



**OPPORTUNITIES AND
CONSTRAINTS IN THE
MOZAMBICAN SMALLHOLDER
SECTOR**

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Glossary of Acronyms

ABSP2 - Agricultural Biotechnology Support Project

AICHA - Agricultural Initiative to Cut Hunger in Africa

CGIAR - Consultative Group on International Agricultural Research

CTIA - Conselho Tecnico para Investigacao Agropecuaria

DA - Development Assistance

DANIDA - Danish Agency for Development Assistance

DFID - Department for International Development

DINA - Direccao Nacional de Agricultura

DINAGECA - Direccao Nacional de Geografia e Cadastro

DINAP - Direccao Nacional Pecuario

DINER - Direccao Nacional de Extensao Rural

DNDR - Direccao Nacional de Desenvolvimento Rural

FAO - Food and Agriculture Organization

GMO - Genetically Modified Organism

GOM - Government of Mozambique

IARC - International Agricultural Research Center

ICM - Instituto de Cereais de Mocambique

IFAD - International Fund for Agricultural Development

INCAJU - Instituto Nacional do Caju

INDER - Instituto Nacional de Desenvolvimento Rural

INIA - Instituto Nacional de Investigacao Agronomica

IPA - Instituto de Producao Animal

IR - Intermediate Result

MADER - Ministerio de Agricultura e Desenvolvimento Rural

MSU - Michigan State University

NEPAD - New Economic Partnership for African Development

NGO - Non governmental organization

OGE - Orcamento Geral do Estado

OMB - Office of Management and Budget

PARPA - Plano de Accao para a Reducao de Pobreza Absoluta

PROAGRI - Programa Nacional Agrario

PVO - Private Voluntary Organization

SADCC - Southern African Development Coordination Conference

SIDA - Swedish International Development Cooperation Agency

SO - Strategic Objective

TARGET - Technology Applications for Rural Growth and Economic
Transformation

USAID - US Agency for International Development

SMALLHOLDER CONSTRAINTS AND OPPORTUNITIES

EXECUTIVE SUMMARY

Opportunities for Growth over the 2003-2010 Period

1. Cash cropping should be encouraged and improved marketing is key to translating this into increased incomes

The emphasis on food security and subsistence crops that characterized the past focus of agricultural assistance cannot carry the farm sector to the higher levels of income that are envisioned in the next cycle of USAID assistance. Increased cash cropping implies that small farmers will become increasingly commercialized as links to off-farm markets provide a greater share of household income. It is important to note that the term “cash crop” includes major food crops such as maize and rice since these are increasingly sold by smallholders for cash.

2. A variety of crops should be encouraged but cashew cannot be ignored

It is inevitable that certain projects will focus on particular cash crops and while it is not the purpose of this paper to “pick winners” adoption of a focus on cash crops in Mozambique makes it impossible to ignore cashews. In terms of simple arithmetic, even a small improvement in cashew technology will, if spread over several million growers, provide a large impact. No other crop apart from staple foods and legumes can equal this impact.

3. In the long run, the percentage of the population engaged directly in farming will decrease, meaning that only a subset of current producers will remain in the future

In Mozambique, as in every single other country in the world, the percentage of the labor force engaged in farming falls as per capita income rises. This is an empirical fact which has been found to be true in all countries and throughout history and is rooted in the fact that as incomes rise a greater percentage of spending falls on non-food items. This implies three observations:

Observation 1 – Given limited resources for aid, the current strategy of focusing on agriculturally favored regions is correct. It is in these areas of high comparative advantage that high returns to investments can be expected. An argument can be made for USAID to broaden its focus somewhat to include potential high return areas not currently covered, but there is no question that a whole-country focus would unnecessarily dilute its efforts and would not generate positive results compared with the more focused alternative.

Observation 2 - Even within favored zones, there will be some farms which evolve into viable and growing agribusinesses while others will be absorbed or fall by the wayside. Accordingly, those small to medium farmers or associations which show growth potential merit further investment since it is these which will form the basis of the future farm sector. As stated in the government's poverty reduction strategy, PARPA, growth is paramount. Accordingly, resources must be targeted as precisely as possible where growth can be generated.

Observation 3 - For those households which will through migration or generational shifts leave the farm sector, it is nevertheless likely that they will remain involved in agriculture through cultivation of personal or family machambas even as income sources become increasingly devoted to non-farm activities. Accordingly, there is still an important economic (i.e. food security) and environmental case to be made for promoting sustainable low input conservation farming techniques among these populations.

4. There is significant opportunity for growth through technological change

Three main types of technological change present significant opportunities for agricultural growth:

- Mozambique's abundance of arable land implies that land-using technologies which can increase cultivated area are likely to be economically efficient, particularly as newly rehabilitated roads give better market access to new areas.
- In addition, higher yielding varieties as well as disease resistant varieties of important crops have the potential to significantly increase incomes for smallholders. The key to unlocking this potential is an increased emphasis on applied research linked with extension to disseminate improved technologies.
- Low input/conservation technologies have met with considerable success in other countries in the region. There is ample scope for the promotion and use of such technologies in the Mozambican context.

Much of the needed research is adaptive in nature; "off-the-shelf" varieties and technologies are readily accessible and can be adapted to Mozambican conditions within a relatively short time. In addition to adaptive research an increased emphasis on extension will ensure maximum impact for each technological intervention. The cost-benefit ratios of such a strategy represents a major opportunity.

5. Support for formation of farmer associations should be continued

It is very clear that one of the major success stories of USAID's NGO mediated investments has been the support for the formation of farmer associations, especially through CLUSA. These associations have numerous advantages, particularly in terms of giving smallholders an ability to counter some of the local market power exercised by small traders in remote areas. Given the fact that the isolation of smallholders will only be penetrated gradually, there is a strong case to be made for continuing and extending the creation of associations beyond that which has already occurred in target areas. This would mean continuing training and support where possible in current focus areas while at the same time broadening the effort to include areas not currently covered.

Major Constraints to Growth in the Smallholder Sector

Constraint: Low Agricultural Productivity and Unsustainable Resource Use

In Mozambique, the use of land and its management have been driven primarily by the needs of local communities and by food security. Current surplus increases in staple crop production in several areas of the country have not been attributable to increases in use of modern technologies that increase productivity, such as better seeds, use of fertilizer and pesticides, but to increases in the area under cultivation. In several areas of the country, slash and burn practices and lack of soil fertility maintenance cultural practices place stress on already fragile ecosystems.

To reverse this trend, smallholders must gain technical knowledge and access to cost-effective and modern agricultural technologies necessary for them to increase yields, profits, and employment in an environmentally sustainable manner. Given the limited ability of smallholders to pay directly for optimal levels of research and dissemination of such technologies, there is a clear role for the public sector in ensuring that these needs are adequately met.

Constraint: Limited Smallholder Access to Markets

Mozambique produces (or has the potential to produce) enough food to feed itself and export, given extensive under-utilized land resources. Those smallholders who grow crops for income, however, find it difficult to access local and regional markets, due to inadequate information regarding market specifications, related inadequate production techniques, high transportation and other transaction costs, and access to critical production inputs.

Constraint: Input Supply and Credit for Smallholders

Prior to independence rural finance for smallholders was provided via the network of small rural traders called *cantineiros* who provided small amounts of inputs and consumer goods in return for promises of output at harvest time. The virtually

complete collapse and disintegration of this network after 1975 left a void in rural areas which has yet to be filled.

It is very unlikely that the old system of rural traders can be resurrected in the same form in which it existed in colonial days. Rural trade is now dominated by itinerant traders working from small trucks and who have no fixed location and consequently very low fixed costs. While there is no doubt still a role that can be played by fixed rural tradesmen, it is unlikely that they can compete with the current low cost alternative in many remote areas. In fact, as roads are improved and transport costs and associated maintenance costs decline, this is likely to be increasingly the case.

Accordingly, other models for rural credit must be exploited. Given the weakness of the formal financial system, the option of more informal, group based microcredit projects is a more viable route to take. Such models have been experimented with by various NGO's in Nampula and elsewhere. There are a variety of potential models that can be used and while there are reasons to favor some types over others it will in the end depend on local conditions which model works best.

The so-called Fundos do Fomento are often mentioned in connection with the issue of rural credit and finance. These funds have historically operated as essentially separate accounts which have been disbursed at the discretion of the Minister of Agriculture, often in the form of grants or loans which are often not repaid. When operated in this manner these funds cannot be considered as positive contributions to the development of rural financial markets or even sustainable rural development in many cases. To the extent that politically connected farmers can obtain grants or loans which do not need to be repaid, these funds in fact undermine true development of financial markets. Accordingly, USAID should support efforts to reorient and restructure the Fundos into entities which can make targeted investments to relieve important bottlenecks rather than as a source of grants disbursed without economic justification.

The Relative Strengths and Weaknesses of NGO's, the Government and the Private Sector

In the long run, both NGO's and the government have a role in providing services to the rural sector. It is clear that a move toward less NGO involvement is indicated, but a sudden shift would be counterproductive

In general terms, the public sector is best suited to those activities with a clear public-good component (such as, eg. road construction), while the private sector is best suited to activities where private profit motives can operate in well functioning markets to produce desirable outcomes. NGO's work well in situations where there is no or insufficient profit motive but where governments are unable or inappropriate as a vehicle for change.

The continued use of NGO's should be done in areas where it is not envisioned that a permanent institutional presence will be needed. For example, an NGO that is engaged is something like creating a farmer association will of course cease to be needed at the point where the association becomes self sustaining. Given the importance of continuing the process of association building, and the undesirability for various reasons of having this done directly by the government, this is a clear area for continued NGO activity.

It is also likely that NGO's will continue to be active in extension given their comparative advantage in activities which require a direct contact with farmers at a grass roots level. In the short run a rapid elimination of NGO's from this service provision would result in a disastrous gap in what has been a successful effort to date. While the government extension system could in many cases, if adequately funded, also perform the direct contact functions currently done by NGO's it will be some years before they are able to fully replace them as an effective organization in the field. Indeed, it may well be that the most efficient model is a partnership in which these contact functions are performed by NGO's on a contract basis. Pilot efforts just getting under way will be important in determining the viability of such an approach.

On the other hand, some functions, such as basic crop research, represent a permanent ongoing need and accordingly are best institutionalized in a government entity. This is particularly true in the case of smallholder oriented research since at the present low level of income there is no realistic prospect that smallholders can pay for the optimal level of research themselves. This does not mean that NGO's or the private sector will not perform some of these functions in the short term, or in the long term on a case by case basis in outsourcing arrangements, but it is important to bear in mind long run needs when making short run decisions on the appropriate vehicle for different needed services.

The following table suggests a possible evolution of PVO roles over the coming years.

Evolving PVO roles – Service Provision → Facilitation	
2002	2004-2010
Ag Extension – direct implementation with own staff	<ul style="list-style-type: none"> • Build capacity of GOM extensionists through collaborative implementation, inclusion in capacity building events. • Encourage (force?) PVO extension staff to form own businesses, under contract to the PVO and/or GOM.

<p>On Station Research – limited involvement, limited to testing of alternative food crop varieties from IARCs, some rehabilitation of infrastructure (Sussundenga)</p>	<ul style="list-style-type: none"> • Exit from this type of work, as INIA gets organized and funded under PROAGRI. • Provide orientation to incoming INIA staff on results/progress to date • Contract with INIA for targeted research useful to their programs
<p>On Farm Research/Demonstrations – PVO staff</p>	<ul style="list-style-type: none"> • Same approach as extension • Ensure strong forwards and backwards linkages with emerging INIA research system
<p>Road Rehabilitation/ Maintenance – own staff plus contractor development program</p>	<ul style="list-style-type: none"> • Move toward 100% contracting • Provide business development guidance to empreiteiros, particularly how to respond to RFPs (technical and pricing). • Continue to fund road rehab from monetization proceeds if appropriate. • Link empreiteiros to GOM contractors for possible subcontracting work.
<p>Microfinance – use own staff, mostly non ag lending</p>	<ul style="list-style-type: none"> • Develop local NGOs, working with commercial banks to gradually take over sustainable lending activities. • Encourage portfolio diversification toward greater provision of ag credit for inputs.
<p>Market linkages – use own staff, tends to be opportunistic/notional rather than analytical (TechnoServe may be an exception)</p>	<ul style="list-style-type: none"> • Conduct alternative product market assessments (USAID to contract?) • Continue to organize small holder groups to assemble and process (sun dry and bag) produce • Help establish linkages to new/existing agribusinesses to produce purchase and outgrowing agreements •
<p>Agribusiness Development – use staff to help establish contacts, subsidize startups via extension/demonstration services, seed/input supply, organization of farmer marketing/processing groups</p>	<ul style="list-style-type: none"> • Continue to facilitate and expand small holder linkages to agribusiness • USAID should contract for business development services – an agribusiness development incubator, for example. • Encourage formation of rural ag processing businesses (eg fruit sun drying) • Facilitate access to other value adding sources, such rudimentary processing activities

- **Funding Options for PVO Involvement in Extension, On - Farm Trials, Demonstrations and Road Rehabilitation Activities**

USAID/Mozambique Development Assistance (DA) funds complement PL480 Title II funding at the rate of about 1 to 3.3 (or 1 to 4.5 if the value of the commodities is used instead of monetization proceeds), and the Title II program significantly increases overall resources available to fund food security interventions in Mozambique.

Other things being equal (which they are not), Mission funding of PVO's could decline, but such a decline would mean smaller programs in general particularly in light of emerging OMB rules that require delivery of PL480 food assistance as food per se versus food for monetization, with proceeds used to fund PVO development programs. A brief discussion of some specific issues follows:

- Mozambique is largely self-sufficient in food production and a net exporter of some staple crops such as maize. Therefore, food aid has the potential for negatively impacting local markets, causing price declines, and thereby lessening incentives for agricultural production. It also continues the negative cycle of dependency, which Mozambique has been transitioning out of during the past several years since the emergency.
- Mozambique's current PL480 Title II program is 100% monetization, which has the advantage of maximizing cash resources available for program implementation, while minimizing potential destimulating effects of food distributions which could shrink the market for locally produced food. It is understood that OMB will require food aid allocations to Mozambique to contain increasing percentages of food delivered as food for distribution, with declining amounts of food available for monetization.
- Malnutrition exists in Mozambique, but is less related to inadequacy of food access than to poor utilization caused by poor sanitary conditions and related diseases with symptoms of diarrhea leading to poor absorption of available nutrients. Therefore, increasing food availability will not necessarily solve malnutrition problems and food aid would essentially be wasted.

In order to mitigate the negative impact of this decision, the Mission should consider some or all of the following options:

- Continue to dialog with OMB and USAID/W to press for maximum amounts of food assistance coming through monetization rather than direct distribution, for the reasons cited above.
- Suggest to OMB and the Office of Food for Peace that the percentages of each type of food assistance be evaluated on a regional or sub-regional basis rather than a country by country basis.

- Program direct food assistance coming to Mozambique for localized emergencies such as droughts, floods and insect attacks.
- Evidence from research in Kenya indicates that HIV/AIDS will have a strong negative impact on rural incomes, particularly for those households that lose the male head to the disease.

A recent study in Mozambique completed in November of 2002 (Rose et. al. 2002) looked directly at the question of food aid monetization. It reaches a strong conclusion that it would be a mistake to engage in direct food aid distribution at this point. The report states that such a move would “sabotage” the progress of the past five years in weaning farm households off emergency aid, developing non-dependent relationships between farmers and PVO’s, increasing local production of food and cash crops, and facilitating market development. The report cites numerous interventions that could improve nutrition, many of which could be supported by USAID.

Strengthening Research and Extension

There is no question that sustained growth of an agricultural economy such as Mozambique’s requires a vigorous and sustained effort to develop its research and extension capabilities. In doing so, there are several considerations that it is important for donors to bear in mind:

- Rates of return on research and associated extension are typically very high. A recent study estimated that improved yields of as little as 25-35% in maize and cassava could generate almost **\$210 million per year** in additional output for smallholders. There are few other investments which can compare with the size of these benefits or the rate of return on the initial outlays needed to achieve them.
- Gestation periods for these returns are on the order of decades, not years. This implies that results may take longer to appear than a single project cycle, making it imperative to carefully choose intermediate results that are feasible and measurable rather than giving up before the goal is attained. In spite of this observation, there are nevertheless several areas where short term research goals can be achieved.
- Many research topics and outputs have a clear public good component, particularly in the Mozambican context, meaning that government must maintain a strong role in funding and promoting research and extension
- The current national research network, headed by INIA, is itself in need of reform and modernization. While useful plans have been formulated, they have yet to be fully implemented. Until they are, research will remain unproductive and unresponsive.

- Extension services are an inseparable component of a successful strategy. Without it, research is for nought. While an eclectic approach to outsourcing and NGO participation is appropriate, it is vital to maintain and expand the government's efforts in this area as well.

Policy Issues

Land Tenure

Land tenure and land titling has been a subject of intense interest and political activity during the present program cycle, and remains a topic of intense debate for two main reasons:

- Much (indeed most) of Mozambican smallholders remain in a situation of occupying land to which they have no clear title even though the laws and regulations associated with it have been passed.

- The law that was passed falls short of what would, in an optimal world, be considered the "best" solution.

- Nevertheless, it is likely not to be possible to change the land law, even at the expenditure of considerable political capital, making alternative approaches desirable

- One thing that would assist smallholders in this process and which would also help prevent corruption would be to publicly post the requirements for the bureaucratic process together with the associated fees. Beyond this it is important to support DINAGECA in taking a proactive approach in promoting titling of smallholders under the processes currently defined in the law.

- Sufficient security of tenure to promote needed investments can likely be guaranteed under the existing framework by first expediting titling as much as possible, and doing whatever can be done to guarantee renewal of smallholder use rights on a more or less automatic basis.

- In terms of use of land for collateral, it should be noted that until such time as this may be legally possible, there are alternative models for credit interventions that do not rely on the ability to mortgage land to succeed. Even if the current land law were to be revised to permit freehold tenure, and smallholders were to receive such unequivocal permanent and transferable title it is extremely important to note that **they still won't get credit from banks anyway**. The simple truth (amply demonstrated in other countries Africa and elsewhere) is that it is extremely unlikely that lack of freehold title is the only or even the most important barrier between smallholders and access to the formal credit system.

