index and Duclos-Esteban-Ray (DER) polarization index. Our findings mainly correspond to the generally accepted view that weather shocks exacerbate existing income and power disparities within societies. However, in some cases we find evidence that inequality and polarization can decline in the aftermath of an extreme event, and increase even where the weather is relatively good. By identifying varying effects of extreme events on inequality and polarization at subnational level, our study enables a more detailed understanding of weather-related effects on socio-economic outcomes in rural societies rapidly integrating into the global economy.

11. [Análise situacional, constrangimentos e oportunidades para o crescimento agrícola em Moçambique](#). Benedito Cunguara, James Garrett, Cynthia Donovan, Célia Cássimo. Relatório de Pesquisa 73P. 15 de Julho de 2013.

The objective of this study is to review the available literature on Mozambique concerning the constraints to agricultural growth, and opportunities for growth. The analysis is guided by the four CAADP pillars: i) extending the area under sustainable land management and reliable water control systems; ii) improving

rural infrastructure and trade-related capacities for market access; iii) increasing food supply, reducing hunger, and improving responses to food emergency crises; and iv) improving agricultural research, technology dissemination and adoption. The study also looks at cross-cutting issues.

### 3. Lessons Learned

MOZCAPAN contributed to real progress on a number of fronts, but fell short of the lofty expectations of creating a vibrant and viable agricultural, food security and nutrition (FSN) policy network capable of driving an inclusive, evidence based policy and program formulation. We take several lessons from this experience.

First, policy process – in addition to policy itself - matters. CAADP was largely focused on improving the policy process in the countries in which it worked. As an “African-led” effort, there was hope that it would gain greater traction locally than previous efforts had been able to do. While this happened to great degree in some countries, it happened to only a limited extent in Mozambique, for a variety of reasons that are beyond the scope of this report to explore.

Thus, our second lesson is obvious but needs to be said: there must be local buy-in if policy process is to improve. More to the point, it may be too easy, in formulating programs that require local buy-in, to under-estimate the difficulty of gaining it.

Third, these observations suggests the importance of operating from a base that allows engaging flexibly with various “pressure points” in the system in order to achieve change. A program needs to be able to engage most intensely on a technical basis with the policy nodes that are most open and able to achieve constructive change, while nudging less dynamic nodes toward the needed change through a range of mechanisms. Progress needs to be made where and when it can.

Fourth, this kind of dynamism in such nodes is inextricably linked to the level of motivation of the personnel. This in turn depends on at least three things: adequate personal remuneration, resources for action, and a clear link in people’s minds between their performance and their rewards (salary, promotions, and level of autonomy in making decisions).

Our fifth point is that, while the Mozambican public sector in general struggles mightily with these issues, there exists substantial variation in capacity and interest across governmental units that can be taken advantage of with the proper programmatic design. We thus return, as in the beginning of MOZCAPAN, to the need for a focus on strengthening of networks, with agile management that can direct resources and attention to the points in the network where it is judged that positive outcomes, including positive change, are likely to occur. As always, these networks need to include active engagement with private sector and civil society, rather than being limited to public sector ministries.

Finally, resources and time-frame matter. MOZCAPAN was envisioned as a five-year program that would be complemented by half-again as much USAID money (\$2 million compared to the nearly \$4 million allocated to MOZCAPAN) to directly strengthen the food security and nutrition network; it was also hoped that other donor funding would come available in a coordinated program. In the end, the

extra USAID funds were not available, other donor funds were spent without specific reference to the desired policy network, and MOZCAPAN's duration was cut from five- to four years. Though only one of several constraints that the program faced, these issues reduced the progress that could be made in establishing a dynamic policy network.

## 4. Looking ahead

Mozambique needs to find a way, over the next five- to 10 years, to spur broad-based growth that drives more rapid poverty reduction. In thinking about how USAID might contribute to this objective, we start with several observations that reflect our views of the country's current situation and the fundamental drivers of inclusive growth. We then lay out a vision for an approach that could make an important contribution to spurring such sustainable growth.

Our first observation is that the country has yet to enter into a pattern of sustained growth that drives rapid poverty reduction. Official data (Quarta Avaliação da Pobreza e Bem-Estar, 2016) shows that poverty fell from 69.7% in 1996 to 46.1% in 2015 but for each percentage point of economic growth poverty reduced by only 0.26 percentage points. This is about half as fast as what Sub-Saharan Africa has achieved on average for a given level of growth. The report found that poverty remains much higher in rural areas and is becoming geographically concentrated in some provinces.

Second, there is no solution to the growth-with-equity problem without a solution to the country's ongoing political and security crisis. The government of Mozambique must find a way to tackle high-level corruption and resolve the conflict with RENAMO, or the public- and private investments needed for broad, sustained growth that fuels poverty reduction will not happen.

Third, assuming such a solution is found, broad growth with rapid poverty reduction will not occur without rapid increases in the productivity of rural people. A large majority of the population, and an even larger majority of the poor, continue to live in rural areas. Growth and poverty reduction will not take-off without dramatic increases in rural dynamism.

Fourth, more than in any other country in the region, reducing rural poverty in Mozambique means increasing farm productivity. A little-appreciated fact in most of Africa is that nearly half of all work *in rural areas* takes place off of smallholders' own farms, in the rural non-farm economy (RNFE): 54% of all work in rural Rwanda occurs in the RNFE, while the figures are 50% in Nigeria, 47% in Uganda, 45% in Tanzania, and 44% in Zambia and Malawi<sup>2</sup>. This means that, in those countries, raising rural productivity *cannot* be merely a question of raising farm productivity; strategies there must also increase productivity in the very large rural non-farm economy on which so many rural residents depend.

Two countries of the region depart from this pattern. Rural Ethiopia is more reliant on farming, with 72% of all rural work occurring on smallholders' own farms. Mozambique, however, is even more of an outlier: 86% of all work in rural areas of the country takes place on smallholders' own farms. This speaks to a remarkably *untransformed* rural sector. Achieving transformation requires increases in the productivity of farmers, which can then fuel the spending power that will feed development of the rural

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<sup>2</sup> Authors' calculations from Living Standards Monitoring Survey data for each country, based on full-time equivalent labor.

non-farm economy and the eventual exit from farming that is the *sine qua non* of transformation and sustained economic growth.

Fifth, linking rural production with urban demand must be a central pillar of any program to drive productivity increases in farming. Over the past 20 years, urban populations in Mozambique have grown 3.5% per year, compared to 2.3% for rural populations<sup>3</sup>. Assuming conservatively that per capita expenditure in urban areas rose by 2% per year, demand for food in urban areas increased at least 5% per year. This means that total urban food demand grew two- to three-times more than rural populations over this twenty year period<sup>4</sup>. Growing urban demand for food is more than able to sustain high rates of growth in farm productivity and rural incomes if the local production and marketing system can capture most of this increased demand.

The opportunity is, in fact even larger than these figures suggest. Currently Mozambique is the most import-dependent country in the region, and Mozambican food processing companies have by far the smallest presence in local markets of any country that MSU has surveyed (Ghana, Nigeria, and Tanzania, in addition to Mozambique). If farm production can be ramped-up and if companies can obtain the financial and human and technological resources needed to process and market this food into urban areas, it could fuel even more rapid rates of rural growth and poverty reduction. Export crops – cotton, tobacco, cashew, and more recently pigeon pea, among others – can make an important contribution to further rural income growth and poverty reduction.

We conclude that Mozambique enjoys huge opportunities for rural growth due in part to its unbalanced growth to date. Rapid growth concentrated primarily in urban areas has driven very large growth in urban food demand together with rising dependence on imports. With the right public investments and a strong enabling environment, the huge gap that has emerged between urban demand and rural production can be progressively closed, driving very rapid rural income growth and poverty reduction.

Our sixth point is two-fold. First, policy and policy process matter to the prospects for closing this gap and driving rural poverty reduction. Second, much progress has been made over the past five years on this front. CEPPAG started and grew more slowly than had been hoped; as a result, it has too little core staff, and the network that operates around it is in its infancy; huge progress needs to be made. Yet at the same time, there now exists a center, supported at the highest levels of the university, that has basic infrastructure, a strong and respected position in a growing regional network of such centers (ReNAPRI; including leadership of the network over the past year), real operational links to multiple international research organizations (MSU, IFPRI, and UNU-WIDER, among others), and an emerging record of being called on by government to inform them on policy issues. This is a scaffolding on which to build.

With these thoughts in mind, and drawing on the lessons learned in the previous section, we offer the following thoughts on key elements of a forward-looking program to build capacity for policy analysis and design in food security and nutrition. First, we continue to believe in the essential wisdom of the vision behind CEPPAG and REPPAG – a core investment in an organization outside a public line ministry, which would strategically link to multiple policy nodes within the public sector, and be guided by a

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<sup>3</sup> Authors' calculations from UN DESA data, 1995 – 2015.

<sup>4</sup> 59% growth in rural populations compared to a range of 117% to 157% in estimated growth in total urban demand. Based on 3.5% urban population growth, assumed per capita urban income growth of 2% per year (conservative), and an income elasticity of demand for food between 0.6 and 0.8.

board that includes representatives from the private- and civil society sectors, in addition to public sector.

Second, there needs to be a medium-term commitment (five years) to such a system, with the anticipation that, subject to satisfactory progress based on agreed indicators and decision processes, funding will be continued past that initial period. Only with such time horizons can this kind of policy capacity be created and reach a critical mass that becomes self-sustaining.

Third, the commitment would preferably involve partnering with more than one international organization. This multiple partnering is key, because different international organizations have their own comparative advantages and set of connections within the country. If well managed, such an approach can be much more effective than an approach featuring only one international collaborator. Such an approach seems especially viable in Mozambique, since CEPPAG already has working relationships with a broadening range of international organization including MSU.

Fourth, one key focus of the work of the center and network should be value chain or sectoral studies (an example of the latter could be studies of the food processing sector, not limited to one commodity) built around stakeholder working groups. It is not easy to put together such groups and keep them actively engaged over an extended period of time. One way to improve the prospects for such engagement is to reach out much more intensively, at the beginning of the program, with the private- and NGO-sectors in systematic assessments of the policy- and programmatic environment, with an eye to identifying concrete policy change agendas. Identifying such an agenda, with clear benefits to participating stakeholders if achieved, and a clear understanding of how the research and outreach work will contribute to achieving the policy change, appears to us to be a necessary condition for success over time.

Fifth, we would argue for a component of experimentation – linked to formal impact evaluation – with programmatic approaches to raising farm productivity. Mozambique cannot escape the need for major and broad increases in farm productivity if it is to achieve the growth and poverty reduction it needs.

