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ECONOMIC GROWTH, FOOD CROP RESEARCH
AND AGRICULTURE IN MALI

USAID/MALI
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MEMORANDUM

TO : AFR/PD, Tim Bork

FROM : USAID/Mali, Dennis Brennan 

DATE: March 6, 1989

SUBJECT: Agricultural Research, Economic Growth and the FY 1990 CDSS

As requested in STATE (88) 304881 and 293042, we have completed a supplementary paper to the FY 1990 CDSS entitled "Economic Growth, Food Crop Research and Agriculture in Mali". The paper deals with issues of agricultural research on cereal crops and the role of increased food crop production in a growing Malian economy. The conclusion of the paper, supported by detailed quantitative projections under varying assumptions, is acceptable rates of economic growth projected for Mali cannot occur without a continual increase in the level of agricultural production, including major increases in food crop production. In this situation, attention to the agricultural sector in general, and the food crops sector in particular, is critical.

A brief discussion of the background to the paper may help to place it in context. During the review of the 1990 CDSS for Mali, and in the subsequent Bureau review cable, participants in the review engaged in a substantive discussion about the strategy behind the proposed Mali program, and the issue of agriculture's role in the economy. The issue revolved around the following question: Is the development strategy outlined in the CDSS based upon expected stagnation, or does the Mission see Mali as being on a growth path? Key to the discussion was the Mission's vision of the country's development over the coming generation. We reaffirm the point made in the the CDSS that our strategy is built upon a view of a growing economy and not of a stagnant one.

What is the scenario for growth for the Malian economy for the coming generation? We in the Mission strongly believe that although Mali is poor, it is not locked into a cycle of poverty. Continued policy reform, encouragement of the private sector and reinforcement of the country's management capacity will help Mali achieve higher growth rates. These rates of growth, however, depend critically on a dynamic agriculture sector which is expanding as a source of food, income, employment and economic growth.

The attached paper presents several key conclusions:

1. **Economic growth is inseparable from growth in the productivity of the agricultural sector.** Growth in agriculture is a *sine qua non* for growth in other sectors. Increased productivity in the agriculture sector will increase rural incomes and provide a broad market for the goods and services of other sectors.
2. **Economic growth will be accompanied by growing demand for millet, sorghum, corn, and other food staples.** As incomes rise, the *per capita* consumption of grains, and in particular of millet and sorghum, will rise. In Mali, these are not inferior goods. Given Mali's demonstrated comparative advantage in agriculture and food crops, reliance on grain imports to meet burgeoning food demand would involve inefficient allocation of resources which would slow economic growth.



3. *Agricultural research has had a larger impact upon production and income in Mali than has been generally acknowledged.* Improved seeds and farming practices have been adopted by large numbers of farmers in farm extension target areas, and (based on solid studies of farmer seed use and on-farm yields) contributed between \$8 million and \$16 million a year to Mali's economy. There remains significant potential for improved productivity.
4. *Increased food crop production is a necessary component of any successful economic growth strategy in Mali.* Growth in the export or the food transformation sector relies upon continuous increases in food crop productivity. Mali's comparative advantage, even under the widest possible variety of assumptions, is mainly in the agriculture sector and in the food subsector. The most optimistic projections of growth in complementary sectors will not obviate the need for growth in the food sector.

What are the implications of these findings for the Mali program? Within a broad sectoral agenda, our focus includes technology generation and dissemination. Through projects such as Farming Systems Research and Extension (688-0232) and Semi-Arid Tropics Research (688-0226) we are exploring ways to increase individual farmer productivity. Further along the chain, in projects like Development of the Haute Vallee (688-0233), Village Reforestation (688-0937) and Livestock Sector II (688-0218) we work directly with field agencies and extension agents to deliver the results of research to farmers. In the area of marketing and distribution, the Cereals Market Restructuring Project (688-0241) works with the public and private sectors to improve the efficiency of the cereals marketing system.