- Decentralization of land tenure decisions is not necessarily a prescription for equality in land holdings.

Cashew Policy

The appropriate focus for USAID is to increase the profitability and production of smallholder cashew so as to provide additional cash income to the millions of smallholders who could potentially benefit from it together with additional foreign exchange earnings for the country. While elimination of the current tax on raw nut exports would assist in getting to this goal it would entail such political battles that it would detract from USAID's ability to pursue other ways of achieving it. However, there are numerous supply side interventions which could have an important impact on smallholder cashew production. Among these interventions are promotion of Indian process manual shelling factories through such entities as Technoserve and continued progress in multiplication and dissemination of disease resistant varieties. INCAJU is currently the entity responsible for research but needs to be linked more effectively with extension efforts if their research results are to achieve the maximum possible impact.

Smallholder Grain Exports

One issue which seems to resurface with regularity is the issue of free export of smallholder produced grain, particularly maize. At the present time this is most important in the central provinces where exports to food deficit countries such as Malawi are important sources of income for small farmers. Here, there is a clear "best" policy which is completely attainable: smallholder maize exports can and should be encouraged to the extent possible. Indeed, this is a policy battle which has already been largely won at the central government level. It remains an issue at the local (district) level in some cases, but the importance of this should not be minimized. It is precisely the local officials who are "the government" to the smallholder. Should these officials, or other people in a position of power, such as extension or NGO workers, oppose or obstruct such activities it can have a strong negative effect.

Rice

While maize has historically been the main staple grain crop exported in addition to being used for subsistence, rice is another possible candidate for export. Rice has been grown by smallholders in the Zambezi River delta for centuries, but has not been an important export crop in recent times. Given the fact that the SADCC region imports \$200 million of rice annually, and there is no other important production zone in the region, there is an obvious potential market for Mozambique. The FAO is just starting a project in the rice area and this is one which deserves multi-donor support insofar as that would help the overall effort. MADER has focused much of its past effort in rice on the Chokwe irrigation scheme rather than the rice growing areas of the Zambezi delta. To the extent that these efforts are redirected toward the Zambezi where the comparative advantage is much clearer, they should be supported.

Cotton

Cotton remains an extremely important crop for smallholders in many areas and as an export for the country as a whole. Accordingly, it is to be expected that it will continue to be grown and may well expand substantially if international market conditions improve. However, given the heavy involvement of the private sector in this crop, together with the obvious profit incentives that these companies have to promote improved varieties, cultural practices, etc. it should not be considered as the most important area for government expenditure and involvement.

Roads and other Infrastructure

It would be difficult to overemphasize the importance of continuing the campaign of road building that USAID and other donors have supported in the past. If small farmers are to engage in the market economy then they must have physical access to it and it is roads that provide this. The reactivation of production for cash crops in many areas is a direct consequence of the reestablishment of road networks. Indeed, many farm level interventions can have only a limited effect if farmers remain physically isolated from the larger economy.

Regardless of theoretical debates on this matter, as roads improve and perhaps most importantly as the projected Zambezi bridge is completed, the existence of alternative outlets will inevitably have a positive impact on farm level prices and smallholder incentives.

One very important corollary of the success to date in building and rehabilitating roads is the need to start to shift spending toward maintenance. There is a natural tendency on the part of donors to regard this as a recurrent cost which should be borne by the government, but this is a dangerous attitude in the current situation. The institutional capacity to perform ongoing maintenance is itself a form of capital that needs to be built up.

An extremely important point to note in relation to any effort to build roads is the close association in Sub Saharan Africa generally and Mozambique particularly of HIV/AIDS infections with transport routes. It is no accident that those areas best served with road links to the rest of the country (e.g. Tete) are at the same time the areas with the highest rates of HIV transmission. As roads are extended into new areas it is very important that AIDS education and prevention programs be instituted at the same time as a preemptive measure. Waiting for the higher rates of infection to manifest themselves is simply not defensible given that we know full well that along with easier transport and communication comes higher rates of infection.

HIV/AIDS

At first blush, it would appear that this is not an issue which is directly within the province of smallholder agriculture. However, the gravity of this problem and together with the potential for it to become even worse than it already will, dictates that there be no part of the government or society which considers itself exempt from consideration of how it can contribute to a solution.

Some mitigative program considerations actions

1. Integrating data on the magnitude of HIV/AIDS would be useful - by region to the extent possible - for programming decisions.
2. For areas with over 20% HIV prevalence, innovate around ways to overcome labor, capital, and mobility restrictions facing those families (such as labor-saving or equipment-sharing technologies). For example, support innovations that would allow labor-poor households to deal with the requirements of preparing a field for a new higher-value crop.
3. Initiate risk-reduction strategies, particularly for women producers, perhaps with a "middlewoman" who is less vulnerable at the marketplace
4. All rural extensionists can and should be given a short course in such basic factual information so that there is at least one accurate information source at the farm level.
5. The close association of HIV/AIDS transmission with improved transport and communication routes makes it imperative to link road building programs with AIDS education and awareness programs. The time to act is before the virus is spread, and not after.

Linkages between various USAID/Mozambique activities and other A.I.D. funded programs

There are several opportunities to leverage existing funding and acquire additional funding from other types of USAID-sponsored activities on global and regional levels. A number of these are highlighted below.

Agricultural Initiative to Cut Hunger in Africa (AICHA).

The recommended USAID/Mozambique CSP programs will be consistent with these focus areas particularly given the strong emphasis on research and extension, since this links directly to the AICHA emphasis on science and technology. There is a possibility that one third of the AICHA resources will be focused on biotechnology (to be confirmed).

- **Agricultural Biotechnology Support Project (ABSP2).** The next “green revolution” will likely come about from the application of biotechnology to agriculture, both in the form of transgenic manipulations (GMOs) and non-transgenic applications (e.g. tissue culture). Mozambique has a strong potential for becoming one of the ABSP2 “focus countries”, and the Mission should engage Cornell early on to make sure that appropriate attention and assistance is received. Areas of particular interest include development of an appropriate biotech policy environment, incorporation of INIA into partnerships with ABSP2 biotechnology development partners focusing on solution to pressing Mozambican needs (e.g. cassava mosaic virus and brown streak), on a national or regional basis.

- **Technology Applications for Rural Growth and Economic Transformation (TARGET)**

TARGET focuses on getting profitable, productivity enhancing, agricultural technologies that are now in the pipeline or on the shelf, into the hands of end users i.e., smallholder farmers and rural enterprises. And, it supports efforts to apply technology to emerging issues that limit the competitiveness of African agriculture in global markets. TARGET program objectives include the following:

- Increase access to and use of technology now in the pipeline to support food system development, among rural households;
- Raise the quality and quantity of technology used, and products derived from agriculture, to generate rural household income;
- Increase and improve the application of information technology for agricultural trade, science and development planning;
- Promote innovation in development and application of agricultural technology to address emerging challenges and opportunities.

TARGET includes a Technology Access Fund (TAF), with funds managed by the CGIAR Secretariat and administered in consultation with USAID staff. IARC activity proposals should have the support of the relevant Sub-regional organization (ASARECA, CORAF, SACCAR) and take into account their on-going research priority areas. Partners could include a range from NARS, NGOs, U.S. universities, to the private sector.

The Key Role of Agribusiness and Exports

The entire thrust of a strategy based on increased marketing of smallholder output is premised on the ability of the smallholders to access the markets. This means that there is a crucial link between the smallholder sector interventions *per se* and Intermediate Results relating to transport infrastructure and expansion of agribusiness and marketing networks. Without these crucial linkages there can be no expectation of sustained improvement at the farm level.

The Potential of Unmonetized Food Aid to Undermine Agricultural Development

USAID is responsible for a large amount of food aid in Mozambique some of which is given as food aid and much of which is monetized. It is worth emphasizing that **apart from disaster assistance the provision of non-monetized food aid has negative implications for agricultural development in Mozambique.** This means that it should be avoided, even if it is the only type of food aid on offer. Though acceptance might mean a larger USAID program in the country, this program cannot counteract the negative effects of such unmonetized aid. These observations are confirmed by the recent report (Rose et. al. 2002) which analyzed the question of monetized vs. non-monetized food aid in Mozambique.

Potential Intermediate Results and Corresponding Indicators

The Preliminary Strategic Framework lists four intermediate results (IR's) under the first Strategic Objective of accelerating rural income growth. It should be noted that the corresponding activities will wherever possible be channeled through PROAGRI. In this way, the establishment of new independent projects can be avoided.

Our analysis suggests several points:

1. It should be noted that the overall long term development goal of broad based double digit growth is one that has never been attained by any country if the period measured is one of decades (with one or two possible exceptions, none of which are in Africa. This caveat notwithstanding, the objective of accelerating rural income growth is a reasonable one for USAID.

2. The third IR under the first SO focuses on land tenure. Given the likelihood that a change in the current land law is likely not to be in the manageable interest of the Mission a substitute IR is suggested:

“Expansion of rural smallholder production of crops for sale to the market together with policies to promote sustainability of this goal”

Possible indicators would be:

- Increased percentage of smallholder output sold into market channels
- Increased number small farmer village level associations and increased percentage of farmers and districts organized into associations
- Streamlining of the Process for Registering Associations
- Increased number of village level credit institutions geared toward smallholders and small and medium agro-processing enterprises.

3. The following IR is currently listed as the last under SO 1 and is a reasonable goal for the next project cycle:

“Use of Sustainable Agricultural Technology Increased”

The following are some potential indicators that can be used to gauge progress on IR 1.4:

- Increased share of MADER budget devoted to research and extension
- Increased number of agricultural researchers obtaining post graduate training
- One zonal research center in the northern or central region of the country to be fully equipped and staffed by the end of the program period and designated as the center of INIA’s research effort
- Improved linkages between INIA and other international research centers
- Progress toward creating systematic and regular links between research and extension at the central, provincial and district levels.
- Adoption of improved technologies/varieties by smallholders

Opportunities and Constraints in the Mozambican Smallholder Sector

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Introduction

The bulk of the Mozambican population is engaged in agriculture on small parcels of land of less than 5 hectares. Accordingly, both growth considerations and equity considerations dictate a focus on this segment of the people in terms of efforts to promote sustained growth in the country. Given only peripheral attention during the colonial period, and unable to develop during the long years of civil war following independence, it has really only been over the past ten years that smallholders in rural areas have had a chance to establish themselves as self-sufficient producers.

At the present time they are poised to move beyond this status to become producers who rely more and more on marketed surplus to generate income growth. This transition from subsistence production to market-integrated small businesses presents a series of opportunities and constraints. The following section discusses these in greater detail.

I. Opportunities for Growth over the 2003-2010 Period

Potential for Expansion of Cash Crop Production

If one takes a long term view of agricultural development and the overall rise of incomes which goes with it, it is inescapable that increased cash cropping is necessarily associated with it. Up to the present time the main thrust of USAID's program (as well as those of other donors) has been on food crop production and a return to self sufficiency and self sustaining growth in the family sector. However, it will not be possible for the high rates of growth that are USAID'S stated strategic objective if the thrust of the program is not broadened to emphasize marketing of surpluses by smallholders. It is important to noted that growth is also the government's objective, as stated in the poverty reduction strategy, PARPA.

The term "cash crop" should be understood to include (indeed must include) food crops as well as cash crops for the simple reason that as the

economy grows and the population becomes increasingly urbanized, each farmer must feed an increasing number of non-farm inhabitants. There are several observations which follow directly from this:

1. Cash cropping should be encouraged and improved marketing is key to translating this into increased incomes

Cash cropping should be encouraged. Only by selling crops off-farm can rural inhabitants get the wherewithal to purchase manufactures and other items from the non-farm economy. Only by exploiting their comparative advantages both vis a vis urban areas and vis a vis other countries can they raise their incomes substantially above the subsistence level. This means that successful farmers will become increasingly commercialized as incomes rise. Inevitably they will become more involved in the off-farm economy both in terms of agricultural inputs and outputs as well as non-farm activities more generally.

In order to interact with these markets on the best possible terms, expansion of small farmer associations can play a key role. The ability to interact with traders on a bulk basis will by itself increase farm level incomes even without taking into account production increases or yield improvements. These associations can also provide entry points for small credit programs as well as extension messages.

2. A variety of crops should be encouraged but cashew cannot be ignored

It is inevitable that certain projects will focus on particular cash crops and while it is not the purpose of this paper to “pick winners” adoption of a focus on cash crops in Mozambique makes it impossible to ignore cashews. While USAID’s retreat from direct involvement in cashews was an appropriate response to the political turmoil surrounding cashew policy in the past few years, a focus on cash crops without some attention to cashew is tantamount to ignoring an elephant in the living room. The following facts speak for themselves:

- Cashew has long been and remains by far the most important smallholder cash crop, and this is especially true in the high potential agricultural areas where USAID has focused.

- A corollary of the first point is that cashew cultivation is well known and well understood by the millions of smallholders who constitute USAID’s target population. The importance of this human capital should not be underestimated;

other cash crops starting “from scratch” require an effort at familiarization and extension which cashew does not.

- There is a clear potential for yield increases through technological improvements and replanting.

- The world market for cashews has been growing at a rate of about 10% per year for a sustained period. Projections are that this trend is likely to continue.

In terms of simple arithmetic, even a small improvement in cashew technology will, if spread over several million growers, provide a large impact. No other crop apart from staple foods and legumes can equal this impact.

In addition to cashew, the experience of the past ten years demonstrates that there is significant potential for growth in two additional areas:

- Contract farming of cash crops, particularly cotton, has provided an important way for smallholders to access off-farm markets. Other crops such as sugar and tobacco also have important potential to increase smallholder incomes. In these areas the private sector has clear efficiency and incentive advantages over the public sector or NGO's in providing the necessary supports for smallholder production. While international market conditions have been adverse for cotton in recent years, the overall model of contract farming is one which has proven capable of providing substantial income growth in those crops where it is suitable. Mozambican experience with contract farming has been mixed. To date it has been difficult to enforce contracts apart from those under area concessions, e.g. cotton and tobacco. Here the government has a choice: If it wishes to avoid the problems associated with granting area specific monopolies then it must support contract enforcement between smallholders and businesses if there is to be any incentive for input suppliers to extend credit to small farmers. However, it should be noted that the root cause of recent problems in cotton areas has been the depressed state of the world cotton market rather than inherent contract problems per se.

- Niche markets for cash crops have become increasingly important in a variety of areas. Examples such as paprika, sesame, sunflower and others show that smallholders will readily respond to incentives and have the capacity to produce output of sufficient quality to meet world market requirements. Continuation of efforts in such niche markets will be an important component of smallholder growth over the coming years.

3. In the long run, the percentage of the population engaged directly in farming will decrease, meaning that only a subset of current producers will remain in the future

As the overall population becomes more urbanized, less favored rural households will leave the countryside and migrate to cities or will depend increasingly non-farm income if they remain in rural areas. This implies that while excessively rapid out-migration may cause dislocations, in the long run not all or even most rural households will stay in the farm sector - only a subset of them will engage in the capital accumulation and productivity increases that come with modernization and growth.

This last point merits amplification. If only some of the current farm households will form the core of a more productive farm sector in the future, then it makes sense to focus development efforts on those areas and producers where the greatest returns can be expected. Accordingly, the following three observations are very important:

Observation 1 - The current strategy of focusing on agriculturally favored regions is correct. It is in these areas of high comparative advantage that high returns to investments can be expected. The history of area development projects in resource-poor areas in Africa has been documented elsewhere (see, e.g. the World Bank's series of monographs under the Managing Agricultural Development in Africa Project in the late 1980's and early 1990's) and demonstrates clearly that putting money and effort into less favored areas is a recipe for projects with low or negative returns. An argument can be made for USAID to broaden its focus somewhat to include potential high return areas not currently covered, but there is no question that a whole-country focus would unnecessarily dilute its efforts and would not generate positive results compared with the more focused alternative.

Observation 2 - Even within favored zones, there will be some farms which evolve into viable and growing agribusinesses while others will be absorbed or fall by the wayside. Accordingly, those small to medium farmers or associations which show growth potential merit further investment since it is these which will form the basis of the future farm sector.

One of the most important areas for investment will be in basic business practices for those associations and individuals who become increasingly involved in the market. This implies (as noted in the section on extension) an increased ability on the part of the extension services, NGO's and the private sector to provide assistance in these areas in addition to more traditional agronomic areas.

Observation 3 - For those households which will through migration or generational shifts leave the farm sector, it is nevertheless likely that they will remain involved in agriculture through cultivation of personal or family machambas even as income sources become increasingly devoted to non-farm activities. Accordingly, there are still important economic (i.e. food security) and environmental cases to be made for promoting sustainable low input conservation farming techniques among these populations. Haggeblade and Tembo (2002) document a package of such techniques applied in Zambia and while direct application of these techniques to parts of Mozambique is not likely to be possible, a minimal amount of adaptive research could yield positive lessons given that the technology is most suited for areas with erratic rainfall where hand hoe tillage is prevalent. Adequate provision of extension services has been essential to this process.

Even if USAID continues to emphasize certain provinces or areas, coordination with other donors can ensure coverage of the whole country. In addition, as the government takes more and more responsibility for allocating money within the sector, it will of course choose to spread its efforts through the whole of the country as it sees fit, rather than continuing the more focused approach taken by many external donors.

4. There is significant opportunity for growth through technological change

Mozambique's abundance of arable land implies that land-using technologies which can increase cultivated area are likely to be economically efficient, particularly as newly rehabilitated roads give better market access to new areas. In addition, higher yielding varieties as well as disease resistant varieties of important crops have the potential to significantly increase incomes for smallholders. The key to unlocking this potential is an increased emphasis on applied research linked with extension to disseminate improved technologies. Much of the needed research is adaptive in nature; "off-the-shelf" varieties and technologies are readily accessible and can be adapted to Mozambican conditions within a relatively short time. The cost-benefit ratio of such a strategy represents a major opportunity.

