

MINAG

IIAM

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Strengthening Mozambican Capacity for Agricultural Productivity Growth, Policy Analysis, and Poverty Reduction

**Annual Project Narrative Report - FY07 (2006/07)
Mozambique Associate Award / Food Security III LWA CA
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Annual Narrative Report FY07

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Strengthening Mozambican Capacity for Agricultural Productivity Growth, Policy Analysis and Poverty Reduction

Introduction

FY07 was affected by three events which have influenced the implementation of the project in the Ministry of Agriculture (MINAG). The first event was the removal of Mr. Tomas Mandlate in February, 2007 as the Minister of Agriculture and his place taken by Eng. Erasmo Muhate . Mr. Tomas Mandlate served as the Minister of Agriculture for about two years. During his term in office, he made significant personnel changes at senior positions and removed some material incentives (especially transport) from senior technical staff. The future of some technical staff on contract and paid by PROAGRI funds became uncertain as the Ministry showed an intention to terminate the use of these contracts but without clear indications of when it was to happen. Removal of incentives and the increased uncertainty for future employment combined with the unknown future of PROAGRI resulted in the departure of technical staff.

While he was in office, the Minister defined the priority areas for development and initiated the preparation of a strategic plan for the sector. He had also approved the hiring of new technical staff for the various departments of the Directorate of Economics to replace the staff members who had left. Unfortunately he was removed from office before the decision was implemented. The process of hiring new staff was restarted in May 2007, but was later cancelled because of procedural errors. Then, before the posts could be re-advertised, there was a fire outbreak in the Ministry shifting the priority to re-establishment of normal activities of MINAG.

Eng. Muhate is an agronomist and has worked for many years in MINAG and the Cotton Institute of Mozambique (IAM). When he addressed his first meeting of the Consultative Council of MINAG, he made various statements which raised further questions on the direction of the Ministry. In particular, he suggested that MINAG is simply an implementing agency for policy, rather than one which evaluates and establishes policies. The directive of the new Minister was to focus Ministry efforts on having a direct impact at the producer level. It is unclear what that means for the Directorate of Economics and policy analysis and studies.

The second event was the fire outbreak in MINAG which occurred on 26th of May 2007 causing substantial damage to the building and a loss of documents and equipment. The fire destroyed the middle part of the building starting from the second floor to the top. This section of the building housed the offices of PROAGRI, agricultural services, the Veterinary Services, the Vice Minister and the Minister. The cause of the fire has not yet been established. The activities supported by the project continued normally with part of the staff of SIMA and DAP operating from the main project offices in IIAM. After electricity and water were established and some cleaning done, normal services were established within the relatively unaffected wings and in other installations outside the main building. There is no indication yet when main repairs of the building will start.

The third event is related to the Alliance for a Green Revolution in Africa (AGRA). The President and Minister adopted the AGRA platform, shifting attention away from the preparation of the Strategic Plan for the Agricultural Sector to the preparation of a Green Revolution Strategy for Mozambique. The process is under the direct leadership of the Minister of Agriculture.

Midterm evaluation of the project

Mid-term evaluation of the project was carried between from 20th of February to 9th of March, 2007 by Mr. Kurt Rockeman from the USA and Dr. Lidia Brito from Mozambique. The central purposes of the project mid-term evaluation were a) to assess progress made by the project and constraints encountered, and b) to recommend measures to improve the performance and fit of project activities with the needs of USAID, Ministry of Agriculture, and stakeholders.

The evaluation team was provided with all the project documents and was assisted in identifying relevant people to be interviewed. Mr. Rockeman was able participate for one day in the technology transfer workshop organized by the project in Nampula. A draft evaluation report was produced in April and was circulated to the stakeholders for comments, which were later incorporated into the final evaluation team report produced in July. Annex 1 included here presents the executive summary of that report.

This annual narrative report presents the principal accomplishments of the MSU project in FY07 and shortcomings encountered during the implementation of the workplan. It is organized by project objectives. Annex 2 details the cumulative research and outreach related outputs of the project, based upon the website.

Objective 1: Strengthen capacity of the new agricultural research institute (IIAM) to identify and disseminate improved crop, livestock and natural resource management technologies through the integration of social sciences with effective zonal research centers

1.1 Integration of Socio-Economists into IIAM

The Administrative Tribunal signed the contracts of the 8 socio-economists in October, 2006, and with effect from November, IIAM assumed the responsibility of paying their salaries. The housing problem for the socio-economists assigned to the zonal centers was not completely resolved. While the construction of the two houses for the Nampula socio-economists has been completed at the research station, electricity connection has not yet been effected because IIAM is required to incur additional costs for the construction of a service line which, unfortunately were not foreseen in their budget. It is expected that the problem will be resolved, by the end of December 2007 to enable the two socio-economists to move to these houses. In the case of the Central Zonal Center, the provincial government has promised to allocate some houses to the Zonal Center and the two socio-economists will be given a priority. While this permanent solution is being sought, the Center will be responsible for paying rents with effect from October, 2007.

Administratively, the socio-economists have been located in the Department of Technology Transfer in both Zonal centers. This means that their workplans and local budgets are integrated in the departmental workplan and budget. This integration is gradually facilitating

the access to Zonal Center funds for socio-economic activities and participation in multidisciplinary research and technology transfer activities.

1.2 IIAM Investment Plan

The financing of the IIAM investment plan did not begin in FY07 as was initially envisaged because it was not incorporated into MINAG's midterm expenditure framework and 2007 budget. However, several steps have been undertaken to ensure support for the investment plan from MINAG. These steps included presentation of the plan to the Minister, the PROAGRI group and key Directorates of MINAG. These presentations have been of mutual benefits in that they assure that the plan is responding to MINAG's priorities and that the investment sought is articulated with other investment priorities. On the other hand the presentations allowed the Ministry and development partners to gain better understanding of the constraints that IIAM is facing in responding to its mandate of technology development/adaptation and transfer. The plan has now been included in MINAG's medium term expenditure framework and USD 6 million has been budget for 2008, although 1 million is for a fixed obligation for which IIAM will not have flexibility in their application.

1.3 Research activities

a) Diagnostic research on grain legumes

A baseline study was carried out in Beira and Nacala Corridors by the International Institute of Tropical Agriculture (IITA) in collaboration with IIAM between 16th of October and 10th of November, 2006. IIAM and IITA are implementing a study on "Enhanced Soil Management Practices for Improved Productivity in the Beira and Nacala Corridors" which is one of the components of the Agricultural Input Markets Strengthening Project (AIMS) being financed by USAID.

The two socio-economists from Central Zonal Center and one from the North-eastern station (Adelino Manuel) helped to implement the survey. Before the survey, they participated in a 5-day methodology workshop in Beira. A final report has been produced as a joint output of IITA and IIAM, and the IITA in-country coordinator has indicated that the data can be made available to CESE for additional analyses.

b) Economic Impact of Cashew Powdery Mildew Disease Spraying: A Smallholder Perspective from Southern Mozambique

The study is being conducted by CESE in collaboration with the Institute of Cashew (INCAJU) and it covers the provinces of Gaza and Inhambane. The first round of data collection took place in FY06 and involved a representative sample of 400 small holder producers divided into two strata, namely households who sprayed some of their trees against Cashew Powdery Mildew and those who didn't spray their trees. The second round of data collection took place in FY07. Data entry, cleaning and analysis have been carried out and a report is being finalized.

Regression results indicate that households who sprayed their trees had significantly higher production than households who didn't spray their trees. However when analysis looked at households according to terciles established using their total cashew production, the partial budget results show that spraying was only profitable for the households in the highest production tercile. Given that 2006 cashew production was in general very poor, the study will be repeated in FY8.

c) Small farmer irrigation in Southern and Central Mozambique

A baseline survey was carried out for 10 small scale irrigation schemes in the Provinces of Maputo (4 schemes) Sofala (3 schemes) and Zambézia (3 schemes) as part of the Small Scale Irrigation Project (SSIP) whose objective is to contribute to the improvement of rural household income and food security. The baseline study is intended to produce (a) recommendations which will be taken into account during project implementation and (b) information that will be used to evaluate the project. Ten reports have been produced, one for each irrigation scheme, and they have been submitted to SSIP. Researchers completed a synthesis draft report which will be published under the IIAM research reports series after it has been reviewed.

d) Evaluation of levels of adoption of varieties distributed by the Northeast Zonal Research Center

The crop varieties initially identified for study are groundnuts, cowpeas, cassava and sesame. Two field visits were made by Ellen Payongayong and the socio-economists of the Zonal Center in Nampula during the months of May and June to pre-test the questionnaire and to collect information necessary for the survey design. The team visited Mogovolas, Meconta, Monapo and Mossuril districts. During these visits, they asked NGO staff members and farmers about the introduced varieties of cowpeas, groundnuts, sesame, and cassava. The information obtained from the field indicated that the cowpea variety IT18 previously identified for the adoption study had been around for only one year, and there was extensive mixing of cowpea varieties in fields, such that cowpeas were excluded from the rest of the research. For groundnuts, the variety Nametil has been around since 2001, and the sesame variety ICTAR 198, known as Nicaragua, has been grown in the area since 2001. At the time of the visit, groundnuts and sesame were still in the field and the team was advised to delay the survey until July, when the two crops will have been harvested in order to be able to get production data.