The Mali program in agriculture will continue to focus on these areas. Improved approaches for cereal crop production are essential for Mali's economic growth and stability. The Mission will continue to support the GRM's agriculture research institutes, including their rainfed cereal crop production work. The GRM with Mission assistance is conducting research on cash crops which also have export potential, including corn, cowpeas and peanuts. Efforts in marketing and improving marketing efficiency will intensify over the CDSS period as well.

The preparation of this analysis has been a useful strategic exercise. It has clarified and reinforced the validity of the strategy we chose for the 1990 CDSS. It has resulted in closer collaboration with the country's agriculture research administrators and researchers, and was particularly opportune since it coincided with the GRM's process of preparing their first national agriculture research strategy with the assistance of ISNAR. The results of the analyses contained in this document will be reflected in the PID for the Agriculture Research Support project, for which our design will begin in mid-April.

Attachment: paper entitled "Economic Growth, Food Crop Research and Agriculture in Mali"

cc: AFR/SWA with attachment
AFR/DP "

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CONTENTS

Introduction ...	1
1. What is the "linkage between [USAID] agriculture sector activities and the potential for economic growth in Mali?"	2
Alternatives to an agriculturally-focussed strategy	2
Export opportunities and constraints to diversification	3
Linkages between agriculture, policy change, and macroeconomic factors	5
2. "Should we continue to commit resources to the development of what are essentially low value crops of declining popularity [in particular millet and sorghum] or embark on a more growth oriented strategy?" and "Is our strategy more linked to overcoming hunger rather than achieving growth?"	6
Coarse grain popularity	7
Comparative advantage and the economic costs of food imports	8
Coarse grains as the number one economic priority for Malian farm household production	12
Economic growth linkages with coarse grain production	14
3. "Should AID make a 20-25 years commitment to developing a self-sustaining agricultural research program?"	15
Relationship between technology, policy, and other constraints	15
Long term commitment to agricultural research	16
Mali's agricultural research accomplishments to date and their economic impact	17
Projected agricultural research accomplishments for the short and long term	19
Benchmarks for measuring agricultural research impact	20
4. Is an agriculture sector grant an appropriate instrument for USAID's agriculture sector activities?	22

Annexes

ANNEXES

- Annex 1: Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010.
- Annex 2: Background Paper on Mali's Agriculture Sector and USAID/Mali Agriculture Strategy (update of April 1988 submission for CDSS review)
- Annex 3: GRM list of Improved Technologies developed by Mali's agricultural research agency (I.E.R.)
- Annex 4: Executive Summary of Incentive System and Economic Policy Reform in Mali (AIRD report by Stryker et al. for the World Bank)
- Annex 5: Agriculture - related recommendations of Mali Business Climate Review by Grant and Hanel.
- Annex 6: 1988 CDSS cable
- Annex 7: 1988 ABS cable
- Annex 8: Background Studies on the Relationship Between Food and Agriculture, Private Sector Development, and Economic Growth in Mali.
- Annex 9: Contribution of Improved Seed and Intercropping Recommendations to Mali's Economy

INTRODUCTION

Increased productivity in agriculture and continued progress in policy reform are the two most critical determinants of Mali's economic growth performance for the next twenty years. USAID's program has concentrated on these two aspects of economic growth since program consolidation in 1985. The program during the 1990-94 period will continue the focus on agriculture and policy change.

USAID/Mali has undertaken a series of careful studies, conducted by in-house staff and outside consultants, of policy and productivity constraints in agriculture. These studies, done in 1987 and 1988, served as the basis for the agriculture sections of the USAID/Mali CDSS, for the report (Background Paper on Mali Agricultural Sector and USAID/Mali Agriculture Strategy) which accompanied the CDSS, and for the project designs or redesigns of four major agriculture projects, now completed or almost completed (DHV, Livestock, VRP, and PRMC). During the same period other donors and the GRM also conducted several important agriculture sector studies.