Finally, data systems in Mozambique have improved but need continued strengthening. They are informed decision-making, program design, and to modifications in programmatic approaches over time. USAID needs to remain engaged in this area, working in collaboration with FAO, drawing on resources from USDA, and building capacity over time. Innovative approaches such as engaging organizations other than line ministries in key aspects of the system, in close collaboration with line ministries and agencies (INE), should be considered.

## Annexes

### A. Summaries of each research report and policy brief

#### Topic 1. Farmer supply response to high price environment and assessment of the determinants of smallholder crop commercialization

**Summary:** As discussed earlier in this report, very slow growth in agricultural productivity has been a major problem in Mozambique and a key contributor to the country's poor performance on poverty reduction over the past two decades. As such, the large increase in commodity prices beginning in 2008, and programmatic responses to it, provided a natural opportunity to study the impacts of the new environment on farmer behavior. Key questions were whether farmers responded with higher output, and what mix of extensification and intensification was present in the response. A key basis for several analyses in this area was the "partial panel" survey that MSU conducted immediately prior to the start of MOZCAPAN. This survey revisited farmers from the 2008 national agricultural survey (TIA) in Nampula, Zambezia, and northern Sofala and Manica provinces during 2012. Using these data and others, MSU and its colleagues produced 16 research papers and policy briefs grouped around the topic of smallholder productivity and crop commercialization (X of these were reprints of papers produced by MSU under other funding that were judged relevant to Mozambique).

Synthesizing across these studies, the following conclusions stand out. First, nearly all crops saw increases in productivity and in farmer commercialization over the study period. Second, some of these increases was driven by farm intensification, not extensification. These findings were not commonly appreciated in Mozambique, where the perception of a stagnant rural sector is strongly embedded among most observers. Second, some crops such as pigeon pea and (in more restricted areas) soybean saw very large increases in production in response to strong market demand. Third, this progress, though real, has been too slow to raise large numbers of farmers out of poverty or to reduce Mozambique's productivity gap compared to its neighbors.

Fourth, receipt of market information substantially increases market of smallholder farmers, and this participation has significant impacts on farming productivity; increased provision of market information may contribute to behavioral changes that lead to higher productivity among poor Mozambican farmers.

Finally, despite some progress, the fundamental challenges for Mozambican smallholder agriculture remain what they were a decade ago: improve the availability and use of improved seeds and fertilizers, promote use of animal traction in areas that have a history of such, and continue to improve market access through improved rural infrastructure and market information.

1. [Analysis of Food Crop Prices in Mozambique before and after the 2007/08 International Food Price Crisis](#) David Mather, Helder Zavale, Benedito Cunguara, and David Tschirley. Research Paper 74E (Key local collaborating institution: UEM through Helder Zavale)

Large increases in international cereal prices during the international food price crisis of 2007/08 contributed to dramatic cereal price increases in many developing countries that regularly import grains. Previous research using descriptive analysis has noted that food commodity prices in Mozambique appear to be higher on average since 2008 (Cunguara et al 2012), even though international grain prices began to fall in 2009. In this paper, we use a combination of graphical and time series econometric analysis of

monthly retail market price data from Mozambique to investigate: (a) the extent to which food commodity prices have risen in Mozambique post-2008; and (b) whether increases in international cereal prices and/or changes in domestic factors appear to explain any observed increases. We have four main findings from this analysis.

First, we find an upward structural shift in food prices in most rural and urban markets of Mozambique between January 2008 and March 2013. Second, our time series econometric analysis finds an upward shift in urban prices of maize, rice, cowpea and small groundnut since January 2008, though the magnitude of this shift varies by crop and market. Third, the international price does not account for the upward shift in prices of commodities other than rice. Fourth, the upward structural shift in the price of commodities other than rice appears to be due to domestic factors, such as increased domestic demand. While this is primarily due to the continued increase in population and average household income, for the case of maize (cassava), the price rise is also explained at least in part by the arrival of several poultry plants (a brewery of cassava beer) in northern Mozambique soon after 2008.

Because the majority of rural households are net buyers of staple food commodities like maize, rice and beans, higher food prices hurt domestic urban consumers and also the majority of rural households. This begs the question of what is the appropriate role for government in addressing an environment of higher domestic prices of these commodities. Several public goods could support stronger supply response from smallholders, which could decrease domestic food staple prices. One of the most direct ways to do this is for the government to continue to improve rural roads. Improved rural roads would provide even higher farm-gate prices to farmers, which would further incentivize them to increase their crop production, while reducing input costs for both farm and non-farm activities. Another key investment would be for the government to help farmers north of the Zambezi River to expand their cultivated area by gaining access to animal traction. The adoption of large livestock in northern Mozambique, currently at less than 1% of all households, would require a number of investments (Cunguara et al 2016), such as (a) testing for trypanosomiasis prevalence; (b) providing livestock extension on large livestock-keeping; (c) subsidizing access to trypanosomiasis treatment wherever its prevalence is clearly a key constraint. However, access to animal traction would enable smallholder farmers in the medium- to high-potential zones in northern Mozambique to expand their cultivated area and gain access to manure, which has been shown to have a significant positive effect on yields of several crops (Mather et al, 2015).

2. [Smallholder Cropping and Input Responses to Changes in Expected Prices and Market Access in Central and Northern Mozambique, 2008-2011.](#) David Mather, Benedito Cunguara and David Tschirley. Working Paper 75E. December 2015.

The analysis presented in this paper is guided by three research questions, using descriptive and econometric analysis of panel rural household data from selected central and northern Mozambique districts: 1) To what extent have the input and cropping decisions of our sample small- and medium-holder households in the center and north responded to increases in domestic food prices between 2007/08 and 2010/11. If so, how did they respond - via extensification of crop production (increasing area planted to food crops), intensification (increasing labor and/or other inputs applied per hectare), and/or a combination of both? 2) What role have changes in expected crop prices and market access played in affecting smallholder cropping and input behavior, relative to other household- and village-level factors?, and 3) Are there factors that appear to be constraining a more robust smallholder supply response to this higher food price environment, and what implications (if any) are there for public policies that might alleviate those constraints? The study finds that (a) there has been a robust smallholder response to higher food prices, by both extensification and intensification of crop production; (b) there remain serious

constraints to the sustained and larger supply response that will be required if the country is to solve the food price dilemma – that is, to maintain favorable prices for farmers while reducing retail food prices for both urban consumers and rural net buyers.

3. [Food Crop Marketing and Agricultural Productivity in a High Price Environment: Evidence and Implications for Mozambique](#). Rui Benfica, Duncan Boughton, Bordalo Mouzinho and Rafael Uaiene. Research Paper 76E. May 2014.

This paper assesses the relationship between agricultural productivity and market participation and performance following an increase in market prices in Mozambique. The analysis is based on panel data before (2008) and after (2011) the change in price regime to identify the relative importance of market access versus household and farm-level factors in explaining productivity differences. Six findings stand out. First, the results suggest increases in market participation rates and in the intensity of participation over the study period, although progress has been slow. Second, modest productivity increases were found for all crop groups. Third, the study finds a strong correlation between market participation and productivity. Econometric results suggest that creating an enabling environment for greater access to marketing opportunities can have important effects on productivity of cereals and groundnuts/beans; direct investments that lead to increased adoption of productivity enhancing technologies are also very important to maximize the benefits of market access. In light of the significant effects of farm-level productivity on market participation, and recognizing current low levels of farm-level productivity, additional investments in farm-level productivity are unquestionably necessary for improved agricultural performance. Finally, the paper highlights investment priorities aimed at strengthening agricultural market participation and performance and improving agricultural productivity.

4. RP 71E. [Determinants of Crop Income in Rural Mozambique, 2002-2005](#). David Mather. January 2012.

This paper aims to better understand the determinants of household crop income in rural Mozambique, by using the TIA panel household survey of 2002-2005 to measure the impact of various private and public assets on crop income. The results highlight the extreme sensitivity of crop income to weather shocks, and thus the potential value of: a) promotion of smallholder access to low-cost methods of irrigation and/or conservation farming techniques to reduce the impact of drought -- in contrast to the recent emphasis of heavy investment in formal perimeter irrigation schemes; and b) investment in development and dissemination of drought-tolerant maize varieties as well as varietal improvement in traditionally drought tolerant crops such as cassava and sweet potato. The results also suggest that caution may be warranted prior to substantial increases in funding to assist farm associations, without a better understanding of why associations in the north have had a significant effect on crop incomes, while those in the center and south have not.

5. [Changes in Smallholder Cropping and Input Use in Central and Northern Mozambique, 2008/2011](#). Benedito Cunguara, João Mudema, David Mather, and David Tschirley. 15 November 2012. *Flash* 60E. (Key local collaborating institution: CESE through João Mudema)

In this flash, the authors use household survey data from small- and medium-holders in 2008 and 2011 to investigate how and to what extent farm households in selected districts of Central and Northern Mozambique have responded to the sharp increase in domestic food crop prices since 2007. They find that smallholders in most sampled areas responded to this higher price environment by significantly increasing their total area cultivated (extensification), by increasing the number of crops they cultivate,

and (in Tete, Manica, and Sofala) by increasing their use of animal traction, manure and hired seasonal labor (intensification). They find increases in the proportion of smallholders growing cassava, pigeon peas, cowpeas, groundnuts, orange and non-orange-fleshed sweet potatoes, and tree crops such as mangoes and papaya. Two principal constraints continue to limit smallholders' production response to this higher price environment: the near absence of animal traction north of the Zambezi river, and very limited use of chemical fertilizers outside of Tete.

6. [Comerciantes Esperam uma Redução na Produção de Milho na Presente Campanha Agrícola](#). António Paulo, Dolito Loganemio, Arlindo Miguel e Fazila Gomes. 29 de Agosto de 2012. *Flash* 59P. (Key local collaborating institution: SIMA – all authors were from SIMA)

In January 2012 SIMA conducted a survey nationwide, and found that many farmers in central and northern Mozambique do sell their crops. Most of them said the rains were not regular during that cropping season and they were expecting to have smaller quantities of maize in the markets, but higher prices. They also said road infrastructure has been improved as well as the communication network, but marketing permits still represent a constraint due to bad application of the law. The formal banking system is still to be spread in rural areas as it is still missing in many districts and traders have to deal with theft. Besides the radio, cellphones are the most important source of information. The quality of the product remains an issue to processors and exporters, particularly for soybeans, sunflower, oloko beans, and sesame.

7. [Constrangimentos para o Estabelecimento de Bolsas de Mercadorias em África: Implicações do Caso Zambiano para Moçambique](#). Estudo preparado por Nicholas Sitko e T.S. Jayne. Agosto 2012. *Flash* 58P.

