Strengthening Mozambican Capacity to Harness Technology, Markets and Policies for Accelerated Productivity Growth and Poverty Reduction

A Proposal in Support of PROAGRI 2

For consideration by USAID/Mozambique

Prepared by

Michigan State University (MSU)
Department of Agricultural Economics

In collaboration with

Ministry of Agriculture and Rural Development (MADER)

August 2004

Strengthening Mozambican Capacity to Harness Technology, Markets and Policies for Accelerated Productivity Growth and Poverty Reduction

Contents

Background To The Food Security III Cooperative (LWA) Agreement

On September 30, 2002, USAID awarded the Food Security III Cooperative Agreement (under a Leader with Associates [LWA] Agreement mode) to Michigan State University. It is a potential 10 year project, but with evaluation for renewal after the first 5 years. The project is managed in the EGAT Bureau in close cooperation with the Africa Bureau. The CTO for FS III is Dr. George Gardner in EGAT/AFS.

FS III was competitively bid, and MSU's winning of the award means that USAID missions can now receive and discuss proposals to complete work and add resources under the agreement via their respective Mission or Regional contracting offices. A very important feature of the LWA Project Mode is that the development and discussion of proposals for activities can be done jointly by MSU and potential Host-Country partners with substantive input at an early stage from USAID Mission technical staff, thus facilitating refinement of proposed project activities to meet agreed upon objectives of MSU, host-country partners and USAID. Another important advantage is that such jointly developed proposals do not have to go through further competitive bidding processes providing the agreed upon scopes of work are consistent with the themes and approaches authorized under the FS III Agreement. Final proposals for Mission or Regional-Level Associate Awards must be reviewed and approved by the FS III CTO to assure correspondence with the overall FS III mandate.

Objectives of the Food Security III Cooperative Agreement

The following description of the scope of work of the FS III Leader with Associate Cooperative Agreement, taken from MSU's successful proposal, illustrates clearly the consistency between the FS III mandate and approach, on the one hand, and USAID/Mozambique's FY 2004 -2010 Country Strategic Plan on the other hand.

The strategic goal of the project is to integrate research findings into national, regional, and international policy dialogue and program design to promote rapid and sustainable agricultural growth as a means to cut hunger and poverty. MSU's proposed approach and specific research themes and activities for FS III will be consistent with the objectives and focal areas of the Partnership to Cut Hunger and Poverty in Africa (PCHPA), the Initiative to End Hunger in Africa, and the Poverty Reduction Strategy Paper (PRSP) process. Hallmarks of MSU's proposed approach include:

1. Partnering with African institutions, USAID Missions, and individual analysts and decision makers.
2. Integrating research, outreach, capacity building and institutional strengthening.
3. Focus on both individual and collective action.
4. "Disaggregated" research that looks below the macro level to examine regional, village, household, and gender-level impacts.
5. Conducting policy analysis with attention to implementation in the real-world setting of a given country.

Strategic Research Themes and Activities. The overall research perspective of FS III views food security broadly in a structural transformation context that takes into account the role of trade, non-farm income generation, and implications for poverty alleviation and sustainable natural resource use. The major proposed research themes are:

1. Improving food systems performance. Sub-themes include strengthening agricultural productivity, specific commodity value chains and input/output market performance and trade.
2. Understanding household income/livelihood dynamics. Illustrative topics include the level and distribution of rural assets, collective actions for financing social and infrastructure investments, and responding to rising prime-age mortality.
3. Understanding food security/natural resource management interactions—towards a greener and safer food security.

Capacity-building activities will support the project's research and outreach objectives. MSU will partner with African organizations to implement degree training and short-course/in-service training in research/outreach skills.

Strengthening Mozambican Capacity to Harness Technology, Markets and Policies for Accelerated Productivity Growth and Poverty Reduction

Executive Summary

The purpose of this proposal is to support efforts by the Ministry of Agriculture and Rural Development (MADER) and its private sector and PVO partners to ensure that the economic opportunities presented by market-oriented policies and democratic governance translate rapidly into broad-based increases in rural incomes. Breaking out of the low productivity-low income trap that frustrates the ambitions of so many rural Mozambican households requires a coordinated approach to enable smallholders to access and benefit from improved technology, efficient markets and supportive policies. Evaluations of ongoing agricultural development efforts in Mozambique to reduce input and output marketing costs through strategic investments in public and private goods, and help farmers operate more effectively within those markets, have concluded that it is also necessary systematically to identify and make accessible profitable crop and livestock production technologies through the research and extension system.

For these reasons, MADER and MSU propose a coordinated program of capacity building activities with the twin goals of expanding the *availability* of appropriate crop, livestock and natural-resource management technologies for smallholder farmers and accelerating the *uptake* of those technologies by strengthening policy institutions and market information services.

The specific objectives by which these goals will be achieved are:

1) strengthen the capacity of the new research organization (IIAM) to identify and disseminate improved crop and livestock technologies that are economic and market-oriented by training a corps of social scientists and integrating them into operational zonal research centers and headquarter divisions;

2) establish effective linkages between social science capacity in IIAM and MADER's Economics Directorate (DE) that ensure a favorable policy and market environment for rapid technology adoption;

3) strengthen IIAM and DE's ability to quantitatively monitor improvements in smallholder technology adoption and market participation, and analyze key cross-cutting concerns related to gender, nutrition, and HIV/AIDS. The first objective will be achieved by the establishment within IIAM of a cadre of social scientists whose work programs are fully integrated with, and directly contribute to the effectiveness of, operational zonal research centers. Social scientists will receive formal and in-service training in the core work areas of 1) institutional priority setting across commodities and regions (trade-offs in what to invest in where); 2) diagnostic research on farmer circumstances, constraints, and opportunities for technological change; 3) placing the results of on-station and on-farm trials in an economic and social context; 4) investigating the early acceptance and subsequent diffusion of agricultural technologies; and 5) assessing the impact of new technologies from the dual perspectives of rate of return and consequences for different groups in society.

4) IIAM technical scientists will also receive training in methods to evaluate the profitability

of improved technologies, and will have specialized backstopping in technical areas necessary achieve concrete results. Collaborative analysis of cross-cutting research themes with high policy significance, especially gender, nutrition and HIV/AIDS, will be carried out together with DE. Specific activities and outputs are discussed in detail in section 4 of the proposal.

To ensure a favorable policy and market environment to accelerate uptake of improved technologies by smallholder farmers, capacity within DE will be increased through 1) graduate-level training of existing Mozambican policy analysts; 2) institutionalization of a transparent and inclusive policy process (including policy priority setting and policy monitoring), and 3) timely applied policy research, analysis and dialog with policy makers on agreed priority areas by Mozambican analysts working in collaboration with MSU resident and campus-based technical assistance. The cost-effective and dynamic human resource base of DE's market information system (SIMA) will also be supported, albeit at a lower level, to further consolidate the Nampula provincial market information service, and establish new provincial market information services in Zambezia and one other province with an emphasis on radio transmission and regional market opportunities.

To ensure that DE is able to provide timely quantitative data on the agricultural sector for policy analysis (including gender, nutrition and HIV/AIDS), for agricultural research priority-setting, as well as monitoring agriculture's contribution to Mozambique's poverty reduction strategy and action plan (PARPA), capacity strengthening will be provided for the national agricultural sample survey (TIA). In addition to continued methodological improvements (such as the implementation of a panel data sample to collect information from the same households over time), and training of Statistics Department (DEST) staff in sampling methods and data analysis, efforts will be made to improve compatibility and minimize duplication with other data collection efforts inside and outside of MADER (e.g., MADER's early warning system and the Ministry of Plan and Finance's poverty surveys). Specific activities and outputs related to DE are discussed in detail in section 5 of the proposal.

To achieve the goals and objectives summarized above, MSU anticipates four years of intense activity with an additional two years of consolidation, following an in-depth review in year four. To finance the proposed activities MSU requests a grant of US$5,764,710 from USAID/Mozambique over a 72 month time period (1 October 2004 – 30 September 2010).