The field survey was conducted in the last week of July in the District of Monapo and covered 200 households. The analytical work is being carried out by the two socio-economists under guidance from project staff. Raul Pitoro went to Nampula to work with the socio-economists on report outline, review of analytical methods using STATA software, and the analyses to be carried out to answer the research questions. Data analysis and report write-up will be completed in FY8.

e) Adoption of bean varieties introduced in the Central Region

Researchers found that the bean variety Diacol Calima was the most important variety disseminated to the farmers in Tete Province. The main drawback encountered during the preparation of research protocol is the lack of sufficient documented information to understand the process involved in testing and dissemination of the bean variety Diacol Calima. IIAM Legumes and Oilseeds Program staff members indicated that records and information needed to design an adoption study could be obtained in Angonia on the Diacol Calima diffusion program. Gilead Mlay with the socio-economists of the Center Zonal

Center traveled to the Districts of Angonia and Tsangamo in Tete during the month of June to collect background information about Diacol Calima and other bean varieties grown by small farmers. The researchers planned to further develop the survey design, pre-test a draft instrument, and identify collaborators for the implementation of the survey.

The team worked with Mr. Diniz Pio, a mid-level agronomist, employed by the Ministry of Agriculture. Contrary to expectations, Mr. Pio did not have any documents on bean varieties distributed by IIAM and other organizations. He has extensive field experience and provided information based solely on recall. The distribution of Diacol Calima in Tete Province was first undertaken in 2000 by a SIDA funded project which obtained the seed from Malawi.

A DANIDA funded project operated for two years (2000 to 2001) in the region and was linked to the Provincial Directorate of Agriculture. That project worked closely with the agricultural extension system which provided the supervision and technical assistance to farmers contact groups. The project distributed seed in the districts of Angonia , Tsangano and Macanga.

IIAM worked closely with CIAT on on-farm trials of Diacol Calima and the results showed that the variety was high yielding and resistant to diseases. In 2005, 500kg of IIAM-multiplied seed was distributed through an ICRAF project in the region. According to the information provided by Mr. Pio, there was no formal involvement of the extension service and follow-up was weak.

The meetings with farmers were very informative on bean production, consumption and marketing. Farmers produce several improved and local varieties (up to 8 different varieties) to satisfy multiple objectives. Diacol Calima is recognized as being high yielding, but has no local market. Its production is destined for home consumption and sale in Malawi. The few farmers we visited were requested to provide samples of the varieties they grow and on the basis of these they were asked to rank them in terms of a) consumption characteristics (cooking time and taste) b) production characteristics (yield, resistance to diseases and drought, time to maturity etc.), and c) market characteristics (mainly in terms of price). We felt that apart from yield and disease resistance, not enough diagnostic work has been done to justify the promotion of the variety.

From the visit, the researchers determined that an adoption study is not justifiable. They recommended that a diagnostic study be conducted in the same administrative posts which benefited from the distribution of Diacol Calima because such a diagnostic study can inform IIAM and contribute information to the design of more relevant on-station and on-farm bean trials. It was agreed that further consultation be made with the Legumes Programs to evaluate the potential for conducting the study in FY8.

f) Evaluation of the impact of vaccination against Newcastle Disease in central and southern Mozambique

Alda Tomo is pursuing her M.Sc. in Agricultural Economics at MSU, and the topic of her research is an impact evaluation of vaccination of chickens against this devastating disease. She returned to Mozambique in mid-May as planned to review secondary information, to identify locally-available research results, and to discuss the research with local experts. Based on this, she developed her draft research protocol concentrating on the definition of research problem and objectives of the study. Tomo used TIA data to inform the selection of study sites. Nampula, Tete and Gaza Provinces were identified as the most suitable for the

study, and with time constraints, it was decided to limit the study to Chibuto District of Gaza Province. Two visits were made to Gaza to collect secondary information and identify appropriate sites within Gaza to conduct the survey. The field survey was carried out in the last two weeks of July, and it is expected that after preliminary data analysis, additional data collection in FY08 will be necessary to satisfy the thesis requirements.

g) Adoption survey of Nikwaha Cassava Variety

The two IIAM socio-economists based at the Northeast Zonal Centre conducted a cassava survey in September in the Districts of Memba, Mossuril, Mogincual and Nacala-a-Velha. There were two objectives of the survey: 1) validating the coefficients used for the impact assessment study by McSween et al.; and 2) verifying if the variety continues to maintain the same levels of tolerance against the Cassava Brown Streak Virus over time¹. The field survey was carried out under supervision of Ellen Payongayong.

1.4 Assessing the need to update the priority setting document using TIA05 data

Analysis of product values and evaluation of individual shares to total values show that cassava, maize and sweet potatoes have maintained the same positions as in 2002. The other commodities show wide variations probably reflecting the effects of weather. Given that 2004/05 was not a normal season, it would be more meaningful to revisit the analysis using TIA 2006 data since 2005/06 season was considered normal.

1.5 Agricultural Technology Transfer

Under an amended scope of work for the Food Security III Associate Award, MSU in collaboration with USAID-funded PVO agricultural programs and IIAM implemented two workshops with the objective to enhance the identification, adaptation and transfer of improved agricultural technologies.

The specific objectives of the amended scope of work are:

- a) To increase the impact of USAID-funded PVO agricultural programs through improved selection of technologies with the highest likelihood of adoption and impact ('best-bet' technologies),
- b) To improve the monitoring and impact assessment of technology transferred by USAID-funded PVO agricultural programs,
- c) To strengthen the linkages and communication between technology development activities of IIAM, USAID-funded PVO agricultural programs and other relevant bodies.

The first workshop was successfully conducted in Nampula from 6th to 7th of March, 2007 and was attended by 53 participants from IIAM (all 4 Zonal Research Centers and IIAM-Maputo), USAID funded PVOs, Extension Services, one farmer association (IKURU) and USAID-Maputo.

The workshop had the following objectives:

- to take stock of agricultural technologies available on-shelf and those in early stages of dissemination;

¹ [Economic Impact on Food Security of Varietal Tolerance to Cassava Brown Streak Disease in Coastal Mozambique](http://www.aec.msu.edu/agecon/fs2/mozambique/iiam/rr_1e.pdf). S. McSween. T. Walker. V. Salegua. R. Pitoro. IIAM-DFDTR Research Report No. 1E. August 2006. http://www.aec.msu.edu/agecon/fs2/mozambique/iiam/rr_1e.pdf

- to review success stories of technology transfer activities,
- to identify the principal factors that influence agricultural technology adoption and their impact

The following were the key observations from the workshop:

- a) There are many technology options particularly in crop production but the information is not easily accessible;
- b) The technologies were mainly presented as components and not as technology packages;
- c) In the area of livestock, there is scanty information on available technologies in animal nutrition, pastures and better performance breeds;
- d) It was not clear what criteria are used for recommending the technologies;
- e) More research work is needed in the area of animal traction and mechanization;
- f) There is a need for research to provide technology packages for various target groups – from low use of purchased inputs to intensive use of purchased inputs, by agroecologies;
- g) There is a need to include social-economic factors in technology evaluation and in making farmer recommendations; and
- h) IKURU urged strongly that in evaluating the performance of research-extension system the focus should be on its impact on the well-being of the producers.

A draft of the technology source book which was produced for presentation in the workshop has been undergoing extensive revisions and updating and will be published under IIAM research papers. Because of weak documentation and dissemination of IIAM's research outputs, the process of revising the source book has been slower than anticipated.

In order to facilitate future access to IIAM's research results in a form consumable by extension the FSIII project, COMPETE project and Department of Technology Transfer have proposed a format for compiling information from researchers to enable the Directorate of Training, Documentation and Technology Transfer to produce published material for use by extension. The compilation of information is in progress for maize, beans and cassava.

The second workshop was held in August 2007. This was a training workshop on ex-ante assessment of best bet agricultural technologies. It was attended by 12 participants of which 6 participants came from the six USAID funded PVOs, 4 from IIAM Zonal Centers and 2 from IIAM's Directorate of Training, Documentation and Technology Transfer. The workshop was facilitated by Dr. Thomas Walker with participation of project staff (Raul Pitoro, Ellen Payongayong and Gilead Mlay) and the Coordinator of CESE (Feliciano Mazuze).

The workshop was designed to build the capacity of USAID-funded partners to carry out ex-ante assessment of agricultural technologies in order to select best bet technologies for transfer. The training was considered very useful and the participants recommended that the same be offered to more technical staff working in the area of technology development, transfer and monitoring. It was also recommended that the duration of the course be extended to provide more details on concepts and more time on hands on application of the methods. The workshop outline is attached as Annex 3.

1.6 IIAM Web Site

The project continued to support further development of IIAM web site and assisted COMPETE to developing its web page. Close cooperation between the Director of DFTT, (Dr Paula Pimentel), COMPETE grants manager (Pauline Wynter) and Steve Longabaugh of MSU made it possible for the Web site to attain its present level of development both in terms of design and content. The web site of IIAM is <http://www.iiam.minag.org.mz/index.htm> .

1.7 Training

a) Training of IIAM researchers on simple techniques for technology evaluation

The project in collaboration with the Directorate of Training, Documentation and Technology transfer organized a six-day course between 21st of June and 29th of June, 2007 for IIAM researchers. The course comprised two principal modules, namely planning of on-station and on-farm experiments and economic analysis of experimental data (see Annex 4). There were 18 participants of which 8 came from the 4 zonal centers, 1 from experimental station of Umbeluzi and 9 from the technical directorates of IIAM in Maputo. The distribution of participants by area of training was as follows: 11 agronomists, 6 veterinarians and 1 forester. The course was offered by 2 staff from the project and 2 from IIAM. IIAM also supported all the costs for the participants (air tickets, lodging, per diem and photocopying of material used for the course).