The objective of this *flash* is to inform the debate and the establishment process of a commodity exchange in Mozambique. Using a case study from the Zambian Agricultural Commodity Exchange (ZAMACE), the authors analyze six mutually reinforcing factors contributing to low trading volumes passing through ZAMACE: i) high risk of contract non-compliance and poorly developed arrangements for addressing contract shirking and opportunistic behavior through the exchange; ii) the potential conflict of interest associated with traders acting as brokers on the exchange; iii) the relationship between market thinness and the cost of participation in the exchange; iv) the relationship between market manipulation and market thinness; v) the inability thus far to nurture financial institutions' commitment to the exchange; and vi) the ad hoc and unpredictable nature of government intervention in commodity markets. Making commodity exchanges work in African food markets is not merely a matter of providing adequate funding and developing appropriate institutions. By their very nature commodity exchanges are situated in the broader context of agricultural markets that are often characterized by inefficient legal systems, thinly traded spot markets, limited numbers of potential participants, passive financial institutions, vested political interests, and high levels of policy unpredictability. Thus, when assessing the feasibility of developing a robust commodity exchange, governments and donors must closely examine whether or not existing market conditions and political objectives are supportive of an exchange. The existence of one or more of the constraints identified in this report can lead to a vicious cycle of exchange under-utilization, opting out by potential participants, and eventual collapse of the exchange, regardless of the degree of financial support offered.

8. [Impact of Agricultural Market Information Systems Activities on Market Performance in Mozambique. Mozambique Country Report](#). Andrew M. Kizito, Cynthia Donovan, and John M. Staatz. IDWP 124. July 2012.

The objective of this research is to analyze the impact of agricultural market information systems (MIS) activities on market performance in Mozambique. This report analyzes factors that are associated with reception of improved agricultural market information from the MIS and other sources among farmers in Mozambique; and how the reception of improved agricultural market information affects prices obtained by sellers of maize in Mozambique. From the econometric analysis of a two-year panel household data set for four provinces in Mozambique, the study finds that the generic factors that are associated with the reception of improved agricultural market information include: (a) growing maize and large and small groundnuts; (b) owning a radio; (c) presence of a cell phone network in the village; (d) membership in a farmer association; (e) access to extension services; (f) proximity to a road with public transport; (g) being nearer to a village administrative post; (h) level of education; and (i) the agro-ecological zone in which the household is located. The analysis indicates that, holding other factors constant, reception of market information by staple crops farmers in Mozambique is associated with a higher probability of market participation of up to 34%. From the econometric analysis of the effects of receiving information on prices received by smallholder farmers, the study finds that the mean price difference per kilogram of maize sold between households with and without information (also referred to as an information premium or information rent) is 12%. This premium translates into an average income gain of 0.32 meticaís per kilogram of maize sold, or an income gain of \$2.96 per household per year (about 1% of average gross household income in 2005 meticaís, which was \$361) for an average household that sells about 214 kilograms of maize in the main growing season per year. The estimated aggregate marginal population gain in income by an estimated quarter million households that received information and sold maize is estimated to be \$723,121 in the main marketing season per year. These gains are approximately six times more than the operational costs in MIS of \$130,000 in 2002. This suggests that even if as little as 1/6 of the information received by Mozambican farmers in 2002 came from the SIMA and only maize price gains are included, that MIS was a socially profitable investment. These results are consistent with the observation that providing improved agricultural market information helps to link farmers to markets, a process that improves their welfare, and moves them to more efficient market outcomes.

9. [An emerging success story of pigeonpea expansion in smallholder agriculture in Mozambique: A summary of key findings](#). T. Walker, S. Silim, B. Cunguara, C. Donovan, P. Parthasarathy Rao, M.A. Amame, M. Siambi. September 30, 2015. *Flash* No. 73E (Key local collaborating institution: IIAM, ICRISAT)

Pigeonpea production in Mozambique is large, is very important for smallholder farmers, has made important contributions to poverty reduction, and has outstanding prospects for growth; Pigeonpea's expansion was largely unanticipated by public sector. It therefore occurred in an atmosphere of "benign neglect", and was based on a de facto extensification strategy. Success has led to attention from policy makers and local agribusiness. But any strategy for continued growth must be based on a sound knowledge of (a) the details of the Indian market, (b) the agronomic realities of pigeonpea as a crop, and (c) the local context in which expansion has taken place. The way forward for pigeonpea in Mozambique requires a balanced, mixed approach emphasizing steady productivity growth, shorter duration varieties, and investments to reduce marketing costs.

10. [Pigeonpea in Mozambique: An Emerging Success Story of Crop Expansion in Smallholder Agriculture](#). Tom Walker, Said Silim, Benedito Cunguara, Cynthia Donovan, P. Parthasarathy Rao, Manuel Amame, Moses Siambi. Research Paper 78E. September 2015. (Key local collaborating institution: IIAM, ICRISAT)

This study documents the rapid emergence of pigeonpea as a smallholder export crop in Mozambique and discusses implications of pigeonpea's expansion. The rapid expansion of pigeonpea underscores the need for two simple and straightforward interventions. First, seed availability of the new medium-duration varieties ICEAP 00554 and 00557, released in 2011, should be markedly increased and distributed to farmers. These earlier medium-duration varieties have the capacity to escape terminal drought and can increase productivity by several hundred kilograms per hectare. In particular, breeder's seed production in pigeonpea lags severely behind other crops in Mozambique and in other producing countries in the region. Without a substantially greater investment in pre-basic seed, Mozambique's competitive position as a leading exporter of pigeonpea will increasingly be compromised. Secondly, farmers should have access to information on how to sow pigeonpea as a row intercrop with maize during the planting season and on market prices for pigeonpea during the long period of seasonal exports beginning in May and ending in January. Indeed, to stimulate the early acceptance of the new earlier medium-duration varieties, extension needs to emphasize pigeonpea as a resource-efficient row intercrop with maize and stop the promotion of pigeonpea as a sole crop in monoculture. Extension messages need to be adjusted to Mozambican conditions of relative land abundance and labor scarcity. Production of timely new extension materials, including farmer leaflets and radio messages, and the conduct of demonstration trials in mid-altitude sub-regions of higher production potential should be sufficient to reinforce agronomic activities relevant for sustaining pigeonpea's market-oriented expansion.

11. Walker, T., Cunguara, B., and Donovan, C., 2016. [Assessing directions for cowpea R&D in USAID's Feed the Future program in Mozambique in 2016](#). MEAS report. University of Illinois.

This paper begins by discussing the challenges in improving cowpea productivity in Mozambique. Then the authors describe past investments in cowpea research and technology transfer by USAID, the Government of Mozambique, and other donors. Those investments have laid the building blocks for tackling the challenges addressed in the first section of this brief report. Armed with information on the uniqueness of the production and market contexts and with evidence on past performance of cowpea productivity, the paper identifies what appear to be the three most viable options for future investment in cowpea R&D.

12. Walker, T., and Cunguara, B., 2016. [Taking stock of soybean R&D and USAID's Feed the Future program in Mozambique in 2016](#). MEAS report. University of Illinois.

Ten years later soybean production is very much in evidence in Mozambican agriculture. Since the initiation of USAID's Program in Mozambique in 2008/09 and the Bill & Melinda Gates Foundation's Tropical Legumes Project in 2007/2008, soybean R&D has received widespread support from the international donor community who have funded an array of reliable and experienced partners in diverse dimensions of soybean research and extension. Indeed, donor investment during the past decade in soybean R&D arguably has been greater than R&D for all other legume crops combined. In 2016, decision-making is at a critical juncture on the role of soybean R&D in USAID's Program in Mozambique. The choices can be summed up by the following questions: Has investment by USAID, other donors, and the Government of Mozambique been sufficient to ensure a robust and sustained rate of growth in production? Is 50-70 thousand tonnes of production enough to sustain spontaneous adoption into the foreseeable future (Pereira 2013)? Specifically, is the recommendation to invest in an aggressive scaling program in the comprehensively analyzed and cogently argued Kohl's report from mid-2014 still valid? The authors address these questions and identify specific options for investment in R&D. They also document the major components that have characterized soybean's expansion in Mozambique.

13. [Demystifying the Role of Grain Assemblers in the Rural Maize Markets of Eastern and Southern Africa](#). Nicholas Sitko and T.S. Jayne. IAPRI Working Paper No. 84. June 2014.

This article seeks to shed empirical light on the ways in which assembly traders affect the performance of rural cereal markets. It does this in four interrelated ways. Using survey data from 205 village focus group discussions and 2,703 individual farm-level maize transactions in Kenya, Malawi, Zambia, and Mozambique, the article examines: 1) What market channels are available to farmers in rural regions and what percent of transactions pass through each of these channels? 2) What are the market margins between farm-gate and wholesale/retail maize prices in nearby markets for the various available market channels? 3) How many assembly traders come into rural villages, and how does this vary in terms of standard market access indicators such as distance to urban market or distance to a paved road? and 4) What is the effect of assembly trading on the distance travelled to the initial point of sale by farmers? The results suggest that state interventions in staple food markets undermine assembly traders, and that there is a need to redirect state interventions. Rather than thinking in terms of creating institutions to overcome perceived issues of market access and private sector exploitation, donors and governments need to think about how to help farmers to better engage with existing market channels and how to facilitate greater competition within the trading sector.

14. [A Case Study of Lettuce, Kale, Tomato and Onion Gross Margins and Costs of Production among the Horticultural Producers Supplying Maputo](#). Jennifer Cairns Smart. December 2015. *Flash* N°74E. (Key local collaborating institution: IIAM/CESE through collaboration on data collection)

Using data from the 2014 horticultural multiple visits study conducted as part of the trilateral partnership between Mozambique, Brazil, and the United States, this flash characterizes the costs, sales and gross margins of lettuce and kale in the green zones of Maputo, and of onion and tomato in the nearby districts of Moamba and Boane supplying Maputo's horticulture market. A typology of ranked technological sophistication of the farmers included in this study is used to disaggregate and compare the results. Findings indicate that within each technological sophistication bracket, higher costs spent are correlated with less gross income earned. The greatest cost of those earning the largest gross margins per kilogram harvested across crops is for seed and/or seedling, and these farmers also evidence an increased share of costs spent on labor, particularly salaried labor. Producers in the zonas verdes tend to sell a greater share of the harvest they produce in comparison with producers in Moamba and Boane. And finally, costs spent on pesticide are generally low across all groups, however the producers that spend the most on pesticide per kilogram of product harvested tend to be characterized by less appropriate perceptions of pesticide toxicity and generally poorer pesticide management behavior.

15. Ngare, Lucy, Franklin Simtowe, and Jaquelino Massingue. [Analysis of Price Volatility and Implications for Price Stabilization Policies in Mozambique](#). *European Journal of Business and Management*. Vol.6, No. 22, 2014.