To accomplish the full set of activities described in this proposal, MSU will request an additional resource contribution from MADER (via Proagri 2 and PAAO based resources) over four years (years two through five of Proagri 2)[1]. Budget ceiling constraints during the transition from Proagri 1 to Proagri 2 have made it impossible to fit MSU Technical Assistance into MADER unit PAAOs for 2005. For this reason, we request that USAID cover basic TA expenses of DAP, TIA, and SIMA during project Year 1 as described in the attached budget. The proposed USAID budget calls for these expenses to be covered during Years 2-5 entirely by the funds coming to MSU directly from MADER.

[1] Proagri 2 will operate for only five years (1 January 2005 -- 31 December 2009). We therefore anticipate that an agreement starting 1 January 2006 (delayed one year while budget ceiling issues are resolved) will be able to last only four years.

1. Introduction

Mozambique has made significant progress in the decade following the 1992 peace accords that formally ended a 16-year civil war. Since the mid-1990s Mozambique has maintained one of the highest economic growth rates in SSA. This progress has been made possible in part by extensive and sustained policy change: other than South Africa, no country in Southern Africa has reformed and stabilized its economy like Mozambique. Grain movement controls ended over a decade ago. Minimum producer prices were abolished in the mid-1990s. The grain marketing parastatal was disbanded shortly thereafter, and there is no serious discussion of reviving either of them. The county has a demonstrated and sustained commitment to open borders, and has benefited mightily from it by importing maize regularly to the south while exporting out of the north when shortages emerge in neighboring countries. Inflation over the past six years has averaged 8.5%, the lowest in the region. A market driven exchange rate policy is also in place, with the metical remaining stable in comparison to the US dollar over the past two years.

Yet this impressive growth has not translated into widely shared gains in agricultural income. Growth has smiled on a small minority of households with the skills and opportunity to participate in off-farm salaried employment. The 60% of households with the lowest incomes showed only modest improvements over a six-year period between nationally representative rural income surveys. Returns to education are low in agriculture, even in well-endowed agricultural areas like Nampula and Zambezia provinces. Only in the higher altitude areas of Tete and Niassa provinces, with strong cash crop performance and market links to neighboring countries, did agriculture play a key role in economic growth. Overall, most income growth occurred off the farm, especially in the salaried wage labor sector, and much of this wage income growth came from the public sector and NGOs. This pattern of growth raises real concerns in an economy where 85% of the population derives its principal income from agriculture. For sustainable and equitable growth to occur, returns to investing in agriculture must increase.

The lack of broad-based growth in rural incomes is due in part to the lack of remunerative marketing opportunities and productivity growth in smallholder agriculture, especially in food crops. Nationally, cropping agriculture accounted for two-thirds of total rural income but grew by a total of only 4.5% over the six years. Farm size has remained stagnant for a majority of smallholders. Use of purchased inputs remains extremely low, and is concentrated in a few provinces and among a relatively few smallholders who grow cotton and tobacco under contract farming arrangements that typically include input provision. Broad-based agricultural growth requires significant increases in productivity for food crops that allow rural households to eat better and that also have domestic and/or regional market potential.

2. The Problem and the Opportunity

Smallholder farmers are prevented from accessing improved food crop technologies by a set of mutually reinforcing technology, market and policy constraints. The chronic lack of access to improved varieties and crop management techniques results in low production and marketable surplus. Low production in a subsistence economy leads to food insecurity with adverse consequences for labor productivity. Information is also insufficient to make better decisions on crop choice and area allocation. Incentives and policies to facilitate area expansion are also lacking. The private sector is equally constrained in providing low cost marketing services because of very low volumes, compounded by high transport costs and high financial interest rates on operating capital. High marketing costs and lack of strategic market information result in low farm-gate prices for the small amounts that farmers can afford to sell. Low returns on farm-gate

sales result in lack of purchasing power and low effective demand for inputs and consumption goods. The cycle perpetuates itself.

Breaking out of the low productivity-low income trap requires a coordinated approach to enable smallholders to access and benefit from improved technology, efficient markets and supportive policies. In addition to ongoing efforts in Mozambique to reduce input and output marketing costs through strategic investments in public and private goods, and help farmers operate more effectively within those markets, it is also necessary to systematically identify and make accessible profitable crop and livestock production technologies through the research and extension system.

The time is right for a more coordinated approach to solve these interlinked problems in Mozambique for four key reasons. First, the country has extensively reformed its economy, with little if any of the policy backtracking that has characterized many of its neighbors. In other words, government has largely stopped engaging in counterproductive interventions, and is now increasingly focused on identifying key things that it – in collaboration with the private sector – could do to spur market oriented economic growth and poverty reduction. Second, the country has an explicit commitment to working with the private and NGO sector to achieve development goals. Third, MADER has, in collaboration with its development partners, including MSU, laid a foundation of institutions and human capacity to generate information to design and implement coordinated programs.[2] The opportunity now, in the context of the proposed second phase of the national agricultural development program Proagri 2, is to bring these capacities together with the private and NGO sectors to focus on practical analytical tasks for use in program design and investment decision making.

3. Goal and Objectives

The goal of this project is to support MADER's efforts through Proagri 2 to raise productivity and cut hunger for rural smallholder families. This goal will be achieved through an approach that enhances MADER's capacity to identify and implement new science-based technologies in partnership with public sector entities, NGOs, and the private sector. Together with complementary market innovations and policies, the introduction of new technologies will catalyze broad-based increases in the productivity and competitiveness of Mozambique's food system.

This ambitious goal will be reached by accomplishing the following objectives:

1) strengthen the capacity of the new research organization (IIAM) to identify and disseminate improved crop and livestock technologies by training a corps of social scientists and integrating them into operational zonal research centers and headquarter divisions;

2) establish effective linkages between social science capacity in IIAM and MADER's Economics Directorate (DE) to ensure a favorable policy and market environment for rapid technology adoption;

3) strengthen IIAM and DE's ability to quantitatively monitor improvements in smallholder technology adoption and market participation, and to analyze key cross-cutting concerns related to gender, nutrition, and HIV/AIDS.

[2] Key examples include the integrated agricultural research organization (IIAM), the commercial agricultural sector promotion office (GPSCA), the national market information system (SIMA) and the policy analysis department (DAP).

This goal and objective set is entirely consistent with USAID/Mozambique's strategic objective of ***sustained rapid rural income growth*** in target areas specified in its Country Strategic Plan (CSP) for FY 2004-2010. The CSP notes that, in relation to Proagri 2, "all stakeholders see a renewed emphasis on effective research and extension services as the necessary and extension services as the necessary condition for field-level impact" (page 10). The World Bank funded agriculture public expenditure review concurs. Increased effectiveness of agricultural research and extension through the establishment and integration of a social science capacity is the central focus of this proposal. Additional support for the national agricultural sample survey (TIA), agricultural policy, and market information is included in the proposal to ensure that increased productivity translates into measurable increases in rural incomes. The proposal will be implemented over a six-year period, with four years of resource-intensive activities and a two-year consolidation phase at a lower level of funding and technical assistance presence. A review of accomplishments will be undertaken in year 4 to guide the consolidation phase.

In subsequent sections, we discuss how these objectives will be accomplished, with specific and verifiable outputs. We first (section 4) describe the rationale for and approach to establishing a social science capacity within IIAM, and reinforcing the zonal research center programs to which social scientists are assigned. In section 5, we then speak to the continued and complementary strengthening of DE's data collection and analytical capacities (agricultural statistics, market information and policy analysis), including the crossing-cutting issues that increasingly condition the prospects for broad-based participation and uptake in agricultural development.

4. Strengthening IIAM's Capacity to Identify and Disseminate Improved Agricultural Technologies Through the Integration of Social Sciences with Effective Zonal Research Centers

4.1 The Need for a Social Science Capacity within IIAM

Improving the flow of relevant extension messages is increasingly recognized as a priority for accelerating agricultural development in Mozambique. Borrowing from abroad is a strategy to buy time to increase the supply of available technology until domestic capacity in agricultural research matures. After only twelve years of peace, the expectation that public-sector agricultural research in Mozambique should be fully mature is misplaced. But it is reasonable to expect that agricultural research will play a significantly larger role and make a more readily identifiable contribution to agricultural development.