5. Farmer Associations should continue to be organized and encouraged

It is very clear that one of the major success stories of USAID's NGO mediated investments has been the support for the formation of farmer associations, especially through CLUSA. These associations have numerous advantages, particularly in terms of giving smallholders an ability to counter some

of the local market power exercised by small traders in remote areas. Given the fact that the isolation of smallholders will only be penetrated gradually, there is a strong case to be made for continuing and extending the creation of associations beyond that which has already occurred in target areas. This would mean continuing training and support where possible in current focus areas while at the same time broadening the effort to include areas not currently covered.

It should be noted that these associations can help not only in obtaining the best possible output prices for cash crops (and this term should be understood to include maize and other staples in addition to such crops as cashew, tobacco or cotton) but also as an entry point for improved technologies and inputs on the production side. Associations can make extension efforts more efficient through their ability to reach more farmers and can also form the nucleus of credit interventions.

Another important point to note regarding farmer associations is that these are not an area where the activity can be easily performed by the government. Apart from the politically motivated rural organization efforts of the past, farmer associations must be fully owned and seen to be so by their members if they are to be effective. Experience in many other countries has demonstrated that there are numerous pitfalls in public sector involvement with such entities.

One area that can definitely use some improvement is the onerous bureaucratic and monetary requirements associated with official registration of farmer associations. At the present time it can take on the order of a year, together with a substantial cash outlay for an association to be officially recognized. This fact suggests a two-pronged approach for the immediate future: First is to assist farmer associations in negotiating and affording the process involved in associating. Second is a policy effort aimed at the government to streamline the procedure and eliminate unnecessary red tape, fees and delays.

Major Constraints to Growth in the Smallholder Sector

Constraint: Low Agricultural Productivity and Unsustainable Resource Use

In Mozambique, the use of land and its management have been driven primarily by the needs of local communities and by food security. Current surplus increases in staple crop production in several areas of the country have not been attributable to increases in use of modern technologies that increase productivity, such as better seeds, use of fertilizer and pesticides, but to increases in the area under cultivation. In several areas of the country, slash and burn practices and lack of soil fertility maintenance cultural practices place stress on already fragile ecosystems.

To reverse this trend, smallholders must gain technical knowledge and access to cost-effective and modern agricultural technologies necessary for them to increase yields, profits, and employment in an environmentally sustainable manner. Given the limited ability of smallholders to pay directly for optimal levels of research and dissemination of such technologies, there is a clear role for the public sector in ensuring that these needs are adequately met.

Constraint: Limited Smallholder Access to Markets

Mozambique produces (or has the potential to produce) enough food to feed itself, given extensive under-utilized land resources. Those smallholders who grow crops for income, however, find it difficult to access local and regional markets, due to inadequate information regarding market specifications, related inadequate production techniques, high transportation and other transaction costs, and access to critical production inputs.

Constraint: Input Supply and Credit for Smallholders

Prior to independence rural finance for smallholders was provided via the network of small rural traders called *cantineiros* who provided small amounts of inputs and consumer goods in return for promises of output at harvest time. The virtually complete collapse and disintegration of this network after 1975 left a void in rural areas which has yet to be filled.

It is very unlikely that the old system of rural traders can be resurrected in the same form in which it existed in colonial days. Rural trade is now dominated by itinerant traders working from small trucks and who have no fixed location and consequently very low fixed costs. While there is no doubt still a role that can be played by fixed rural tradesmen, it is unlikely that they can compete with the

current low cost alternative in many remote areas. In fact, as roads are improved and transport costs and associated maintenance costs decline, this is likely to be increasingly the case.

Accordingly, other models for rural credit must be exploited. Given the weakness of the formal financial system, the option of informal, group based credit projects is one viable route to take. Such models have been experimented with by various NGO's in Nampula and elsewhere. There are a variety of potential models that can be used and while there are reasons to favor some types over others it will in the end depend on local conditions which model works best. Some points to consider regarding small credit projects:

- Mobilization of savings is a key part of any sustainable program. If small and micro-credit are viewed simply as a means to funnel money into rural areas without generating savings, then experience indicates that the projects will not be sustainable after the implementing institutions depart
- The more transparent is the connection between savings and loans at the micro level, the more viable the project will be. Experience shows that when smallholders view the money disbursed in loans as “their” money because they have deposited it, there are immense social pressures to maintain high repayment rates.
- Farmer associations can play an extremely important role as a facilitating and organizing institution for small credit schemes.
- Non-subsidized rates of interest are essential if schemes are to be sustainable. While such high interest rates are prohibitive for many, this is as it should be - initial projects ought to be limited to those with very high rates of return. If such projects cannot be identified, then there is a real question as to the advisability of promoting rural finance in such an area.
- Linkages with formal sector financial institutions are important if redeposits are to earn rates of return sufficient to support the small credit entities. Given the current high level of interest rates in the country, there is every reason to expect that depositors in rural areas should benefit from these rates, thus encouraging savings.
- Small credit schemes take time. Instant results cannot be expected to be sustainable and goals and indicators should reflect this.

Again, as noted above, Mozambique should be regarded as being in an initial phase of development of rural financial markets and further experimentation ought to be encouraged. Nevertheless, enough experience has been obtained to date to evaluate what has worked and what has not up to this point. What should be emphasized is that this experimentation is good and should continue - periodic evaluations will be useful since this area, unlike many others, has not been exhaustively studied in the Mozambican context, since experience is only recent.

The Importance of the Input Supply System for Smallholder Credit

Though (as noted above) the pre-independence system of *cantineiros* is unlikely to be resurrected, that history does have some useful lessons for the present. A key element of the old informal credit system was that it was based on the provision of inputs (seeds, implements, etc.) in return for a promise of output at the end of the season. This is a model that can be duplicated in some respects in the modern context.

In essence, rather than trying to create a third party (a bank or other credit institution) to finance a transaction between two other parties (an input supplier and a farmer) it may make more sense in some situations to promote extension of credit by input suppliers since they have an obvious profit motive in making the transaction and are more likely to do it voluntarily.

Indeed, this is precisely what happens in the instances where vertical integration is achieved through contract farming as is the case in, e.g. cotton or tobacco areas. Given the interest that the companies have in buying the output, they have a natural interest in seeing that the proper inputs are supplied and financed if necessary. Contract farming, assuming that farmers have the option to enter into the contracts or not, offers a reasonable way for farmers to get additional opportunities to produce cash crops.

Processors constitute another viable route for such schemes. Examples at the present include paprika and sesame, where provision of seeds is linked with downstream processing to create a production and marketing chain. One point is worth making in connection with the current examples of paprika and pigeon-pea, where marketing and processing is at the present dominated by a single firm. While all such markets must start with an initial firm, it will be important to diversify into other buyers as soon as possible, since monopsony markets have the potential for exploitation. Indeed, the price paid for paprika by the sole buyer has already dropped by 25%.

Seed Supply

Inputs such as seed or fertilizer for field crops such as maize or rice pose other problems since it will be more difficult to create the needed marketing arrangements given the smaller profit margins on these types of crops. There are numerous examples of failed government input supply schemes around the world. However, a case can be made that there are public good aspects to such inputs as disease resistant or higher yielding seeds and that some government assistance in dissemination in the initial stages could be useful.

Seed supply in particular is a problem in Mozambique due to the extensive recent history of free seed distribution as part of humanitarian and disaster relief efforts. This has resulted in a perception by many that seeds should not have to be paid for, while it has at the same time made it impossible for a private sector seed supply system to develop beyond a very rudimentary stage. Indeed, a recent study showed that 37% of the country's 138 administrative districts have no retail seed store at all.

Having a viable seed distribution system run by the private sector is the long term goal but some external assistance is likely to be needed to achieve what is needed over the short to medium term. This is particularly true given that much of the research results that can benefit smallholders is in fact embodied in improved seeds. Accordingly, there are several recommendations that can be made:

- Avoid free seed distributions as much as possible. At a minimum, a symbolic price should always be charged in the absence of major humanitarian disasters.
- Support development of additional national seed companies through guarantee funds for bank loans. Mozambique is not and cannot be expected to become the major profit center for the international seed companies currently operating in the country. While the privatization of the existing state owned companies was a step forward, it is not by itself sufficient to provide the country with adequate coverage. Accordingly, government guarantees for commercial loans to national seed companies could alleviate one of the main obstacles to their growth. Such guarantees would provide banks with an incentive to support such developments while at the same time avoiding direct subsidies to interest rates.
- Partnerships between various stakeholders should be encouraged wherever possible, particularly with smallholders themselves. This can be achieved through contracts for seed multiplication either with associations or with individual

farmers. Such associations are likely candidates for growth into small seed companies, something which is already happening and which should be encouraged.

Fundos do Fomento

The so-called Fundos do Fomento are often mentioned in connection with the issue of rural credit and finance. These funds have historically operated as separate accounts which have been disbursed at the discretion of the Minister of Agriculture, often in the form of grants or loans which are often not repaid.

When operated in this manner, these funds cannot be considered as positive contributions to the development of rural financial markets or even sustainable rural development in many cases. To the extent that politically connected farmers can obtain grants or loans which do not need to be repaid, these funds in fact undermine true development of financial markets. Accordingly, USAID should support efforts to transform the Fundo into a more positive force for development.

A minimal goal would be to eliminate the practice of calling disbursements from these funds “loans”. Given that repayment is rarely enforced, the payments really are grants and should be called that. Calling them loans merely reinforces the perception that loans need not be repaid, thus making the eventual development of a real rural financial system all the more difficult.

A transformed Fundo could operate as a form of social investment fund where investments in public capital could be made based on economic analysis of costs and benefits. Such quick disbursing expenditures could then be used to alleviate production bottlenecks or other important social needs.

II The Roles of the Public and Private Sectors and the NGO's

The historical reasons for USAID's reliance on NGO's as implementing agencies for its agricultural development efforts are obvious. When USAID launched its program in the early 1990's needs were so severe and the government's capacity so limited that there was really no choice in the matter. If any grass-roots effort at all was to be mounted, it would have to be done via external (i.e. non-governmental) organizations.

However, it has always been true that in Mozambique as in any other country, there are some activities which in an optimal world are best done by the government, others which are best done by the private sector, others which can best be accomplished by NGO's, and still others which are best done by some combination in partnership. While this "optimal" world was far from existing 15 years ago, the strengthening of MADER and other public institutions has led to a situation where it is appropriate to reevaluate the relative roles of the three different avenues for providing assistance.

In general terms, the public sector is best suited to those activities with a clear public-good component (such as, e.g. road construction), while the private sector is best suited to activities where private profit motives can operate in well functioning markets to produce desirable outcomes. NGO's work well in situations where there is no or insufficient profit motive but where governments are inappropriate or unable to act as a vehicle for change.

Now that PROAGRI has been successful in installing government capacity it is time for USAID to start relying more on these institutions where possible as implementing agencies. Obvious candidates for such a shift in emphasis are the research and extension functions of government. Here it must be noted at the outset that this does NOT imply that there is no role for NGO's in these activities. Rather, the point is that government will be able to gradually take over more functions directly, and in other areas will be capable of making the decision itself where NGO's will be more effective in achieving desired goals.

Nevertheless, it is still early to assume that MADER will be able to fully cope with the full spectrum of activities that are projected for the next project cycle. Partnership arrangements are still necessary for the government to gain the necessary experience while at the same time effectively implementing needed interventions at the present.

The continued reliance on NGO's should be in areas where it is not envisioned that a permanent institutional presence will be needed. For example,

an NGO that is engaged is something like creating a farmer association will of course cease to be needed at the point where the association becomes self sustaining. Given the importance of continuing the process of association building, and the undesirability for various reasons of having this done directly by the government, this is a clearly an area for continued NGO activity.

It is also likely that NGO's will continue to be active in extension given their comparative advantage in activities which require a direct contact with farmers at a grass roots level. In the short run a rapid elimination of NGO's from this service provision would result in a disastrous gap in what has been a successful effort to date. In the long run, the government envisages an ongoing role for NGO's on an outsourcing basis as a provider of extension services. A pilot program in two districts will be initiated shortly and is to be evaluated in three years for potential expansion to other districts and modification on the basis of lessons learned. It would certainly be premature to end direct funding of NGO's for these services prior to the conclusion of the government's decision process on how to engage with NGO's in this area on an ongoing basis.

This pilot program has the potential to have a significant influence on future government/NGO relations in a situation where all or most support is channeled through the government budget mechanism. It is envisioned that NGO's will absorb current extensionists in the affected districts but it is yet to be resolved how exactly NGO employees will relate to those in government in terms of pay, housing, etc. The government will retain a presence in these districts for monitoring purposes, as well as other government functions apart from extension.

On the other hand, some functions, such as basic crop research, represent a permanent ongoing need and accordingly are best institutionalized in a government entity. This is particularly true in the case of smallholder oriented research since at the present low level of income there is no realistic prospect that smallholders can pay for the optimal level of research themselves. This does not mean that NGO's or the private sector will not perform some of these functions in the short term, or in the long term on a case by case basis in outsourcing arrangements, but it is important to bear in mind long run needs when making short run decisions on the appropriate vehicle for different needed services.

In terms of input supply, the situation is less clear. As discussed above, the long run goal is a private sector run input supply system but it is likely that development of these systems may require some assistance if they are to get off the ground in the short or medium term. Credit, as discussed above, is an area where direct government involvement in lending has a long and dismal history around the world. Facilitation of village level savings and loans and other small or

micro-credit institutions is worth pursuing. National level agricultural development banks are unlikely to prove any more sustainable in Mozambique than they have in other parts of the world.

Seed production and distribution, as discussed above, may well merit some assistance in terms of small scale localized seed companies, and certainly multiplication of research derived seeds for new varieties can be done on a contract basis, effectively privatizing the production at the smallholder level. One of the most important roles for government in this area is to stay out of free distribution since continuation of this will undermine any possible private sector development.

Fertilizers and other agrochemicals are another area where international experience does not support direct government intervention. At the present time this market is largely left to companies engaged in contract farming. Direct provision of fertilizers to smallholders cannot be recommended, though farmer associations provide a viable mechanism for purchase in cases where it is cost effective.

The following section discusses the role of U.S. PVO's and NGO's in greater detail, and is followed by a section discussing the role of the public sector.

The Evolving Role of PVO's and NGO's

For the most part, PVOs and NGOs have been heavily involved in direct service delivery to smallholders and the rural population in general. This began during the war years in the late 1980s and early 1990s, primarily through implementation of emergency relief programs, with activities such as emergency food distributions, distribution of seeds and tools to returning refugees (“ag paks” and “veg paks”), animal restocking (goats), health services, supplemental feeding/child survival, and school reconstruction. As the war ended, these programs were phased out, and the installed capacity of the PVOs shifted toward transitional and developmental types of activities during the mid-1990s, culminating in the approval by the Mission and the Office of Food for Peace of six Development Assistance Programs (DAPs) that ran from 1997 to 2001, with total resources allocated of USD\$112.9 million. Around that time, USAID/Mozambique decided to focus its assistance to Mozambique geographically in provinces of higher agricultural production potential, primarily Nampula and Zambezia and secondarily in Manica and Sofala. Services shifted toward :

- Agricultural research and extension, primarily targeted toward increasing productivity of food crops such as maize, beans and cassava, as well as some oilseeds (sunflower). Research focussed primarily on testing of new varieties provided by the IARCs on research stations and farmers' fields, and extension services in terms of field advice on cultural practices and demonstrations of new varieties compared to traditional varieties;
- Rehabilitation of rural farm-to-market secondary and tertiary roads using labor-based techniques to maximize local labor input. The work was managed directly by PVOs (primarily World Vision) initially, gradually developing and incorporating small scale road contractors ("empreiteiros") which were trained and managed by the PVOs;
- Small-scale food processing, primarily distribution/sale of presses for cooking oil, hammer mills for maize transformation, demonstration of cashew decorticators, etc. Most of the machinery was procured locally or regionally, and remaining stocks turned over to agribusinesses such as Agro Alfa for sale to farmers on consignment.
- Development of producer associations, both as targets for extension services as well as for assembling and commercializing produce, primarily food crops such as maize.
- Micro-finance activities, including small-scale lending primarily to non-agricultural activities such as buying and selling;
- Nutrition and child survival health activities, including introduction of new crops ("orange flesh sweet potato"), infant vaccination programs, HIV/AIDS awareness, etc.

The PVO's have continued some of these activities under the Development Activities Programs begun in 2002 and running through 2006. There seems to be a gradual evolution in approach, with relatively greater emphasis on facilitating access to existing and new markets for higher value cash crops. Some examples include:

- Paprika. A firm called Cheetah with plants in Malawi and Zambia has entered Mozambique, opened an office in Nampula, and is purchasing farmer-graded and dried paprika at approximately M18,000 per kilo in parts of Nampula and Zambezia provinces. Farmers seem pleased with the income from paprika and are anxious to plant more. PVOs have provided seed to farmer groups, as well as extension services on growing, drying and grading of paprika.

- Pigeon pea/Dal. A dal factory is being built in Gurue by an Indian investor, which will purchase pigeon peas from smallholders, thus providing another cash source for surrounding farmers. Pigeon pea is a traditional smallholder crop, but apparently dal requires a white pigeon pea variety.
- Small-scale cashew processing. Through initial purchases and demonstrations, PVOs have helped stimulate an emerging small scale processing industry, using simple machines made in India to split the cashew nut and facilitate the transformation of raw cashew nuts.
- Improved nutrition. Introduction of Orange Flesh Sweet Potato to replace or complement local white variety as vitamin A nutritional supplement.

There are also some new product production and marketing ideas “in the pipeline”, including black pepper (on lands that Madal has ceded to smallholders in Lugela), vanilla in the same area, fruit processing (drying, juice) using locally grown tropical fruits like papaya, mango and pineapple.