High food price instability is one of the major risks facing agricultural households from developing countries. Resulting from agronomic factors as well as the historically low levels of world grain stocks and climate change, increased food price volatility has attracted renewed interest among policy experts in identifying appropriate policy instruments to counter its effects. This paper applies the GARCH model to data from twelve maize markets in Mozambique to estimate price seasonality and volatility. The results reveal the presence of seasonality, and high volatility. There is scope for improving price stability through the use of both market and non-market based price stabilization interventions that encourage investments in market infrastructure such as roads, warehouses and a market information system;

institutions such as warehouse receipt system, credit and insurance; maintaining a strategic reserve and reduced tariffs and food-for-work programs.

16. Steven Haggblade, Agnes Andersson Djurfeldt, Drinah Banda Nyirenda, Johanna Bergman Lodin, Leon Brimer, Martin Chiona, Maureen Chitundu, Linley Chiwona-Karlton, Constantino Cuambe, Michael Dolislager, Cynthia Donovan, Klaus Droppelmann, Magnus Jirström, Emma Kambewa, Patrick Kambewa, Nzola Meso Mahungu, Jonathan Mkumbira, João Mudema, Hunter Nielson, Mishek Nyembe, Venâncio Alexandre Salegua, Alda Tomo, Michael Weber, (2012) "[Cassava commercialization in Southeastern Africa](#)", Journal of Agribusiness in Developing and Emerging Economies, Vol. 2 Iss: 1, pp.4 – 40. (Key local collaborating institution: IIAM through various)

Cassava production surged noticeably in Southeastern Africa beginning in the 1990s. The purpose of this paper is to examine the commercial responses and food security consequences of cassava production growth in the region. The paper incorporates a mix of quantitative analysis, based primarily on original analysis of national farm household survey data, together with key informant interviews with value chain participants in the three neighboring countries of Malawi, Mozambique and Zambia. In the cassava production zones, cassava's high productivity means that its per kilogram carbohydrate cost is only 60% to 70% of the cost of cereals such as maize and wheat. This cost advantage opens up a range of profitable opportunities for commercialization of cassava-based foods, feeds and industrial products. Despite this potential, cassava commercialization in Southeastern Africa remains in its formative stages, with only 10 per cent to 30 per cent of production currently marketed. Unlike West Africa, where cassava commercialization has centered on marketing ready-to-eat cassava-based convenience foods, the emerging cassava markets in Southeastern Africa have centered on fresh cassava, low value-added cassava flour, and experiments in industrial processing of cassava-based starches, biofuels and feeds. Strategic investment in a set of key public goods (breeding, training in food sciences and food safety, and research on in-ground cassava storage) can help to shape this transition in ways that benefit both commercial interests and the food security of vulnerable households.

## Topic 2. Completion of Research on Conservation Agriculture

**Summary:** Increasing agricultural productivity remains a priority to reduce poverty in Mozambique. In fact, this is the main conclusion from the country's last two national poverty assessments. One approach to raising productivity that has garnered persistent attention from donor and government agencies, and NGOs, is conservation farming (CA). Yet uptake by farmers often remains unimpressive despite apparently favorable economics for the smallholder farmer. Under this topic we conducted five studies that map all the stakeholders involved in the promotion of conservation agriculture in the country; provide an inventory of the technologies being promoted; review scientific literature and project reports in order to better assess what is known about CA in Mozambique; and examine the role for farmers' participation in locally adapting conservation agriculture and the challenges researchers and development agencies face in using innovation networks for CA adaptation.

Four conclusions stand out. First, manual CA systems of reduced tillage predominate, but CA inputs such as herbicides and equipment such as rippers, jab planters, and direct seeders are generally unavailable. These technologies have the potential to increase agricultural productivity but must be locally adapted. Second, smallholder farmers tend to use different CA components separately, and only a few combine them; few use what researchers and promoters consider a full package of CA techniques. Third, research gaps include both biophysical (e.g., lack of basic agronomic studies for the different agro-ecological zones) and socio-economic studies to better understand farmer decision making and the profitability and

riskiness of CA relative to the conventional system of production. Fourth, the majority of stakeholders working on CA agree that i) CA is useful for most smallholders in Mozambique but needs to be adapted to local conditions through research that is closely linked with farmers' reality; and ii) manual forms of CA are seen as the most immediately relevant to smallholders.

1. [Mozambique conservation agriculture inventory report](#): Grabowski, P., and Mouzinho, B., IIAM RP 6E, 2013. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN)

This report describes the conservation agriculture (CA) technologies being promoted and researched in Mozambique and summarizes the experiences of a variety of conservation agriculture projects across Mozambique's diverse agro-ecological zones. A wide range of development agencies, research organizations, private sector companies and educational institutions are involved in conservation agriculture. They operate in at least 84 of Mozambique's 128 districts and promote CA for higher agricultural productivity and improved utilization of natural resources including soil and water. Manual CA systems of reduced tillage predominate, including basins and direct seeding. Animal based CA systems are promoted in areas where cattle populations are large such as Manica and Chicualacuala. Some of these CA systems rely on herbicides and synthetic fertilizers while others emphasize compost production and leguminous cover crops for soil fertility improvement and weed control. A few educational institutions have started training agricultural students on CA and a variety of CA manuals are available in Portuguese. CA equipment such as rippers, jab planters and direct seeders are generally not available. The experiences of researchers and development agencies involved in CA are described for each agro-ecological zone. The emphasis is on how the agro-ecological context has interacted with the CA principles to affect levels of adoption and the performance of the technology. This inventory aims to facilitate networking among organizations involved in CA so that they can learn from each others' successes and challenges. It also aims to be a resource for those wishing to research the performance of CA in each agro-ecological zone of Mozambique by documenting the experiences on the ground.

2. [Conservation agriculture: Literature review and research gaps](#). Grabowski, P., and Mouzinho, B., IIAM RP 4E, 2013. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN)

This report reviews scientific literature and project reports in order to better assess what is known about CA in Mozambique. The key research gaps that need to be filled to better assess how CA can be used to benefit smallholder farmers are identified in the realms of both bio-physical and socio-economic research. On the biophysical side the most important research gaps are as follows. First, there is a lack of basic agronomic studies for the different agro-ecological zones, especially regarding plant populations, fertilization rates, cover crops, rotations and weed control strategies. These would facilitate CA adoption and be useful more generally. Second, limited scientific studies directly compare CA and conventional tillage systems for the different agro-ecological zones and cropping systems. Third, an assessment of different manual reduced tillage and planting systems (basins, jabplanters, dibble sticks, "Chinese" hoe etc.) is needed. Fourth, soil changes under CA with cassava are poorly understood, especially regarding the permanence of soil organic matter (SOM) after soil disturbance from harvesting. On the socio-economic side the priority research topics are as follows. First, studies are needed to better understand farmer decision making, highlighting the profitability and riskiness of CA relative to the conventional system of production including thorough analysis of labor changes by season and gender impacts. Second, studies are needed on how CA is being promoted with farmers and the relative successes of different

extension/education approaches including cost-effectiveness and the long-term benefits of building farmers' capacity to learn and adapt. Third, eventually a large scale adoption study would be useful for charting progress on CA across the country and for characterizing adopters and non-adopters. Fourth, over the long term it would be useful to develop panel data, by establishing a baseline in a new area before farmers use CA and continuing over the course of 5 or more years to assess the impact of the technology on their livelihoods.

3. [Adapting Conservation Agriculture to Local Contexts in Mozambique – the Role of Farmers' Participation and Innovation Networks](#). Philip Grabowski, John Kerr, Cynthia Donovan and Bordalo Mouzinho. April 2015. *Flash* No. 72E. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN)

Agricultural technologies, such as conservation agriculture (minimum tillage, mulching and crop rotations), have the potential to dramatically improve smallholder livelihoods but must be locally adapted. This flash examines the role for farmers' participation in locally adapting conservation agriculture (CA) and the challenges researchers and development agencies face in using innovation networks for CA adaptation. The authors find widespread agreement among researchers and program managers about the need to locally adapt CA. Yet farmers' involvement in research is limited to managing researchers' experiments. In contrast, some NGOs work collaboratively with farmers through Farmer Field Schools to adapt CA to the local context. We also find widespread agreement about the importance of establishing links across the value-chain, and we document lessons from nascent efforts to accomplish this. The results also indicate that effective collaboration will require coming to terms with polarized disagreements on two key issues: the importance of emphasizing minimum tillage and the role of commercial inputs for CA.

4. [The use of conservation agriculture by smallholder farmers in central and northern Mozambique, 2010/11](#). Bordalo Mouzinho, Benedito Cunguara, and Cynthia Donovan. 23 October 2013. *Flash* No. 67E. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN)

With climate change and the ever-growing emphasis on sustainability, conservation agriculture (CA) stands as one of the promising technologies described in the Strategic Plan for Agricultural Development in Mozambique, 2010-2019. This flash uses data from a survey on price dynamics carried out in 2011, to characterize smallholder farmers who used CA components in central and northern Mozambique. The authors find that smallholder farmers in most of the covered areas tend to use different CA components separately, and a few combine them. The combination of maize-legume intercropping and mulching is the most common, while minimum tillage is the less common CA component among farmers covered by the survey

5. [Prioritizing Actions for Conservation Agriculture in Mozambique](#). Grabowski, P., and Mouzinho B. 2013. RP 5E. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN)

Conservation agriculture has been promoted in Mozambique since 1996 but wide-scale adoption of the three principles (minimum soil disturbance, rotation/intercropping with legumes and permanent soil cover) has remained elusive. In order to prioritize the activities that may facilitate wide-scale adoption of CA a multiple round survey of 43 CA "experts" working in Mozambique was carried out. Of the 43 experts, 35 responded to at least one round of the on-line survey. The results show that the majority agree that CA is useful for most smallholders in Mozambique but needs to be adapted to local conditions through

research that is closely linked with farmers' reality. Manual forms of CA are seen as the most immediately relevant to smallholders. There is less agreement among these experts about the role of inputs in CA.

### Topic 3: Research on Agriculture, Income Diversification, Food Security and Nutrition, and Agrifood Systems Transformation

**Summary:** Achieving nutritional changes through agricultural interventions is complex, and there is a need to understand the various mediating relationships in the nutrition-agriculture linkage. For example, nutritional status is lower in northern Mozambique, a region of higher production than in the south. Nutritional status is also linked to diet transformation that is unfolding in many developing countries. Given the complexity of these linkages it is important to think beyond advocating for a single approach and to instead think about building a larger, coherent strategy that comprises many varied approaches. Income diversification makes farmers more resilient to climatic shocks as the income from nonfarm activities can either be invested in agriculture to achieve higher productivity that can improve nutritional status, or can be reinvested in businesses to ensure continuing income from them, also with potential nutritional benefits.