As a result of questions raised during the CDSS and ABS reviews regarding the role of crop technology development in economic growth, USAID/Mali substantially deepened and expanded the analysis performed for the CDSS. The recent analysis has been based on the earlier studies, but also on more recent studies not available at the time of the CDSS, as well as on a thorough review of the agricultural research system now underway.

This paper provides a summary, in easily accessible, narrative form, of recent USAID analyses and their implications for USAID's strategy to promote accelerated economic growth through policy change and agricultural development. The details and technical rationale behind the discussion in this summary paper are found in the annexes.

AID/W interest in USAID/Mali's agriculture strategy and proposed agricultural research activities comprises four separate questions raised in the CDSS and ABS cables. These questions are addressed in turn in the paper. They are as follows:

- o What is the role of agriculture sector activities in economic growth?
- o Does increased food crop production, in particular coarse grain production, contribute to economic growth?
- o Why is agricultural research needed to increase food crop production, and what is its impact?
- o Is an agriculture sector grant a more appropriate vehicle for USAID/Mali's planned agriculture sector activities?

Question No. 1:

What is the "linkage between [USAID] agriculture sector activities and the potential for economic growth in Mali?"

USAID/Mali's 1990-94 CDSS provides a description of the ways in which Mali's agricultural development promotes economic growth. The background paper (submitted for the CDSS review) in Annex 2 of this summary paper provides a more detailed rationale for an economic growth strategy with a major agricultural component. Agriculture is of fundamental importance to Mali's economy, accounting for 50% of GDP, 75% of exports, and 70% of employment. However, building an economic growth strategy where agriculture plays a key role should be first based on a consideration of other alternatives.

Alternatives to an agriculturally-focused strategy

The likely alternative to an economic growth strategy based on agricultural production would be one based on industrial development. The failure of such a strategy in the first two decades of independence of most African countries should not by itself discourage consideration of the strategy now. Early failures were due to severe policy constraints and statist misallocation of resources which prevented an industrial development strategy from ever getting off the ground.

An industrial development strategy would produce goods for either the domestic or international market. This is the crux of the problem with such a strategy. The domestic market is composed largely of rural people with relative low purchasing power. In the absence of an increase in farm incomes, growth of the domestic market for industrial goods, and for services, would be limited to the urban market. Farm incomes can be increased only by increasing the productivity of agriculture. The urban market, despite a very high urban population growth rate, is a very limited one which for the next few years even under the most favorable economic growth scenarios is likely to see very little if any per capita income growth due to the legacy of past bad policies. An industrial development strategy, even in the presence of good policies, would have to rely on the international market to achieve and maintain the capacity-utilization and employment required for economic growth.

A strategy of industrial development for export would promote economic growth only if Mali's comparative advantage in efficient resource use lies in industrial exports. The World Bank recently commissioned a careful set of calculations of comparative advantage for a number of economic activities in Mali (See AIRD report, Annex 4). The results are robust and consistent across crops and subsectors: Mali's comparative advantage lies in agricultural production for domestic markets (grain) as well as export (livestock, cotton). There are a few industrial products in which Mali may have a comparative advantage, as well, but these are without exception processed agricultural products or inputs into agricultural production, almost all of which show a comparative advantage for domestic but not export markets. USAID/Mali's recent Business Climate Review (Annex 5), using an entirely different method and set of data, arrived at a near identical conclusion: that Mali's comparative advantage is in agricultural production, and in processed agricultural commodities or agricultural equipment (plows, cooking oil, textiles, processed milk, tea, skins and hides, feed) the only exceptions being soap and consumer plastic products for the domestic market. A recent workshop on alternative export possibilities sponsored by the Malian Trade Center was focused

primarily on agricultural exports.