We found the group to be very heterogeneous in terms of statistics background with some participants having only the very elementary statistics, such that they struggled to understand the statistical rationale underlying the principles for the design of experiments. The participants showed keen interest about the economic analysis of experimental data and felt that the knowledge gained will contribute in improving the work of technology generation and transfer. The participants suggested that future courses should focus more on statistical analysis and be directed to more homogeneous groups in terms of level of knowledge and skills in applied statistics and experimental design.

b) MS level studies

i. Alda Tomo, one of the socio-economists of IIAM, is pursuing her M.Sc. in agricultural economics at MSU. She spent Fall 2006 in English language studies, and began coursework in agricultural economics in Spring 2007. She has joined faculty members from Agricultural Economics and Veterinary Science for the committee to supervise her thesis research on Newcastle disease. As indicated above, she was in Mozambique May-August 2007 for thesis research.

ii. Isabel Siteo has been awarded a scholarship by the Australian Government to pursue graduate training in Australia. She will begin her training in January 2008.

1.8 Others

a) The project purchased a Scanner and Digital camera for DFTT, The scanner will enable IIAM to increase the dissemination of research results presently only available in limited copies in printed form.

- b) The project staff collaborated with COMPETE, a USAID funded competitive research fund at IIAM in the evaluation of concept notes. The project coordinator is a member of the Technical Review and Evaluation Committee (TREC)
- d) The project staff (Mlay and Boughton) helped to organize a brainstorming session about the implementation of a green revolution strategy. The request was made by the Director General of IIAM. Directors of Extension, DFTT, head of the Department of Policy, Coordinator of CESE and the Director General of IIAM participated in the session. It is expected that a technology transfer task force will be created to facilitate inter-institutional collaboration for technology development and transfer of profitable agriculture technologies under the umbrella of the green revolution strategy.

Objective 2: Strengthen Capacity of the Directorate of Economics to Implement the National Agricultural Survey (TIA)

2.1 Implementation of TIA 2006

Fieldwork, data cleaning and processing were completed successfully. Documentation has also been completed and preliminary results are available in CDs.

2.2 Preparation and implementation of TIA 2007

The preparatory work for TIA 07 included recruitment and training of supervisors and consultation with stakeholders. Consultation with the cashew institute (INCAJU) was very fruitful as it allowed the harmonization of methods for estimating cashew production. Fieldwork started according to plan and is progressing well. It is envisaged that preliminary results will be made available in December.

2.3 Staff situation and training

The staff situation in the Department of Statistics remained unchanged during this period. Advertisement to hire 6 new technical staff was finally re-launched in July, 2007 but the process of contacting is still long and these may not be available before January 2008. Training was limited to staff engaged in supervision and implementation of fieldwork for TIA 07.

2.4 INCPROX

MSU, through the leadership of Ellen Payongayong, provided assistance in the analyses of survey data from 6 NGOs working with USAID. While it was planned that the contribution of MSU be as little as possible for this year's INCPROX work, to ensure uniformity and comparability of results, it was decided that the income calculations be done by MSU staff.

2.5 Review of TIA and Early Warning System

The review of TIA and Early Warning System (EWS) agricultural data systems was carried out by a team of three international consultants (statistician, sampling specialist and an agricultural economist) and a local consultant (statistician). Ellen Payongayong played a key role in preparing the documentation for the consultants and providing clarifications on issues raised during the review process. A report was produced and discussed in a workshop involving Ministry of Agriculture, Ministry of Plan and Development, the National Institute

of Statistics, FAO and PROAGRI group. The report evaluated positively the TIA methodology, and documentation of the process. However the review team thinks that TIA is still not timely in releasing results and that the information solicited is excessive and too costly to collect annually. In the case of EWS, the report indicated that the documentation is incomplete and often the implementation in the field does not correspond to what is documented. In both systems shortage of qualified staff is considered as a limiting factor. Among the principal recommendations of the report is the integration of TIA and EWS into a unified system of agricultural statistics. The recommendation has implications on the institutional arrangements which will require bringing under the same umbrella information system for management, TIA and EWS. The workshop endorsed the report without significant changes on the main recommendation. So far the Ministry has not yet acted on the recommendations of the review.

Objective 3: Strengthen capacity of the Directorate of Economics to provide a supportive policy environment

3.1 Analysis of Rural Income and Poverty Dynamics

Work on rural incomes and poverty dynamics which started in the last quarter of FY 6, continued during FY07. The poverty dynamics work undertaken by Cunguara for his M.S thesis using the income panel data was defended successfully. A working paper will be published under the Directorate of Economics Research Papers as soon as a final version of the thesis is submitted to MSU. The results of his thesis indicate that adoption of improved agricultural technologies and cultivation of cash crops are associated with movement out of poverty. Simulation results showed that reducing vulnerability to days of drought has a significant impact on poverty reduction.

Two draft reports on rural incomes based on TIA 2005 have been produced. The first paper presents the descriptive income results while the second one presents the results on rural income determinants. Annex 5 presents a summary of the descriptive income results.

3.2 A review of cotton sub sector

The study was implemented by Duncan Boughton, David Tschirley and Raul Pitoro and had the following purposes:

- to provide an overview of Mozambique's cotton structure sector and trends;
- to examine sector performance in relation to external market challenges and technological opportunities;
- to assess how institutional arrangements in the sector, government and corporate culture have interacted to facilitate or hinder response by the sector; and
- to examine the net effect on farmer returns and household income.

A preliminary report was produced and presented at the workshop on Multi-country Review of Cotton Sector Reform: Experience in Sub-Saharan Africa. The workshop was held in Washington, DC from 31st October to 2nd November, 2006 and was organized by the World Bank.

Lessons Learned from the review

Mozambique's cotton sector has been relatively well studied, although there are still some gaps to be filled. The major lesson from Mozambique is that a "stop-go-stop" approach to

sector reform is of little help. Leadership is required from all stakeholders, especially from government and industry. Strong leadership has been lacking, resulting in many donor funds sitting on the sidelines rather than being invested in a coherent and consistent reform process. Strong companies are hindered from expanding their operations, while weak companies providing negligible extension services continue un-sanctioned. Instead of working together with government and industry, NGOs involved in farmer and community development are increasingly looking for ways that farmers can diversify out of cotton. The window of opportunity for Mozambique's cotton industry to get on a growth track is closing gradually. Unless there is strong consensus among the partners for a system-wide sector reform process, the future of cotton in Mozambique is likely to be a small number of companies optimizing their existing ginning capacity with little new investment. This would be very unfortunate with a large, poor rural population where over 85% of households do not have access to a reliable and profitable cash crop. On the other hand, if a strong consensus for reform were to emerge, the presence of selected strong companies suggests excellent potential for Mozambique to become a model for cotton sector growth in Africa.

3.3 Illness, death and macronutrient adequacy of Rural Mozambican household production of Macronutrient in the face of HIV/AIDS by Cynthia Donovan and Jaqueline Massingue

The study was based on TIA 2002-2005 and looked at smallholder production of kilocalories, fats and proteins from 7 key crops: maize, millet, sorghum, rice, cassava, Irish potatoes, sweet potatoes, beans and groundnuts. This preliminary analysis focused on ex post outcomes and needs, comparing household that were directly affected by a male illness in 2002 or death in 2000-2002 period with households that experienced no such difficulty. The researchers showed that affected households in the south and in the north were particularly hard hit. They produced significantly lower quantities of macronutrients with these basic crops in 2005 than the non-affected households and they had significantly lower income per adult equivalent. The study concluded that for households dependent on own-food production for their macronutrients, adult mortality or illness from HIV/AIDS and other diseases affects their ability to meet their needs. The researchers indicated the need to develop this analysis more rigorously, using the panel information, an area for future research. The paper is available in Food and Nutrition Bulletin 28(2) and is being featured in the World Bank Development Report on Agriculture.

3.4 Analysis of Public Expenditure for the Agricultural Sector

The Ministry of Agriculture signed the letter of agreement with ReSAKSS-SA to enable the creation of the country node which will oversee the implementation of activities under ReSAKSS. The process to constitute the node has started. On the basis of the Minister's approval of the Directorate of Economics to host the node, DE has requested the project to provide technical support to implement the agricultural expenditure study.

The process for constituting the country team has started and will be composed of technical staff from Ministry of Agriculture, Ministry of Planning and Development, Ministry of Finance and Eduardo Mondlane University. Because of the need to guarantee ownership of the outputs and creation of capacity it has been necessary to create a solid institutional base before the work starts. After the approval of the Terms of Reference by MINAG, an agreement will be finalized with ReSAKSS to enable the work to start.

3.5 Training

- a) Benedito Cunguara defended successfully his M.S thesis and returned to Mozambique where he will take part in a joint CIAT/University of Boku research project on technology adoption constraints in Manica as part of a PhD program with Austrian funding.
- b) In-service training of Department of Policy staff on basic statistical analysis of survey data was not undertaken in FY07 as planned due to lack of staff to train. The recruitment process has been initiated but it is highly unlikely that new employees will be in place before January, 2008.

3.6 Others

a) Drs Cynthia Donovan and David Mather completed the study on the impact of HIV/AIDS on rural sector, with funding from the World Bank, to complement the other research under the Ministry. The report was submitted to the World Bank and it is being translated into Portuguese and will be available as a Research Paper under the Directorate of Economics Research Papers Series. The Policy brief no 49E produced by the authors presents the following key findings:

- Effects of prime-age mortality (PA) vary considerably by gender and household position of the deceased individual as well as by region. When PA males die, households are less able to bring in new adult members, are more likely to lose access to livestock and landholdings, and to suffer income effects. Households in the North/Centre with a PA male head death average 25% loss in crop income; in the south, PA male death is associated with an 88% reduction in non-farm income.
- In spite of these income reductions, net income per adult equivalent among households with a PA death is not significantly different from those households without a death. Households with a death are also not any more likely than other households to have net income in 2005 below the expenditure based poverty line.
- Nevertheless, asset losses, demographic and income shifts all point to vulnerability to future income and asset shocks, especially households with a PA male death.