Under this broad topic a total of seven studies were conducted. The main conclusions are the following. First, analysis of data from agricultural surveys shows that food insecurity increased between 2002 and 2008, and this coincides with a period of little progress in poverty reduction. To achieve broad-based food security in rural Mozambique, interventions may need to focus on addressing these drivers to increase agricultural productivity while enhancing resilience to price and weather shocks. Interventions must also be spatially targeted and tailored to each segment of the population.

Second, the results suggest that as long as incomes in ESA continue to rise at levels near those of the past decade, the transformation of their economies is likely to advance dramatically. Key features will be: sharp decline in the share of the workforce engaged in farming even as absolute numbers rise modestly, sharp increase in the share engaged in non-farm segments of the agrifood system, and an even sharper increase in the share engaged outside the agrifood system

Third, the results indicate that there is a need to use a range of instruments in a multisectoral manner in order to achieve a significant reduction in malnutrition, especially chronic malnutrition. Increasing the production and availability of food is an important step but food and nutritional security also require investments in human capital that can lead to behavioral changes that improve food security status.

1. RP 72E. [An Introduction to Nutrition-Agriculture Linkages](#). Kimberly Chung. February 2012

This paper provides a simple framework for thinking critically about nutrition-agriculture linkages. The purpose is to help readers identify the linkages of greatest importance to their goals and to begin thinking about how to take steps toward integrating programs more effectively. Five different approaches are discussed and when possible examples are given from the Mozambique context. The framework illustrates the complexity of effecting nutritional changes through agricultural interventions, and underscores the importance of understanding the various mediating relationships in the nutrition-agriculture loop. Changes should be monitored at each link within the chain, with the understanding that changes to nutritional status will be the last to be affected. Given the complexity of these linkages it is important to think beyond advocating for a single approach and to instead think about building a larger, coherent strategy that comprises many varied approaches.

2. Mabiso, A., Cunguara, B., Benfica, R., 2014. [Food \(In\)security and its Drivers: Insights from Trends and Opportunities in Rural Mozambique](#). *Food Security*, 6(5):649-670. August 2014.

We used multiple rounds of nationally representative agricultural survey data to analyze the trends and drivers of food insecurity in rural Mozambique. Reduced-form Probit models were estimated to explain the observed trends as a function of underlying drivers and factors related to agricultural policy interventions. Despite rapid macroeconomic growth, food insecurity in the rural areas had increased from 42.9 % in 2002 to 47.8 % in 2008. Significant inequalities were also observed in the distribution of food insecurity with a substantial disadvantage to the bottom quintile households and rural households located in the Northern provinces. Limited progress on several drivers of agricultural production and food access as well as geographic disparities appear to explain a significant part of the food insecurity trends and distribution. Whether the indicator was use of improved farm inputs and technology, receipt of agricultural extension services, farm production, or cash income, progress did not occur. This implies that to achieve broad-based food security in rural Mozambique, interventions may need to focus on addressing these drivers to increase agricultural productivity while enhancing resilience to price and weather shocks. Interventions must also be spatially targeted and tailored to each segment of the population.

3. Tschirley, David, Thomas Reardon, Michael Dolislager e Jason Snyder. [O Surgimento da Classe Média na África Oriental E Austral: Implicações Para a Transformação do Sistema Alimentar](#). Publicado em *Journal of International Development*, Vol. 27, #5 (2015).

The authors show five points regarding the middle class in developing East and Southern Africa: (1) 55 per cent of the region's middle class—37 per cent of the 'non-vulnerable' middle class—is rural; (2) 61–83 per cent of the middle class's food is purchased; (3) processed food occupies 70–80 per cent of the class's food expenditure, with similar shares in urban and rural areas; (4) perishable products account for 44–55 per cent of the class's expenditure. Policy attention to processing and to food products 'beyond-grains' thus needs to be 'mainstreamed'; and (5) the import share of food expenditure does not rise with income in urban areas.

4. Tschirley, D., J. Snyder, M. Dolislager, T. Reardon, S. Haggblade, J. Goeb, L. Traub, F. Ejobi, F. Meyer. *A Transformação Emergente da Dieta Alimentar Africana: Implicações para o Emprego no Sistema Agro-Alimentar*. Publicado no *Journal of Agribusiness in Developing and Emerging Economies*, Setembro de 2015.

The objective of this paper is to understand how the unfolding diet transformation in East and Southern Africa is likely to influence the evolution of employment within its agrifood system and between that system and the rest of the economy. To briefly consider implications for education and skill acquisition. The authors link changing diets to employment structure. We then use alternative projections of diet change over 15- and 30-year intervals to develop scenarios on changes in employment structure. The results suggest that as long as incomes in ESA continue to rise at levels near those of the past decade, the transformation of their economies is likely to advance dramatically. Key features will be: sharp decline in the share of the workforce engaged in farming even as absolute numbers rise modestly, sharp increase in the share engaged in non-farm segments of the agrifood system, and an even sharper increase in the share engaged outside the agrifood system. Within the agrifood system, food preparation away from home is likely to grow most rapidly, followed by food manufacturing, and finally by marketing, transport, and other agrifood system services. Resource booms in Mozambique and (potentially) Tanzania are the main factor that may change this pattern. Clarifying policy implications requires renewed research given

the rapid changes in Africa over the past 15 years. Improved quality of education at primary and secondary levels must be the main focus of efforts to build the skills needed to facilitate transformation.

5. Massingue, Jaqueline, Anina Manganhela, Cynthia Donovan, and Almeida Tembe. Contribution of the Agriculture Sector to Multi-Sectoral Combat of Chronic Malnutrition in Mozambique: Perspectives from a National Seminar on Community Nutrition. July 2012. Flash No.57E. (Key local collaborating institution: MINAG through Manganhela and Tembe)

The overall objective of this flash is to summarize, document and disseminate the main results and experiences of the agricultural sector that were presented at the seminar, as well as emphasize the contributions from the seminar that may influence decision making about additional investments in linking agriculture and nutrition within the CAADP process in Mozambique. The results indicate that there is a need to use a range of instruments in multisectoral manner in order to achieve a significant reduction in malnutrition, especially chronic malnutrition. On the other hand, increasing the production and availability of food is an important step but the food and nutritional security also require investments in human capital training.

6. Cunguara, Benedito, Gorka Fagilde, James Garrett, Rafael Uaiene and Derek Headey. [Growth without Change? A Case Study of Economic Transformation in Mozambique](#). Journal of African Development. Volume 14, #2. Fall 2012.

Mozambique is generally perceived as having experienced rapid economic growth and urbanization. In this paper we re-evaluate structural transformation in Mozambique through a variety of data. We find that the structural transformation of Mozambique is dualistic in several dimensions. The composition of output has changed rapidly on the back of various industrial “mega-projects”, yet both the share of agriculture in total employment and the national poverty rate have scarcely declined at all. In agriculture, there has been some promising growth in the cash crop sector, yet productivity of major food crops stagnated for most of the 2000s. And while the south of the country is significantly urbanized, spatially disaggregated population estimates suggest that Mozambique has experienced much less urbanization than UN data would suggest. These facts suggest that a more pro-poor strategy should exploit the pro-poor growth potential of the agricultural sector, as well as improving the business environment for the small and medium enterprise sector.

7. Massingue, J., Mosse, G., Uaiene, R., Mutondo, J., Tschirley, D. and Tostão, E. O que comemos e onde produzimos? Resultados do Inventário de Produtos Alimentares Processados em três cidades Moçambicanas: Maputo, Chimoio e Nampula. CEPPPAG Policy Brief 01. (Key local collaborating institution: CESE through Mutondo; CEPPAG through Tostão)

The objective of this policy brief was to map what we eat and where we grow our food. An inventory of processed food was conducted in three cities, one in each of the three country regions. Results point to an emerging diet transformation that is witnessed by increased demand for perishable and processed food. However, such growth in demand is yet to be followed by growth in agro-processing and packaging by local companies. Most of the processed food that is available in the three survey areas is imported, especially from South Africa, Portugal, Pakistan, and Thailand.

## Topic 4: Smallholder Land Access and Issues in Commercial Agriculture and Development Interventions

**Summary:** Mozambique uses no more than 15% of its 36 million hectares of arable land. Data from agricultural surveys show that farmers believe they could obtain more land if they wanted too. It is thus puzzling that the average cropped area per household hovers around 1.5 hectares, quite small for a country considered to be land-abundant. There is much scope to increase agricultural production either through extensification, intensification or a combination of both, and its link with commercial agriculture.

Under this topic we conducted three studies: one examined the potential for smallholder area expansion using animal traction, another evaluated the impact of activities related to ‘improving land access in urban hotspot areas’, and the final one focused on spillover effects from large farm investments in Mozambique.

Key conclusions from the three studies are the following. First, there is a strong significant negative effect of disease pressure on animal traction ownership, but that this is much reduced in villages with access to vaccination. Any efforts to promote animal traction in the north of the country would not only need to assess the level of trypanosomiasis prevalence and provide access to treatment, but would also need to consider how the additional constraints could be met prior to any cattle restocking promotion.

Second, the results of the baseline data analysis presented in this report provide a picture of the status of surveyed households in study areas of Nampula city and Monapo across three broad categories: a) socio-economic characteristics (i.e., demographics, sources of income, asset holdings, and access to credit); b) land characteristics (i.e., land ownership, land markets, land investments, perceptions on tenure security and knowledge about land law and rights); and c) welfare characteristics (i.e., level of income, consumption and expenditure).

Third, the number and area of large farms within 25 or 50 kilometers of these investments raised use of improved practices, animal traction, and inputs by small farmers without increasing cultivated area or participation in output, credit, and nonfarm labor markets. The limited scope and modest size of the estimated benefits point toward considerable unrealized potential.

1. [Exploiting the potential for expanding cropped area using animal traction in the smallholder sector in Mozambique](#). Benedito Cunguara, David Mather, Tom Walker, Bordalo Mouzinho, Jaqueline Massingue, Rafael Uaiene. Research Paper 79E. April 2016. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN)

While Mozambique enjoys great potential for area expansion, at present only 2% of smallholder farmers use tractors and 8% use animal traction, with virtually none in the northern regions. Trypanosomiasis carried by the tsetse fly is believed to play a crucial role in the low use of cattle in animal traction particularly by the households in the Central and Northern Provinces of Mozambique, where trypanosomiasis prevalence is believed to be high. Using data on both rural household animal traction ownership in 2002 & 2005 and trypanosomiasis prevalence from Central regions of the Mozambique, we use both descriptive and econometric analysis to assess the relative role of disease pressure as compared with other potential determinants of animal traction ownership. We find that there is a strong significant negative effect of disease pressure on animal traction ownership, but that this is much reduced in villages with access to vaccination. We also provide descriptive evidence that suggests that other factors may also constrain cattle ownership and thus animal traction use in the north, such as relatively poor pasture quality and a near-complete lack of a tradition of cattle husbandry. Thus, any efforts to promote animal traction in the north of the country would not only need to assess the level of trypanosomiasis prevalence

and provide access to treatment, but would also need to consider how the additional constraints could be met prior to any cattle restocking promotion.