Export opportunities and constraints to diversification

location, and resulting high transportation costs, its comparative export is limited to a subset of the goods discussed in the previous section, specifically cotton, livestock, skins and hides, and possibly non-traditional processed agricultural products such as fruits. The agricultural commodities in which Mali has a comparative advantage are primarily for the domestic market, as are the agricultural inputs. These factors mean that the agro-industrial commodities in which Mali has a comparative advantage require continued increases in agricultural production in order to contribute to economic growth. They require increased agricultural production not only because their raw materials (given high inland transportation costs for imported inputs) must come from the domestic agricultural sector, but also because most of the market (that is rural people on farms) will be in a position to purchase more of these products only if their incomes rise, which also requires increased agricultural production. The World Bank has calculated, for other African countries, the magnitude of the effect of farm income on non-farm rural income via these income, raw material, and agricultural input linkages with agriculture. For countries almost as poor as Mali (Sierra Leone, Togo) the results are that every 10% increase in farm income leads via these linkages to an additional 5% increase in non-farm income.

Economic growth is therefore inseparable from growth in the productivity of the agricultural sector. The only industrial development strategy which could succeed would be one which closely resembles that of USAID/Mali, that is building a solid base for enhanced productivity in agriculture, and hence enhanced rural incomes, on the basis of which, in a conducive policy environment, increased agroindustrial enterprises for domestic markets and export can eventually grow and thrive.

A successful economic growth strategy based on policy change and agricultural development would have major effects on urban and rural life and private sector development. First, it is important in order for evolutionary growth in efficient nascent industry to take place that wages remain relatively low. This can only happen if food prices remain at reasonable levels while still, in combination with cost-reducing technology, maintaining production incentives. A successful economic growth strategy will therefore necessarily ensure first that the optimal combination of imports and cost-reducing domestic food production techniques leads to food prices which are not rising. Second, the commercial, agro-industrial, and services linkages deriving from increased productivity and incomes in agriculture will be felt most keenly by a large number of small businesspeople providing inputs and consumer goods and services to farmers and purchasing their raw materials. Third, the hub of many of the private sector, input manufacture, and agro-processing linkages will be in secondary cities.

All of the above is consistent with development theory and with experience in developing countries in other parts of the world. And it has already happened in Mali. The southern zone of Mali where CMDT has increased cotton productivity and production over the past fifteen years has seen a tremendous development of private provision of non-agricultural goods and services in secondary cities serving farmers whose disposable income has increased dramatically due to increased agricultural production. USAID/Mali's activities i. the productive Second Region should produce similar effects, through the DHV and FSR/E projects' impact on farm production and income.

In any consideration of Mali's economic growth prospects based on agricultural production, it is important to recognize that Mali is a country rich in resources. Often the basic abundance in resources is overlooked when Mali is considered as one more dry SWA country. But the marginal Sahelian areas and growing problems of environmental degradation should not obscure Mali's production potential in its extensive and productive southern sub-humid zones. The World Bank/AIRD report (Annex 4) confirms that southern Mali has the potential to produce far greater quantities of agricultural commodities on a sustainable basis. Increasing attention to both environmental protection and improved productivity are required for this to occur, but it can occur. Mali has abundant water and land resources, and good rainfall in the southern zones. In addition, even the marginal northern zones are a very important source of livestock, Mali's second most important export commodity. More details on Mali's resource base are provided in the CDSS and the accompanying Background Paper (Annex 1).

If USAID/Mali is going to continue to provide sustained and reliable support to agricultural development, shouldn't it go with the proven "winners," livestock and cotton production for export? USAID has provided considerable support to livestock development, and the support will continue. It is clear that the next big push on the supply side is likely to involve greater integration of livestock in southern cropping areas. Livestock production and coarse grain and cotton production will become increasingly interdependent.

Concerning cotton, USG policy limits USAID's ability to support cotton production. Other donor resources and expertise are adequate. USAID/Mali has through the OHV project and now through the DHV project provided substantial support to private sector development, food crop production, and policy change in an important cotton area. Expansion of farm to market roads, improved delivery of credit, and more effective extension will continue to have effects on all agriculture activities in the OHV zone. USAID is, in short, providing substantial support to one of the proven export commodities (livestock) and complementary limited activities in the cotton sector which do not however directly increase cotton production.