Together with findings from earlier research on HIV/AIDS with Mozambican colleagues the key messages from this work were presented in poster format for the USAID SO6 exhibition on contributions to women in development. The research was presented to various groups in Mozambique, including SETSAN, Ministry of Planning and Development, and MINAG.

(b) The research report on rural income patterns in Mozambique, 1996-2002 was concluded and is now available on the web at www.aec.msu.edu/fs2/mozambique. The full title of the report is: Changes in Rural Household Income Patterns in Mozambique, 1996-2002, and Implications for Agriculture's Contribution to Poverty Reduction. Duncan Boughton, David Mother, David Tschirley, Tom Walker, Benedito Cunguara and Ellen Payongayong. MINAG-DE RP61, December 2006.

(c) Danilo Abdula, our project staff member, was appointed to be part of the team preparing the strategic plan for the agricultural sector. The work was expected to be completed in July, 2007 but because of the shift in priorities the goal was not achieved. It is now expected that the draft strategy will be presented in the first quarter of 2008.

(d) Benedito Cunguara was invited to participate in a Workshop in Poverty and Income Dynamics in Rural Asia which was held at IIRI, Los Baños, Philippines on September 3-4,

2007. Cunguara and Dr Kei Kajisa prepared and presented a paper entitled “Determinants of Income and Schooling Investments in Rural Mozambique 2002-2005: A Panel Cross Section of the Rice Growing Provinces”.

Objective 4: Strengthen the National Market Information System (SIMA)

4.1 Provide SIMA staff with technical backstopping

SIMA staff members have continued to produce the weekly market information bulletin Quente Quente. The weekly market information for the Nampula Province (Esisapo) was interrupted in September for lack of funds. Both Quente-Quente and Esisapo are available on the SIMA website: www.sima.minag.org.mz. Work on the new Quente Quente summary in English to complement the QQ in Portuguese was completed and quente quente no 613 was made available in English in April, 2007. The English version will facilitate the exchange of information in the region.

A windshield survey of traders and producers (known as the Inquérito de Janela) was implemented between 23rd of May and 4th of June 2007 by SIMA staff. Based on convenience sampling of traders and producers along the main transport routes in production region in Sofala, Manica, Tete, Nampula and Niassa Provinces during the first weeks of the harvest season, information was solicited on their perspectives about harvest and marketing prospects for crop year 2006/2007. The survey results were used to produce Flash no. 48. A dissemination seminar was held on 16th August, 2007 in Zambézia province.

Efforts to strengthen and expand provincial SIMA continued during this FY07 with technical support from Cynthia Donovan. A visit was made to Tete between 30th of May and 3rd of June to revitalize SIMAP-Tete. The key activities included the training of a new technician and establishment of renewed contact with Radio Mozambique to re-instate the broadcasting contract. Preparatory activities for the installation of SIMAP-Zambezia were undertaken during the visit to the Province of Zambézia between 10th and 16th of June 2007. The launching of SIMAP-Zambézia took place on 15th of August followed by 6 days training of enumerators.

With the assistance of Cynthia Donovan, the possibility to use TRADENET system for market information exchange was explored. Donovan and the SIMA met with staff members from Technoserve and IITA concerning the possibility of developing a web-based system including text messaging (SMS) for linking farmers, processors, transporters, and traders more efficiently. Hammond from the AIMS project was also invited for they are interested in developing an SMS system, but he was unable to attend. All agree that inputs are an important addition to MIS activities. Discussions continue and Technoserve is bringing in technical staff on the development side linked to Busylab, which is associated with www.tradenet.biz in West Africa. Donovan also encouraged looking at the Zambia ZNFU SMS system at www.farmprices.co.zm. SIMA has now entered into an agreement with Technoserve and Busylab/TRADENET to allow SIMA to provide market information to the system. Work continues in FY08 to develop this system, and Technoserve with Busylab have begun discussions with the local cell phone companies.

4.2 Facilitate linkages with market information systems in the region

A planned field trip for September to Zambia to discuss the SMS system of ZNFU could not be realized and was postponed. However, SIMA staff members worked with the website of the program to understand what information was contained in the system and what was being transmitted.

Donovan presented the Tradenet-style platform to the SIMA team and they discussed the possibilities for linking countries in the region based on a single platform. Lessons from West Africa indicate that the single platform approach may not be sustainable or meet local farmers' needs.

4.3 Staff situation

The staff situation for SIMA continues to be uncertain due to lack of job security under existing salary arrangements. SIMA staff members are consulting with other institutions including the PROAGRI group to find alternative salary arrangements. It has become clear that even with availability of a temporary solution, the Ministry will need to have a more permanent solution on staff recruitment, training and retention.

Annex 1. Executive Summary of the Report on Mid-term Evaluation of the Project

This mid-term evaluation of the Michigan State University (MSU) activity in Mozambique under the Food Security III Cooperative Agreement is based upon our review of project documentation, and extensive interviews and discussions in Mozambique between February 19 and March 9, 2007. The evaluation also takes into consideration the profound changes in Mozambique's agricultural sector over the past 17 years, the corresponding challenges for the Ministry of Agriculture (MINAG), and how MSU activities have responded to the situation and evolved during that time period. Therefore, our findings and conclusions are relevant to the entire period during which MSU has worked in Mozambique, with an emphasis on the past 3 years.

The current phase focuses on establishing socio-economics capacity within the new Mozambican Agricultural Research Institute (MINAG-IIAM). This is expected to help MINAG-IIAM generate improved technologies applicable to the needs and circumstances of rural Mozambican households, and therefore more likely to be widely adopted. MINAG-IIAM also plans to use socio-economics to help inform and guide research priority setting, diagnose smallholder research needs, evaluate the profitability and risk of new technologies, and carry out technology adoption and impact studies.

MSU also backstops and supports data collection and analysis activities in the MINAG Directorate of Economics (MINAG-DE). This includes training newly recruited MINAG-DE staff; helping the Statistics Department by advising staff with regard to SIMA and TIA (design, data entry, and analysis); and advising and helping the Policy Department (PD) with strategy development and policy analysis.

Project Impact

The impact of training and capacity building, combined with data collection and policy analysis, is extremely hard to quantify. Trained professionals are better able to contribute to society's goals and objectives, but the benefits accrue over the lifetime of those trained. Activities that produce timely and reliable data make studies and analyses based on that data more credible, but benefits depend upon how the results are used. Finally, the impact of good versus bad decisions, informed decisions versus political expediency, and bad choices avoided is hard to measure because of the multiple factors involved, and the difficulty of establishing cause and effect.

We are convinced that MSU activities have had an enormous positive impact on Mozambique's agricultural sector, helping the Government of Mozambique (GOM) avoid actions (an export ban on raw cashews, an export tax on tobacco) that would have had strongly negative effects on sector growth and rural incomes. Significant examples of project impact include the following:

- MSU has built significant local socio-economic expertise and capacity, with a sizable cadre of MSU-trained economists contributing to Mozambique's agricultural sector development.
- Mozambique's Market Information System (SIMA) is a high quality, effective, and widely utilized information source, continually adapting in response to public demand, and firmly in place as a core MINAG activity.
- Mozambique's National Agricultural Survey (TIA) is a methodologically sound source of representative rural and agricultural data; increasingly used as the basis for resource

allocation, food security and poverty studies, and agricultural policy analysis; and firmly in place as a core MINAG activity.

- MINAG-DE has produced an impressive amount of studies and analysis with MSU assistance, and there is compelling evidence of their use to inform MINAG decision-making. As a result, MINAG-DE has an established (but fragile) professional culture which expects executive decision-making to be informed by study and analysis.
- MINAG-DE and MINAG-IIAM managers and staff recognize the benefits of using socio-economic methods, skills and tools to inform decision-making, planning and operations at all levels; and have highlighted the importance of doing this in the years to come.
- MINAG-IIAM has established the Center for Socio-Economic Studies (CESE) to incorporate socio-economics and bring its methodologies and tools to bear on the overall research program, setting research priorities, making resource allocation decisions, and impact evaluations. The process is making excellent progress, with the recent exercise in research priority setting led by the CESE exemplifying the importance placed on the use of these analytical tools.

Article I. Recommendations

The Food Security III Mozambique Activity is the latest phase of MSU efforts dating back to 1990, and can only be evaluated in the context of events in Mozambique over the past 17 years. During that time Mozambique has transitioned from a command to a market economy, presenting MINAG with enormous challenges in defining their role. MINAG has emerged with a clear sense of its mission – to facilitate the emergence of commercial agriculture as an engine of growth in the rural economy, increase agricultural production to improve household food security, and reduce rural poverty – as reinforced by conclusion of the recent evaluation of the Initiative to End Hunger in Africa (IEHA) that Mozambique is headed in the right direction, and is the only country in the region making measurable progress toward achieving the Millennium Development Goal of halving hunger and poverty.

The institutional impact of these changes has been complicated by successive changes in organizational structure and mandate – from the Ministry of Agriculture to the Ministry of Agriculture and Fisheries to the Ministry of Agriculture and Rural Development and back to the Ministry of Agriculture. These changes, in combination with political and personnel changes in top management positions, made it difficult for MINAG to establish a new institutional identity, and provide the continuity and stability needed to build and strengthen its new organizational culture.