At this time, the staff strength of the crops research institute (INIA), the largest component of the newly consolidated public-sector research system, numbers about 60 scientists trained at the Bachelors level or above. About half of them are located in the INIA head office, and the other half is out-posted to four research stations and three research posts. Few if any of these professionals are social scientists. This level of staffing seems low for a country with 10 different agroecologies, 34 million hectares of arable land, and 19 million people. Getting spread too thin can result in the lack of critical mass to address the most relevant priorities. Similar challenges face the smaller but essential livestock-focused research units, IPA and INIVE.

The consolidation of research on crops, animal production, animal health, and forestry into one institute should lead to greater economies of scale in agricultural research. The increasing emphasis on client-oriented research, spearheaded by four zonal centers, should result in more rationalization of scarce resources and fewer "inactive" regional posts. And the return of recent

graduates should make a significant difference in human capital. These changes in the research environment enhance the potential for social science to contribute to interdisciplinary research leading to the development and transfer of new technologies that are economically viable and adapted to the most important agro-ecologies. Without external support for capacity building, it is unlikely that social science will be able to play a role in problem identification, priority setting, technology design, and impact evaluation.

Historically, social science capacity has been weak in national agricultural research in developing countries. Capacity has been hard to build and difficult to maintain. As a consequence, interdisciplinary research between biological and social scientists is rare or ad hoc. Teaching biological scientists the basics of social science methods has been a valuable complementary but, still, second-best strategy.

Technological change in Mozambican agriculture is and will be heavily dependent on decentralized adaptive research that responds to regional specificities. Such research should be institutionalized as a routine best practice in a stable environment that allows scientists to learn from past failures and to build on past achievements. Developing an effective in-house capacity in social science research is a necessary condition for strengthening decentralized adaptive research.

4.2 Social Science Staffing and Analytical Agenda

In a national agricultural research institute, such as the IIAM, an internationally accepted rule of thumb that provides guidance on the size of relative investment in social science is: social scientists (trained at the BS level or above) should be about 5-10% of the total scientific staff of the institute. Arguably, a country the size of Mozambique could warrant an investment of about 100 agricultural scientists that in turn would imply a staffing pattern of 5 to 10 social scientists. (It is understood that not all of the 100 scientists do pure science as many also have administrative functions that take up considerable time). Therefore, this initiative speaks to the need for the effective training and deployment of 7-8 social scientists for IIAM.

The main role of social scientists in agricultural research is to provide information on the demand for technology. Social scientists engage in research support to biological scientists and research administrators. However, their roles are not restricted to cost accounting or macro planning. The work they do results in more and better quality information for decision making especially on research resource allocation. And their activities are conducted in an interdisciplinary research setting. Where social science fits into the process of technological change is illustrated in Figure 1 in the context of decision-making on resource allocation, technology design, and recommendation generation.

Core work areas that social science should address include the following:

(1) Assist in institutional priority setting across commodities and regions (trade-offs in what to invest in where);

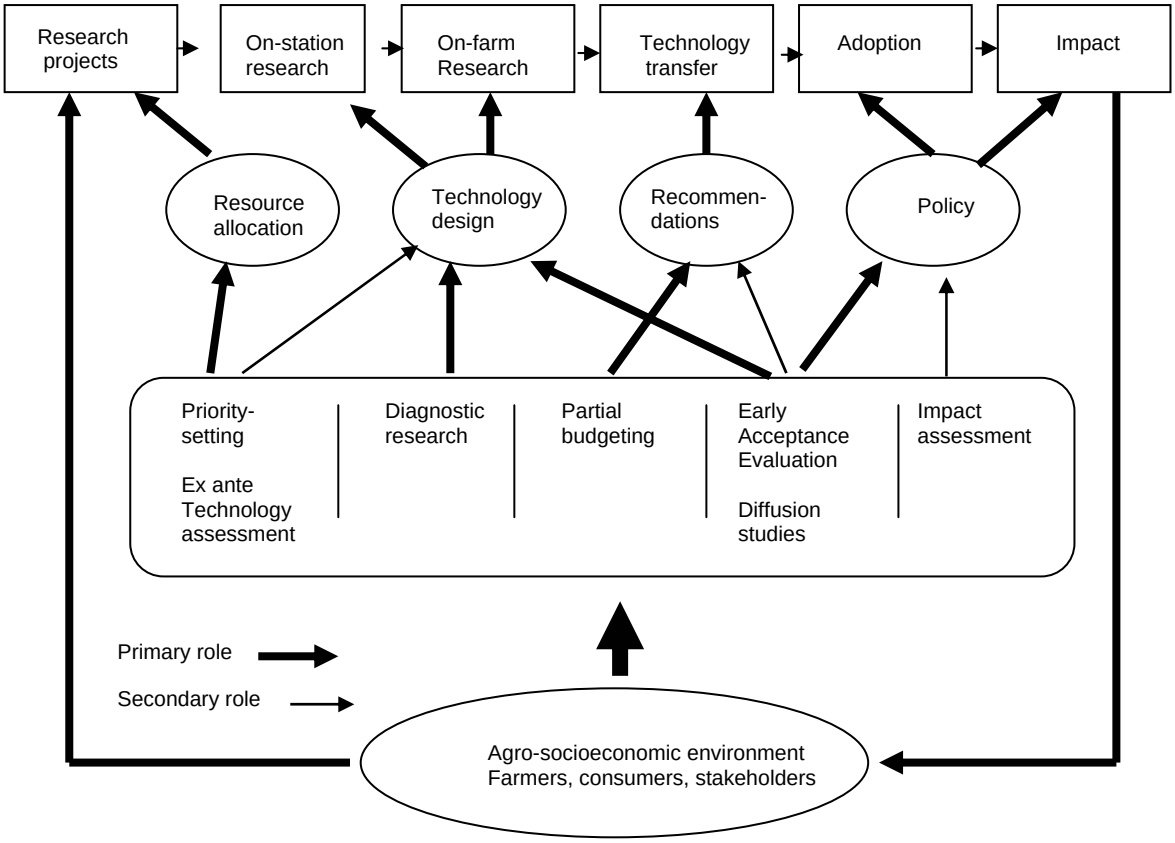
(2) Conduct diagnostic research of farmer circumstances, constraints, and opportunities for technological change. Such research contributes information on what type of research is socially desirable and on the design of specific technologies;

(3) Place the results of on-station and on-farm trials in an economic and social context;

(4) Investigate the early acceptance and subsequent diffusion of agricultural technologies;

(5) Assess the impact of new technologies from the dual perspectives of rate of return and consequences for different groups in society.

Figure 1. Role of Social Science in the Generation and Diffusion of Agricultural Technology



Several illustrative applications relevant to Mozambique in each of these substantive work areas are described below. In each of these areas it will be important for IIAM social scientists to coordinate with other MADER units responsible for policy and market development to ensure that potential synergies affecting technology adoption are captured.

Priority Setting

Priority setting should be conducted every three years to ensure that research investments are congruent with the problems and opportunities expected to generate the greatest expected impact. Criteria related to both desirability and feasibility are important in priority setting. Documenting the actual level of research expenditure and scientist's time by commodity, work area, and region provides a baseline for priority setting and is one of the major outputs of the exercise. An array of techniques for priority setting are available, but experience suggests that scientists are more likely to "buy into" the process when the method is participatory and when information can be freely exchanged among participants in a workshop setting. Therefore, a participatory one-week workshop with a facilitator is preferred to a detailed "outside" study where scientists only give their opinions on areas of their expertise. The uncertainty of agricultural research also cautions against spending too much time on priority setting. One week by all scientists and selected stakeholders every three years seems to be an appropriate level of effort. The involvement of social scientists is limited to preparation of background materials, participation in the exercise, and analysis of results. The leader of the social science unit, discussed in the next section, is expected to be the person most involved in priority setting.