Agricultural diversification into new crops for export shows little promise for the near future as a major source of economic growth or export revenue. The technical and market aspects of non-traditional crops need further exploration. There are in fact some non-traditional export crops, and other potential cash crops for domestic consumption. The DHV project will be exploring some of these possibilities, especially horticultural crops. The GRM agricultural research institute (IER) also has a research program testing appropriate varieties of soybean, sesame, sugarcane, tobacco, and tea. In addition, there is some possibility for the growth of Bambara nuts, cowpeas, and peanuts as cash crops (more likely for the domestic rather than international market).

However, all of these potential cash or export crops face either serious technical constraints or market limitations. They are worth pursuing and USAID/Mali will be carefully following up on potential opportunities. But at this point major investments to increase their production are not warranted. The other set of crops with some potential for export or domestic market expansion, and with adapted varieties already available, is fruit and vegetable production. Here, however, marketing problems and outlets require a great deal of attention before the launching of any major undertaking.

In short, there is no new magic bullet in the agriculture sector upon

which to base major new initiatives now. Mali's promising export prospects are limited to a few important commodities with well developed marketing channels. In the future other exports and local cash crops will take on a greater importance, but their contribution to GNP is likely in the medium term to remain limited relative to the importance of livestock and cotton exports and production of food crops for domestic consumption, processing, and eventually animal feed.

Linkages between agriculture, policy change, and macroeconomic factors

Unlike the present portfolio, earlier USAID/Mali agricultural activities were not always designed with the promotion of economic growth as their primary focus. Following the end of the Sahel drought of the early 1970's many countries and USAID programs in the Sahel, including those in Mali, were built with their priority objectives being to help farmers and the country to achieve autarkic food self-sufficiency. The USAID/Mali program has evolved since that time. Agriculture remains the major sector, but the approach is now economic growth through agriculture. For example, it is now well known that, first of all, considerable attention is needed in the areas of marketing, local processing, off-farm income linkages, and other areas not directly part of agricultural production in order for actions in the area of agricultural production to be sustained and to increase economic growth. USAID/Mali's current projects are oriented towards relieving the technical, policy, institutional, and infrastructure constraints to agriculture's contributing to economic growth.

Neither agricultural productivity alone, nor ancillary marketing and processing linkages with agricultural production, will have a substantial effect on GDP and exports without overall macroeconomic and sectoral policy changes being sustained and broadened. Policies inside and outside of agriculture need to be improved for adequate growth either in the agriculture sector or the economy as a whole. The budget crisis, malfunctioning financial markets, and tax and regulatory constraints on private business all pose a number of severe constraints on increasing growth in the agricultural sector, and therefore on GDP growth. This is why, both in the agriculture portfolio, and more generally in the economic policy reform activities, USAID/Mali is devoting resources to changing the policy environment.

On the other hand, in the presence of an improved policy environment, economic growth will still be severely constrained unless a major increase in agricultural productivity (and hence in rural incomes and supply of raw materials and food for cities) is forthcoming. USAID/Mali's program, both in its conception and in operational day to day implementation, is therefore not based on agricultural fundamentalism, but rather on a coherent vision of economic growth in which crop and livestock production, marketing, and processing activities (through Livestock, DHV, VRP, PL480 Section 206, as well as USAID agricultural research activities) play a prominent role and provide a strong complement to USAID/Mali economic policy reform activities in promoting economic growth.

Question No. 2:

"Should we continue to commit resources to the development of what are essentially low value crops of declining popularity [in particular millet and sorghum] or embark on a more growth oriented strategy? Is our strategy more linked to overcoming hunger rather than achieving growth?"

USAID/Mali's strategy is to promote economic growth through policy change, private sector development, and increased agricultural productivity in order to increase incomes, nutritional status, and the well being of Malians. Both economic growth and hunger alleviation are integral parts of USAID/Mali's strategy.