Within the context of this dynamic environment, there are no major implementation issues unique to the project, and nothing is broken. The greatest weakness in the current phase of the project is the lack of a commonly understood and articulated unifying theme. This weakness needs to be addressed to improve project focus and help guide resource prioritization. Simply put, the project title and objectives are vague, and need to be clarified and more explicitly linked with expected results. Therefore, we recommend that project partners:

- **Clearly Articulate the Vision:** A clear statement of the link between stated objectives and what it practically seeks to achieve over the remaining life of the project needs to be articulated in terms which are commonly understood by all parties. The statement needs to specifically articulate the link between the long-term goal and medium-term objectives in order to provide a unifying theme for project activities. This will provide a common point of reference for planning, budgeting, and managing implementation. At present the

conceptual gap between overall goals and individual activity descriptions contained in project documentation is too big, and needs to be filled.

- **Review and Revise Objectives, Relationships and Processes:** The objectives of each major actor (MINAG, MINAG-DE, MINAG-IIAM, and USAID) with regard to the project, their relationship with MSU, and the processes which will be used to guide implementation need to be clearly stated.
- **Sign Memoranda of Understanding:** Memoranda of Understanding between MSU and MINAG-IIAM, and MSU and MINAG-DE, need to be developed and signed to establish clearly articulated objectives, relationships, and processes as described above.

The following recommendations apply specifically to Michigan State University:

- **Clarify the Long-term Goal:** After 17 years MSU's long term institutional rationale for being involved in Mozambique, and what it expects to achieve, is not commonly understood or consistently stated. It needs to be clarified.
- **Reinforce Mozambican Identity:** MSU needs to deliberately and purposefully reinforce MINAG-IIAM and MINAG-DE ownership of the Mozambican identity of the activities it supports.
- **Develop a Phase-down Plan.** MSU needs to plan on phasing out its direct assistance to MINAG-IIAM and MINAG-DE by September 2010, focus on consolidating achievements and leaving a legacy, and perhaps maintaining a long-term collaborative relationship with knowledge-generating institutions and its local *alumni* network
- **Improve Reporting on Impact:** MSU needs to more systematically record project results. In addition to existing information, we recommend summarizing specific subjects/issues that have been studied/analyzed; the document(s) produced; and what took place as a result.
- **Compile a Reference Document:** Project reports do not do justice to the magnitude of project impact and results. Therefore, we recommend that MSU compile a document listing the specific issues and policies studied and analyzed, the results and recommendations produced, and the outcome in terms of decisions and actions over its 17 year history in Mozambique. This should also include: a list of the specific issues and policies where USAID sought MSU advice, what was provided, and the result; and a list of MSU advice and assistance utilized by implementing donor program.

The following recommendations apply specifically to MINAG, MINAG-DE, and MINAG-IIAM:

- **Clarify Objectives:** MINAG-DE and MINAG-IIAM need to review the specific objectives which MSU is supporting to make certain they are clearly stated and understood. There is a general sense of what these are, but reviewing and clarifying them in the light of experience to date will help inform and focus future efforts.
- **Set the Policy Agenda:** MINAG-DE and MINAG-IIAM need to become more proactive and forward-looking with regard to setting the policy agenda. Specifically, MINAG needs to establish an internal process for identifying priority policy issues, commissioning studies and analysis, and discussing and debating the results to inform decision-making. We believe that the *Conselho Técnico* is the most logical home for this process, linked to the *Conselho Consultivo*. MINAG also needs to incorporate the identification of the issues to be studied and analyzed in the planning process for Directorates and Departments as the first step in developing a demand driven agenda for MINAG-DE and PD.

- **Establish a National Agricultural Policy Forum:** Following from the previous recommendation, MINAG need to establish a structure and process for broader participation and collaboration in policy studies, analysis and research, and for discussing and debating the results. This should include participants from both the public and private sectors depending upon the subject matter.
- **Facilitate a Local Network of Socio-Economists:** MINAG-DE and MINAG-IIAM need to facilitate a Mozambican network of socio-economists to encourage formal and informal communication reinforced by opportunistic collaboration.
- **Keep Up The Good Work:** MINAG needs to ensure that SIMA, its flagship data collection activity, receives the management attention and resource allocations needed to maintain quality and keep evolving in response to user demand.
- **Combine Crop Estimates Responsibilities:** MINAG needs to resolve the methodological issues which lead to the discrepancy between TIA and *Aviso Prévio* estimates of crop production, and co-locate these efforts in the same office and under the same oversight ensure collaboration and consistency.
- **Streamline and Improve Dissemination of the National Agricultural Survey:** MINAG needs to identify which variables measured in TIA require annual measurement, and which ones can be collected periodically, to lighten the data processing burden and permit more timely processing and dissemination. MINAG also needs to more broadly publicize TIA data and results to encourage greater public use of the information.
- **Clarify MINAG-DE and PD Role:** MINAG needs to review the functions and organizational structure of MINAG-DE, and identify ways to improve its performance with regard to planning, monitoring, and informing policy. This should specifically include a review of the role and responsibilities of the PD in order to define expectations, guide its work, and help enable professionalism.
- **Define the PD Relationship with the Minister:** The Policy Department's advisory function will at times require direct communication with the Minister. The circumstances in which the MINAG hierarchy can be bypassed in this regard need to be defined and stated.
- **Actively Seek Ways to Mitigate Staff Recruitment and Retention Issues:** The recruitment and retention of trained and experienced professional socio-economic staff is a persistent issue for MINAG-DE. MINAG needs to actively seek ways to mitigate this issue to maintain the quality and continuity of data collection and socio-economic analysis.
- **Actively Seek Ways to Mitigate Research Cash Flow Issues:** Timely availability of resources throughout the growing season (bridging government fiscal years) is a persistent issue for MINAG-IIAM. MINAG-IIAM needs to actively seek ways to mitigate this issue in order so as not to compromise the quality of its research.

The following recommendations apply specifically to USAID:

- **Stay the Course:** USAID needs extend the MSU activity through September of 2010, with a focus on the work in MINAG-IIAM. This is a reasonable time period for IIAM to incorporate and consolidate the application of socio-economics to agricultural research. The current project ending date of September of 2008 is too short a time for this to take place. MINAG-DE would also benefit from an extended period of support. The long-term benefits of the USAID investment are now being realized, and the project is an effective means for the Mission to substantively engage with MINAG. MSU has an enormous amount of institutional credibility, enhanced by the Country Director's personal

credibility, and it would take years for another institution to achieve the MSU's level of acceptance and influence. Impact to date has been substantial, but much remains to be done and there are no major implementation problems.

- **Review and Update Objectives and Expectations:** The link between the project, higher-level USAID objectives, and expected results is not clear in the project documents. This link needs to be reviewed and updated to help guide resource allocation and implementation.
- **Include a Mechanism for Accessing MSU Assistance:** The activity does not have a defined process for requesting direct MSU assistance on an *ad hoc* basis when significant additional resources, or resource re-allocations, will be needed to respond. USAID needs to specifically include the activities and level of effort MSU will provide within the Cooperative Agreement so that they can be included in and budgeted for in Annual Work Plans.

The following recommendation is presented for joint consideration:

- **Fund a Local In-Service Modular MSc Program in Socio-Economics to Build Training Capacity.** There is a clear need for a local (Mozambican) Masters program in socio-economics. The partners (MSU, MINAG-DE, MINAG-IIAM and USAID) need to aggressively explore establishing such a program. This would increase the pool of professionals with a credible MSc in agricultural economics, and create the local capacity to provide this type of training. We recommend establishing a modular, in-service MSc program for candidates currently employed by MINAG (including IIAM) – and perhaps others – that would not require removing candidates from their jobs, allowing them to pursue their studies while remaining on the job. We also recommend using an approach which encourages agricultural specialists with field and management experience to pursue MSc degrees in agricultural economics. For these individuals their training in socio-economics would be complemented by their previous knowledge and experience, which would increase their professional stature within the hierarchy of their institutions.
- **Collaborate with UEM.** The Faculty of Agriculture and Forestry at Eduardo Mondlane University (UEM) already offers an MSc program in rural development, and has a cadre of senior staff involved in the program. We recommend exploring collaboration with this program, the only of its kind offered in Mozambique.

Annex 2: Cumulative Research and Outreach Related Outputs



Strengthening Mozambique's Capacity for Agricultural Policy Analysis, Productivity, Growth and Poverty Reduction

Projecto de Apoio ao Fortalecimento da Capacidade em Análise de Políticas, Produtividade Agrícola, Crescimento Económico e Redução da Pobreza em Moçambique



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Project Overview

MSU has worked with the Ministry of Agriculture (MINAG) in Mozambique since 1991 to increase MINAG's capacity to formulate and implement facilitative agricultural sector policies, strategies, and institutional reforms. Since 2004, assistance has also been provided to the National Agricultural Research Institute (IIAM). The twin goals of the current project are to expand the availability of appropriate crop, livestock and natural-resource management technologies for smallholder farmers, and to accelerate the uptake of those technologies by strengthening policy institutions and market information services. The project seeks to achieve this goal through formal and on-the-job training in the identification of priority policy issues, collection and timely analysis of relevant information, and prompt dissemination of actionable results to managers and policy makers.