The crop and livestock research divisions of IIAM would be the logical place to begin priority setting. Priority setting from a commodity perspective is easier and more informative than from a natural resources perspective. Crops research is the main area for agricultural research investment in Mozambique. A second priority setting exercise would focus on research resource allocation for the IIAM as a whole.

A select group of extensionists should participate in the priority-setting exercises. Additionally, the extent to which extension input is factored into IIAM's priorities needs to be analytically described. The annual meeting of research and extension should provide a venue to identify discrepancies in perceptions about research and extension emphases. Social scientists in IIAM should have the capacity to contribute information on important differences of opinion between research and extension for decision-making.

Priority setting is complementary to more formal ex ante assessment of prospective technologies. Candidate technologies should be identified in the priority setting exercise. Again, because of the uncertainty of agricultural results, a great deal of time should not be spent on ex ante assessment, but a few "big-ticket" items warrant more effort than a back-of-the envelope calculation. It is expected that social scientists in IIAM will carry out one or two ex-ante technology assessments per year of the project.

Assembling other relevant background information contributes to successful priority setting where the information generated in the exercise leads to changes in decision-making. A database on how scientists spend their limited time is crucial to informed priority setting. Although social scientists do not have a comparative advantage in the establishment of a simple time allocation database, they can be catalytic in its creation at an appropriate level of aggregation for priority setting. The current commitment to project-based research management in the crops research institute should be conducive to generating information on the division of scientist time among research areas.

Other secondary data should be exploited for their implications for agricultural research. Scientist and research administrators have yet to integrate the findings of the TIA data into their programs. A report summarizing the relevancy of the TIA results for agricultural research will set the stage for the first priority setting exercise.

The issue of alternative suppliers also looms large in priority setting. In Mozambique, the private sector is engaged in crop management and more limited, variety research in tobacco, cotton, and sugar cane. NGOs active in agricultural extension also support some adaptive research such as technology testing. The export-oriented fruit and horticulture industry is another prime candidate for private sector research. Eventually, cross-pollinated crops, such as maize, that are easy to hybridize will become the subjects of plant breeding in the private sector. The amount and type of private sector research requires documentation. The theme of alternative suppliers is dynamic and should be revisited prior to the second priority-setting exercise.

At this stage in the development of public-sector agricultural research in Mozambique, priority setting with regard to the zonal research centers warrants special attention to ensure that the zonal centers are more than just the sum of the institutes that form the basis for the new IIAM. Information from stakeholders served by the zonal centers must become a key input into both regional and national priority setting for agricultural research.

Diagnostic Research

Careful diagnostic inquiry is the hallmark of good social science that supports effective agricultural research. Establishment of one or two benchmark sites within one hour of the zonal research center creates a diagnostic research capacity over time. These sites are equivalent to investing in an institutional memory for on-farm research. (Experience shows that biological and physical scientists do not regularly visit villages that are far from the station or their residence). An inventory of “near” villages is a first step in the establishment of these sites that serve as loci for on-farm diagnostic research and technology tests. Following village selection, a baseline survey is the next step in the process that continues with the specification of hypotheses, priority trials, and treatments for on-farm research.

Rapid rural appraisals of specific constraints and opportunities complement information in commodity-specific questionnaires, such as the recent excellent baseline survey of cassava production, processing, and markets and build on the data collected in the benchmark sites. These appraisals would most likely be carried out in group interviews and focus on the dynamics of technological change along gradients or transects of population density and market access. For example, the degree to which priorities for maize improvement respond to the needs of more commercial smallholder farmers in districts with higher marketed surplus is an important consideration in maintaining regional competitiveness.

Economic Analysis of Budget Data

Partial budgeting of experimentation and demonstration data is one of the most important responsibilities of a social scientist working in agricultural research. We expect that social scientists will be seasonally involved in this task following the harvest of experiments in the pursuit of recommendations in well-defined domains.

Aside from the partial budgeting of agronomic and animal production data, estimating crop

enterprise budgets and revisiting the results of Sasakawa Global 2000 initiative figure prominently as priorities so that social scientists in IIAM are made aware of and can contribute to the big picture on agricultural intensification and regional competitiveness. Data on costs of production by commodity are sparse in Mozambique and represent one of the main inputs that IIAM could contribute to wider agricultural sector analysis.

Since 1995, the Sasakawa Global (SG 2000) initiative has funded thousands of demonstration plots showing fertilizer response at moderately high levels of application in several crops, especially in maize. Research based on the results in the initial years of the program suggested that fertilizer application was not profitable. The lack of subsequent diffusion of fertilizer seems to confirm the "low returns" conclusion. (The TIA 2002 data suggest that the small amount of inorganic fertilizer that is used in Mozambique is applied mainly to tobacco and to horticultural crops). Crop response was good in some locations, mainly mid-altitude, but poor in others. In general, fertilizer:output price ratios were too high to generate an attractive rate of return on investment. However, the more recent results of SG 2000 also warrant economic analysis. The profitability of low levels of application, constraints to greater fertilizer availability, targeting small geographic areas of highest economic response, and building private-sector market capacity are major issues.

Recently, SG 2000 has expanded its emphasis to minimum tillage and soil conservation techniques. The economics of these new intensification practices also merits a thorough analysis. Again, social scientists in IIAM are unlikely to be able to undertake this work by themselves. Colleagues in the Policy Analysis Department (DAP) should also be involved.

Technology Adoption Surveys

Early acceptance studies resulting from technology testing are the research niche of social scientists working in agricultural research on the adoption and diffusion of improved technologies. Information on early acceptance potentially has a bearing on technology design.

Past research and extension work has also resulted in several technologies that could warrant an investment of time and resources by IIAM in better understanding constraints to adoption and in providing the basis for documenting impact. With excellent international and regional cooperation and support from the Rockefeller foundation, the crops research institute has released several improved maize and cassava varieties. Sufficient materials have been released from both programs to begin quantifying diffusion and the determinants of varietal adoption, to evaluate the pay-off to research, and to assess program direction. In particular, the congruence between the supply of traits of varieties in the pipeline and the demand for characteristics in the commercializing regions needs to be assessed.

With regard to animal health and production, several successful vaccines and associated techniques are candidates for evaluation particularly if success can partially be attributed to adaptive research by livestock scientists in Mozambique. Other successful technologies may rank high on the agenda for adoption enquiries even though public-sector agricultural research did not have much if anything to do with them. Until agricultural research matures, government extension and NGOs have had to rely on borrowed technologies taken "off the shelf." For example, both NGOs and the national extension service have promoted treadle pumps to provide smallholders access to irrigation. Based on data from TIA 2002, farmers who irrigated at least one of their fields had 15% higher income than those who relied solely on rain-fed agriculture. Treadle pumps are one of several examples of extension efforts to borrow technology from abroad until national agricultural research developed and generated technological options tailored to Mozambican conditions. The

success and failure of these borrowed technologies need to be documented and lessons drawn about where they best fit in time and space in Mozambican agricultural development.

Technologies that are not that successful or whose diffusion falls short of expectations also command research attention if they are essential for agricultural intensification. Recently, the use of animal traction seems to have stabilized at a low level of only 10% for small-scale farm households. Animal traction paves the way for the line sowing of crops and enhances the potential for crop-livestock interactions. Apparently, the use of animal traction is proceeding at a very slow pace because of tsetse fly infestation and the absence of complementary public-sector investments in stocking and training. Tractorization is costly and is not a practical solution until fields are adequately cleared and destumped. Hiring manual labor for large cultivated areas is not efficient. The problem is not only small cultivated area per se but also yield losses due to poor hand weeding. Many households only have time to carry out one or two weedings, leaving too many weeds in the field to compete with cultivated plants. Herbicides may be a cost-effective option for some farmers cultivating higher value crops. Social scientists at IIAM need to understand the dynamics of agricultural intensification over time and related constraints to the adoption of inputs or modes of production that condition regional differences in the effective potential for intensification.