- **Should the programs be continued?**

GOM programs such as PROAGRI have focussed on system building at the center, and service provision at the provincial and district levels continues to be weak. PVO programs should continue, but they should evolve and change in order to facilitate Mozambique’s continuing transition to a market economy. Currently, most PVOs are primarily development service providers, providing essential assistance to small holders in terms of extension, promotion of alternative crops, formation of marketing associations, etc. Increasingly, they should be involved in capacity building, working toward the eventual “hand off” of most of the activities to the Mozambican public and private sectors as donor funding levels decline.

- **How to make the programs more effective**

PVO’s should be encouraged to transition their activities so that they become **development facilitators** rather than direct service providers. One potentially appropriate model would be expansion to other sectors of the road contractor development approach (*empreiteiros*), whereby PVOs (primarily World Vision) encourage the establishment of road contracting businesses and get them to perform the road services. PVOs provide some initial startup capital, identify roads to be rehabilitated (in coordination with GOM priorities), develop terms of reference for the work, let, fund (through monetization) and supervise the

contracts. For example, PVOs could encourage (or even require) their extensionists to form private ag consulting businesses, that could then provide services under the existing DAPs, and compete for GOM PROAGRI outsourcing contracts should the GOM chose to go in that direction in funding its rural ag extension activities. Other examples of current and facilitation type activities are highlighted in the following table.

Evolving PVO roles – Service Provision → Facilitation	
2002	2004-2010
Ag Extension – direct implementation with own staff	<ul style="list-style-type: none"> • Build capacity of GOM extensionists through collaborative implementation, inclusion in capacity building events. • Encourage (force?) PVO extension staff to form own businesses, under contract to the PVO and/or GOM.
On Station Research – limited involvement, limited to testing of alternative food crop varieties from IARCs, some rehabilitation of infrastructure (Sussundenga)	<ul style="list-style-type: none"> • Exit from this type of work, as INIA gets organized and funded under PROAGRI. • Provide orientation to incoming INIA staff on results/progress to date • Contract with INIA for targeted research useful to their programs
On Farm Research/Demonstrations – PVO staff	<ul style="list-style-type: none"> • Same approach as extension • Ensure strong forwards and backwards linkages with emerging INIA research system
Road Rehabilitation/ Maintenance – own staff plus contractor development program	<ul style="list-style-type: none"> • Move toward 100% contracting • Provide business development guidance to empreiteiros, particularly how to respond to RFPs (technical and pricing). • Continue to fund road rehab from monetization proceeds if appropriate. • Link empreiteiros to GOM contractors for possible subcontracting work.
Microfinance – use own staff, mostly non ag lending	<ul style="list-style-type: none"> • Develop local NGOs, working with commercial banks to gradually take over sustainable lending activities. • Encourage portfolio diversification toward greater provision of ag credit for inputs.
Market linkages – use own staff, tends to be opportunistic/notional rather than analytical (TechnoServe may be an exception)	<ul style="list-style-type: none"> • Conduct alternative product market assessments (USAID to contract?) • Continue to organize small holder groups

	<p>to assemble and process (sun dry and bag) produce</p> <ul style="list-style-type: none"> • Help establish linkages to new/existing agribusinesses to produce purchase and outgrowing agreements •
<p>Agribusiness Development – use staff to help establish contacts, subsidize startups via extension/demonstration services, seed/input supply, organization of farmer marketing/processing groups</p>	<ul style="list-style-type: none"> • Continue to facilitate and expand small holder linkages to agribusiness • USAID should contract for business development services – an agribusiness development incubator, for example. • Encourage formation of rural ag processing businesses (e.g. fruit sun drying) • Facilitate access to other value adding sources, such rudimentary processing activities

• Funding Options for PVO Involvement in Extension, On - Farm Trials, Demonstrations and Road Rehabilitation Activities

USAID/Mozambique Development Assistance (DA) funds complement PL480 Title II funding at the rate of about 1 to 3.3 (or 1 to 4.5 if the value of the commodities is used instead of monetization proceeds), and the Title II program significantly increases overall resources available to fund food security interventions in Mozambique.

Other things being equal (which they are not), Mission funding of PVO’s could decline, but such a decline would mean smaller programs in general particularly in light of emerging OMB rules that require delivery of PL480 food assistance as food per se versus food for monetization, with proceeds used to fund PVO development programs. A brief discussion of some specific issues follows:

- Mozambique is largely self-sufficient in food production and a net exporter of some staple crops such as maize. Therefore, food aid has the potential for negatively impacting local markets, causing price declines, and thereby lessening incentives for agricultural production. It also continues the negative cycle of dependency, which Mozambique has been transitioning out of during the past several years since the emergency.
- Mozambique’s current PL480 Title II program is 100% monetization, which has the advantage of maximizing cash resources available for program implementation, while minimizing potential destimulating effects of food distributions which could shrink the market for locally produced food. It is understood that OMB will require food aid

allocations to Mozambique to contain increasing percentages of food delivered as food for distribution, with declining amounts of food available for monetization.

- Malnutrition exists in Mozambique, but is less related to inadequacy of food access than to poor utilization caused by poor sanitary conditions and related diseases with symptoms of diarrhea leading to poor absorption of available nutrients. Therefore, increasing food availability will not necessarily solve malnutrition problems and food aid would essentially be wasted.

In order to mitigate the negative impact of this decision, the Mission should consider some or all of the following options:

- Continue to dialog with OMB and USAID/W to press for maximum amounts of food assistance coming through monetization rather than direct distribution, for the reasons cited above.
- Suggest to OMB and the Office of Food for Peace that the percentages of each type of food assistance be evaluated on a regional or sub-regional basis rather than a country by country basis.
- Program direct food assistance coming to Mozambique for localized emergencies such as droughts, floods and insect attacks.
- Evidence from research in Kenya indicates that HIV/AIDS will have a strong negative impact on rural incomes, particularly for those households that lose the male head to the disease.

A recent study in Mozambique completed in November of 2002 (Rose et. al. 2002) looked directly at the question of food aid monetization. It reaches a strong conclusion that it would be a mistake to engage in direct food aid distribution at this point. The report states that such a move would “sabotage” the progress of the past five years in weaning farm households off emergency aid, developing non-dependent relationships between farmers and PVO’s, increasing local production of food and cash crops, and facilitating market development. The report cites numerous interventions that could improve nutrition, many of which could be supported by USAID.

Refocusing PROAGRI Directly on the Countryside through Research and Extension

Conversations with donors, government officials and others indicated that PROAGRI has enjoyed a great deal of success in transforming and improving the government structures related to agriculture even though it must be acknowledged that progress to date has been less than what was foreseen at the inception of the project. This fact is largely due to the lack of recognition of just how far MADER and associated institutions had to go 4 years ago in order to be in a position to start making a difference on the ground in rural areas. Even so, perceptions at the district level are that PROAGRI has yet to make a large difference. While the process of formulating PAAO's has clearly involved local staff to a greater degree, and some additional resources in the form of cars, motorcycles and other items are evident, there has as yet not been any major change in how local ministry representatives operate.

At this point, the success in increasing the capacity at the level of the central ministry is very clear and perhaps even more important is the sense of ownership felt by the national leadership in the sector. Perceptions that PROAGRI is a donor driven project are reduced compared to a few years ago, and the fact that the extremely diverse hodgepodge of donor interventions of the past decade have been supplanted with a unified vision of the way forward is an achievement whose magnitude should not be underestimated.

However, it is also clear that if the overarching strategic objective of increasing rural incomes is to be realized, PROAGRI must, in its second phase, clearly move beyond the somewhat inward focused efforts of self transformation that characterized the first phase and move the center of gravity of its efforts out into rural areas. This means an increased emphasis on research and extension to directly affect the client populations. Only if useful change is actually effected in the countryside will the first phase of PROAGRI have been worth the expenditure, and this requires that adequate research and the extension to communicate it be done.

Up to this point, an insufficient share of donor money has gone to research, though NGO's have been the vehicle for a substantial amount of extension. It is important to be very clear about this point: Simply creating an efficient ministry is only half the battle. We must then ask the question of what the ministry is to do with its newly created capacity. The answer has to be to effect productivity improvements at the farm level. Only by doing this can incomes and welfare be increased and this can only be done if the research into what technological changes are appropriate is performed.

It should be noted that this need for more research has been noted by various observers both within the government and the donor community. In

addition to this consultancy, which is unanimous in this view, other observers such as Prof. Eicher of MSU and the EU's Food Security Unit also concur. An EU technical paper is typical of such statements in its conclusions saying "Significant investments in research and extension are necessary"¹

It must further be recognized that it is the government that must be expected to play the most important role in making sure that this is done. Research and extension for smallholders have strong public good characteristics which means that if the government does not do it, it will not get done.

It must be recognized that such an emphasis involves a long term commitment on the order of decades and not years. However, it is also the case that though the returns are long term in nature, they are also huge in terms of financial rates of return available on any alternative investments. Internal rates of return of 30-60% or higher have been documented on research and extension efforts in other high and middle income countries which have a natural resource base amenable to agricultural growth and intensification, and there is every reason to think that Mozambique too can achieve this kind of success.

Research and Extension

There is no question that sustained growth of an agricultural economy such as Mozambique's requires a vigorous and sustained effort to develop its research and extension capabilities. In doing so, there are several considerations that it is important for donors to bear in mind:

- Rates of return on research and associated extension are typically very high. A recent study estimated that improved yields of as little as 25-35% in maize and cassava could generate almost **\$210 million per year** in additional output for smallholders.² There are few other investments which can compare with the size of these benefits or the rate of return on the initial outlays needed to achieve them.
- Gestation periods for these returns are on the order of decades, not years. This implies that results may take longer to appear than a single project cycle, making it imperative to carefully choose intermediate results that are feasible and measurable rather than giving up before the goal is attained.
- Many research topics and outputs have a clear public good component, particularly in the Mozambican context, meaning that government must maintain a strong role in funding and promoting research and extension

- The current national research network, headed by INIA, is itself in need of reform and modernization. While useful plans have been formulated, they have yet to be fully implemented. Until they are, research will remain unproductive and unresponsive.

- Extension services are an inseparable component of a successful strategy. Without it, research is for naught. While an eclectic approach to outsourcing and NGO participation is appropriate, it is vital to maintain and expand the government's efforts in this area as well.

The following sections discuss needs in the areas of research and extension in greater detail.

Research

That increased effort on research is necessary is shown by the repeated comments from many that “extensionists lack new messages”. Indeed, if extensionists are to have an impact, and are to maintain the respect and confidence of client populations, they must be able to help provide solutions to problems that farmers have identified as important to them. Studies have shown that internal rates of return to agricultural research range from 20-60%.³ Given the existence of many crop varieties already available, the issue for Mozambican agricultural research in the short run is two-fold: determining what are the most important constraints facing Mozambican producers, and secondly, screening available varieties for those that can be most readily adapted for local needs.

INIA remains a research station based entity organized along crop lines. Available resources are spread far more thinly than can be justified by the results that are obtained. Serious attention should be paid to directing research to areas with directly applicable results in the field which can be readily achieved within a relatively short time.

In addition, it must be recognized that research in the southern zone of the country makes far less sense from the point of view of linking with extension and farmers than would locating a principal station in the most important agricultural zones. While there is a plan to create a network of stations in each important agroclimatic zone, it is important to proceed at a pace which allows a critical mass of both personnel and funding at each station rather than trying to achieve too much and not reaching that critical level anywhere. This might imply establishing new stations one at a time, particularly since staffing is and will remain a problem given the very slow pace of training that has occurred to date. A reasonable

approach would be to build one zonal center at a time, starting in the most important agricultural zone in the north.

There was little enthusiasm among the research institutes visited for the new Council for Agricultural Research (CTIA) which has been created to unify the various research efforts of the four existing institutes (INIA, IPA, INIV, and CEF). Whether this is because of a general lack of understanding of the purpose of CTIA or because of a general resistance to any reduction of institutional independence was not clear. However, it was felt that while there is an important role for CTIA, it is in need of some clarification and redefinition.

Rather than simply merging the existing institutes into one (which is the current understanding of the CTIA) it would make more sense to operate the new overarching entity as a regulatory and policy setting body able to allocate resources and set research goals. Accordingly, it would make sense to have the CTIA include representation from not only the four institutes named above, but also from other important stakeholders receiving government resources including the Faculty of Agronomy and Forest Engineering at the University, as well as the research efforts under INCAJU and the Instituto de Algodao. Representation from the private sector, especially seed companies, would also be important, as would the inclusion of representatives from agricultural extension.

Thus, rather than running research directly, the CTIA would analyze competing research proposals, set priorities, allocate funding, and oversee rules for release and dissemination of varieties. Though it was not possible to find direct evidence on the relative importance (as shown by funding levels) of the current research efforts, it was clear that there was nobody in charge of developing such an overall vision. It seems that there is an emphasis on crop research at INIA over the other institutes, but what is obvious is that this question needs to be addressed at a level capable of influencing the resource allocation decisions that would flow from it.

While it is not the purpose of this paper to pick research areas, there are several general comments that can be made. First, is that research into high value areas implies that a large share of research be devoted to cash crops, including those food crops such as maize which are themselves also cash crops. There are clearly many cases where off-the-shelf technologies or varieties from abroad can be readily adapted to Mozambican conditions. These targets of opportunity should be promoted and encouraged wherever possible. Existing studies of potential returns from research should be used for guidance and updated or supplemented where needed.

A second observation is that the cash crops which most need government research are those which are primarily smallholder crops and where there is no private sector incentive to engage in the needed investigation. Crops which fit this description are both food crops such as maize, rice and cassava, and crops such as cashew, sesame and paprika, though these last might well be candidates for a partnership in research and extension between public and private sectors. Crops where there is less imperative for government activity are purely commercial crops such as sugar or tea or where there will be little or no smallholder production, at least for the foreseeable future. Cotton is a crop where research needs are high but where the involvement of private sector operators together with uncertain returns makes it less than a top priority for the government.

A third observation is that the current underdevelopment of seed markets together with traditional cultivation practices often makes open-pollinated varieties a more attractive option for smallholders than hybrids. This means that, given the relative difficulty for the private sector to recoup investment costs from development of such varieties there is a clear and necessary role for government investment. This also implies that the role of the government may not necessarily extend beyond varietal development, depending upon the public good properties of the seed in question. As discussed in Jaffee and Srivastava 1992, and in M. Morris ed. 1998, the private sector cannot be expected to actively engage in production where benefits accrue to a broad audience and cannot be recouped by any individual or company. This characteristic often applies to breeding and research, but is much less often true of multiplication or marketing & distribution. Government support, where necessary, can be effectively provided through such mechanisms as joint ventures. In this way, the benefits of quality control and marketing support can be provided where needed without sacrificing the financial discipline which the private sector can provide. Nevertheless, it is still the case that many farmers in Mozambique will continue to rely on more informal sources and that permitting and encouraging these will be important.

What Type of Technological Change?

Increasing Cultivated Land

Extensive growth is obviously attractive when a large percentage of arable land lies unused in the most productive areas. Simply put, there is a limit to how much land a family farmer can be expected to till using hand tools such as hoes. The HIV/AIDS epidemic makes the need for land-using/labor-saving technological change all the more imperative. It is highly likely that Mozambique has yet to see the worst of the AIDS crisis in rural areas. This means that labor shortages of prime working age people are likely to grow more severe in the years to come.

Mechanization projects promoting tractors in areas currently using hand-hoe technology are unlikely to prove any more effective in Mozambique than they have in the past in other countries, suggesting that investigation into animal traction has the potential for high returns. Here, there are two potential avenues:

First, a study of where bovines can be used in the central and northern areas of the country without suffering from problems of tsetse infestations is a much needed prerequisite. Contrary to popular belief, there are many small areas scattered through the country where tsetse is not a major problem - knowledge of where these are would be very valuable. Second, research into the potential for other species, particularly equines, could also help. In fact, there is a history of donkey and mule use in Mozambique prior to independence, so there is clearly potential in this area, especially for transport purposes.

However, it is important to note that development of animal traction will necessarily be a long term project. In the South, where cattle production has long been an integral part of the farm economy and rural society in general there is much less potential for increased crop production due to inferior fertility and rainfall. In the Center and North where such potential does exist, there is no tradition or culture of keeping large animals. Developing this will not only take time, but will also require sustained efforts at extension.

One possible avenue for mechanization is the use of small mechanical tillers which can substantially increase cultivated area per household. This technology is readily available from Latin America and Asia and is far more accessible than even the smallest tractors. Nevertheless, it is unlikely that most smallholders will be able to afford this technology in the near future.

New Crop Varieties

There are clear opportunities for beneficial change through the introduction of new varieties of crops which fall into one of two categories:

- Disease resistant varieties

- Higher yielding varieties

There are some very serious disease problems in several important crop plants that can be effectively addressed through breeding/selecting for resistance to the pathogens involved. In many cases there are resistant varieties available

either locally or internationally and the task for research is to come up with a locally adapted version that is suitable for distribution to smallholders.

Fortunately, this is not a complicated or even an extremely time consuming task. The methods are well known and results can reasonably be expected in at least some cases within a few years. The task for the government is to focus the research and extension resources it has on these problems to rapidly achieve the needed results.

Some examples will help to clarify this problem. One of the most important smallholder crops is cassava, and currently there is a major problem both with cassava mosaic virus and with brown streak disease, which have the potential to reduce yields by 50% or more according to field reports. This mission saw examples of plants which were resistant to one or the other of these diseases. Incorporation of resistance to two diseases into a single variety is a relatively straightforward exercise that can and should be pursued immediately.

Another example is the problem of *oidium* resistance in cashews. While there is probably more work needed to identify the best sources of resistance in the species, it is clear that this is an area deserving of major efforts. The field trials we saw could clearly benefit from additional resources and expertise.

Higher yielding and/or early maturing varieties of commonly grown smallholder crops also have considerable potential to increase smallholder incomes. Given Mozambique's low yields even compared with its neighboring countries, there is obviously room for improvement. The success of such varieties as Matuba maize demonstrates that new varieties that are suited to local conditions can be successfully developed and disseminated. It is clear that this is a direction for research with considerable untapped potential.