- [Current/Recent Outreach](#)
- [Project Proposal](#)
- Annual Narrative Reports
 - [2005/06](#) (CDIE Reference number PD-ACI-959)
 - [2004/05](#) (CDIE Reference number PD-ACI-958)
- Cumulative Project Output Reports: ([2005/06](#), [2004/05](#))
- [Prior Project Fact Sheet](#): summarizes project approach and output up to Sept 2004.
- [Capacity Building Accomplishments](#)
- [Contact Information](#): in-country personnel, U.S. based backstop and collaborative institutions.
- Quick Links - Mozambique on the Food Security and Food Policy Information Portal for Africa-FSIP ([English](#) and [Portuguese](#))
- Quick Links - Building Professional Skills-FSIP ([English](#) and [Portuguese](#))

Most Recent Research and Outreach

"Flash": series of short papers, closely focused on issues of relevance for understanding the Mozambican food and agricultural system. [Top](#)

- [Impacts of Prime Age Adult Mortality on Rural Household Income, Assets, and Poverty in Mozambique: Analysis with the TIA Panel Data Set](#). Cynthia Donovan and David Mather. volume 49E. September 2007. (CDIE Reference number pending)
- [Chuvas Tardias e Excessivas Retardam o Início da Comercialização de Milho na Zona Norte: Os Comerciantes de Pequena Escala Perspectivam Fracas Colheitas Para a Campanha de 2006/07](#). Por: Equipa Técnica do SIMA. volume 48P. 06 de Julho de 2007. (CDIE Reference number PN-ADK-298)
- [Comerciantes de Pequena Escala Esperam Boas Colheitas, Mas Preços ao Produtor São Baixos nas Zonas de Difícil Acesso: O Que Fazer para Incentivar a Produção e a Comercialização Agrícolas?](#) Por: Equipa Técnica do SIMA. volume 47P - 31 Maio 2006. (CDIE Reference number PN-ADH-902)

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Research Reports: over 50 have been produced, most of them published and downloadable in both English and Portuguese. [Top](#)

IIAM

- [Estabelecimento de Prioridades para a Investigação Agrária no Sector Público em Moçambique Baseado nos Dados do Trabalho de Inquérito Agrícola \(TIA\)](#). T. Walker, R. Pitoro, A. Tomo, I. Siteo, C. Salência, R. Mahanzule, C. Donovan, and F. Mazuze. IIAM-DFDTT Relatório de Pesquisa 3P. August 2006. (CDIE Reference number PN-ADI-408)
- [Priority Setting for Public-Sector Agricultural Research in Mozambique with the National Agricultural Survey Data](#). T. Walker, R. Pitoro, A. Tomo, I. Siteo, C. Salência, R. Mahanzule, C. Donovan, and F. Mazuze. IIAM-DFDTT Research Report No. 3E. August, 2006. (CDIE Reference number PN-ADH-871)
- [Introdução de Novas Tecnologias Agrícolas e Estratégias de Comercialização no Centro de Moçambique](#). Rafael N. Uaiene. IIAM-DFDTT Relatório de Pesquisa No. 2P. Agosto de 2006. (CDIE Reference number PN-ADI-407)
- [Introduction of New Agricultural Technologies and Marketing Strategies in Central Mozambique](#). Rafael N. Uaiene. IIAM-DFDTT Research Report No. 2E. August, 2006. (CDIE Reference number PN-ADH-870)

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MINAG

- RP64. [Income Poverty Effects of Expansion and Policies in Cash Cropping Economies in Rural Mozambique: An Economy-wide Approach](#). Rui M.S. Benfica. 2007. (CDIE Reference number pending)
- RP63. [Interlinked Transactions in Cash Cropping Economies: Rationale for Persistence, and the Determinants of Farmer Participation and Performance in the Zambezi Valley of Mozambique](#). Rui Benfica. 2007. (CDIE Reference number pending)
- RP62E: [Toward Improved Marketing and Trade Policies to Promote Household Food Security in Central and Southern Mozambique: 2007 Update](#). David Tschirley and Danilo Abdula. September 2007. (CDIE Reference number pending)

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Policy Presentations: in collaboration with its partners in MINAG, IIAM and USAID/Mocambique, MSU maintains an active policy outreach program. In addition to presentations by project personnel, MSU has assisted MINAG and IIAM leadership in preparing presentations for both local and international policy fora. [Top](#)

IIAM

- [Strengthening Mozambican Capacity for Agricultural Productivity Growth, Policy Analysis, and Poverty Reduction](#). Gilead Mlay. A Presentation to the SAKSS-SA Regional Workshop in Johannesburg, October 4th 2006.
- [Resultados do Exercício de "Priority Setting" de Namaacha, 29 Maio – 01 Junho, 2006](#). Raul Pitoro. Apresentado num encontro de PROAGRUII, IIAM, Maputo, Mozambique, 20 de Junho, 2006.
- [Debriefing on IIAM/MSU Collaboration with AGORA/HINARI Portuguese Training](#), Maputo, Jan 24-26, 2006 (Note file size = 1.6 mb)

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MINAG

- [Estratégias para Desenvolver o Sector Agrário em Moçambique Componente de Pesquisa: Comercialização Agrícola](#). Danilo Carimo Abdula. Apresentado no Workshop para a definição dos ToR para a Revisão do PAEI e formulação do Plano Estratégico do MINAG. Julho, 2007.
- [Análise de Rendimento e Dinâmica da Pobreza nas Zonas Rurais de Moçambique 2002-2005 Resultados Preliminares produzido por David Mather e Benedito Cunguara com base no TIA 02 e TIA 05 \(painel\)](#). Raúl Pitoro e Gilead Mlay. Apresentado no Workshop para a definição dos ToR para a Revisão do PAEI e formulação do Plano Estratégico do MINAG. Junho de 2007

- [Mortalidade, HIV e Impactos sobre Famílias Rurais](#). Cynthia Donovan, Angela Faria, and Maria Selemane. Presentation to the HIV/AIDS working group (SANHA) of the Secretariat for Food Security and Nutrition (SETSAN), Maputo, 20 June 2007.

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Workshops and Training Materials: [Top](#)

- Workshop on Ex-Ante 'Best Bet' Technologies Assessment in Research/Extension Context. Namaacha, Mozambique. June 20-24, 2007.

Theses Reprints: [Top](#)

- Benfica, Rui M.S. [An Analysis of Income Poverty Effects in Cash Cropping Economies in Rural Mozambique: Blending Econometric and Economy-Wide Models](#). PhD Dissertation. 2006. (1 MB)*
- Abdula, Danilo Carimo. [Improving Maize Marketing and Trade Policies to Promote Household Food Security in Southern Mozambique](#). M.Sc. Thesis, May, 2005. (555 KB)*
- Uaiene, Rafael N. [Maize and Sorghum Technologies and the Effects of Marketing Strategies on Farmers' Income in Mozambique](#). M.Sc. Thesis. 2004. (500 KB)
- Mazuze, Feliciano M. [Analysis of Adoption and Production of Orange-fleshed Sweetpotatoes: the Case Study of Gaza Province in Mozambique](#). M.Sc. Thesis. 2004. (640 KB) *

* by MSU graduate students supported by the project

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Professional Publications [Top](#)

- [Market Participation by Rural Households in a Low-Income Country: An Asset-Based Approach Applied to Mozambique](#). Duncan Boughton, David Mather, Christopher B. Barrett, Rui Benfica, Danilo Abdula, David Tschirley and Benedito Cunguara. *Faith and Economics* Vol 50, Fall 2007: 64-101.
- Mather, David, and Cynthia Donovan. 2007. The Impacts of Prime-age Adult Mortality on Rural Household Income, Assets, and Poverty in Mozambique. Report for World Bank/Mozambique.
- Donovan, Cynthia, and Jaqueline Massingue. 2007. Illness, death, and macronutrients: Adequacy of rural Mozambican household production of macronutrients in the face of HIV/AIDS. [Food and Nutrition Bulletin](#), Vol 28, no. 2, supplement 4: S331-338.

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SIMA (Agricultural Marketing System of Mozambique) [Top](#)

MSU has assisted MINAG since 1991 in implementing an Agricultural Market Information System (SIMA). SIMA produces weekly (Quente-Quente) and monthly bulletins (Boletim Mensal). You'll find domestic prices of 25 products in 27 producer, wholesale, and retail markets throughout the country, plus regional and international prices of selected commodities, and market commentary.

- [SIMA Web site](#) - Full set of SIMA and SIMA Provincial (SIMAP) Publications and presentations.

Survey Instruments and Data Documentation [Top](#)

Since 1991, FSP has carried out or assisted in a large number of household surveys in Mozambique. 2005 National Agricultural Household Survey (TIA05)

- [Panel Questionnaire](#)
- [Nova Questionnaire](#)

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- [O Curso Sobre a Planificação e Análise de Experimentos](#). IIAM- DFDTT em Colaboração com MSU-FSIII/MOZ.

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Food Security III Cooperative Agreement between US Agency for International Development, EGAT/AG Bureau cooperating closely with Africa/SD Bureau, and MSU Department of Agricultural Economics.