Large-scale, nationally representative adoption surveys are prohibitively expensive for social scientists at IIAM. The TIA could be strongly complementary to thematically more focused, and geographically more limited, adoption inquiries of social scientists in IIAM. Although the TIA may be a blunt instrument to capture differences in adoption in small component technologies, skillful questionnaire design should result in reliable estimates for technologies ranging from line sowing to major varietal change. Therefore, information from the TIA, discussed in section 5, is valuable in both priority setting and adoption research.

Impact Assessment

Impact assessment is the fifth and last well-defined task for social scientists working in the generation and transfer of improved agricultural technologies. Expected impact assessment was discussed earlier in the context of priority setting. "After the fact" (ex-post) impact assessment is a more important and difficult undertaking. Agricultural research in Mozambique needs to document some well-defined success stories to instill confidence that progress is being made. Adoption is a necessary condition for impact. Hence, output in this area is conditioned by the success of research summarized by the level of adoption (See Table 1).

Table 1. A Research Strategy for Ex-Post Impact Assessment

Sequence of questions	Decision	Action	Potential for ex-post impact assessment
1. Has the technology taken off (anecdotal evidence)?	No Yes	Stop Continue	Case study of a failure
2. Would the technology have been developed without the project?	Yes No	Stop Estimate adoption	Case study of a failure
3. Is there sufficient adoption to warrant continuing?	No Yes	Stop Estimate net benefits per hectare	Case study of a failure
4. Are the estimated net benefits sufficiently reliable to continue?	No Yes	Stop 1. Estimate costs 2. Calculate rate of return and net present value 3. Estimate the technology's benefits to the income of adopting households	Success story: Adoption case study
5. Is the impact of the technology on household income sufficiently large to warrant research on deeper consequences?	No Yes	Stop Invest in a study of indirect or deeper consequences	Success story: Rate of return study Success story: Case study of multiple consequences

4.3 Training, Implementation Strategy, and Timeline

This component of the project features in-service training divided into two stages. In the first stage, spanning the first three years of the project, six agricultural scientists will be recruited to fill three positions at headquarters and three positions at the zonal research centers. All six scientists will undergo a six-week training program to develop a good initial understanding of empirical analysis, diagnostic research, partial and crop enterprise budgets, adoption research, and impact assessment. Following the completion of the intensive in-service training program, three of the six will be placed in the two zonal centers that are perceived to be the most operational. The three headquarters scientists should be kept together, perhaps in the training wing of the new IIAM, to maintain a critical mass in social science capacity. On completion of the first stage, these staff will be incorporated into IIAM. The earliest the new IIAM will become financially operational and begin to function as a thoroughly integrated entity is 2005. Direct incorporation of social scientists into the technical divisions of IIAM without a unit or departmental identity could lead to fragmented research and high transactions costs in obtaining operational funds for research.

Dispersed capacity could result in the loss of capacity. By the end of 2007, the leadership of IIAM should have a good idea of how best to organize social science research in the consolidated institute, and the headquarters scientists will be organizationally housed in a socio-economics unit or directly incorporated in programs and projects without any disciplinary affiliation depending on the decision taken by the directorate.

In the first stage, social science research still responds to the needs of the IIAM directors who annually should review the research and training program. The degree of integration in interdisciplinary research with other scientists in IIAM should loom large as a criterion in this review. The social scientists posted in the zonal centers will report directly to the head of the zonal center similar to all other out-posted scientists.

Experience learned in the first stage will be tapped to guide the second stage that will differ in two important respects. Much of the training in the second stage will be concentrated in year 4; our exit strategy focuses on maintaining critical mass through periodic follow-up from a non-resident campus-based presence. Most, if not all of the new trainees in the second stage will be posted to the zonal research centers assuming that all such centers are operational. An assessment of the effectiveness of the zonal centers is a key input for the assignment of trainees in the second phase.

Of the 12 trained staff, it is likely that two will be sent for graduate MS training in areas where the IIAM currently has a mandate but does not have trained capacity. Natural resource economics and Agribusiness are two of these areas that should contribute to IIAM's forestry, soil conservation, and agro-processing agendas.

The new regional MS program supported by Rockefeller Foundation is a possible option for this graduate training, as costs would be substantially lower than training in the U.S. Participation in this program could help to get it established in Mozambique. Regardless of where training takes place, MSU project staff and on-campus backstopping faculty are committed to working actively with these students on their field research.

Sensitizing biological scientists to social science perspectives and methods complements the in-service training in specialized programs and mentoring in the conduct of research. A one-week workshop is planned annually throughout the first four years of the project. The subject of the workshop will be one of the five work areas of social science participation in agricultural research. These workshops will be open to administrators and staff from IIAM, DNER, and NGOs.

An additional in-service capacity building activity for IIAM, as well as DAP and SIMA staff, will be carried out in Mozambique through periodic workshops and classes on using the internet as a cost effective research tool. These workshops will be based on mini-tutorials available over the internet, utilizing resources which support the Food Security and Food Policy Information Portal for Africa. This research, policy information and capacity building project is being implemented by the FSIII Cooperative Agreement and a number of African Regional Food Security and Food Policy Support Networks, like FANRPAN which operates in Southern Africa. A working demonstration and further information on activities of this project can be seen at http://www.aec.msu.edu/agecon/fs2/test/index.cfm?Lang=en [3]

[3] The capacity building objectives of the Food Security and Food Policy Information Portal for Africa complement well the capacity building needs of IIAM, DAP, and SIMA researchers. These objectives are to assist the African Regional Food Security and Food Policy Support Networks (and their country-level partners) to improve access to and utilization of digital information and data resources by: 1) assisting country-level researchers and policy makers to conduct research quality internet searching for policy relevant data and information; 2) offering in digital format over the

Outputs for support to IIAM are given in Table 2. The project requires the full-time presence in country of at least one PhD economist experienced in agricultural research. Appropriate short-term backstopping from MSU is also envisaged both for training and analysis of cross-cutting issues related to gender, nutrition and HIV/AIDS.

The project also contributes to the overall goal of making agricultural research more relevant by indirectly strengthening zonal research and research-extension linkages. The effectiveness of zonal research is conditioned by support for a decentralized accounting system that responds to the needs of agricultural research, for adequate infrastructure and station management, for an incentive structure that permits the pursuit of a career path in agricultural research in a regional setting, and for "liquid" operational funds to engage in on-farm research. Contributions to improvement in several of these important areas are likely to be forthcoming from the IIAM-EMBRAPA partnership. While beyond the scope of the project to actively manage the work in the zonal research centers the project will help to monitor the performance of the zonal centers and to bring this information to bear on decision-making in IIAM. Annual monitoring visits are planned with the directorate of IIAM in which performance of the zonal centers will be rigorously evaluated over time with indicator variables. Performance issues range from the sustainability of the zonal center approach to the location of zonal centers to the potential for improvement of specific centers to the role of extension in zonal research.

The project will also contribute to strengthening research-extension linkages. Earlier, we discussed the participation of extension in priority setting events and in sensitization workshops. Ways need to be found to tap into the considerable experience of both public-sector and NGO extension in diagnosing problems and opportunities. Recommendations for further strengthening research-extension linkages will be elaborated in a consultancy that builds on recent MADER-funded evaluations. The number and content of on-farm trials and extension (both public-sector and extension) demonstrations in the recent past will be inventoried by region to determine the nexus between the investment in adaptive research and output in the form of recommendations.

Success in this project is marked by "routine" interdisciplinary research within a farming systems perspective. Social scientists in IIAM will be routinely sought out for their advice by research management and by their colleagues in biological sciences. IIAM social scientists should be in a position to say what technologies are profitable and are demanded by farmers but are still constrained by institutional factors such as access to inputs and what technologies are unprofitable and need more work. This project should also generate reliable information on the prospects for documenting future impact.

4.4 Linkages and Cross-Cutting Issues (Gender, Nutrition and HIV/AIDS)

Linkages with other areas and other institutional actors were discussed in the previous two sub-sections. In this sub-section, linkages with USAID investment in graduate training, with NGOs, and cross-cutting issues warrant more comment.