Intensification and Fertilizer Use

In most of Mozambique much of the value added in smallholder agriculture comes from production technologies where the only other major input apart from labor is the hoe (enxada) and billhook (catana).⁴ Fertilizer use per hectare is lower in Africa than in any other area of the world, (Average African application rates are below average world levels by a factor of approximately 4.) and this is especially true in Mozambique.⁵ This disparity is even more striking in the case of maize, Mozambique's most important staple grain, where average fertilizer use in Africa is less than one eighth that of developing countries as a whole.⁶

Available evidence from Mozambique shows that fertilizer use here is low even by African standards. Only 7% of all farming households use fertilizers at all, though as expected, this type of technological intensification is more prevalent in the more densely populated central provinces. According to surveys, land tenure has no correlation with fertilizer use, but use is greater among households with land holdings of more than three hectares.⁷

This means that there is likely to be potential for increasing outputs through increased fertilizer use and while the point at which this becomes economically attractive for smallholders may be some time off in the future, it is likely to occur in the relatively near future in areas where population growth is creating pressures for intensification, as is the case in the South and in peri-urban zones. Eventually it will be true throughout the country. In fact, one recent study suggests that 50-75% of the maize yield increases in developing countries outside of Africa from the mid 1960's to the 1980's can be attributed to fertilizer use.⁸ That such a strategy could be viable in Mozambique is supported by the fact that in three of Mozambique's neighboring countries, Malawi, Zambia, and Zimbabwe, half or more of the maize area was fertilized in 1990.⁹ Maize yields in Mozambique averaged 0.5 T/ha. (1991-95) which is half or less of those in these three neighboring countries¹⁰

Nevertheless, there are several problems with increasing fertilizer use in Mozambique at the present time. Among these is the fact that fertilizer represents the largest cash outlay for those who use it. This is a prohibitive problem for many smallholders, who can only use purchased inputs if rural traders are willing to extend credit. Also, the unreliability of rainfall in some areas makes a risk increasing input such as fertilizer less attractive to smallholders. Finally, fertilizer is bulky, and both transport and storage costs are high.

Fertilizers are more likely to be cost effective on horticultural crops at the present time; indeed, examples of this can be found in some areas. In the long run field crops such as maize, which can be very responsive to fertilizer application, are also likely to provide additional demand. However, fertilizer use cannot be widely promoted until research into appropriate practices for Mozambican conditions and crop varieties is performed.

Intensification of cultivation is an inevitable concomitant of agriculture development. Fertilizer in particular, though little used by smallholders now, will become increasingly important, especially in areas where natural fertility is low and in danger of depletion. Given the potential irreversibilities inherent in ignoring this problem, and the long run environmental damage that could potentially result, this is an area which requires attention.

Pan-national fertilizer recommendations are of little use, and are particularly unhelpful in as large a country as Mozambique where both agroclimatic conditions and staple crops vary so widely. Research into the economic and agronomic desirability of commonly available commercial formulations under different conditions is both important and straightforward work for researchers. It should be noted that it is much less desirable to try to “optimize” recommendations in agronomic terms when it is obvious that questions such as ready availability of recommended formulations can have an important impact on cost. In addition, considerations of economic factors such as risk/return characteristics of recommendations are also important.

Extension

Since the late 80’s (with the Economic Recovery Program of Mozambique) the Government of Mozambique in partnership with different donors has devoted considerable effort to building and consolidating agricultural extension services. It is not possible at this point to establish in quantitative terms the role that the extension services played in the improvement of agricultural output. Regardless of that role it is perceived that the technology transfer process needs to take the next step because soon or later (if not now) it needs to be more sophisticated and more sustainable. In the course of our work, different stakeholders underlined that fact that within the relatively limited areas of coverage that each extension organization services, they had exhausted the messages that had to be delivered to the farmers such as use of better varieties, reduced tillage,¹¹ planting and spacing, harvesting, etc. Similarly, the extension institutional framework and its linkage to research are indicated as the points that need to be addressed. The next sections discuss a framework that could lead to the improvement of technology transfer and potential directions for the scope and orientation of USAID strategy as related to the extension services.

Long Term Vision and Objective for Extension Services

The extension services are institutionally new in Mozambique. Until 1982, the agricultural policy and strategy of Mozambique was based on development of modern state farms, and all agricultural services such as research, credit, marketing and transfer of technology were geared towards the commodity oriented large farms. Only after 1982 when the government initiated a shift from a

centrally planned economy to a more market oriented economy, small farmers were considered the backbone of agricultural development in Mozambique. With that shift, the extension services were created under the classic Training & Visit (T & V) approach. Along the way it is perceived that the high recurrent costs of existing services lead to unsustainable activities and staffing levels. In the context of budgetary constraint, this leads to a high dependency on donor assistance. This situation contributed greatly to the collapse of extension services in many other countries. In the wake of the globalization of world economy and the challenges posed by the New Economic Partnership for Africa (NEPAD) it becomes a condition that the effectiveness and efficiency of extension services will take place only when it is built under the framework of the market forces. **Therefore it is proposed that the long term challenge of USAID support in agricultural development in Mozambique be oriented by the building blocks that will strongly consider a shift from a supply driven extension system to a one that is demand led without neglecting the need to alleviate poverty.**

In this way, increasingly, the benefits that accrue to individual farmers from extension advice will have to be paid for, just like any other input. This essentially means that extension moves towards a commercial, cost recovery activity that is more responsive to client need. Government services remain free in two areas namely public interest issues, such as environmental protection, as a safety net for those farm families that can not afford any contribution to cost recovery. Public sector actors will be faced with new roles and skill requirements. There will be less emphasis on technical expertise and more on diagnostic skills to respond to farmer defined problems. There will be less emphasis on subsidy or input and more emphasis on bringing groups together for joint learning. Local control will increasingly be available over budget allocation although it is likely that the budgets themselves will be significantly smaller in size.

In this context the establishment of sound public and private partnership (PPP) as well as community-public and private partnership (CPPP) foundations seems to be the goal to be pursued.

The achievement of that goal seems not to be so difficult although it poses exciting challenges. The USAID Program in Mozambique already includes Agribusiness in its scope and linking this with food security points to a way forward. One way to establish that linkage is the vertical integration of agricultural industries where the anchor industry could constitute a gateway to address some of the post-harvest management issues that include access to storage, transport, processing and market. The link between farming and processing will also determine the market demand and provide the farmers with the knowledge of incorporating technology that stimulates that market, hence driving the extension

services. However, considering that private investment in agro-industry is at very early stage of development, Non-Governmental Organizations (NGO) can fill that gap by promoting an extension service that is oriented to transform subsistence farming activities into one that brings in economies of scale. The role of NGO's in this process is discussed ahead on the institutional framework section.

2 Scope

Linkage between Research and Extension

International competitiveness is associated with the ability of technological innovation what implies the need to continuously combine the technological opportunities with the market needs. In this process, market and technology stimulate each other. Thus extension services have to be strongly linked to research. There is been much debate regarding these linkages with little success at field level, because that debate has been almost exclusively concerned with institutional arrangements. The foundations for an effective linkage between the two should start at the field level with more practical work and less talking. This can be achieved by consistently establishing on-farm trials that are in accordance with research methodologies and programs defined by research organizations. There is need to define an extension service which will work with the multiple ecologies, frequently on marginal or poorly watered lands, in multicropping systems. As such it is necessary that local experiments be conducted with an emphasis on ecology and biophysical synthesis, not just environmental potential. It is also necessary that experiments be designed to reflect multicropping systems that have simultaneous demands on production and ecological system. This does not demand that the analytics of agronomy are abandoned but that new ways are found, through real field experiment, to address issues of soil acidity, water stress, evapotranspiration, organic matter and issues of sound environmental management. At field level and experimental ground each extension network can simultaneously be a research agent and each research technician can be an extension agent without too much complicated institutional arrangements.

Some specific considerations for linkage of research and extension are:

- The leadership of the research establishment should be directed toward applied research focused on solving current problems identified at the farm level. Indeed, not only are current problems not prioritized, but they are not evaluated in terms of economic return in a way which then results in an allocation of funds that is related to this evaluation. This is not a recommendation for replacement of the leadership of, e.g. INIA, but rather is a call for empowerment of the higher

research council (CTIA) under appropriate leadership to make such allocative decisions.

- Explicit funding of linkages is key. Currently, there is no allowance in the separate institutional budgets for the meetings and other activities which would embody the needed linkages. It is most important to do this at a decentralized level (district/provincial) and not only at the central level.

- Tying research incentives to successful solution of problems such as release of new varieties is important. Such incentives can be monetary but also can include other types of recognition as well.

- In the long run, it may be necessary to make research and extension part of a single entity which can effectively ensure the needed linkages. In the short run, inclusion of extension representation in the CTIA is important.

Methodology for Extension

The Training and Visit (T & V) methodology under use today is a very much top down approach (Researcher-Extension Agent and Farmer) and assumes that there are shelved technological packages developed by the research services. The work of the extension agents is simplified to be that of delivering the existing technological packages or technologies developed by the research station. This assumption proved not to be true because the research services have been designed to concentrate their attention on commodity approach, and the extension agents are poorly trained to be able to retrieve the generated technologies and adopt them to farmers' conditions.

If considering that small farmers are at subsistence level and that risk management constitutes the central concern of decision-making, the T & V methodology alone is deprived of sustainability and security for farmers and it is likely to bring no changes on farmers' management attitudes.

The emphasis on horizontal diffusion of technology can add more steam to the process. It brings efforts to the creation of farmer-to farmer extension in which individual farmers are more important than agricultural extension workers for driving across the message. Farmer- to -farmer networks can be of value for a number of reasons such as:

- Farmers involved speak the same language;

- Relevance since farmers share the same constraints and potentials rather than the frequently non-farming background of the professional extension agents
- Availability as farmer extension agents live in the same local area:
- Accountability because farmer extension agents only recommend what they have successfully undertaken themselves.

To move towards a farmer-to farmer extension service requires asking a number of specific questions. Although we do not attempt to answer these questions in this paper, they can serve to guide debate on the requirements of such a process in Mozambique. These questions include:

- What is the role of the farmer–extension agents in relation to the community they serve and to other agriculturally focused organizations? What is the role of a gendered extension service? Should there be a role for specialization in this system?
- How should farmer–extension agents be selected and what remuneration should be available to them?
- What proportion of time should each farmer-extensions allocate to extension work as opposed to working their own farm as a model farm?

These questions can only be addressed during the process of extension development.

Farmer-to farmer extension programs are essentially field based, applied science programs. They begin by defining a diagnostic problem in a specific site setting including the identification of key farmers. Workshops are held to define the problem and to identify what extension support is needed to design local experiments to address potential solutions that could raise productivity. Experiments are then undertaken simultaneously in real world conditions allowing farmers to share results and come to their own conclusion about models of good practice.

Institutional Framework for Extension

Insufficient attention is paid to institution building, not least because the traditional time frame of externally funded projects has not matched that required for sustainable capacity development in Mozambique. Such projects rarely last more than three years and, even if they do, changes in government and donor

personnel, as well as policy, frequently means that capacity development is not high on the action agenda even if all partners pay lip service to it. This is one area where PROAGRI has improved the situation substantially given its institutionalization of a much longer time frame for project assistance.

Public sector investment must recognize that uniform, public sector administration is not the most appropriate or cost effective framework to provide a flexible service tailored to the different categories of farmer and the range of agro-ecological zones. The high recurrent costs associated with national extension practice can only be controlled if a decentralized system is put in place. Fortunately, new technology allows decentralized approach to be mounted fairly easily. A decentralized approach should at least consider (i) coordination mechanisms, (ii) an open extension system, and more emphasis on horizontal diffusion of technology as opposed to the actual vertical system.

Coordination of a Decentralized Extension System

At present, the DNER is engaged in a decentralization of spending authority from the center to the provincial level. While this is a major step forward, there remains the tasks both of empowering the levels below the provincial directorates but more importantly of decentralizing the actual information flows and extension methodology. A decentralized extension system requires a more sophisticated coordination approach and an efficient flow of information. This can be achieved if the whole extension approach in Mozambique is built under a national extension system that would consider the conceptual framework, extension methodologies, organization and management, linkages between research and extension, criteria for designing the extension network, basic principles for professionalization of extension agents and criteria for a national coverage. Besides the ease of coordination, an extension system holds the following advantages:

- Easy management and monitoring of a decentralized process;
- The technology adaptation process prioritizes local realities, with guaranteed continuity towards professionalisation of the services;
- Faster feed-back in relation to local needs and development of long term perspectives; and
- Easier decision making process.

Open System

A few years ago the Ministry of Agriculture assisted by the World Bank developed good ideas that would lead to an open extension system that was named SISNE. We could not locate the original SISNE document, but at that time the main arguments of SISNE were as follows: “An open extension system will allow the intervention of the private sector and non-governmental organizations and a shift from an extension system based on a supply mechanism to a more demand driven process.

An open extension system shall be structured in such a way that has a functional information management system that can be able to retrieve and use hidden technology as well as accommodate experiments developed elsewhere. The system shall also be based in a steady growing national capacity as opposed to actual dependency on external assistance through Donors and Non-Governmental Organizations”.

The Role of NGOs in Extension

Building the national capacity and a critical mass that will lead the agricultural development process is of paramount importance. No matter what are the strategies and goals for that development, if there is no a serious commitment in developing national human capital, the development process is condemned to fail. Although NGO’s have been playing a critical role as the extension delivery mechanism, they are also blamed for eroding the national capacity. NGO’s constantly and consistently absorb most of the research and extension staff that have been trained by public funds mostly through donor support. This is only possible because NGO’s can afford to pay better salaries than the Government and can provide a better working environment. This should not be considered a problem as long as that staff had continuity in providing extensions services after the NGO project terminates.

We reason that this process can be reversed by putting together a strategy that seeks the continuation of the NGO role in the provision of the extension services that is centered in capacity building. This process should be oriented by the following principles:

- a) The use of NGO’s in extension services should be limited where the public service is providing adequate coverage at this stage and/or as indicated above in areas defined as of public interest such as environmental protection. Otherwise, a continuation of some form of the public/private partnership that is the current model is best, with use of NGO’s on a contract basis where no government network is

possible, and use of the government alone in cases (such as environmental protection) where some enforcement mechanism is needed. Over time, the emphasis on the government role in the partnership can be increased as the government capacity grows.

- b) NGO intervention should center in empowering local communities in aspects of horizontal diffusion of technologies as well capability of advocating community and public partnerships, community and private partnerships. In areas where formation of farmer coops is still ongoing NGO's are preferable and in many cases the government has made a decision to contract out grass roots direct contact functions to NGO's. The NGO efforts at the farm level together with farmer-to-farmer capacity of transfer of technology can be complemented by training Subject Matter Specialists (already located a Provincial and District Directorates) that are so critical in the backing-up the extension agents.

This process could create foundations for continuity, but should be complemented by the present training program at higher level of research and extension agents as well as a strong political championship at Government levels.

If, as seems likely, there continues to be a mix of NGO's and government extensionists it must be recognized that they are all competing for the services of the same pool of extension agents. Under such circumstances the best among this pool will naturally gravitate to the employers which offer the best pay and working conditions. It is imperative that the government do what is necessary in terms of salary, housing, transport, etc. to not only make their agents effective, but to be sufficiently competitive that they can attract the best candidates. Also relevant in this connection is the clarification of career paths for extension agents so that those who go out to the field can see a path in future which can potentially lead to further advancement.

Given the existence of different extension services with different messages in different (or even the same) areas, there is an extremely valuable potential role for government in providing communication channels between these various entities so that "what works" can be communicated among them.

It must be stressed that this is not a recommendation for any type of top-down standardization of extension messages. Rather it is obvious at this point that many different approaches have been tried and that some have been more effective

than others. Those which have worked well deserve replication and this requires communication. The government is the obvious candidate for filling this role.

Just as research efforts need a greater dose of economics in particular and social science in general, so too has extension been overly focused on purely technological and/or agronomic messages. Extension work needs to include business and economics-oriented components given the importance of this to any effort by farmers to increase welfare and incomes.

III. Policy Issues

It must be acknowledged that the bulk of the job of liberalizing the Mozambican economy from the old regime of centralized control has already been accomplished. Starting in the late 1980's the country underwent a series of Structural Adjustment Programs under the auspices of the World Bank, the IMF and other donors which progressively dismantled the price controls, centralized allocation and investment systems and other aspects of the former Soviet-inspired command economy. Nevertheless, there are several important policy issues which remain subjects of debate and which are of great importance to the smallholder sector. Not all of these are attractive candidates for inclusion in USAID's list of objectives for the next program phase, or put another way, changes in some policies either may not be attainable or may not be worth the expenditure of political capital that would be needed. These considerations are detailed below under each policy issue.

Land Tenure

Land tenure and the legal recognition of land tenure and land rights through land titling have been a subject of intense interest and political activity during the present program cycle, and remains a topic of intense debate for two main reasons:

- Much (indeed most) of Mozambican smallholders remain in a situation of occupying land to which they have no clear title even though the laws and regulations associated with it have been passed.

- The law that was passed falls short of what would, in an optimal world, be considered the "best" solution.

The above considerations might lead to the conclusion that a reasonable policy objective would be a revision of the existing land law to more adequately support a freely functioning rural land market and a smallholder sector based on free and clear titles to the land occupied. However, there are several reasons for not choosing such a route. First and foremost is the almost religious intensity of feeling on this issue in many quarters - there are few topics where disagreement, even violent disagreement, can be so readily foreseen. Indeed, the passage of the previous land law was accompanied by just such emotion, leaving many participants unwilling to embark on this exercise yet again, and making any entity which insists on resurrecting it the object of no small amount of resentment and irritation. Such a course of action would be costly both in terms of the cost in good will and in terms of the energy expended that could have been used on alternative objectives.

In fact, there is a strong possibility that after the next election there will be even less willingness to consider further liberalization of the land law than there is at the present time. In such a situation just maintaining the current status quo would have to be considered to be a success. From this point of view there is much to be said for encouraging continuing titling under existing law so as to create ‘facts on the ground’ that will at least give smallholders some official claim to the land they are occupying.