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- [Impacts of Prime Age Adult Mortality on Rural Household Income, Assets, and Poverty in Mozambique: Analysis with the TIA Panel Data Set](#). Cynthia Donovan and David Mather. volume 49E. September 2007. (CDIE Reference number pending)
- [Chuvas Tardias e Excessivas Retardam o Início da Comercialização de Milho na Zona Norte: Os Comerciantes de Pequena Escala Perspectivam Fracas Colheitas Para a Campanha de 2006/07](#). Por: Equipa Técnica do SIMA. volume 48P. 06 de Julho de 2007. (CDIE Reference number PN-ADK-298)
- [Comerciantes de Pequena Escala Esperam Boas Colheitas, Mas Preços ao Produtor São Baixos nas Zonas de Difícil Acesso: O Que Fazer para Incentivar a Produção e a Comercialização Agrícolas?](#) Por: Equipa Técnica do SIMA. volume 47P. 31 Maio 2006. (CDIE Reference number PN-ADH-902)
- [Learning from the 2002/03 Food Crisis in Southern Africa: Lessons for the Current Year](#). David Tschirley, Pedro Arlindo, Jan J. Nijhoff, Billy Mwinga, Michael T. Weber, and T.S. Jayne. volume 46E. October, 2005. (CDIE Reference number PN-ADH-901)
- [Mudanças no mercado e na produção para melhorar a segurança alimentar em Mozambique](#). David Tschirley, Danilo Abdula, e Michael T. Weber volume 45P - Setembro 2005. (CDIE Reference number PN-ADH-900)
- [Improving Production and Marketing to Enhance Food Security in Mozambique](#). David Tschirley, Danilo Abdula and Michael T. Weber. volume 45E, September 2005. (CDIE Reference number PN-ADH-899)
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 - RP 10E - [The Organization, Behavior, and Performance of the Informal Food Marketing System in Maputo](#). MOA/MSU Research Team. May 1993. (CDIE Reference number PN-ABR-411)
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 - RP 3P - [Inquérito ao Sector Familiar da Província de Nampula: Observações Metodológicas](#). MOA/MSU/UA Equipa de Pesquisa. Novembro de 1991. (CDIE Reference number PN-ABS-736)
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- Benfica, Rui. [An Analysis of the Contribution of Micro- and Small Enterprises to Rural Household Income in Central and Northern Mozambique](#). M.Sc. Thesis. March 1998. (765 KB)
- Marrule, Higinio. [Land-Poor in a "Land-Abundant" Setting: Unraveling a Paradox in Mozambique](#). M.Sc. Thesis. March 1998. (730 KB)*
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- Donovan, Cynthia. [The Effects of Monetized Yellow Maize Food Aid on Local Maize Prices in Mozambique](#). Ph.D. Dissertation. February 1996. *
 - [Chapters 1-5](#) (Note: 4.4 megabyte download)
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- Dengo, Maria Nita. [Household Expenditure Behavior and Consumption Growth Linkages in Rural Nampula Province, Mozambique](#). M.Sc. Thesis. December 1992. PN ABS 943.*

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2007

- [Market Participation by Rural Households in a Low-Income Country: An Asset-Based Approach Applied to Mozambique](#). Duncan Boughton, David Mather, Christopher B. Barrett, Rui Benfica, Danilo Abdula, David Tschirley and Benedito Cunguara. *Faith and Economics* Vol 50, Fall 2007: 64-101.
- Mather, David, and Cynthia Donovan. 2007. The Impacts of Prime-age Adult Mortality on Rural Household Income, Assets, and Poverty in Mozambique. Report for World Bank/Mozambique.
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Annex 3: Program for the Training Workshop on Ex-ante Technology Assessment

Day	Time	Contents	Responsible
Monday 20/8/07	8:00 - 10:00	General Principals of Ex Ante Impact Assessment Introduction, objectives and selection of best bet technologies	Tom Walker
	10:00 - 10:30	Coffee/Tea Break	
	10:30 - 12:30	General principles of impact assessment	
	12:30 - 13:30	Lunch break	
	13:30 - 15:30	Empirical facts related to general principles	
	15:30 - 16:30	Coffee/Tea Break	
	16:30 - 17:30	In-depth discussion of selected concepts	
Tuesday 21/8/07	8:00 - 10:00	Estimating net benefits with a partial budget	Raul Pitoro
	10:00 - 10:30	Coffee/Tea Break	
	10:30 - 12:30	Estimating net benefits with a partial budget	Raul Pitoro
	12:30 - 13:30	Lunch Break	
	13:30 – 15:30	Projecting adoption with a logistic curve	Tom Walker
	15:30 - 16:00	Coffee/Tea Break	
	16:00 - 17:30	Financial appraisal	Tom Walker
Wednesday 22/08/07	8:00 - 10:00	Operationalizing ex-ante technology assessment The remaining ingredients in the recipe <ul style="list-style-type: none"> • Valuing research, extension and other technology related costs • Reviewing the spreadsheet • Sensitivity analysis 	Tom Walker
	10:00 - 10:30	Coffee/Tea Break	
	10:30 - 12:30	Presentation of the DREAM Model	Gilead Mlay
	12:30 - 13:30	Lunch Break	
	13:30 - 15:30	Brief review of Excel in the context of ex-ante assessment	Ellen, Payongayong
	15:30 - 16:00	Coffee/Tea Break	
	16:00 – 17:30	Practice with an example	Ellen P.

Day	Time	Contents	Responsible
Thursday 23/08/07		Practical Applications	Tom. Raul, Ellen, F. Mazuze
	8:00 - 10:00	Specifying the technology for assessment and the recommendation domain with the TIA data <ul style="list-style-type: none"> • Identify key components • Estimate number of households, hectares or livestock units • Consider heterogeneity 	
	10:00 - 10:30	Coffee/Tea Break	
	10:30 - 12:30	Specifying net benefits per hectare or per animal unit based on a partial budget	
	12:30 - 13:30	Lunch Break	
	13:30 – 15:30	Specifying the adoption pathway and projecting adoption	
	15:45 - 16:00	Coffee/Tea Break	
	16:00 - 17:30	Specifying research, extension and other technology related costs	
Friday 24/08/07		Assessing a best bet technology	Tom, Raul, Ellen, Mazuze
	8:00 - 10:00	Estimating results and sensitivity analysis	
	10:00 – 10:30	Coffee/Tea Break	
	10:30 - 12:30	Writing up the results	
	12:30 – 13:30	Lunch Break	
	13:30 - 15:30	Presenting results	
	15:30 – 16:00	Closing remarks & Coffee/Tea Break	
	16:00	Departure for Maputo	

Pre-workshop preparation

The 2 days of practical work will be based on participants' own data from research-extension technology activity. Specifically the information should be on one or two 'best bet' technologies expected to be released or disseminated in the near future and should include the following:

- Description of the technologies in terms of their strengths and weaknesses vis-à-vis the technology expected to be replaced,
- Information that would permit the calculation of net benefits. Such information will include inputs, outputs, prices etc) and
- If possible information on total cost of agricultural extension from the last phase (for participants from NGO's).

To facilitate course preparation, we would appreciate if you would let us know by e-mail the technologies you will use for the practical sessions. Each participant is requested to bring a laptop computer for the analytical work.

Annex 4: Training Course on Experimental Design and Analysis

IIAM- DFDTT EM COLABORAÇÃO COM MSU-FSIII/MOZ O CURSO SOBRE A PLANIFICAÇÃO E ANÁLISE DE EXPERIMENTOS 21-29 de Junho de 2007

1. Os objectivos do curso:

No fim do curso os participantes deverão ser capazes de:

- a) Escolher delineamentos apropriados e eficientes para satisfazer os objectivos da pesquisa;
- b) Especificar modelos estatísticos adequados para os delineamentos escolhidos;
- c) Melhorar a gestão de ensaios e a qualidade estatística das medições feitas no campo
- d) Fazer análises financeiras básicas e necessárias para fazer as recomendações aos produtores e

Modulo 0: Introdução (4 horas)

- O método científico (Mlay)
- Experimentos comparativos (Mlay)
- Os requisitos para um bom experimento (Mlay)
- A distribuição normal, distribuições derivadas (t, e F), estimação e testes de hipóteses (Vilanculos) χ^2
- Contrastes ortogonais (Vilanculos)

Modulo 1: Os conceitos básicos para o desenho de experimentos (1.5 dias)

1. Os princípios de desenho experimental (Mlay)
 - Os objectivos do estudo,
 - Repetições
 - Casualização
 - Controle local
2. Modelo matemático para simples experimentos comparativos (Vilanculos)
 - Os pressupostos,
 - Avaliação dos resíduos e verificação da validade dos pressupostos do modelo
 - Transformação de dados

3. Ideias elementares sobre a estrutura de tratamentos

- Escolha de tratamentos
- A estrutura factorial
- Os modelos para os efeitos principais e interacções
- As vantagens de estruturas factoriais

Modulo 2: Desenho experimental para aumentar a precisão e (2 dias)

1. Delineamento e análise de ensaios simples de blocos (Vilanculos)
2. Os princípios de desenho de ensaios baseados em blocos (Vilanculos)
3. Delineamentos de blocos incompletos para experimentos de um factor (Vilanculos)
4. Blocking múltiplos e “delineamentos de “cross-over” (Mlay)
 - Quadrados latinos
 - Delineamentos Cross-over
5. Delineamentos baseados em unidades experimentais sub-divididas (Vilanculos)
6. Blocos incompletos para experimentos factoriais (Mlay)
7. Análise de co-variância (Vilanculos)

Modulo 3: Gestão de ensaios (2 horas) (Amane e Ecole)

1. Fontes de erros e viés durante a implementação de ensaios
2. Montagem de ensaios
3. Acompanhamento do ensaio ao longo do tempo
4. Medições no campo

Modulo 4 : Análise financeira de dados agronómicos (2dias) – Pitoro e Mazuze)

1. Introdução

- As recomendações aos produtores
- Condições experimentais representativas
- Os objectivos do produtor

- A relação entre análise estatística e análise financeira de dados experimentais

2. Orçamento parcial baseado em dados experimentais

3. Estimação de custos

- Identificação e medição de inputs variáveis
- Determinação dos preços de inputs ao portão de machamba
- Determinação dos preços de equipamento ao portão de machamba
- Determinação do preço de mão-de-obra

4. Benefícios brutos

- Preço de produto à porta da machamba
- Inclusão de todos os benefícios brutos no orçamento parcial

5. Estimação de benefícios

- Identificação e avaliação dos benefícios

6. O uso da curvas de benefício líquido para fazer recomendações

- A curva de benefício líquido
- A análise marginal de benefícios líquidos

7. Escassez do capital e o custo de capital para investimento

8. Variabilidade nos benefícios líquidos e as implicações para fazer as recomendações

- As fontes de variabilidade de rendimento
- Ajustamento das recomendações para tomar conta da variabilidade de rendimento
- Variabilidade de preços e análise de sensibilidade

Annex 5. Descriptive Income Paper: Summary

In spite of impressive reductions in poverty from 1996 to 2002, the majority of Mozambique's population remained below the poverty line in 2002/03 (51.5% in urban areas, 55.3% in rural; MPF et al, 2004). TIA 2005 provides the most recent data available on rural household income and asset levels. As many researchers will likely use this new TIA income data, the first objective of this paper is to provide background information on the methods used to construct TIA 2005 income and the TIA 2002-2005 panel income file. The second objective of this paper is to evaluate changes in rural household income and assets as reported by TIA 2002 and TIA 2005 to see if the upward trends in household welfare found from 1996 to 2002 (in both IAF and TIA data) have continued and are observed in TIA from 2002 to 2005. The third objective of this paper is use information about the structure of income, household asset levels, and household access to technology and public goods in 2002 and 2005 in order to investigate the prospects for continued rural economic growth.