2. [Impact Evaluation of Site-specific Activities under the Land Tenure Services Project: Report of the Baseline Survey Conducted in Two Urban Areas in Northern Mozambique](#). Mywish K. Maredia, Raul Pitoro, Songqing Jin, Ellen Payongayong and Gerhardus Schultink. October 2012.

This report describes the impact evaluation design of activities related to ‘improving land access in urban hotspot areas.’ The site-specific interventions in priority bairros within Nampula city and Monapo vila are the subject of this impact evaluation. Activities to be evaluated include: a) Satellite mapping and inventory exercise; b) Capacity building of the local cadastral offices; c) Piloting a sound approach to area-wide registration of land rights. The plan is to use a non-experimental comparison group difference-in-difference (DiD) design approach for this evaluation. Data will be collected at household level from both the treatment and control areas before and after the intervention. This report presents the results of the baseline survey conducted in 2010-11 of 1690 households –881 in Nampula city and 809 in Monapo vila. The results of the baseline data analysis presented in this report provide a picture of the status of surveyed households in study areas of Nampula city and Monapo vila across three broad categories: a) socio-economic characteristics (i.e., demographics, sources of income, asset holdings, and access to credit; b) land characteristics (i.e., land ownership, land markets, land investments, perceptions on tenure security and knowledge about land law and rights); and c) welfare characteristics (i.e., level of income, consumption and expenditure).

3. [Deininger, Klaus W.; Xia, Fang; Mate, Aurelio; Payongayong, Ellen](#). 2015. Quantifying spillover effects from large farm establishments : the case of Mozambique. Policy Research working paper; no. WPS 7466. Washington, D.C. : World Bank Group. (Key local collaborating institution: MSDS/DE through Mate)

Almost a decade after large land-based investment for agriculture increased sharply, opinions on its impact continue to diverge, partly because (positive or negative) spillovers on neighboring smallholders have never been rigorously assessed. Applying methods from the urban literature on Mozambican data suggests that changes in the number and area of large farms within 25 or 50 kilometers of these investments raised use of improved practices, animal traction, and inputs by small farmers without increasing cultivated area or participation in output, credit, and nonfarm labor markets; or, once these factors are controlled for, yields. The limited scope and modest size of the estimated benefits point toward considerable unrealized potential. The paper discusses ways to systematically explore the size of such potential and the extent to which it is realized.

## Topic 5: Policy Synthesis of Research Relevant to the CAADP/PNISA Process

**Summary:** MSU has conducted many studies on agricultural development, poverty reduction, food security and nutrition, just to name a few topics. In order to make all these studies more accessible to the general public, we summarized findings of all studies into four policy briefs, each covering one of the four CAADP pillars: i) extending the area under sustainable land management and reliable water control systems; ii) improving rural infrastructure and trade-related capacities for market access; iii) increasing food supply, reducing hunger, and improving responses to food emergency crises; and iv) improving agricultural research, technology dissemination and adoption.

1. [Investment in Research and Extension: An Imperative to Increase Agricultural Productivity](#). Rafael Uaiene, Raul Pitoro and Jaqueline Massingue. July 2013. *Flash* Nº65 E.

To reach the annual agricultural growth envisaged by PEDSA, research, innovation and the adoption and diffusion of improved technologies are fundamental. The research and innovation system requires strengthening of human, financial and material capacity so that it can substantially improve its performance. Technical innovation in agriculture will not happen without organizational innovation. This flash analyzes the current situation of agricultural research and extension as key pillars of PEDSA. It presents the main findings of various studies and provides policy recommendations to improve the performance of agricultural research and extension, and consequently the agricultural sector as a whole.

2. [Food Availability and Quality of Diet in Mozambique: Linking Agriculture to Nutrition](#). Jaqueline Massingue, Cynthia Donovan and James Garrett. July 2013. *Flash* Nº 64E.

Even with the economic growth in recent years in Mozambique, the agricultural sector is still not exploiting its full potential to reduce poverty and food and nutrition insecurity. The food system is limited in its contribution and needs multisectoral responses to address the crisis. Within the food system, there is a need to improve productivity, efficiency, value chains, and the quality and diversity of food for consumption. In collaboration with the private sector, the public sector can invest in various interventions. This Flash focuses on interventions for the following objectives: 1) agricultural productivity, especially for products of high nutritional value, 2) greater efficiency and less market losses, 3) availability of more nutritious food in markets, and 4) increased diversity of products in the diet; 5) increase in income opportunities for vulnerable households, and 6) general education and nutrition. Multisectoral action at all levels is needed to ensure that economic growth results in food security and nutrition, which is the challenge of CAADP Pillar III.

3. [Agricultural Marketing and Development in Mozambique: Research Findings and Policy Implications](#). Rui Benfica and David Mather. June 2013. *Flash* No.63E.

Increasing smallholder participation in food and cash crop markets in Mozambique and improving the performance of these output markets are vital for achieving the goals of rural poverty reduction and household food security. This Flash synthesizes key empirical research findings from Mozambique related to factors associated with smallholder participation in food and cash crop markets, food and cash crop market performance, and implications of these findings for state investments and policy. Key investments required to improve smallholder market participation and market performance are needed in the following areas: rural road infrastructure; development/dissemination of improved inputs; improving the spatial coverage and targeting of SIMA price data; improving local storage capacity; expanding the electricity grid. Key policies include: improve competition and introduce incentive based monitoring systems for out-grower schemes; facilitate smallholder inclusion in sugar cane development; phase out the VAT applied to imported maize grain and/or solve problems related to VAT in agriculture and agricultural imports; if the state chooses to use its grain reserve for price stabilization, it must adopt a rules-based, predictable and transparent approach to state operations in markets so that the private sector understands the specific market conditions that will trigger government interventions.

4. [Sustainable land and water management in Mozambique](#). Benedito Cunguara and Rafael Uaiene. July 1, 2013. *Flash* N.º62E.

This flash summarizes findings from previous studies on Mozambique that cover CAADP Pillar I about sustainable land and water management. The authors find that both land and water are used inefficiently and far below their potential. Access to agricultural services is low and decreasing, as well as the use of modern agricultural inputs. The role of the public sector in agriculture has not been very proactive,

contributing to reduced investments both by the public and the private sectors. Better use of land and water is a necessary condition to reduce poverty, and entails reducing the gap between potential and the actual production and productivity levels. More than any other development stakeholder, the Government has enormous responsibility in stimulating agricultural growth through the design and implementation of agricultural policies and investments that are favorable and conducive to public-private partnerships that would benefit about four million smallholder farmers in rural Mozambique. We provide some examples of such investments.

5. [Factors influencing the use of improved inputs by smallholder farmers in central Mozambique, 2010/11](#). Bordalo Mouzinho, Benedito Cunguara, Eunice Cavane, and Cynthia Donovan. January 2015. *Flash* N°71E. (Key local collaborating institution: Capacity building for Bordalo Mouzinho of MOZCAPAN; CEPPAG through Cavane)

This flash looks at the factors influencing the use of improved inputs, using data from a survey on Price Dynamics carried out in central and northern Mozambique in 2011. Findings suggest that at present the use of inorganic fertilizers is only closely tied to growing crops with higher economic value and an assured market. In addition, households with higher asset levels or headed by males are more likely to access fertilizers. Extension, credit and price information were strongly linked with the use of improved maize seeds. Given the importance of these inputs in increasing productivity and their limited use among most smallholder farmers, a greater emphasis should be placed on improving the access to information and input markets. This includes various options. First, there should be continued efforts to improve smallholder access to inputs through financial market development and strategic programs, including vouchers and credit. Second, increased market opportunities for cash crops and staple crops help to ensure farm income and investment options. Third, greater public and private investments should be made to improve the existing roads by expanding and refurbishing them, in addition to improvements in the access to electricity. Livestock may contribute to the assets available to the household for obtaining inputs. Given the potential contribution to soil fertility with manure, ensuring livestock health is another area for public and private investments.

6. [Typology of Horticultural Producers Supplying Maputo](#). Jennifer Cairns, David Tschirley & Isabel Cachomba. November 2013. *Flash* N°70E. (Key local collaborating institution: IIAM/CESE through Cachomba)

Using data from the 2013 horticultural baseline study conducted as part of the trilateral partnership between Mozambique, Brazil, and the United States, this flash characterizes the smallholder horticultural producers supplying the city of Maputo. Cluster analysis is used to partition households into four groups based on 32 dimensions of technology endowment, capacity, and behavior. Results of this study indicate that there is a great diversity of horticultural producers in Maputo, ranging from those generally characterized by low land endowment, access to extension or training advice, and diversity of horticultural sales (cluster one) to those with high levels of the same indicators (cluster four). Level of technological capacity among the producers does not correspond with specific geographic regions of our study, as the producers of Moamba and Boane most commonly appear among the least technified farmers (primarily the dispersed producers in these areas), but also frequently appear among the most technified producers (generally those with shared central irrigation systems). Producers in the zonas verdes tend to be more uniform in the level of technology they apply, making up most of the two middle clusters (two and three).

7. [Risk Perception and Behavior in Pesticide Use by the Horticultural Producers of Maputo](#). Isabel Siteo Cachomba, Jennifer Cairns, David Tschirley & Jason Snyder. October 2013. *Flash* Nº69E. (Key local collaborating institution: IIAM/CESE through Cachomba)

This flash examines the perceptions of horticultural farmers in the province of Maputo with regard to pesticides, as well as the behavior that these producers exhibit concerning use of these chemicals. The analyses are based on data from a baseline survey conducted within the trilateral project (Mozambique, Brazil and the United States) also known as the horticultural food security project (PSAL). The survey took place from May to June of 2013 in the green belt of Maputo, and in the nearby districts of Boane and Moamba. The results of this study indicate that the most used pesticide among farmers in these areas - Methamidophos - is classified as highly toxic by both the Environmental Protection Agency of the United States (EPA) and the World Health Organization (WHO). Producers in these areas generally hold the perception that almost all pesticides are highly toxic (even those that are less toxic according to the EPA and WHO), yet do not take proper precautions of pesticide handling or use.