The relationship between increased food production and economic growth has been documented for some time. Since the publication of Johnston and Mellor's seminal article on agriculture and economic growth in 1961, followed by work of W. Arthur Lewis on the importance of food as a wage good, and by a number of other researchers on the backward and forward linkages between agricultural production and economic growth, there has grown an enormous body of theoretical and empirical evidence for the critical role of agricultural production, and in particular food production, in economic growth. Much of this work has been conducted by US researchers funded by the USG. Even those scholars who take major issue with donor approaches to agricultural development (such as P. T. Bauer) share the common perception of the key role of agriculture, and in particular food staple production, in economic growth. Indeed it is difficult, in the face of the evidence, to find empirical or theoretical justification for an approach which does not support growing efficiency in food crop production as a *sine qua non* of economic growth.

The scholarly evidence is matched by the experience of AID and its predecessor agencies. With the exception of Hong Kong and Singapore, special cases with no agricultural land base, the newly industrializing country success stories (Taiwan, Thailand, Korea, Malaysia, Indonesia) are countries whose impressive economic growth and industrial development records are based on a solid foundation of rapid growth in food production which was effected in part through substantial USG support. Indeed recent AID testimony to Congress, backed up by substantial AID/W and USDA research, has made the case that development of LDC agriculture including food staples is the best way to help US farm exports. The rationale made to Congress and to US producer groups is that increasing production of food and fiber in LDC's leads to increased economic growth and incomes, thereby greatly *expanding* LDC demand for US exports of food staple crops. This rationale is backed up by several decades of experience and empirical evaluation.

Specifically regarding hunger alleviation, it has been clear for some time in Asia, and is becoming increasingly clear in Africa, that income is a key determinant of nutritional status. An approach which increases incomes, of both farm and non-farm people, is the most broad based approach to reducing hunger. A combination of policy reform, private sector development, and agricultural growth is the most effective way to increase incomes and thereby reduce hunger. The President's End Hunger Initiative supports an approach to agriculture which targets increased economic growth and incomes as the most effective way to reduce hunger. If the discussion is confined to ways to increase agricultural productivity and incomes (leaving aside questions of free food distribution) there is no real distinction between an approach which alleviates hunger and one which increases economic growth. Empirical

evidence regarding the income determinants of nutritional status, and the Agency's own considered approach to implementing the President's End Hunger Initiative, support this approach.

In the specific case of Mali, investment to increase production and productivity of subsistence food crops (specifically the coarse grains millet and sorghum) is consistent with, and indeed a necessary condition for, sustained economic growth for several reasons. First, demand for coarse grains is increasing, not declining, and will increase more with faster economic growth. Second, Mali's comparative advantage in food production means that relying on major increases in food imports to meet growing demand would have important costs in terms of inefficient use of resources and lost economic growth opportunities. Third, increasing farm productivity may free up resources for other economic activities (whereas focusing on those other activities without providing farm households the means to maintain food production levels is unlikely to succeed). Fourth, coarse grains have a number of promising economic growth linkages via processing, marketing, and animal feed.

Coarse grain popularity

With sustained levels of economic growth, Mali's demand for coarse grains for human consumption will increase substantially over the next two decades (See Annex 1). While rice is a preferred commodity whose demand will also expand substantially, there will be a growing market for coarse grains under any economic growth scenario. Carefully conducted urban studies by Tufts University in the past two years have documented that both poor and better off Malians eat more millet and sorghum as well as more rice as their incomes increase. Increased incomes resulting from economic growth of 3% per person per year will lead to increased consumption of coarse grains, in urban as well as rural areas, for some time to come.

Table 1 below illustrates how increased incomes deriving from economic growth are likely to lead to increased consumption of both coarse grains and rice. These estimates are based on the following factors:

- o Fairly high "income elasticity" of demand for rice and coarse grains, that is the increase in consumption of rice or coarse grains which results from increased consumer income. (Estimates come from the Tufts University study.)
- o Estimates of rapid but declining rates of migration between rural areas and towns (where consumption patterns change considerably).
- o Continued population growth.
- o Alternative estimates of economic growth rates. (The fast growth scenario is based on a 3% per capita income growth rate divided between rural incomes growing at 3.2% annually and urban incomes starting at a low 1% growth rate due to the legacy of the past and current economic crisis on urban incomes, and then rising to an urban income growth rate of 2.3% by the end of the twenty-year period. The slow growth scenario is based on a 1% per capita annual growth rate, with urban growth rate being negative (-1%) at the start of the period and growing positive (1.3%) at the end of the period. Results of the analysis are robust under other assumptions of urban and rural growth rates for income and population.)