One thing that would assist smallholders in this process and which would also help prevent corruption would be to publicly post the requirements for the bureaucratic process together with the associated fees. Transparency in requirements would be both cheap and easy to implement and would make it much more difficult for bureaucrats to take advantage of applicants. Of course, this same logic could be applied to virtually every function of government which requires filling out of forms, payment of fees, etc.

Rather than focusing on getting a “first best” land law, it is perhaps more pragmatic to concentrate on the true underlying goal. This is to support the ability of the smallholders to have the ability and incentive to make the investments necessary for improved incomes and growth in marketed surplus. It perhaps might be “best” if this could be done on the basis of a land law other than that which is currently on the books. On the other hand, avoidance of this fight would allow concentration on encouraging an interpretation of the existing law and regulation which would allow land use rights to be valued by a freely functioning market and to be bought and sold by smallholders. In addition, sufficient security of tenure to promote needed investments can likely be guaranteed under the existing framework by first expediting titling as much as possible, and doing whatever can be done to guarantee renewal of smallholder use rights on a more or less automatic basis.

In terms of use of land for collateral, it should be noted (see below) that until such time as this may be legally possible, there are alternative models for small credit interventions that do not rely on the ability to mortgage land to succeed. While some may argue that, for example, Grameen Bank style group credit schemes are a second best solution (though this is debatable) the point is that one need not remain stuck at square one simply because the current land law is likely to remain in place over the next project cycle.

Even if the current land law were to be revised to permit freehold tenure, and smallholders were to receive such unequivocal permanent and transferable title it is extremely important to note that **they still won’t get credit from banks**

anyway. The simple truth (amply demonstrated in other countries Africa and elsewhere) is that it is extremely unlikely that lack of freehold title is the only or even the most important barrier between smallholders and access to the formal credit system. Even if they were to receive title, they would still be small and poor while the financial institutions would still be weak, inefficient and undercapitalized, resulting in no new credit flows to the smallholder sector. It is far better to focus on the truly binding constraints to progress, rather than concentrating on theoretical debates which are highly unlikely to be successful, and unlikely to produce the desired results even if they were to be concluded successfully.

It should be remembered that experience elsewhere in Africa and around the world shows that even freehold farmers with clear title to land can themselves be evicted by politically powerful interests regardless of the legal issues surrounding such actions. More important than these legal aspects is the creation of a strong smallholder sector with a strong voice in government. It is the strength of this interest group which is the strongest protection in the long run, thus supporting the argument for efforts to speed up implementation of the existing titling process rather than expending effort to get that process changed.

One final note is important: Decentralization of land tenure decisions is not necessarily a prescription for equality in land holdings. Research in Mozambique (as well as elsewhere in Africa) demonstrates that large disparities exist at the local level under traditional methods of land allocations. Recent moves in some parts of Mozambique to devolve more authority to traditional *regulos* can have the effect of reinforcing this tendency. In the long run, it is likely that more marginal holdings will result in migration from the farm sector, at least in an economic sense, as family members rely more on off-farm income sources where possible to supplement earnings from farm production.

Cashew Policy

Most economists have a strong bias against export taxes such as those currently imposed on raw cashew nuts. However, this battle was fought and lost over the last program cycle and there is good reason to avoid the issue at least in terms of a “frontal assault” in the short and medium term. While there is no doubt that USAID should clearly lean in the direction of elimination of the current tax on raw nut exports since it so obviously penalizes smallholders at the expense of inefficient but politically connected processors, here, as in the case of land tenure above, it would be more productive to take a step back and focus on the real objective in this situation.

The real objective is not elimination of the export tax. Rather, it is to increase the profitability and production of smallholder cashew so as to provide additional cash income to the millions of smallholders who could potentially benefit from it together with additional foreign exchange earnings for the country. Certainly elimination of the tax would assist in getting to this goal but would entail such political battles that it would detract from USAID's ability to pursue other ways of achieving it. In particular, there are numerous supply side interventions which could have an important impact on smallholder cashew production.

Another consideration is that there in fact are legitimate economic grounds for imposition of output taxes on products such as cashew. A prime example is if such taxes are used for technological improvements which accrue to the benefit of the producers being taxed. This would be true if, e.g., the tax receipts received by INCAJU resulted in research which was then extended to smallholders. While INCAJU does indeed fund at least some of its activities from such tax receipts, the benefits have yet to become of widespread benefit in the countryside.

Among these interventions are promotion of Indian process manual shelling factories and continued progress in multiplication and dissemination of disease resistant varieties. The first intervention is one which will ultimately provide the basis for a move away from the inefficient processes which underlie the political interest in the cashew export tax - this technology is more profitable than the mechanical processes regardless of the level of the export tax and so can be expected to become more widespread in the long run. Helping to finance such factories can do more to help smallholders than can renewed battles over the export tax. Multiplication and dissemination of new varieties should continue, but at the same time it should be recognized that INCAJU appears to be relatively well funded compared to other agricultural sector entities and so it is not clear that this area is likely to yield the highest returns for USAID in the next 5-10 years.

Smallholder Grain Exports

One issue which seems to resurface with regularity is the issue of free export of smallholder produced grain, particularly maize. Here, there is a clear "best" policy which is completely attainable: smallholder maize exports can and should be encouraged to the extent possible.

Indeed, this is a policy battle which has already been largely won at the central and provincial government levels. It remains an issue at the local (district) level in some cases, but the importance of this should not be minimized. It is precisely the local officials who are "the government" to the smallholder. Should

these officials, or other people in a position of power, such as extension or NGO workers, oppose or obstruct such activities it can have a strong negative effect. Simply put, smallholders are themselves the best judges of what they should and should not sell. From a food security point of view maize is an excellent cash crop because the farmer retains the choice of eating it rather than selling it, unlike other non-food cash crops.

Accordingly, it would be useful to ensure the continued “decentralization of the message” of liberalization of cross border trade to the local levels. Provincial and/or district level workshops where local officials can receive the message directly from senior officials can be of great value in situations where this trade is still hampered. This will avoid situations in which officials in Maputo claim total liberalization while smallholders themselves still say there are obstacles to the trade.

Rice

While maize has historically been the main staple grain crop exported in addition to being used for subsistence, rice is another possible candidate for export. Rice has been grown by smallholders in the Zambezi River delta for centuries, but has not been an important export crop in recent times. Given the fact that the SADCC region imports \$200 million of rice annually, and there is no other important production zone in the region, there is an obvious potential market for Mozambique.

This is all the more attractive given the fact that rice production is already well established and well understood in Zambezia. Indeed, the production area is relatively compact, with most of it lying within 100 km of the provincial capital of Quelimane. Relatively straightforward adaptive research into off-the-shelf technologies readily available from international agricultural research centers such as IRRI could dramatically improve yields within a relatively short time.

This suggests that a focused effort in this area could yield very positive results within a few years, not only improving incomes and welfare in Zambezia, but also demonstrating the efficacy of such research/extension efforts. The FAO is just starting a project in the rice area and this is one which deserves multi-donor support insofar as that would help the overall effort.

Cotton

The history of the recent joint ventures in cotton has not been a happy one. One of the main reasons for this is the decline in world cotton prices over the last

few years, making it a particularly unfortunate time in which to be launching new production schemes. As a result, frictions between growers and companies have at times degenerated into a zero-sum conflict which has damaged relations between the parties while at the same time endangering the financial viability of the companies.

Cotton also has a very unfortunate colonial history in Mozambique which makes it a very loaded topic from the point of view of company/farmer relations. This fact, together with poor market conditions, makes it an area where direct involvement has high potential for problems in exchange for risky returns. Though it may still provide a useful alternative for farmers in some areas, the history of extensive cotton production by smallholders is fraught with problems both in Mozambique and elsewhere on the continent.¹²

Basically, the yields obtainable by smallholders using low input methods are too low to justify their devoting a large share of their labor to it given the necessity of guaranteeing a minimum of food production for subsistence needs. This diversion of critical labor inputs to food production at crucial points in the crop cycle reinforces the problems of low yields which underlie the lack of profitability at the prices of the recent past. See Carr (1993) for a discussion of these issues.

Nevertheless, cotton remains an extremely important crop for smallholders in many areas and as an export for the country as a whole. Accordingly, it is to be expected that it will continue to be grown and may well expand substantially if international market conditions improve. However, given the heavy involvement of the private sector in this crop, together with the obvious profit incentives that these companies have to promote improved varieties, cultural practices, etc. it should not be considered as the most important area for government expenditure and involvement.

Roads and other Infrastructure

It would be difficult to overemphasize the importance of continuing the campaign of road building that USAID and other donors have supported in the past. If small farmers are to engage in the market economy then they must have physical access to it and it is roads that provide this. The reactivation of production for cash crops in many areas is a direct consequence of the reestablishment of road networks. Indeed, many farm level interventions can have only a limited effect if farmers remain physically isolated from the larger economy.

In terms of the profit margin of smallholders producing for markets, roads have the capacity to both lower input costs and raise the farmgate price obtainable for output. At the same time, they increase availability and affordability of consumer items, with a consequent positive effect on incentives to produce for the market.

Road building and rehabilitation is obviously a high cost activity, but one in which the long term benefits are well worth the expense. This is true not only of secondary and tertiary roads in farm areas but also of trunk roads that can allow development of interregional trade within the country. While historical trade patterns in Mozambique have meant effective separation of the markets in the south from those in the center and north of the country, there is no reason to assume that this necessarily must always be the case. In fact, development of these links, and the consequent opening of the country's major demand center (Maputo) to marketing of foodstuffs from the major producing regions would provide smallholders with a second major alternative market in addition to exports to neighboring inland countries such as Malawi.

While it may be argued from a purely physical transportation point of view that traditional interior trade routes provide a more "natural" market for producers in central or northern provinces, the institutional and bureaucratic impediments to cross-border trade provide a built in advantage to domestic long-haul marketing routes, particularly when those routes can be traversed in 24 hours or less due to improved roads. Regardless of theoretical debates on this matter, as roads improve and perhaps most importantly as the projected Zambezi bridge is completed, the existence of alternative outlets will inevitably have a positive impact on farm level prices and smallholder incentives.

One very important corollary of the success to date in building and rehabilitating roads is the need to start to shift spending toward maintenance. There is a natural tendency on the part of donors to regard this as a recurrent cost which should be borne by the government, but this is a dangerous attitude in the current situation. The institutional capacity to perform ongoing maintenance is itself a form of capital that needs to be built up. This will require donor support and technical assistance or it will not happen. Should this occur, there is a very real possibility that the impressive progress in roads achieved so far can be lost as road conditions deteriorate through lack of maintenance.

An extremely important point to note in relation to any effort to build roads is the close association in Sub Saharan Africa generally and Mozambique particularly of HIV/AIDS infections with transport routes. It is no accident that

those areas best served with road links to the rest of the country (e.g. Tete) are at the same time the areas with the highest rates of HIV transmission. As roads are extended into new areas it is very important that AIDS education and prevention programs be instituted at the same time as a preemptive measure. Waiting for the higher rates of infection to manifest themselves is simply not defensible given that we know full well that along with easier transport and communication comes higher rates of infection.

In terms of other off-farm infrastructure, much of this falls within the orbit of the private sector, particularly warehouses and other physical underpinnings of agricultural marketing. However, it is worth reiterating the long-standing recommendations to sell off government owned networks of warehouses such as that owned by Instituto de Cereais de Mozambique. The fact that they are now being rented to private traders rather than being operated directly by the ICM is a major improvement; progressive divestiture as possible should also be pursued. An important note regarding this divestiture: Farmer associations and other cooperatives are likely to be a viable alternative to corporate ownership of such assets, and is likely to be much more politically viable as an alternative. Of course, much of the space owned by ICM is already rented to the private sector, but this could be sold off as possible over the next few years.

Smallholders, Off-Farm Labor and the Larger Economy

In a very real sense, since more than three fourths of the population are small farmers, the smallholder sector, taken as a whole, is the majority of the larger economy. This means that multiplier and linkage effects to and from the sector play an important role in the overall dynamic of growth in the country. What smallholders buy, and their ability to supplement earnings with off-farm labor are key elements of any strategy to increase growth rates.

In particular, a labor scarce situation such as that which exists in many parts of the country implies that off-farm labor opportunities can be very influential in determining expanded consumption opportunities. This provides still more support for a strategy of encouraging cash crop production since it is this increased linkage with the cash economy on the output side that will enable increased use of purchased inputs. It is also true that the existence of large enterprises in rural areas, whether agro-industrial or not, can provide valuable employment opportunities for the rural population.

This means that the “connectedness” of rural investments with smallholders is an important determinant of the overall growth effects the investment can have.

Labor intensive technologies (such as, e.g. the “Indian technology for cashew processing) have a much greater potential impact than do other types. A variety of arrangements (contract, plantation, independent producer, etc.) are possible, largely depending on the technical characteristics of the crop under consideration.

In addition, the existence of larger enterprises can be instrumental in providing marketing channels for smallholders. This can occur either through outgrower contract arrangements or through the development of transport links which facilitate smallholder marketing of similar products. Accordingly, there is a strong linkage between the prospects for smallholders and the development of enterprises further down the supply chain for commodities that they produce.

While this area has been extensively studied by another team under the current planning exercise, it should be noted that this division is in some senses artificial. Successful cash crop development requires development of the entire supply chain, and this means that smallholder technological improvements which increase production must be linked with processing and/or marketing operations further down the chain if the effort is to have a chance of succeeding.

HIV/AIDS

Not many years ago, this issue would not have been regarded as one which is directly within the province of smallholder agriculture. However, the gravity of this problem and together with the potential for it to become even worse than it already is, dictates that there be no part of the government or society which considers itself exempt from consideration of how it can contribute to a solution.

In the smallholder sector there are some powerful reasons to include this topic in any plans for the next program phase. Among them are:

- Mozambique is a neighbor to the most severely affected countries in the world. In addition, it appears that the epidemic is in a somewhat earlier phase here than in some other SSA countries, making it all the more imperative to act as soon as possible.

- As noted above, the likelihood that a large number of prime working age rural inhabitants will die makes research into labor saving technology all the more imperative.

- All of the population is at risk, and 80% of them are farmers. This automatically makes it a priority given the documented productivity declines associated with high rates of HIV infection.

Globally, there is a growing awareness of the progressive impact of HIV on the agriculture smallholder sector. The basic progression is presented below, and impacts the growth opportunities and constraints. All of these pose threats to increasing rural incomes through agricultural production and marketing, and issues should be taken into consideration for program design.

1. Within a given household, when the first adult becomes symptomatic with HIV, labor in the family's smallholder ag immediately drops for two reasons: (a) absence of the sick individual from any ag activities he/she undertook (preparation, planting, weeding, harvesting) for multiple and ever-increasing periods of time, and (b) the person caring for the sick person's labor decreases as the amount of time spent on caregiving increases (estimated at 40% decline).

2. At the same time, spare capital held by the family is liquidated to meet rising health care costs (which are estimated to go up between 400% and 1000%). Cash dries up, savings dries up, and then assets are liquidated (small livestock before big, equipment before land, etc.) But the bottom line is that this is a period of disinvestment in agriculture for many families, which has an impact on future productivity (and therefore aggregate growth).

3. Once the adult dies, the family liquidates more assets for the funeral. At the same time, there may be land grabbing, where the relatives of the man repossess the land. This often results in the land being under-maintained or under-managed. If the spouse is now unable to work the entire land, increasing amounts may lay fallow, either due to lack of inputs, labor, etc. If she is sick (which is the case for about 60% of surviving spouses), then she may not be able to work the land due to lack of energy. This may begin a second spiral, where steps 1 and 2 are again repeated with the spouse, leaving the household yet more destitute.

4. By the end of the cycle (or multiple cycles), many of the households (roughly 40%) have broken up - the children have gone to relatives, and the land to a relative. If this happens in sufficient numbers (as it has in Zimbabwe and Zambia), the overall demographic structure of farming communities changes in this process, with much larger concentrations among the young and the elderly. This is the situation where the growth of agriculture now depends on a population that has:

- less knowledge and experience (the young)
- less energy (the old)

- fewer assets (savings, equipment, livestock, etc.) (the young and many of the old)
- less mobility (the old)
- less land (those whose family assets have been broken up)

5. Finally, families which lose a primary income earner are in danger of food insecurity. Accordingly, they (as is the case with families who lose an adult for any reason) are in need of assistance to promote the ability of single income-earner families to support themselves above the poverty level.

Potential HIV/AIDS Mitigative Activities

1. Integrating data on the magnitude of HIV/AIDS would be useful - by region to the extent possible - for programming decisions.
2. For areas with over 20% HIV prevalence, innovate around ways to overcome labor, capital, and mobility restrictions facing those families (such as labor-saving or equipment-sharing technologies). For example, support innovations that would allow labor-poor households to deal with the requirements of preparing a field for a new higher-value crop.
3. Initiate risk-reduction strategies, particularly for women producers, perhaps with a "middlewoman" who is less vulnerable at the marketplace
4. One possible intervention stems from the observation that for much of the rural population, extension workers are likely to be the only reliable source of information available from the outside world. Accordingly, it is imperative that these workers all are aware of accurate information regarding the nature of HIV, how it is transmitted, and how transmission can be prevented. At a minimum, all rural extensionists can and should be given a short course in such basic factual information so that there is at least one accurate information source at the farm level.
5. The close association of HIV/AIDS transmission with improved transport and communication routes makes it imperative to link road building programs with AIDS education and awareness programs. The time to act is before the virus is spread, and not after.

Corruption

Corruption has become an increasingly important issue as the economy has revived over the past decade. The most obvious recommendation is to improve

the functioning of the justice system as well as oversight functions of the government so that the problem can be minimized as much as possible. Apart from this, there are several other observations which are important from the point of view of the topics covered in this paper.