Via the INSORMIL and DAP/MSU projects, several Mozambican scientists are due to return

---

internet to others in Mozambique and elsewhere in Africa, access to research and policy materials that have not been formally published, but constitute part of the valuable pool of gray research and policy dialogue literature; 3) enhancing the quality and outreach potential of research and policy documents that are being prepared by Mozambican and other African social scientists; and 4) assist African Networks and researchers to learn about and utilize the new AGORA journal article access service.

within one year with a MS degree in agricultural economics. We hope that one of these returnees can be placed in IIAM to support the social science program in the institute. That person will play a prominent role in priority setting, in teaching and mentoring trainees, and in responding to short-term, substantive queries from research managers in IIAM.

In-service training figures prominently in our plan and is not restricted to the public sector. Some of the adaptive research and much of the extension in Mozambique is carried out by NGOs. Previous work by MSU has helped in strengthening the capacity of NGOs to evaluate their impact in terms of rural household income. To obtain funding, both NGOs and public agencies (including IIAM) should document success stories based on analytically sound impact assessment methods. Demand for training in impact assessment will continue to be a priority, and development of NGO analytical capacity will be complementary to enhancing public sector capacity**.**

Ensuring a stable supply of raw material and reducing the average cost of production are two of the most important criteria in determining competitive value chains that are the lifeblood of commercial agriculture. Stable seasonal supplies and low average costs of production are importantly determined by agricultural productivity. Ineffective and ill-defined agricultural research can seriously jeopardize commodity competitiveness. Social scientists can contribute by undertaking focused surveys on the costs of production, by assessing the expected benefits of best-bet interventions, by analyzing constraints to technology acceptance, and by documenting the impact of technological change. With the emerging social science capacity at IIAM and the strengthened capacity at DAP, the stage will be set for a more synergistic analysis of agricultural technology and policy innovations that is discussed in the next section.

The cross-cutting issues of gender, nutrition and HIV/AIDS must be explicitly addressed by IIAM if the full potential contribution of agricultural technology to poverty reduction in a broad sense is to be realized. Agricultural technologies central to improved productivity are rarely gender neutral. Interventions designed to improve household income may differentially impact men and women. Failure to understand existing gender divisions of labor and resource management can lead to new technologies being rejected or reduced profitability. For example, several studies in Sub-Saharan Africa have shown that women are often unable to adopt technologies that require substantial increases in their labor input given the existing demands on their time. Emphasis is often placed on developing technologies that enhance export crop production, with credit and input resources being directed towards men who typically control crops grown strictly for sale.

Hence, IIAM will need to evaluate the potential gender impact of proposed technologies and monitor if income generated through technological adoption results in improved household welfare for all members. For instance, in Mozambique, cereal and root and tuber crops contribute over 70% of cropping income, and women are estimated to contribute 69% of labor share in grain production and 80% of labor share in cassava production. Given the dominant role of cassava in the rural economy, productivity increases in cassava production would enable women to spend time on other activities, including growing crops with higher nutrient values or greater economic return. In other words, expansion of a more profitable cash crop or adoption of a new variety may depend first on the freeing up of labor from essential food crops. Clearly, gender analysis must be an inherent component in all research on potential agriculture technologies examined by the Unit for Socio-economic Research at IIAM.

Given that labor is likely to remain the dominant input in Mozambican farming systems in the medium-term, monitoring the effects of illness and adult mortality on household well-being and agricultural productivity and understanding strategies adopted to reduce that impact is essential for

assuring effective policy design and program response. Results from analysis of 2002 National Agricultural Survey indicated that selected households suffering from an adult death in three years prior to the survey reduced area under cultivation, most likely due to reduced labor availability. Households where an adult female died were more likely to recover some of the lost labor force through remarriage of the household head, compared to households experiencing the loss of an adult male. Potential exists to expand the scope of the mortality/illness module in the National Agricultural Survey proposed for 2005, and if panel data are collected as proposed in the next section, they will provide a tremendous opportunity to explore in greater depth coping mechanisms and the impact of health status on the rural economy. This research addresses the information needs indicated in the Proagri 2 Strategy document, and should be carried out in collaboration with the National Commission to Combat HIV/AIDS (CNCS) and its partners.

Additional research is needed to understand the complex relationship between food security at the community level and HIV/AIDS. The ability to undertake such research within the current framework of the project will depend on the level of resources provided. Two major areas of investigation are proposed. First, strategies for targeting interventions to reach HIV/AIDS affected households need to be investigated in the context of minimizing disincentives to agricultural production at the local level, to encourage communities to be involved in the mitigation of AIDS, and to support the social networks for the caring for households affected by HIV/AIDS. The 2002 survey data indicate that after a death many of the affected households appear similar to their neighbors, on average no poorer in land or income, so careful analysis is needed to avoid negative equity effects of assisting specific households on a single criterion of HIV/AIDS.

Second, due to the potential loss of labor capacity by HIV/AIDS sufferers and those who care for them, it is often proposed that agricultural research activities need to be shifted to concentrate on the development of labor-saving agricultural technologies. Empirical research needs to be done to establish whether such technologies will really reach and benefit HIV/AIDS affected households. Time use studies will help to indicate the nature of time constraints and help to identify where agricultural technologies are most likely to have an impact. Labor saving technology in water or fuelwood access or in food preparation may assist women in reducing the labor time needed in critical household tasks, thus releasing them to invest time in agricultural production. The promotion of income-generating strategies in agriculture, with crop diversification or food processing, may address household needs for income while improved dietary and sanitation practices within the community will better enable such communities to cope with the impact of HIV/AIDS-affected households.

5. Capturing the Synergies between Technology, Markets and Policy by Continued Strengthening of MADER's Economics Directorate (DE)

In this section of the proposal, we discuss complementary and continued strengthening of the Economics Directorate's Policy Analysis Department (DAP) and Agricultural Statistics Department (DEST) to foster and monitor a more favorable environment for rapid technology adoption during the second phase of Proagri.

Based on preliminary discussions between DE and USAID, the preferred method of financing MSU support to these units is through a MADER arrangement with the FS III group via a MADER to MSU subcontract, funded by Proagri 2 resources. DE budget ceilings, progressively reduced over time as part of MADER's commitment to decentralization, do not permit such a buy-in to take place immediately. This constraint is being resolved by a GOM planning and budget system that allows technical assistance costs to be on-budget but not be constrained by unit budget ceilings. An

administrative resolution of this constraint is anticipated in time for the second and subsequent years of Proagri 2. For the first year of support to DE, it is proposed that resources will be provided through the USAID/Maputo's buy-in to FS III.

5.1 Continued Strengthening of the Policy Analysis Department (DAP)

The Proagri 2 Strategy Document (MADER, 2004) anticipates significant increases in the demand for policy analysis as a key MADER core function, hence requiring the formation of additional human capacity. Examples of specific policy issues and/or value chains (subsectors) that will likely be prioritized for the formulation of improved policies during Proagri 2 include:

- *Agricultural input market development*: Increased availability of improved varieties, fertilizer, and herbicides will be essential to raise farm-level productivity. Improved input use is currently limited to a few cash crops and favored geographical areas. Low market volumes, high internal transport and distribution costs, and ineffective demand on the part of smallholders, constrain market development and result in high units costs. Targeted investments that enable the private sector to develop lower-cost input distribution systems are likely to be evaluated and proposed to break out of the chicken-and-egg dilemma. Such strategic and targeted investment programs must be carefully designed and targeted to stimulate sustainable impacts and avoid temporary distortions.

- *Cash crop/outgrower policies*: These policies have given mixed results under Proagri 1. The regulatory framework for the tobacco sector has permitted dramatic increases in area, production and smallholder incomes, although implications for the natural resource base have not been adequately addressed. The use of improved varieties and fertilizer for food crops has also been encouraged in tobacco growing areas. The regulatory framework for cotton, on the other hand, has not facilitated any significant improvement in smallholder outcomes. It is important for both the cotton and tobacco sectors, and for other sectors where interlinked input supply on credit and output markets may require regulation, that these regulatory frameworks be evaluated and updated in a way that reflects the needs and aspirations of all stakeholders.