Human capital: Education

TIA05 shows that the highest schooling grade achieved is still very low among heads in 2005 (average of 2.0 years in Table 4), and only 43% of heads are literate. However, heads' education levels should improve over time, as information on literacy by age shows that young adults age 15-24 are much more likely to be literate than adults just 10 years older (Figure 1), as about 75% of males and 50% of females age 15-24 are literate.

School attendance rates have continued to improve, and the gender gap has decreased considerably. IAF found that child school current attendance of children 12-17 in rural areas was 51.5% for boys and 33.2% for girls in 1996/97. TIA05 finds average attendance rates for children age 12-17 in rural areas are 72.9% for boys and 61.8%.

The TIA data show that average school advancement ratio of all boys and girls age 10-14 increased from 2002 to 2005 (Table 4), which suggests that rural household investment in child schooling improved over this time period (although as noted above, household demand for schooling is but one of various factors which influence schooling outcomes). While this is good news, the results also demonstrate that there is still much room for improvement: the fact that the average advancement ratio is 0.46 for boys and 0.42 for girls indicates that the majority of children are not starting school on time (at age 7), nor advancing one grade per year.

Consistent with findings from many other developing countries, the TIA education data show that children from wealthier households in rural Mozambique are more likely to attend school, have higher completed grade levels on average, and have higher school advancement (Table 4).

Human capital: Health

Consistent with findings from the only seroprevalence data in Mozambique (antenatal clinic data), which indicate rising HIV/AIDS prevalence in many areas of the country in recent years, the TIA data show that both the incidence of PA illness cases and PA death due to illness are increasing from 2002 to 2005 (Table 5). Nearly 10% of households reported either the death of a PA adult due to illness, or a chronically-ill PA adult member, during the 12 months prior to the TIA 2005 interview.

DHS surveys show that the number of rural Mozambican households with latrines increased from 26% in 1997 to 36% in 2003. TIA data show that 38% of rural households had a latrine

in 2002, and that this number increased to 41% in 2005. As one might expect, households in the highest income quintile are much more likely to have a latrine (61%) than those in the lowest quintile (31%).

Physical capital

Consistent with the positive trends seen from 1996 to 2002/03 in IAF, DHS, and TIA, the TIA panel data demonstrate that, on average, rural households in Mozambique have continued to increase their asset holdings from 2002 to 2005, notably in land access and ownership of goods such as bicycles, radios, and have improved the durability of their houses (Table 6). However, we find that TLU/AE fell from 2002 to 2005 (Table 6), which is most likely due to significant losses of chickens in various parts of the country in 2005 due to the spread of Newcastle disease (this is confirmed by TIA data which records losses of chickens due to illness).

Access to public goods

All public goods (road density, price information, extension, farmer association) are positively associated with income – the direction of causality is beyond the scope of bivariate analysis.

- TIA data shows that coverage of price information appears to be increasing (Table 7), as the percentage of households which received price information (via radio, newspaper, NGO, farmer association) increased from 34% in 2002 to 40% in 2005.
- The TIA panel shows that 13 percent of households received extension in 2002, and 14.8 percent in 2005 (Table 7). The TIA panel data show that 26% of households received an extension visit in either or both years, while 74% did not receive an agent in either year
- The percent of rural Mozambican households with a member in a farmer association nearly doubled from 2002 to 2005, but is still quite low at 6.4% of households in 2005 (and much of this may be from Maputo province, though there were large increases in Gaza and Niassa).

Use of improved inputs – fertilizer, animal traction, irrigation

TIA showed some increases in input use from 1996 to 2002 (Boughton et al, 2006), but there has been no improvement since then. Some analysts believe that much of the growth in agricultural production and crop income in rural Mozambique since 1994 has primarily come from agricultural extensification (increasing area cultivated) and very little from intensification (increased productivity via higher levels of inputs and/or shifting area into higher-return cash crops) (World Bank, 2007). Given the continued low levels of fertilizer and animal traction use (both of which help to improve crop yields and maintain soil fertility), it seems doubtful if continued area expansion by manual cultivation will continue to generate growth in crop income over time, without some increase in the adoption of improved inputs and/or increased production of higher-value crops.

Household income 2002 – 2005

- When we compare mean and median household incomes over time, we see that the mean of total net household income per adult equivalent (AE) of panel households rose 15% from 2002 to 2005, but median income/AE fell -1% (Table 8).
- The distribution of income became wider in 2005, as the poorest households in 2005 are considerably poorer than the poorest households in 2002, while the wealthiest households in 2005 are considerably wealthier than the wealthiest households in 2002. However, the

sample mean increased over time because the increases at the top of the distribution were larger than the declines at the bottom of the distribution. The reason for this appears to be as follows: worse rainfall conditions in 2005 appears to have reduced crop income in 2005, which had a large effect on most rural households given that crop income is their principal source of total household income. By contrast, households in the top income quintile enjoyed increases in both crop and non-farm income/AE from 2002 to 2005, and thus their incomes increased.

- When we follow panel households over time (Table 10a), we see that there is rather dramatic relative mobility of households from 2002 to 2005 across quintiles of income/AE computed for each year.

Structure of income

Structural change is typically understood to involve the shift over time from an economy in which farm production employs most people, to one in which non-farm goods and services plays a bigger and bigger role in the economy. This implies a movement away from an economy dominated by subsistence agricultural production (where most if not all of household economic activity is focused on the production of food and consumer goods for home consumption), and towards a more specialized, market-driven economy (where the household produces less and less food and consumer goods/services for its own consumption, and instead concentrates its labor, land, and other assets on production of a fewer number goods which are sold in markets, including the sale of household labor to other farms, businesses, etc). Evidence of structural change would imply increased shares of higher-return farm and non-farm activities. Among farm activities, this would be evidenced by increased participation and/or productivity in cash cropping and livestock production. Among non-farm activities, structural change would imply increased participation and/or productivity in higher-return activities such as production and trading of farm inputs such as fertilizer, farm equipment, etc; marketing of crop/livestock products, adding value to food and livestock products through processing, production/trading of consumer goods such as clothing, housing, etc.

Participation and shares of farm income components

- do we see evidence of movements towards greater reliance on markets? No, the majority of rural households remain subsistence or semi-subsistence farm households.

- evidence of increased participation and/or returns in higher-return farm and non-farm activities? There is also not much evidence from 2005 of any structural change toward higher-value farm activities. In fact, participation in higher-value farm activities declined somewhat since 2002, as only a third (31.7%) have sold some high-value crops (field cash crops, tree crops, horticulture) in 2005, and 26% have sales of livestock products (live animals, meat, eggs/milk). Average shares for these activities remained very low, given both low participation rates and the predominance of food crops in total income.

- there is evidence of great variation in returns to farm activities: even though the wealthier households depend less on farm income than the poorer households, median income/AE from farm income for the top quintile (3,981 contos/AE) is about nearly 14 times higher than that earned by the bottom quintile (286 contos/AE) (Table 12a).

Participation and shares of non-farm income components

- the percentage of households with any non-farm income activity varied considerably from north to south, ranging from 41.9% of households in Niassa to 73% in Maputo Province. The most prevalent non-farm activity in the north and center was family-operated small-medium enterprise (SME), while that in the south is receipt of remittances (pensions are also included, but this entails few cases).

- While this general spatial pattern held for 2005, there were rather large increases in household participation in non-farm activity participation from 2002 to 2005 in the north, in Sofala, and in Gaza (Table 14). It is encouraging to note that much of this increase appears to be due to increased participation in higher-return activities, not activities with lower returns such as unskilled nonfarm wage labor and SME natural resource extraction. Nampula, which suffered some of the largest crop losses in 2005, is the only province with a sizeable increase in SME natural resource activities, which might be a response to drought.

- Note that the top income quintile earns median non-farm income/AE which is 53 times higher than that of the lowest quintile (note that the figures in this table for any given component are computed only for households which participated in that activity).

- even with our relatively disaggregated component categories, there is still a large range of income (Table 15) from within a given component across households with that component. For example, even if we look at a 'higher-returns' activity such as SME other-high, we see that the median income/AE from this activity is 2,433 contos/AE for the top quintile, 291 for the middle quintile, and only 83 contos/AE for the bottom quintile.

- These vast differentials in non-farm returns, and the high correlation between non-farm shares and returns and total household income, are consistent with what Reardon (1997) found in reviewing non-farm shares from household survey data across sub-Saharan Africa. He found that while non-farm income activities are correlated with higher incomes, there are often substantial barriers to entry in many of the higher-return niches. The implication of this non-farm literature for the TIA results is that observing an increase in nonfarm shares in and of themselves does not imply that such households are enjoying higher incomes, as some non-farm opportunities are pursued by households which are 'pushed' by desperation or vulnerability into such activities, rather than being 'pulled' by the lure of higher-returns per labor hour expended (Barrett et al, 2001).