Potential Activities/Interventions Addressing Corruption

1. Transparency in government regulations and fees can be ensured by publicly posting requirements in appropriate offices. This is particularly important to smallholders in such areas as land title registration, registration of associations, and obtaining the necessary permits and licenses to engage in rural trade. To the extent that these requirements and fees are well known, the ability of unscrupulous bureaucrats to take advantage of smallholders can be minimized.
2. Continued efforts to improve salaries in the public sector will help to reduce the incentives and motivations to engage in corrupt behavior.
3. Improved financial controls and accounting such as those instituted under PROAGRI can help to prevent opportunities for corruption. These gains should be consolidated and extended to the provincial and district levels.
4. In spite of the progress achieved in financial controls and accounting to date, it should not be overestimated. Recommendations such as those discussed at DFID to put all assistance to the government into the OGE (the General State Budget) will maximize the danger of corruption by maximizing the number of bureaucratic levels funding will have to go through to reach the field level.

IV. Linkages between various USAID/Mozambique activities and other A.I.D. funded programs

There are several opportunities to leverage existing funding and acquire additional funding from other types of USAID-sponsored activities on global and regional levels. A number of these are highlighted below.

- **Agricultural Initiative to Cut Hunger in Africa (AICHA).** AICHA is a targeted pan-Africa program that will provide additional financial and technical resources to three selected priority countries (Mozambique, Mali and Uganda). Funding under AICHA will be directed toward six focus areas (Note: this list may change and shrink):
 - i) Science and technology
 - ii) Agricultural trade and market systems
 - iii) Strengthening community-based producer organizations
 - iv) Building human capital, institutions and infrastructure
 - v) Ensuring that vulnerable groups and countries in transition are not left out
 - vi) Sustainable environmental management

The likely USAID/Mozambique CSP programs will be consistent with these focus areas. The Mission should pay close attention to this initiative as the operating and access requirements become cleared over the next several months. Projected funding level is currently \$27 million annually, so the potential resource pool for Mozambique should approach roughly a third of that. There is a possibility that one third of the AICHA resources will be focussed on biotechnology (to be confirmed).

- **Agricultural Biotechnology Support Project (ABSP2).** The next “green revolution” will likely come about from the application of biotechnology to agriculture, both in the form of transgenic manipulations (GMOs) and non-transgenic applications (e.g. tissue culture). Since 1991, USAID has supported the introduction of biotechnology to developing countries worldwide through the centrally funded ABSP project. A new cooperative agreement has just been signed with Cornell University for ABSP2, with a total potential value of US\$30 million between core funding (\$15 million) and Mission “buy-ins” (up to \$15 million). Mozambique has a strong potential for becoming one of the ABSP2 “focus countries”, and the Mission should engage Cornell early on to make sure that appropriate attention and assistance is received. Areas of particular interest include development of an appropriate biotech policy environment, incorporation of INIA into partnerships with ABSP2 biotechnology development partners focusing on solution to pressing

Mozambican needs (e.g. cassava mosaic virus and brown streak), on a national or regional basis. As new biotechnologies are developed, the emphasis should shift toward defining mechanisms for commercialization of new agricultural biotechnology products to Mozambican farmers.

- **Technology Applications for Rural Growth and Economic Transformation (TARGET)**

TARGET focuses on getting profitable, productivity enhancing, agricultural technologies that are now in the pipeline or on the shelf, into the hands of end users i.e., smallholder farmers and rural enterprises. And, it supports efforts to apply technology to emerging issues that limit the competitiveness of African agriculture in global markets. TARGET program objectives include the following:

- Increase access to and use of technology now in the pipeline to support food system development, among rural households;
- Raise the quality and quantity of technology used, and products derived from agriculture, to generate rural household income;
- Increase and improve the application of information technology for agricultural trade, science and development planning;
- Promote innovation in development and application of agricultural technology to address emerging challenges and opportunities.

TARGET includes a Technology Access Fund (TAF), with funds managed by the CGIAR Secretariat and administered in consultation with USAID staff. IARC activity proposals should have the support of the relevant Sub-regional organization (ASARECA, CORAF, SACCAR) and take into account their on-going research priority areas. Partners could include a range from NARS, NGOs, U.S. universities, to the private sector.

The Key Role of Agribusiness and Exports

The entire thrust of a strategy based on increased marketing of smallholder output is premised on the ability of the smallholders to access the markets. This means that there is a crucial link between the smallholder sector interventions *per se* and Intermediate Results relating to transport infrastructure and expansion of agribusiness and marketing networks. Without these crucial linkages there can be no expectation of sustained improvement at the farm level.

A related but equally important consideration is the linkage of Mozambique in general to other countries in the region and the world. In a country where per capita incomes are extremely low, as is the case in Mozambique, there is a limit to how much can be expected by selling output to other poor people within the

country. Only by exploiting export markets can farmers (and others of course) expect achieve the high rates of income growth which are the goal of this strategy.

The Potential of Unmonetized Food Aid to Undermine Agricultural Development

USAID is responsible for a large amount of food aid in Mozambique some of which is given as food aid and much of which is monetized. It is worth emphasizing that **apart from disaster assistance the provision of non-monetized food aid has negative implications for agricultural development in Mozambique.** This means that it should be avoided, even if it is the only type of food aid on offer. Though acceptance might mean a larger USAID program in the country, this program cannot counteract the negative effects of such unmonetized aid.

This is a particularly sensitive time for the development of markets for surplus grain from smallholders. Provision of free grain would have disastrous effects on the ability of this market to grow and hence on the ability of smallholders to achieve increases in income.

It is perhaps tempting to view individual disasters such as the death of a family member from AIDS as emergencies deserving of such non-monetized aid. However, such interventions could not possibly be targeted sufficiently to negate the adverse effects that would ensue. First of all, identifying AIDS deaths as such is not possible at the present time. Second, deaths from other diseases cause equal hardship (and may in fact be at least partly due to AIDS, whether acknowledged or not). Third, even if the first two considerations could be dealt with, provision of free food to an estimated 20-25% of the rural population would mean that any hope of developing markets for grain would have to be abandoned for the duration of the aid and some time thereafter.

Accordingly, it is the recommendation of this report that non-monetized food aid not be a component of USAID's strategy except in the event that an emergency such as the recent floods occurs during the strategy period.

V. Potential Intermediate Results and Corresponding Indicators

The Preliminary Strategic Framework lists four intermediate results (IR's) under the first Strategic Objective of accelerating rural income growth. It should be noted that the overall long term development goal of broad based double digit growth is one that has never been attained by any country if the period measured is one of decades (with one or two possible exceptions, none of which are in Africa). While a worthy goal, and one which can be attained for the medium term (perhaps even as long as ten years) it is not realistic to assume that this can continue indefinitely. Given Mozambique's stellar performance in the recent past, it is to be expected that there will be some diminution in overall growth rates as "easy" accelerators are exploited and more difficult work remains to be done. Accordingly, the objective of accelerating rural income growth could be more reasonably restated as "maintaining high rates of rural income growth".

There is an inherent conflict between the statement in the scope of work that "indicators be as narrowly focused as possible" and that they correspond closely to the strategic objective which is a very "macro" level goal. In the past, such indicators as sectoral output levels have been used and while these are certainly worthy, it is difficult to claim that USAID's actions have a direct and measurable impact on them. It is entirely possible that USAID can have a tightly focused, successful program but that these overarching indicators wouldn't show it. The reverse is also possible.

Looking at IR's 1.3 and 1.4, which correspond to the family sector focus of this consultancy, it does not appear that the first of these "Land tenure security and other agricultural policies promote investment in agricultural production" is one which should be adopted as it now stands. As detailed above, changes in the land tenure law are not within the manageable interest of USAID and while accelerated titling under the existing law can and should be encouraged, it is not a good idea to make this one of the centerpiece results of the strategic objective.

A suggested substitute IR could read:

"Expansion of rural smallholder production of crops for sale to the market together with policies to promote sustainability of this goal"

Possible indicators would be:

1. Increased percentage of smallholder output sold into market channels

It should be noted that this indicator includes food crops as well as cash crops per se. The important factor, as argued in the text above, is that increased production of marketed surplus contributes more than any other single factor to smallholder incomes and food security. A reasonable indicator of progress in this area would be an increase in the percentage of output (in value terms) sold off-farm.

2. Increased number small farmer village level associations and increased percentage of farmers and districts organized into associations

Given the key role of associations in providing an interface between small farmers and marketing channels on both the input and output sides, an increase in the coverage of associations will provide a good indicator of the extent of integration of farmers into the larger markets. This indicator can be evaluated both on the basis of the percent of farms so organized and on the basis of the geographical areas covered by associations. Associations are also useful as a vehicle for extension and other interventions, and increasing use of them for this purpose also would be a positive indicator.

3. Streamlining of the Process for Registering Associations

Numerous observers cited the delays, costs, and needless bureaucracy associated with officially registering associations. While many of the benefits of associations are available even to unregistered ones, official status is preferable for several reasons. The current delays of from one to two years in registration could be halved at no sacrifice of government control but would have a very positive effect on the ability of smallholders to successfully complete registration requirement.

4. Increased number of village level credit institutions geared toward smallholders and small and medium agro-processing enterprises.

As discussed above, there is now sufficient experience with various rural credit models to start to try to replicate those which have proven to be effective in Mozambique. While progress in this area is necessarily slow, it is to be expected that continuation of the expansion of such institutions would occur over the coming program period.

Potential Activities Related to IR 1.3

- Continue assistance for formation of farmer associations. Current efforts via NGO's such as CLUSA have been very well received and have shown evidence of success in numerous locations. These efforts should be continued in the areas where they are currently underway. Serious consideration should be given to extending this activity to areas not currently covered by USAID. Priority should be given to high potential agricultural zones where there is a reasonable expectation that promotion of production for the market can meet with success.

- Assist and promote the development of new streamlined regulations for the official registration of farmer associations. While many of the benefits of associations can be gained without explicit registration, this step brings with it important advantages. There is no logical reason for the expensive and time consuming procedure that is currently required. A new streamlined procedure could be modeled on those existing in other regional countries or on the procedure for registering a business in Mozambique itself.

- Fund a variety of village level credit interventions in agricultural zones. These should be carefully considered in terms of their ability to promote savings as well as investment, and hence their long term sustainability. Given the lack of a single model accepted as appropriate, it is reasonable to promote these interventions on a small scale in various different locations.

- Fund an evaluation of alternative village level credit schemes as currently conducted in Mozambique. Such small interventions are a relative newcomer to Mozambique and so have not been well studied to determine which works best in what context and how existing projects might be improved. Such a study would be a precursor to funding additional interventions as in the suggested activity immediately above.

- Continue/increase assistance for marketing and other agribusiness formation via mechanisms such as Technoserve, GAPI or others. These interventions fill what is perhaps one of the most vital gaps in Mozambique – The ability of entrepreneurs to act on incentives and translate their goals into action in the marketplace. One particularly weak area is the input supply system, where farmer associations could be a viable alternative for activities such as seed production/dissemination.

- Continue to fund both trunk and feeder road construction in agriculturally important provinces. This is an activity which enables all other interventions aimed at increasing cash cropping to be successful. Accordingly, it deserves a high priority.

The following IR is currently listed as the last under SO 1:

“Use of Sustainable Agricultural Technology Increased”

Intermediate Result 1.4 is already in line with the discussion of the sector above and with the views of all stakeholders interviewed. Technological change from the current hand-hoe/traditional variety based agriculture will be essential to achieving the strategic objective of increasing rural incomes. The discussion in this concept paper has made it clear that a partnership of government, NGO’s and the private sector will be needed to achieve this goal, but that effectively using the capacity of government that has been built up through PROAGRI is the main task that needs addressing in the next project cycle.

For MADER to have an impact at the farm level on use of improved agricultural technology it will be necessary for substantial investments to be made in research and extension. As noted above, there are strong public good characteristics to both research and extension, and while there is a role for both the private sector and the NGO’s (particularly in the short run) a much stronger emphasis on the part of government is needed. Accordingly, the following are some potential indicators that can be used to gauge progress on IR 1.4:

1. Increased share of MADER budget devoted to research and extension

It may be argued that such an indicator is somewhat heavyhanded and that such an emphasis would be “donor driven”. However, even if this is true, it is still a good idea to promote such a goal anyway. There are several reasons for this.

First is the fact that without such an increased share these services will be underfunded and growth will suffer accordingly.

Second, at the present time research in particular is just one of many claimants on the central budget at MADER and will be unlikely to make major advances without outside help. Simply put, experience around the world may demonstrate the importance of such an allocation but competing bureaucrats in MADER have yet to be convinced. Even if the leadership is itself convinced of the need (and there is certainly reason to think that, e.g. the Vice Minister is in this camp) it is politically difficult to achieve, and the donors could play a useful role in making it happen.

2. Increased number of agricultural researchers obtaining post graduate training

USAID has already funded 10 postgraduate degrees for agricultural researchers in overseas institutions. This number should be expanded enough so that a continuous flow of new researchers is available for the system. There are two reasons to do this: First, the current number of MS and PhD holders is extremely low compared to the need even with 10 additional researchers from the most recent group. Second, it is to be expected that there will be some level of attrition as some percentage of trained researchers leave INIA or related institutes to pursue other career opportunities.

3. One zonal research center in the northern or central region of the country to be fully equipped and staffed by the end of the program period.

The plan to have a series of zonal centers for research instead of having all research done in Maputo is a reasonable one. However, there has been very little progress toward this goal so far. It would be too much to expect that all of the zonal centers could get off the ground simultaneously, but at least one should be able to achieve a critical mass in the short to medium term.

This is not a trivial task. Indeed, it will be a challenge to even achieve the allocation of operating expenses that will be needed through the provincial DPA. Accordingly, it would be a good idea to make the needed capital investments as a separate expenditure independent of PROAGRI. Without the necessary labs, equipment, housing, etc. the zonal centers simply will not happen. While the donors have committed to channeling all money through the MADER financial system, there are precedents for large one-shot capital investments to be considered separately. (e.g. the proposed Zambezi River bridge)

While some may criticize such an approach as “donor driven” there are two responses that can be made. One is that it is indeed donor driven and that this is the only way it will get done, as is the case for some other large capital investments. Second is that this is merely the implementation of the existing master plan for agricultural research and as such is completely in line with the government’s stated plan.

4. Improved linkages between INIA and other international research centers

These linkages are essential for quick progress to be made in crucial areas. There are several ways to promote such linkages. One would be to send researchers for study tours of selected international centers where the measurable

progress could consist of time spent at IARCs and/or breeding lines of important crops (e.g. cassava, maize, etc.) introduced into INIA's breeding program.

A second possibility which should be seriously considered is a partnering arrangement with US Land Grant Universities either directly with one of them or with a consortium through a Collaborative Research Support Program (or programs) of the type which have been used successfully in the past.

5. Progress toward creating systematic and regular links between research and extension at the central, provincial and district levels.

Currently, these linkages are not institutionalized as regular meetings of stakeholders nor is there a formalized council or other entity which embodies such links. Creation of such a permanent entity and establishment of regular meetings to ensure interchange between extension and research would be a step forward.

6. Restructured research organization and leadership

As noted above, the recently created CTIA has yet to be clearly defined and recognized as a policy setting / resource allocating entity. Rather than emphasizing organizational unification of existing research institutions, what is needed is an overarching vision of what needs to be done together with the power to make it happen. Inclusion of all stakeholders including the private sector, extension and other government-funded entities such as the University would be an important improvement.

7. Adoption of improved technologies/varieties by smallholders

While adoption of new varieties/technologies is not something which can be readily predicted or programmed there are enough obvious opportunities that at least some progress should be expected in return for a major investment in these areas. To cite just one example, it is known that resistant cassava varieties exist for some of the major diseases affecting cassava. Release of locally adapted varieties can reasonably be expected by the end of the program period.

Potential Activities Under IR 1.4

- Fund an annual flow of researchers for graduate degrees in plant sciences. Preference should be given to those who will do classwork abroad but who will locate the field work required for their degree in Mozambique. This will directly involve both the researchers and their professors in ongoing research issues in the

country and will facilitate their reentry into the research establishment upon completion of their studies.

- Fund the transfer of the principal agricultural research effort from Maputo to a zonal research center in the north or center of the country. This would involve equipping a center both in terms of scientific needs and in terms of the housing and other needs of the research staff to the level needed to attract the best away from Maputo. Once this capital investment is made, continued funding should be assured to enable the potential returns to be gained as quickly as possible.

- Fund linkages between the domestic agricultural research effort and international agricultural research efforts in both the CG system, neighboring countries, and the US land grant system. Explicit funding of travel and joint work would help cement the interactions between the national and international research communities.

- Fund targeted research/extension efforts for improvement of selected crops. High on the list of such efforts should be cassava, where development and dissemination of a variety resistant to both brown streak disease and cassava mosaic virus is an important priority. Other priorities include oidium resistant cashew, and higher yielding varieties of rice adapted to the conditions of the Zambezi delta. These activities could include both biotechnology oriented projects in collaboration with researchers in the US or international centers, as well as more traditional plant breeding efforts based at the field level in Mozambique. In either case, direct involvement of the extension system as a vehicle for performing field and on-farm trials would be a key element.

- Continue funding through the PROAGRI mechanism. While this mechanism is designed to leave the decision making capacity in the hands of the national authorities, provision of major support does give the USAID mission leverage to promote chosen activities/trends. Chief among these could be the prioritization of research and extension in the MADER budget, reorganization of the leadership and structure of the national agricultural research institutions, and the creation and funding of explicit and institutionalized linkages between research and extension.

Scaling Interventions to Fit Different Mission Budgets

One issue which must be factored in at the current time is the inevitable uncertainty as to exactly how big the USAID budget will be over the coming project cycle. In addition, it is to be expected that there will be some unforeseen changes from year to year which may result in either an expansion or contraction of what had originally been planned. Accordingly, this section indicates which

interventions are likely to be “scalable” in the sense that they could be readily expanded or contracted if the situation requires it, and which are more “lumpy” in that they need to be considered as all or nothing interventions.