- *Cashew sector policy*: The current cashew law, promulgated in late 1999 at the behest of large-scale cashew processors, has brought few benefits. Smallholders have received lower prices for their raw materials because of the export tax, while the majority of the inefficient large-scale processors have gone out of business anyway. New, more efficient, small-scale labor-intensive plants are emerging, but have difficulty in sourcing sufficient amounts of raw material. Under INCAJU's national production strategy, uptake of improved seedlings has been limited and the spraying programs have not established their financial sustainability. The sector strategy and regulatory framework needs to be reviewed and updated to encourage both the fledgling small-scale processing sector and more effective linkages with smallholder producers.

- *Rice sector policy*: Heavy investments in irrigation infrastructure since the 2000 floods have not been accompanied by a significant increase in domestic rice production, even though Mozambique imports large quantities of rice from the world market. Policy measures, such as import tariffs, to improve the short-run profitability of inefficient domestic rice production are potentially in direct conflict with the interests of poor urban consumers, who spend a significant proportion of their limited incomes on rice. It is essential to develop policies and strategies that improve the efficiency of domestic rice

production, processing, and marketing so that the domestic sector can compete without increasing the cost of rice for poor urban consumers.

- *Irrigation policy*: Mozambique has been investing large sums in rehabilitating large and small-scale irrigation systems, equivalent in value to actual expenditures under Proagri 1, without any strong confirmation of their economic profitability or long run sustainability. While improved water control for agriculture is a natural response to the regular incidence of widespread drought and/or flooding, a sector policy and strategy is needed to determine what kinds of investments are viable under what circumstances. Treadle pumps, for example, may be a much more cost-effective option for diversifying and stabilizing market-oriented production. But no systematic analysis of the relative profitability of different irrigation options ahs been undertaken.

- *Land policy monitoring:* Significant investments have been made under Proagri 1 to operationalize the Land Law. DINAGECA is undertaking land use mapping in 20 pilot districts to facilitate private investment in improved land utilization. Recent studies by Jose Negrão and colleagues in Manica indicate, however, that large-scale land parcels have low levels of utilization. Community land demarcation proceeds at a very slow pace, with few examples of success in relation to the objective of community/private investor partnerships. The private sector continues to be frustrated by the state's involvement in transferring land use titles, hindering their effectiveness as collateral. At some point an evaluation of current land policies will be called for to identify complementary measures needed to achieve the objectives of equitable and efficient land use.

- *Rural finance:* Access to rural financial services, especially savings, is essential if smallholders and farmers' associations are to be able to use improved production inputs and market their produce profitably. The Ministry of Plan and Finance is beginning to recognize the need to show leadership in this area following several donor and private sector initiatives to develop innovative proposals. MADER will need to contribute to the design of programs to encourage the availability of rural financial services.

- *Rural infrastructure:* Inadequate rural infrastructure remains one of the largest disincentives to smallholders to increase production and participation in the market economy. Resolving this constraint will require sustained investment in rural roads over the next several decades. But again, MADER must be an active participant in the prioritization of road network investment in the light of domestic and export market opportunities.

Clearly, the valuable analytical capacity built thus far within DAP cannot undertake all these tasks at once. Policy issues will need to be prioritized through public/private/civil society stakeholder groups to be established as part of Proagri 2 at national and provincial level. At the same time there is a need for MADER to approve a set of policy process guidelines that guarantees minimal standards for participation and consultation in the evaluation of policy options, as well as a capacity to monitor outcomes over time. For many issues, it will make sense to outsource studies. Even so, trained policy analysis personnel will be needed to develop relevant scopes of work, and to critically evaluate and utilize the findings.

To meet the expanded demand for policy analysis anticipated under Proagri 2, two additional Mozambican analysts will receive MS level training during the first two years of the project (financed by USAID/Maputo). Additionally, a full-time post-doctoral level technical assistance

person will be assigned to the DAP to support and provide in-service training to MADER analysts. We anticipate that a Mozambican will fill this post-doctoral policy advisory position. In years 2-5 of the project, the MADER subcontract with MSU will also fund appropriate short-term technical researchers from MSU campus staff to provide expertise on specific policy issues, supervise MS candidate research in the field and on-campus, and continue to assist graduates in the development and implementation of their workplans on their return to MADER.

5.2 Strengthening the Department of Agricultural Statistics (DEST)

The work of the agricultural statistics department complements investments in agricultural technology development in different ways. The national agricultural sample survey (TIA) provides the means to monitor the evolution of resource use and productivity over time, while the national market information system (SIMA), in collaboration with provincial directorates of agriculture, provides farmers with access to market information that helps them to profit from increases in productivity through more efficient markets, and more informed marketing choices.

5.2.1 Continued strengthening of TIA

Several improvements in the design and implementation of the national agricultural sample survey (TIA) took place in 2003. The questionnaire covered the basic statistical requirements of the ministry – types of crops grown, volume of production of selected food and cash crops, size of cultivable area and livestock numbers. It also included most of the variables identified in the proxy income indicators' work as well as new questions, among them questions on input use and land constraints. In spite of budgetary constraints, the questionnaire was also more extensively pre-tested this year. Pre-testing was carried out in 14 districts in 5 provinces.

The capacity within the Department of Statistics (DEST) in MADER to write data entry applications has been greatly improved by an intensive 3-week training program in CSPRO (the data entry software). Whereas the Department used to hire outside consultants to prepare data entry applications, MADER can now do this work in-house with minimum consultation from technical assistants. The TIA of 2003 was the second year in which field-based data entry was implemented. Coverage increased from two to three provinces. Preliminary analyses show that data quality is higher in areas where field-based data entry was carried out.

Both the Department of Statistics and the Department of Policy Analysis underwent several weeks of training from February to April last year in the use of SPSS software. There was little opportunity last year for the Department of Statistics to put their acquired knowledge to practice given that planning of the TIA 2003 had already started even before the training was completed. Such practice is taking place for the analysis of the TIA 2003.

Despite the progress made to date, DEST still needs to bolster its capacity in the areas of questionnaire design and data processing. Questionnaire design is particularly important because, increasingly, the TIA results will provide estimates of indicators for the monitoring of Proagri 2 as well as agriculture's contribution to the national poverty reduction action plan (PARPA).

For years DEST published numbers mainly to comply with statistical requirements from the National Statistical Institute (INE) and the Food and Agricultural Organization (FAO). The department needs to work alongside policymakers and researchers to understand better how survey data is put to use beyond statistical reports, so that research and policymakers' data needs are incorporated into the design of questionnaires.

With regard to data processing and analyses, it will take more than the analysis of one survey data set to attain a desirable level of proficiency in these tasks. Though there exists ample opportunity for practice (the department is the repository of several TIAs and the Agricultural Census of 2000), and a demand for the department to link these different surveys to create a comparable series of agricultural data, the department still needs the technical support to carry out such an exercise efficiently and effectively.

As part of the development of a national agricultural statistics master plan (proposed by INE), the department will need to harmonize its methods with other MADER data collection and dissemination efforts, especially the National Agricultural Directorate's early warning system (Aviso Previo). There are significant interdepartmental discrepancies in production estimates, e.g., cassava production, that warrant a close inspection of the varying methodologies employed by the different groups. The goal should be to create an efficient information system through one coordinated effort.

Lastly, current plans are to design the 2005 TIA survey as a panel based on the TIA 2002 households. The design and implementation, and more importantly, the management and analyses of panel surveys are different from one-time surveys. The department will definitely need instruction for this type of exercise.

Based on supplemental funding from MADER, the following tasks will be carried out to respond to the needs identified:

1. provide technical backstopping to the TIA 2005 that will be the first exercise in panel data collection conducted in Mozambique. At least 50-75% of the households in the TIA 2002 will be revisited;

2. provide additional training for DEST staff in SPSS and/or Stata statistical packages, in conjunction with training for IIAM social scientists;

3. organize and facilitate preliminary consultations with Avisio Previo staff to compare methods and results to identify areas of overlap and comparative advantage;

4. build capacity in MADER's Department of Statistics by sending two staff members for two-year diploma training to the Eastern African Statistical Training Centre in Dar es Salaam, Tanzania, or a similar institution;

5. conduct a workshop that focuses on the harmonization of Aviso Previo and TIA methods in the generation of production data, including the integration of dietary quality indicators. This workshop will provide a venue for recommendations on the integration and/or coordination of efforts from a common perspective and sampling framework; and

6. prepare a publication on the dynamics of agricultural sector development based on the TIAs from 1994 to 2003 including the CAP 2000.