8. [Input Use and Channels Among the Horticultural Producers of Maputo](#). Jennifer Cairns, Isabel Cachomba and David Tschirley. October 2013. *Flash* Nº68E. (Key local collaborating institution: IIAM/CESE through Cachomba)

Using data from the 2013 horticultural baseline study conducted as part of the trilateral partnership between Brazil, the United States, and the Mozambican Agricultural Research Institute (IIAM), this flash explores producers' input purchase channels in terms of their formality, frequency, location and value, as well as their methods of irrigation. Principal findings are: (1) Among producers of the zonas verdes of Maputo, the most common source for purchases of seed, pesticide and inorganic fertilizer are informal comerciantes ambulantes, (2) seeds are farmers' largest input cost (compared to pesticides and fertilizer) but farmers generally have low levels of knowledge about the varieties of seeds they use or the benefits of these varieties compared to others, (3) farmers with more land under cultivation and more technological capacity (a) use more inputs and (b) are more likely to purchase these inputs in a formal channel rather than an informal channel, and (4) among users of water pumps in Moamba and Boane (58%), spray or drip irrigation is used by less than 4% of households, whereas irrigation with water pumps is nearly nonexistent in the zonas verdes (0.7%). This leads to large labor demands in both of these areas for regular manual irrigation or trench-digging (in the case of gravity-fed irrigation methods).

9. [O uso de fertilizantes químicos pelo sector familiar em Moçambique](#). Todd Benson, Benedito Cunguara e Tewodaj Mogues. Setembro de 2013. *Flash* No. 66P. Original English version published as [IFPRI Policy Note #5](#).

This paper presents the results of a broad study of fertilizer supply to smallholder farmers in Mozambique that was done to assess whether the taxes (explicit or implicit) that are applied at various points along the fertilizer importation and marketing chain, or the absence of key public goods and services, reduces the access that smallholder farmers have to fertilizer. The study involved a review of the literature of fertilizer supply, demand, and use; interviews with key participants in fertilizer importation and marketing in Mozambique; and two surveys—one with farmers and the other with input suppliers—in two farming areas where more fertilizer is used than is the norm for the country as a whole. The results indicate that the government can take two fertilizer-specific initiatives to accelerate use of fertilizer in Mozambique by smallholders: 1) Overcoming information constraints that smallholder farmers who might use fertilizer face. This includes both information on the proper agronomic use of the appropriate types of fertilizer on specific crops under specific agroecological conditions and information on the proper economic use of

fertilizer under changing input and output market conditions so that farmers can derive reliable profits from their use of the technology; 2) Regulatory reform needed. The fertilizer regulations currently being proposed for Mozambique, if comprehensively implemented, would be a poor fit for the public benefits sought through the regulations. A considerably lighter regulatory regime would allow more fertilizer into Mozambique, resulting in lower costs for farmers. The Ministry of Agriculture should be judicious in its implementation of this legislation. Efforts to assure the quality of fertilizers in open and competitive markets are best achieved through self-regulation processes tied to sufficient information on product quality for farmers and ample choice in suppliers, rather than through heavy regulation and costly enforcement.

10. [Regional Inequality and Polarization in the Context of Concurrent Extreme Weather and Economic Shocks](#). Julie A. Silva, Corene J. Matyas, Benedito Cunguara. Research Paper 77E. May 2014.

This study examines how extreme weather influences regional inequality and polarization within Mozambique in the context of on-going economic shocks. Utilizing satellite-based estimates of rainfall spatially analyzed within a GIS, we establish a 16-year rainfall climatology and calculate monthly rainfall anomalies for 665 villages. We approximate storm-total rainfall from all tropical cyclones entering the Mozambique Channel, as well as the extent of damaging winds for those making landfall, between 2005 and 2008. We group villages according to tropical cyclone impacts and use hierarchical cluster analysis to group the remaining villages according to shared patterns of monthly rainfall anomalies. Using economic data from the 2005 and 2008 National Agricultural Surveys of Mozambique, we relate weather patterns associated with near normal rainfall, tropical cyclones, flooding, and drought to changes in inequality and polarization by conducting decomposition analyses of the Gini index and Duclos-Esteban-Ray (DER) polarization index. Our findings mainly correspond to the generally accepted view that weather shocks exacerbate existing income and power disparities within societies. However, in some cases we find evidence that inequality and polarization can decline in the aftermath of an extreme event, and increase even where the weather is relatively good. By identifying varying effects of extreme events on inequality and polarization at subnational level, our study enables a more detailed understanding of weather-related effects on socio-economic outcomes in rural societies rapidly integrating into the global economy.

11. [Análise situacional, constrangimentos e oportunidades para o crescimento agrário em Moçambique](#). Benedito Cunguara, James Garrett, Cynthia Donovan, Célia Cássimo. Relatório de Pesquisa 73P. 15 de Julho de 2013.

The objective of this study is to review the available literature on Mozambique concerning the constraints to agricultural growth, and opportunities for growth. The analysis is guided by the four CAADP pillars: i) extending the area under sustainable land management and reliable water control systems; ii) improving rural infrastructure and trade-related capacities for market access; iii) increasing food supply, reducing hunger, and improving responses to food emergency crises; and iv) improving agricultural research, technology dissemination and adoption. The study also looks at cross-cutting issues.

## B. Full list of publications (including translated versions)

Topic 1. Farmer supply response to high price environment and reassessment of the determinants of crop marketing

1. [Smallholder Cropping and Input Responses to Changes in Expected Prices and Market Access in Central and Northern Mozambique, 2008-2011](#). David Mather, Benedito Cunguara and David Tschirley. Working Paper 75E. December 2015.
2. [Food Crop Marketing and Agricultural Productivity in a High Price Environment: Evidence and Implications for Mozambique](#). Rui Benfica, Duncan Boughton, Bordalo Mouzinho and Rafael Uaiene. Research Paper 76E. May 2014.
3. RP 71E. [Determinants of Crop Income in Rural Mozambique, 2002-2005](#). David Mather. January 2012.
4. [Dinâmicas de Participação e Desempenho nos Mercados Agrícolas do Centro e Norte de Moçambique: Evidência de um Inquérito-Painel a Famílias Rurais \(2008-2011\)](#). Rui Benfica e David Tschirley. 7 de Dezembro de 2012. *Flash* No. 61P.
5. [The Dynamics of Agricultural Market Participation and Performance in Central and Northern Mozambique: Evidence from a Panel Survey](#). Rui Benfica and David Tschirley. 07 December 2012. *Flash* No. 61E.
6. [Mudanças no Padrão de Cultivo e Uso de Insumos pelos Pequenos Produtores no Centro e Norte de Moçambique, 2008/2011](#). Benedito Cunguara, João Mudema, David Mather e David Tschirley. 15 de Novembro de 2012. *Flash* N.º60P
7. [Changes in Smallholder Cropping and Input Use in Central and Northern Mozambique, 2008/2011](#). Benedito Cunguara, João Mudema, David Mather, and David Tschirley. 15 November 2012. *Flash* 60E.
8. [Comerciantes Esperam uma Redução na Produção de Milho na Presente Campanha Agrícola](#). António Paulo, Dolito Loganemio, Arlindo Miguel e Fazila Gomes. 29 de Agosto de 2012. *Flash* 59P.
9. [Constrangimentos para o Estabelecimento de Bolsas de Mercadorias em África: Implicações do Caso Zambiano para Moçambique](#). Estudo preparado por Nicholas Sitko e T.S. Jayne. Agosto 2012. *Flash* 58P.
10. [Impact of Agricultural Market Information Systems Activities on Market Performance in Mozambique. Mozambique Country Report](#). Andrew M. Kizito, Cynthia Donovan, and John M. Staatz. IDWP 124. July 2012.
11. [An emerging success story of pigeonpea expansion in smallholder agriculture in Mozambique: A summary of key findings](#). T. Walker, S. Silim, B. Cunguara, C. Donovan, P. Parthasarathy Rao, M.A. Amame, M. Siambi. September 30, 2015. *Flash* No. 73E
12. [Pigeonpea in Mozambique: An Emerging Success Story of Crop Expansion in Smallholder Agriculture](#). Tom Walker, Said Silim, Benedito Cunguara, Cynthia Donovan, P. Parthasarathy Rao, Manuel Amame, Moses Siambi. Research Paper 78E. September 2015.
13. [A Expansão do Feijão Bóer na Agricultura Familiar em Moçambique: Uma História de Sucesso](#). Tom Walker, Said Silim, Benedito Cunguara, Cynthia Donovan, P. Parthasarathy Rao, Manuel Amame, Moses Siambi. Relatório de Pesquisa 78P. Janeiro de 2016.
14. [Avaliação da Situação da P&D da Soja e o Programa “Feed the Future”, da USAID, em Moçambique em 2016](#). Tom Walker e Benedito Cunguara. Relatório de Pesquisa 81P. Junho 2016.

15. [Avaliação dos Rumos da P&D do Feijão Nhemba no Programa “Feed the Future”, da USAID, em Moçambique em 2016](#). Tom Walker, Benedito Cunguara e Cynthia Donovan. Relatório de Pesquisa 80P. Junho 2016.
16. Walker, T., Cunguara, B., and Donovan, C., 2016. [Assessing directions for cowpea R&D in USAID’s Feed the Future program in Mozambique in 2016](#). MEAS report. University of Illinois.
17. Walker, T., and Cunguara, B., 2016. [Taking stock of soybean R&D and USAID’s Feed the Future program in Mozambique in 2016](#). MEAS report. University of Illinois.
18. [Demystifying the Role of Grain Assemblers in the Rural Maize Markets of Eastern and Southern Africa](#). Nicholas Sitko and T.S. Jayne. IAPRI Working Paper No. 84. June 2014.
19. [Um Estudo de Caso de Margens Brutas e Custos de Produção de Alface, Couve, Tomate e Cebola entre os Horticultores que Abastecem o Mercado de Maputo](#). Jennifer Cairns Smart. Janeiro 2016. *Flash* Nº74P.
20. [A Case Study of Lettuce, Kale, Tomato and Onion Gross Margins and Costs of Production Among the Horticultural Producers Supplying Maputo](#). Jennifer Cairns Smart. December 2015. *Flash* Nº74E.
21. Ngare, Lucy, Franklin Simtowe, and Jaqueline Massingue. [Analysis of Price Volatility and Implications for Price Stabilization Policies in Mozambique](#). European Journal of Business and Management. Vol.6, No. 22, 2014.
22. Steven Haggblade, Agnes Andersson Djurfeldt, Drinah Banda Nyirenda, Johanna Bergman Lodin, Leon Brimer, Martin Chiona, Maureen Chitundu, Linley Chiwona-Karltun, Constantino Cuambe, Michael Dolislager, Cynthia Donovan, Klaus Droppelmann, Magnus Jirström, Emma Kambewa, Patrick Kambewa, Nzola Meso Mahungu, Jonathan Mkumbira, João Mudema, Hunter Nielson, Mishek Nyembe, Venâncio Alexandre Salegua, Alda Tomo, Michael Weber, (2012) "[Cassava commercialization in Southeastern Africa](#)", Journal of Agribusiness in Developing and Emerging Economies, Vol. 2 Iss: 1, pp.4 – 40.