Lumpy Interventions

Two possibilities stand out as being at the “lumpy” end of the spectrum in that they cannot easily be done halfway, nor can they be readily scaled up by some percentage. These are the zonal research center in the north of the country and the Zambezi River Bridge. The second of these is rather obvious since the idea of half a bridge is comical, and increasing a bridge by, e.g. 50%, is similarly nonsensical. The first is also an “all or nothing” intervention since it is proposed for precisely the reason that research decentralization to date has been piecemeal and lacking in the critical mass necessary to make it work.

To move the central effort at agricultural research away from Maputo will require a concerted effort to equip and staff a center at a level that will make it attractive for researchers and their families to relocate. Continuing the piecemeal approach of the past will not reach the needed threshold and is unlikely to have the impact that could be achieved (and should be achieved) if the main thrust of the agricultural research effort were to be moved to a region that is actually important in terms of agricultural production.

One caveat to this argument exists in both the case of the bridge and the zonal research center: Insofar as other donors join in the effort to fund either or both of these activities then USAID’s share could be scaled up or down accordingly. However, once committed, it will be important to see these interventions through to completion.

Other interventions which are lumpy include policy related issues where what is desired is a change in law or regulation which is either done or not. This report has argued that major policy changes are not the likeliest targets for successful interventions, with the exception of streamlining the process for creation of farmer associations. As discussed above, this would require a national policy change reducing fees and legal requirements, and is not something where it is easy to envision what scaling up or down would really mean. At the same time this intervention is also one which is not directly related to expenditure levels except insofar as a large US program in an overall sense gives the Mission more leverage to seek policy changes of this type.

One other exception is the goal of restructuring the leadership and organization of the research establishment noted above. However, this is also not

directly related to funding except insofar as a willingness to fund major investment in the area gives greater leverage to persuade the government to make such changes.

Easily Scalable Interventions

Interventions which can be easily expanded or contracted are those which consist of a series of smaller pieces each of which more or less stand on their own without relying on the existence of others for their success. There are several which fall into this category.

First, road programs, especially tertiary road construction, are easily added or subtracted since each new road gives clear benefits which are not strongly affected by the existence or lack of tertiary roads elsewhere. One consideration to note in this area, however, is that sudden major cuts would have adverse consequences for the buildup of local contracting capacity which has been an important success story over the past few years. These local road construction companies are reliant on a more or less steady stream of work and so radical shifts should be avoided if possible.

Second, the process of forming farmer associations is one which can be readily expanded if funds are available, or slowed down if they are not. However, it should be noted that in this case the activity is one with an important time dimension – that is, forming a viable association takes time to develop the necessary skills and trust and should not be started (in each case) if there is not a reasonable expectation that the process can be sustained for the time necessary for the association to continue on its own. Nevertheless, the NGO's responsible for this activity in the past have shown themselves to be adaptable in terms of ability and willingness to expand or contract their activities as conditions dictate.

Third, the training of researchers overseas in graduate schools is one which can easily be expanded or contracted as funds permit. While it would of course not be a good idea to cut off a student in the middle of their program, it is very easy to hand out more or fewer scholarships as funding allows.

Fourth, under the heading of science and technology, is the use of biotechnology or traditional plant breeding techniques to improve crop yield or disease resistance. While each crop by itself is a somewhat “lumpy” enterprise requiring a minimum threshold effort to get a research program and associated laboratory and/or field work going, it would be possible to scale such an effort up or down by adding additional crops. Such expansions would be conditional on the

extent to which given crops are both important in economic terms, and present potentially useful research directions which appear to be exploitable.

Interventions which don't easily fall into the categorization of "lumpy" vs. "scalable" are the goals of increasing the share of MADER's budget devoted to research & extension and the goal of increasing marketed surplus from smallholders. Both of these results are ones which in which progress is likely to be gradual, but which should be steady if the desired outcomes are to be achieved.

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DOCUMENTS CONSULTED

- Bagchee, Arun Agricultural Extension in Africa World Bank Africal Technical Dept. Series No. 231, 1994.
- Benfica, Rui “An Analysis of the Contribution of Micro and Small Enterprises to Rural Household Income in Central and Northern Mozambique” MS Thesis Michigan State University, 1998.
- Benfica, Rui, D. Tschirley, L Sambo “The Impact of Alternative Agro-Industrial Investments on Poverty Reduction in Rural Mozambique’ MADER Research Paper No. 51, March 2002.
- Boudreau, Tanya “Food Economy Baseline Profile of the Limpopo River Basin Complex: Gaza Province, Mozambique” FEWS NET Food Economy Group - January 2001.
- Bumb, Balu “Agricultural Input Markets in Mozambique: Rapid Assessment” Memo Sept. 2002.
- D. Byerlee and P. Heisey, “Evolution of the African Maize Economy” Chapter 2 in Africa’s Emerging Maize Revolution, Byerlee & Eicher eds. Lynne Reinner Publishers, 1997.
- Carr, S. “Improving Cash Crops in Africa” World Bank Technical Paper No. 216, 1993.
- de Carvalho, Maria do Rosario Pires and Manuel Antonio Gomes dos Santos “Projecto de sistema de financiamento a agricultura de Mocambique” Cooperacao Portuguesa March 2002.
- Deloitte & Touche, Cashew Marketing and Liberalization Study, Ministry of Industry and Tourism, 1997.
- Dengo, Maria Nita, “Household Expenditure Behavior and Consumption Growth Linkages in Rural Nampula Province, Mozambique” Michigan State University MS Thesis, 1992.
- Dengo, Maria Nita “Cotton Pricing Policy - A Domestic Resource Cost Study”, Ministry of Agriculture, January 1995.
- Ebony Consulting Int. “Refocusing the Fundos do Fomento” Draft August 2002.
- Economist Intelligence Unit - Mozambique Country Report July 2002.
- Eicher, Carl “Mozambique: Review of the Implementation of the Extension Master Plan and Proposals for Improvement” July 2002.
- European Commission “Assessment of the Livestock Situation in Mozambique” October 2000.
- Gemo, H and W Rivera “Mozambique’s Move Towards a Pluralistic National System of Rural Extension” ODI Agren Network Paper No. 110 January 2001.
- Gilham, Bell, Arin, Matthews, Le Rumeur, and Hearn, “Cotton Production Prospects for the Next Decade” World Bank Technical Paper No. 287, 1995.
- Gordon, Anne and Mark Langworthy “Edible Oils in Mozambique – Recent Past, Present and Future Characteristics” Care International, October/November 1999.
- Haggeblade, S and G. Tembo “Conservation Farming in Zambia” IFPRI Workshop on Successes in African Agriculture, Lusaka, June 2002.
- P. Heisey and W. Mwangi, “Fertilizer Use and Maize Production” Chapter 13 in Africa’s Emerging Maize Revolution, Byerlee & Eicher eds. Lynne Reinner Publishers, 1997.
- P. Heisey and M. Smale, “Maize Technology in Malawi - A Green Revolution in the Making?” CIMMYT Research Report No. 4, 1995.

Heltberg, R. and F. Tarp “Agricultural Supply Response and Poverty in Mozambique” Food Policy 27 (2002) 103-124.

Hilton, Brian and Ricardo Xavier “Are Inputs Profitable for Smallholder Farmers in Northern Zambezia Province?” World Vision 2000.

Howard, J. J. Massingue, J. Jeje, D. Tschirley, D. Boughton, A. Serrano “Observations and Emerging Lessons from the 1998/99 High Input Maize Program in Nampula Province, Mozambique” MADER Flash Report No. 22, September 2000.

J. Howard, J. Low, J. Jeje, D. Boughton, J. Massingue, M. Maredia “Constrangimentos e Estrategias para o Desenvolvimento do Sistema de Sementes em Mocambique” DNE/MADER Relatorio de Pesquisa No. 43P January 2001.

International Center for Soil Fertility and Agricultural Development “Promotion and Adaptation of Improved Fertilizer Management for Resource Poor Rice Farmers in Mozambique” April 2002.

International Monetary Fund -Republic of Mozambique Selected Issues and Statistical Appendix, December 13, 2000.

Ireland Aid - “Support to the Agricultural Sector in Mozambique 2002-2004” August 2002.

Isaacman, A. Cotton is the Mother of Poverty - Peasants, Work, and Rural Struggle in Colonial Mozambique, 1938-1961 David Philip Publishers, 1996.

Isaacman, A. and B. Isaacman, Mozambique: From Colonialism to Revolution, 1900-1982 Westview Press, 1983.

Jaffee, S. and J. Srivastava Seed System Development - The Appropriate Roles of the Private and Public Sectors World Bank Discussion Paper 167, 1992.

Jayne, T, D Tschirley, T Yamano, M Weber, R. Benfica, D Neven, B. Zulu “Differential Access to Land Among Smallholder Farmers in Africa: Implications for Poverty Reduction Strategies and Structural Transformation” Draft Interntional Development Working Paper No. 80, March 2001.

Kloeck-Jenson, Scott, “Analysis of the Parliamentary Debate and New National Land Law for Mozambique” Land Tenure Center-Mozambique, September 1997.

Kloeck-Jenson, Scott, “Locating the Community: Local Communities and the Administration of Land and Other Natural Resources in Mozambique” Land Tenure Center-Mozambique, 1998.

Kumar, R. “The Cashew Sector in Mozambique - Assessment and Perspectives” Draft, 1995.

Kyle, S. “Economic Reform and Armed Conflict in Mozambique” World Development 1990

Lele, Christiansen and Kadiresan Fertilizer Policy in Africa MADIA Discussion Paper No. 5, 1989.

Mann, Graham, “Mozambique Cashew Master Plan 1996-2006 - International Agronomists Recommendations and Inputs” October 1995.

MA/MSU Research Team, “Padroes de Distribuicao de Terras no Sector Familiar em Mocambique: A Similaridade entre duas Pesquisas Distintas e as Implicacoes para a Definicao de Politicas”, May 1994

MAP/MSU Research Team, “Smallholder Cash-Cropping, Food-Cropping and Food Security in Northern Mozambique: Summary, Conclusions, and Policy Recommendations” Working Paper No. 25, June, 1997.

MADER Departamento de Estatística “Inquerito Agrícola ao Sector Familiar - Resultados Definitivos” 1996.

MADER/Direcção de Economia “Estratégias e Acções Para Induzir o Crescimento Económico Rural em Mozambique” December 2000.

MADER “Constrangimentos e Prioridades para o Desenvolvimento do Sector Agrário em Mocambique: Perspectiva do Sector Público” October 2001.

Marrule, H, R. Benfica, P. Strasberg, D. Tschirley, M. Weber “Reflections on Poverty and Prospects for Growth in the Mozambican Rural Sector” USAID Policy Synthesis No. 44, July 1999.

Messiter, Bill, “Trip Report - 17 September - 23 September Nampula and Manica Provinces”

Ministerio da Industria e Comercio, Direcção Nacional do Comercio “Análise dos Custos de Transporte na Comercialização Agrícola em Mocambique” Nota de Pesquisa da DNC No. 18, June, 2001.

Mole, Paulo - “Smallholder Cashew Development Opportunities and Linkages to Food Security in Nampula Province, Mozambique” Ministry of Agriculture and Rural Development Directorate of Economics Research Report No. 42, November 2000.

M. Morris ed. Maize Seed Industries in Developing Countries Lynne Rienner, 1998
Newitt, Malyn, A History of Mozambique, Indiana University Press, 1995

Pitcher, M. Anne. “From Coercion To Incentive: The Portuguese Colonial Cotton Regime in Angola and Mozambique, 1946-1974” In The Social History of Cotton in Colonial Africa, Isaacman and Roberts, Eds. Portsmouth 1994.

Republic of Mozambique Ministry of Agriculture and Fisheries “PROAGRI 1998-2003 Executive Summary” February 1998.

Republic of Mozambique - Action Plan for the Reduction of Absolute Poverty 2001-2005 (PARPA) April, 2001.

D. Rorbach, J. Low, R. Pitorro, A. Cucu, J. Massingue, D. Boughton, G. Rafael, A. Paulo, D. Joceme “Prioridades de Investimentos para o Desenvolvimento do Sistema de Sementes em Mocambique” DNE/MADER 2001.

Rose, Donald, and Nina Schlossman, Roger Shrimpton, Stephan Meershoek, “The Extent of and Potential Solutions to the Malnutrition Problem in Mozambique: A Synthesis of Information Focussed on the USAID Title II Development Assistance Area” Helen Keller International, November 11, 2002.

Ruttan, V. Agricultural Research Policy University of Minnesota Press, 1982.

M. Smale and P. Heisey “Maize Technology and Productivity in Malawi” Ch. 5 in Africa’s Emerging Maize Revolution, Byerlee & Eicher eds. Lynne Rienner Publishers, 1997.

Strachan, Lloyd, “Diagnostic Survey of Rural Trade Network and Proposal for Agricultural Marketing Support” INDER, April 1997.

Strasberg, P. Smallholder Cash Cropping, Food Cropping and Food Security in Northern Mozambique, Michigan State University PhD Dissertation, May 1997.

Thresh, J. M. and R. J. Hillocks “Cassava Mosaic and Cassava Brown Streak Diseases in Nampula and Zambezia Provinces of Mozambique” Natural Resources Institute, University of Greenwich, undated.

Tschirley, D, C. Donovan & M. Weber, “Food Aid and Food Markets: Lessons from Mozambique”, Food Policy Vol. 21, No. 2, pp. 189-209.

Tschirley, D, and R. Benfica “O Papel do Mercado de Trabalho, Microempresas, e Agricultura na Reducao da Pobreza Rural em Mocambique” MADER Flash No. 23 November 2000.

USAID - Mozambique Country Strategic Plan FY 1996 - 2001

USAID - “A Donor Coordination Assessment for USAID/Mozambique” Draft Sept. 2002.

V. Venkasetan, Seed Systems in Sub-Saharan Africa, World Bank Africa Technical Dept. Series No. 266, 1994

Wandschneider, T and J Garrido-Mirapeix “Cash Cropping in Mozambique: Evolution and Prospects” EU Food Security Unit Mozambique Technical Paper No. 2, August 1999.

World Bank, “Mozambique: Agricultural Sector Memorandum” AFTA1, 1998.

World Bank, “Mozambique: Project Appraisal Document in Support of the First Phase of an Agricultural Sector Public Expenditure Program (PROAGRI)” Report No. 18862 MOZ

World Bank/Ministry of Agriculture and Fisheries, “Cashew Production and Marketing Among Smallholders in Mozambique: A Gender Differentiated Analysis Based on Household Survey Data”, March 1998.

World Bank - Mozambique Country Economic Memorandum, Feb 7, 2001

Yamano, T. and T. Jayne “Measuring the Impacts of Prime-Age Adult Death on Rural Households in Kenya” MSU Staff Paper 02-26, October 2002.

NOTES

¹ See Wandshneider and Garrido-Mirapeix 1999 p. 98.

² See Rorbach et. al. 2001 for estimates of returns to crop research in Mozambique.

³ See Ruttan (1982) pp. 237, 261.

⁴ See Lele, Christiansen and Kadiresan Fertilizer Policy in Africa MADIA Discussion Paper No. 5, 1989 for a discussion of this in other Sub Saharan Africa countries.

⁵ See FAO Fertilizer Yearbook, any recent year.

⁶ See P. Heisey and W. Mwangi, "Fertilizer Use and Maize Production" Chapter 13 in Africa's Emerging Maize Revolution, Byerlee & Eicher eds. Lynne Rienner Publishers, 1997.

⁷ See Desai, J. Mozambique, Rural Poverty Profile, April 1996.

⁸ See Viyas, V. S., "Asian Agriculture, Achievements and Challenges" Asian Development Review 1:27-44, 1983.

⁹ See Heisey & Mwangi op. cit. p. 197.

¹⁰ D. Byerlee and P. Heisey, "Evolution of the African Maize Economy" Chapter 2 in Byerlee and Eicher, op. cit. p. 19.

¹¹ It was indicated to us by the Government Extension Services that reduced tillage was one of the technology that had contributed for yield increase. Considering that small holders are by tradition users of reduced and conservation tillage, the extent in which the extension services played a role in introducing that technology is questionable.

¹² See, e.g. MAP/MSU Working Paper No. 25 op. cit. and Strasberg 1997. To date, the government has attempted to regulate cotton production through a combination of price policy for seed cotton and contractual obligations for JVC's which essentially require them to act as regional development organizations in promoting smallholders more generally than simply in the production of cotton. This arrangement does not exploit the natural inclinations or comparative advantages of the cotton companies. They are interested primarily in cotton and it is apparent that they lack the will in most cases and often the knowledge to seriously address issues not directly related to cotton. It is not likely that this situation will change drastically in the future. Accordingly, there is much to recommend a government policy which permits cotton companies to pursue cotton intensification, given that this is their comparative advantage, while protecting smallholder interests through other mechanisms which rely on market forces rather than government control or regulation to produce the desired result. Here it is important to recognize that cotton company power to control smallholders is naturally limited in an essential way. Should the cotton price be pushed too low relative to costs, whether by the government or by market forces, smallholders can remedy the situation themselves by switching to other crops if they have control of the land on which to grow them and the opportunity to market them. This makes exploitation far more difficult than it was in the past. In addition, it is important to remember that cotton policy in the 1960's and early 1970's was based on an

open market bidding system not unlike what would be possible at the present time and that the result was a large increase in cotton output. (See the discussion in Isaacman 1996 wherein it is made clear that this type of arrangement was quite beneficial not only to cotton companies, but also permits higher farmgate prices to be passed back to growers.) In economic terms, if one is to rely on market solutions, it is important to ensure that there is no market failure, and to confine government interventions to those which directly address the failures that exist, rather than trying to remedy them through indirect means. Since the monopsony nature of cotton processing is one which cannot be easily addressed, it is better to assure that farmers are not exploited via ensuring that they have other options, rather than trying to promote cotton company behavior which is not naturally in their interest of these companies. If farmers have control over what they plant cotton companies need not be controlled in terms of the price since if they push it too low, they will find themselves without sufficient raw cotton to justify the large investments they have made in their processing capacity. There are conflicting reports over the situation regarding land scarcity and control over it in the various JVC zones, but the long history of market failures in land markets in Mozambique and elsewhere make it clear that this is an area where there is potential for problems and a need for government action if failures are indeed present.