These responses are described in Table 2. Completing them requires an in-country posting of a MS-level scientist skilled in the design and conduct of surveys. This person will also allocate a significant portion of time to training IIAM social scientists in the design, implementation and analysis of farm-level surveys in support of zonal research center diagnostic and on-farm.

Additional consultant time will be provided in support of result 1, and campus backstopping will be provided for tasks 3, 5 and 6.

5.2.1 Continued Strengthening of the National Market Information System (SIMA)

Important progress has been made in institutionalizing the provision of market information services under Proagri 1, although cash flow problems continue to threaten their continuity. The provincial marketing information service based at the Provincial Directorate of Agriculture in Nampula has strengthened linkages between farmer associations, NGOs, and traders by collecting and disseminating weekly information in written bulletins and radio broadcasts on market prices of a range of products, on specific product availability for sale, trader and processor offers to buy, and policies likely to affect local markets. The national SIMA's annual "windshield survey" of traders very early in the marketing year is done in collaboration with provincial systems, and has an excellent record predicting changes in product availability and prices from previous years. In July 2004, the SIMA and Ministry of Industry and Commerce (MIC) jointly organized a national market outlook conference with active participation by the private sector. Together, these services provide a solid foundation that can be improved on and replicated to enhance market opportunities for farmers that will induce their effective demand for improved technologies.

Training extension and SIMA agents in formulating messages for radio programs on profitability, market developments and use of prices means that effective messages can reach up to 80% of even poor rural households in Zambêzia, crossing over the gender and income barriers of more traditional extension methods. In Nampula, 60% of farmers received price information in 2001, compared to only 22% in Zambêzia, where market information systems are weak. With a potential audience of over 1.5 million smallholder households in Zambêzia and Nampula, enhancing broadcasting on these issues can have a major impact on incomes.

We propose three concrete improvements to existing systems:

1. Extending the reach of marketing intelligence into neighboring countries, to provide information to Mozambican stakeholders on potential private buyers or suppliers in these countries, and public policies that could affect trade.

2. Short-term price forecasting (3-4 months) for maize grain, combining quantitative methods with judgment based on more qualitative results of windshield surveys, publicly available assessments of regional or international supplies and prices, and knowledge of policy positions of neighboring countries that might affect export or import prospects. Conducting market outlook conferences in the northern region, in addition to Maputo, will provide a dissemination base for this work, as has been demonstrated in Mali.

3. Training in the design of extension messages that incorporate this information for use by NGOs and the public extension service. Enhanced radio diffusion efforts will reach a high percentage of farmers, including the poor, with messages on opportunities in production, marketing, storage for later sale, and processing.

We further propose to integrate these services into the existing system in Nampula province, and to expand the system into at least Zambezia and one other province in the area. In Nampula, both the regional station Radio Moçambique-Nampula and two community radio stations now broadcast the provincial system's information up to three times per week in the local language. Combining regional stations with wide geographical reach with very local stations that can tailor information to

more local needs may be an effective way to maximize the value the information that is collected. This approach will be pursued in the new provinces.

6. Budget Summary

To support the activities discussed in sections 4 and 5 above, MSU requests a grant of US$5,764, 710 from USAID/Mozambique to be spent over a 72 month time period (1 October 2004 – 30 September 2010).

To accomplish the full set of activities described in this proposal, MSU will request additional funds from MADER over four years totaling $2,745,650 (years two through five of Proagri 2)[4]. This agreement is currently under negotiation. Budget ceiling constraints during the transition from Proagri 1 to Proagri 2 have made it impossible to fit MSU Technical Assistance into MADER unit PAAOs for 2005. For this reason, we request that USAID cover basic TA expenses of DAP, TIA, and SIMA during project Year 1 as described in the attached budget. The USAID budget as currently designed calls for these expenses to be covered during Years 2-5 entirely by the award to MSU from MADER.

The budget contemplates an average of 2.0 in-country MSU FTEs over the life of the project. This includes a full-time trainer and advisor to IIAM for the first 51 months, a survey specialist to work with TIA and DAP for the first 36 months, and a post-doc advisor to IIAM and DAP (Mozambican hire) over the last 60 months.

This proposal calls for 1.4 campus-based FTEs, distributed 0.60 to IIAM, 0.45 to DAP, 0.25 to TIA, and 0.10 to SIMA. The proposed budget has funds to cover a declining portion of in-country operating expenses: 30% the first year, falling to 15% during year 4, and zero during years 5 and 6. The purpose of these funds during the first four years is to allow MSU to cover cash flow problems when needed in Proagri, while at the same time ensuring that MSU and MADER work closely together to achieve smooth functioning of each unit.

The Consulting line item will be used primarily to contract technical assistance for IIAM as it re-establishes its zonal research centers. For other details on the budget, see the attached budget file: BudgetNotes(15August2004).doc.

[4] Proagri 2 will operate for only five years (1 January 2005 -- 31 December 2009). We therefore anticipate that an agreement starting 1 January 2006 (delayed one year while budget ceiling issues are resolved) will be able to last only four years.

Table 2. Timeline of Anticipated Outputs: Years 1-5.

	Year 1				Year 2				Year 3				Y4	Y5	Y6
	1	2	3	4	5	6	7	8	9	10	11	12			
Starting social science in IIAM															
Implications for agricultural research drawn from the TIA data															
Two trained social scientists assigned to headquarters and three placed in zonal research centers															
Scientist time and expenditure data base developed															
Priorities revised and set for commodity research in IIAM, including role of zonal centers															
Benchmark sites established for two zonal centers															
Zonal research center performance reported, discussed, and recommendations made															
Four trained social scientists assigned to zonal research centers and two placed in headquarters															
One new M.Sc. social scientist incorporated back into IIAM															
Expected impact of one major technology analyzed															
Partial budgeting of trial data routinely conducted															
Early acceptance of tested technologies assessed															
Adoption of most promising technologies documented															
Impact of success stories documented															
Strengthening policy analysis in DAP															
Two analysts receive MS level training and are incorporated back into DAP															
Two additional thorough policy analyses and two additional quality pareceres per year															
Mid-term evaluation of the impact of DAP policy analysis in MADER															

	Year 1				Year 2				Year 3				Y4	Y5	Y6
	1	2	3	4	5	6	7	8	9	10	11	12			
Expanding SIMA coverage															
Provincial SIMA in Zambêzia established															
Livestock and input prices added to SIMA sites															
National Market Outlook Conference held in collaboration with MIC, FEWS Net, others															
Short-term price forecasting model developed for maize grain, incorporated into SIMA bulletins															
Training extension and SIMA agents in formulating messages for radio programs on profitability, market developments and use of prices															
Two new BS level trainees integrated into SIMA															
New M.S. integrated into SIMA															
Second new provincial SIMA established															
Improving the monitoring performance of MADER (TIA and DEST)															
Trained statistician at the diploma level reincorporated back into DEST															
Panel data from the TIA 2005 edited and made available for analysis															
Recommendations for integration/coordination of data collection procedures and frameworks at MADER															
Publication of TIA and CAP-based estimates on the dynamics of agricultural development in Mozambique															
Analyzing cross-cutting issues															
Two analysts receive in-service training for work with TIA and other datasets on cross-cutting issues															
Analysis of TIA and other datasets with respect to HIV/AIDS, food security and agriculture															
Evaluation of agricultural technology needs in the context of HIV/AIDS															
Evaluation of agricultural technologies based on gender and income dynamics															

Note: Interventions and evaluations may be constrained by agricultural seasons, so outputs may be moved to correspond to appropriate seasons. Not all interventions, however, would be subject to those constraints.