## Topic 2. Completion of Research on Conservation Agriculture

1. [Adapting Conservation Agriculture to Local Contexts in Mozambique – the Role of Farmers’ Participation and Innovation Networks](#). Philip Grabowski, John Kerr, Cynthia Donovan and Bordalo Mouzinho. April 2015. *Flash* No. 72E.
2. [Uso de Agricultura de Conservação pelos pequenos produtores no Centro e Norte de Moçambique, 2010/11](#). Bordalo Mouzinho, Benedito Cunguara e Cynthia Donovan. Setembro de 2013. *Flash* No. 67P.
3. [The use of conservation agriculture by smallholder farmers in central and northern Mozambique, 2010/11](#). Bordalo Mouzinho, Benedito Cunguara, and Cynthia Donovan. 23 October 2013. *Flash* No. 67E.
4. [Mozambique conservation agriculture inventory report](#): Grabowski, P., and Mouzinho, B., IIAM RP 6E, 2013.
5. [Conservation agriculture: Literature review and research gaps](#). Grabowski, P., and Mouzinho, B., IIAM RP 4E, 2013.
6. [Prioritizing Actions for Conservation Agriculture in Mozambique](#). Grabowski, P., and Mouzinho B. 2013. RP 5E.

## Topic 3: Research on Agriculture, Income Diversification, Food Security and Nutrition, and Agrifood Systems Transformation.

1. RP 72P. [Introdução às Ligações Entre a Nutrição e a Agricultura](#). Kimberly Chung. Fevereiro de 2012.
2. RP 72E. [An Introduction to Nutrition-Agriculture Linkages](#). Kimberly Chung. February 2012
3. Mabiso, A., Cunguara, B., Benfica, R., 2014. [Food \(In\)security and its Drivers: Insights from Trends and Opportunities in Rural Mozambique](#). Food Security, 6(5):649-670. August 2014.
4. Tschirley, David, Thomas Reardon, Michael Dolislager e Jason Snyder. [O Surgimento da Classe Média na África Oriental E Austral: Implicações Para a Transformação do Sistema Alimentar](#). Publicado em Journal of International Development, Vol. 27, #5 (2015).
5. A ser publicado em Journal of Agribusiness in Developing and Emerging Economies, Setembro de 2015. A Transformação Emergente da Dieta Alimentar Africana: Implicações para o Emprego no Sistema Agro-Alimentar. Tschirley, D., J. Snyder, M. Dolislager, T. Reardon, S. Haggblade, J. Goeb, L. Traub, F. Ejobi, F. Meyer.
6. Contribuição do Sector Agrário no Combate Multisectorial á Desnutrição Crónica em Moçambique: Perspectivas do Seminário Nacional sobre Nutrição Comunitária. Por Jaqueline Massingue, Anina Manganhela, Cynthia Donovan, e Almeida Tembe. Julho 2012. Flash 57P.
7. Contribution of the Agriculture Sector in Multi-Sector Combat of Chronic Malnutrition in Mozambique: Perspectives from National Seminar about Community Nutrition. Jaqueline Massingue, Anina Manganhela, Cynthia Donovan, and Almeida Tembe. July 2012. Flash No.57E.
8. Silva, J., Matyas, C., Cunguara, B., 2015. Regional Inequality and Polarization in the Context of Concurrent Extreme Weather and Economic Shocks. Applied Geography. (in press)
9. Cunguara, Benedito, Gorka Fagilde, James Garrett, Rafael Uaiene and Derek Headey. [Growth without Change? A Case Study of Economic Transformation in Mozambique](#). Journal of African Development. Volume 14, #2. Fall 2012.
10. Cunguara, B., J. Hanlon. 2012. Whose wealth is it anyway? Mozambique's outstanding economic growth with worsening rural poverty. *Development and Change*. 2012, 43(3).
11. Cunguara, B. 2012. An exposition of development failures in Mozambique. *Review of African Political Economy*. 39(131):161-70.
12. [Regional Inequality and Polarization in the Context of Concurrent Extreme Weather and Economic Shocks](#). Julie A. Silva, Corene J. Matyas, Benedito Cunguara. Research Paper 77E. May 2014.
13. [Horticultura em Moçambique Características, Tecnologias de Produção e de Pós-Colheita](#). Lenita Lima, Haber Carvalho, Carlos Ecole, Walter Bowen Francisco Vilela Resende. Editores técnicos. This book represents the culmination of the efforts of production, post-harvest, and socio-economics components of the Trilateral Project in Mozambique from 2012-2015. The book was released at the closing ceremonies of the Project during a final workshop held in Maputo, November 16-20, 2015.
14. Massingue, J., Mosse, G., Uaiene, R., Mutondo, J., Tschirley, D. and Tostão, E. O que comemos e onde produzimos? Resultados do Inventário de Produtos Alimentares Processados em três cidades Moçambicanas: Maputo, Chimoio e Nampula. CEPPPAG Policy Brief 01.

Topic 4: Smallholder Land Access and Issues in Commercial Agriculture and Development Interventions.

1. [Exploiting the potential for expanding cropped area using animal traction in the smallholder sector in Mozambique](#). Benedito Cunguara, David Mather, Tom Walker, Bordalo Mouzinho, Jaqueline Massingue, Rafael Uaiene. Research Paper 79E. April 2016.
2. [Impact Evaluation of Site-specific Activities under the Land Tenure Services Project: Report of the Baseline Survey Conducted in Two Urban Areas in Northern Mozambique](#). Mywish K. Maredia, Raul Pitoro, Songqing Jin, Ellen Payongayong and Gerhardus Schultink. October 2012.

3. [Explorando o potencial para a expansão da área cultivada usando a tracção animal no sector familiar em Moçambique.](#) Benedito Cunguara, David Mather, Tom Walker, Bordalo Mouzinho, Jaqueline Massingue, Rafael Uaiene. Relatório de Pesquisa 79P. Setembro de 2016.

Topic 5: Policy Synthesis of Research Relevant to the CAADP/PNISA Process

1. [Investment in Research and Extension: An Imperative to Increase Agricultural Productivity.](#) Rafael Uaiene, Raul Pitoro and Jaqueline Massingue. July 2013. *Flash* Nº65 E.
2. [Investimento na Investigação e Extensão: um Imperativo para Aumentar a Produtividade Agrária.](#) Rafael Uaiene, Raul Pitoro e Jaqueline Massingue. Junho 2013. *Flash* Nº 65P.
3. [Disponibilidade de Alimentos e Qualidade da Dieta em Moçambique: Ligando a Agricultura à Nutrição.](#) Jaqueline Massingue, Cynthia Donovan e James Garrett. Julho 2013. *Flash* Nº 64P.
4. [Food Availability and Quality of Diet in Mozambique: Linking Agriculture to Nutrition.](#) Jaqueline Massingue, Cynthia Donovan and James Garrett. July 2013. *Flash* Nº 64E.
5. [Comercialização Agrícola e Desenvolvimento em Moçambique: Resultados de Pesquisas e Implicações de Política.](#) Rui Benfica e David Mather. Julho 2013. *Flash* No.63P.
6. [Agricultural Marketing and Development in Mozambique: Research Findings and Policy Implications.](#) Rui Benfica and David Mather. June 2013. *Flash* No.63E.
7. [Gestão sustentável de terra e água em Moçambique.](#) Benedito Cunguara e Rafael Uaiene. 1 de Julho de 2013. *Flash* N.º 62P.
8. [Sustainable land and water management in Mozambique.](#) Benedito Cunguara and Rafael Uaiene. July 1, 2013. *Flash* N.º62E.
9. [Factores que influenciam o uso de insumos melhorados no sector familiar: Estudo de caso da região centro de Moçambique, 2010/11.](#) Bordalo Mouzinho, Benedito Cunguara, Eunice Cavane e Cynthia Donovan. Junho 2014. *Flash* Nº71P.
10. [Factors influencing the use of improved inputs by smallholder farmers in central Mozambique, 2010/11.](#) Bordalo Mouzinho, Benedito Cunguara, Eunice Cavane, and Cynthia Donovan. January 2015. *Flash* Nº71E.
11. [Tipologia dos Produtores de Hortícolas que Abastecem o Mercado de Maputo.](#) Jennifer Cairns, David Tschirley & Isabel Siteo Cachomba. Novembro 2013. *Flash* Nº70P.
12. [Typology of Horticultural Producers Supplying Maputo.](#) Jennifer Cairns, David Tschirley & Isabel Cachomba. November 2013. *Flash* Nº70E.
13. [Percepção de risco e comportamento no uso dos pesticidas pelos produtores de hortícolas de Maputo.](#) Isabel Siteo Cachomba, Jennifer Cairns, David Tschirley & Jason Snyder. Outubro de 2013. *Flash* Nº69P.
14. [Risk Perception and Behavior in Pesticide Use by the Horticultural Producers of Maputo.](#) Isabel Siteo Cachomba, Jennifer Cairns, David Tschirley & Jason Snyder. October 2013. *Flash* Nº69E.
15. [Cadeia de Valor dos Insumos na Produção de Hortícolas em Maputo.](#) Jennifer Cairns, Isabel Cachomba & David Tschirley. Outubro de 2013. *Flash* Nº68P.
16. [Input Use and Channels Among the Horticultural Producers of Maputo.](#) Jennifer Cairns, Isabel Cachomba and David Tschirley. October 2013. *Flash* Nº68E.
17. [O uso de fertilizantes químicos pelo sector familiar em Moçambique.](#) Todd Benson, Benedito Cunguara e Tewodaj Mogues. Setembro de 2013. *Flash* No. 66P. Original English version published as [IFPRI Policy Note #5](#).
18. Benson, Todd, B. Cunguara, and Tewodaj Mogues. 2012. The supply of inorganic fertilizers to smallholder farmers in Mozambique: Evidence for fertilizer policy development. A research report produced by the International Food Policy Research Institute (IFPRI) with the support of the Alliance for a Green Revolution in Africa (AGRA). [Análise situacional, constrangimentos e](#)

[oportunidades para o crescimento agrário em Moçambique](#). Benedito Cunguara, James Garrett, Cynthia Donovan, Célia Cássimo. Relatório de Pesquisa 73P. 15 de Julho de 2013.

19. Pauw, Karl; Thurlow, James; Uaiene, Rafael and Mazunda, John. 2015. Agricultural growth and poverty in Mozambique: Technical analysis in support of the Comprehensive Africa Agriculture Development Program (CAADP). MozSSP Working Paper 2. Washington, D.C.: International Food Policy Research Institute (IFPRI) <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/127359>