Table 1: Future Demand for Coarse Grains and Rice

	<u>Fast Growth</u>			<u>Slow Growth</u>		
	1986	2000	2010	1986	2000	2010
Per capita income	\$207	\$313	\$421	\$207	\$238	\$263
Aggregate GDP (\$billions)	1.57	3.45	6.06	1.57	2.62	3.78
Per capita rice consumption (kg)	27	42	52	27	35	39
Per capita coarse grain consumption (kg)	135	151	172	135	131	134
Total rice consumption (000 MT)	207	462	748	207	392	564
Total coarse grain consumption (000 MT)	1,030	1,670	2,470	1,030	1,450	1,937
Population (millions)	7.6	11	14.4	7.6	11	14.4

Table 1 illustrates that the "best case" scenario of economic growth for Mali is fully consistent with growing, not shrinking, demand for the basic food staples millet and sorghum. Under this scenario both population and per capita incomes would approximately double in twenty years, leading to a quadrupling of GDP. Even a "worst case" scenario of stagnant per capita GDP would still see overall demand for coarse grains increasing year by year simply due to the effects of population growth, although increasing substantially less than in the best case scenario of reasonably fast sustained growth in GDP.

In the long run coarse grains will become an inferior good, the per capita demand for which declines as incomes increase. But Mali remains a very poor country, with per capita incomes only half or less of those in Cote d'Ivoire and Senegal, and substantially below those of neighboring Guinea and Niger as well. It is unclear if millet and sorghum are inferior goods with declining demand even in those countries, but even if they are, Mali will take 10 years to arrive at Niger's present level of per capita income, and 23 years to arrive at Senegal's under the favorable economic growth scenario of 3% per capita GDP growth per year. Even two decades from now, however, continued population growth and increased demand for poultry (and therefore coarse grain based feed) could keep aggregate demand for coarse grains on an important level even if per capita direct consumption is declining.

Comparative advantage and the economic costs of food imports

The goals of "drought-proofing" Mali, of making it the "millet basket" of West Africa, or of promoting "food self-sufficiency" for the country, goals frequently enunciated during the 1970's, would have had substantial resource costs and would have further exacerbated Mali's economic problems because, had they led to large scale concrete actions, they would have further misused the meager investment and human resources at the country's disposal. Mali will probably always import some food, including some grain, especially but not exclusively in drought years. Not to acknowledge this would lead to a

misallocation of resources.

However, it is also important to recognize that Mali does have a comparative advantage, given existing resource endowments and location, in producing food and other agricultural commodities. This comparative advantage, as discussed in section 2 above, has been carefully documented by the AIRD report for the World Bank (Annex 4). It is not the imputed "low value" or "high value" per se which should guide Mali's investment decisions, but rather the country's relative productivity (given border prices and the productivity of other countries) in producing different commodities. The country will achieve better resource utilization, and hence higher economic growth rates, to the extent that it avoids importing goods in which it possesses a comparative advantage.

Table 1 above shows the best estimates available of Mali's grain consumption levels in the years 2000 and 2010. As discussed in Section 4, below, of this report, agricultural research has already made a measurable and important contribution to Mali's ability to produce more grain in the face of a trend of increasing grain deficits. Further increases in productivity are needed for Mali to continue to meet an important proportion of the much greater demand for coarse grains and rice which will be present in the Years 2000 and 2010. Without such increased productivity, Mali's grain imports would pose a large and growing burden on the economy.

Mali has already become an important grain importer. During the 1977 to 1988 period, average grain imports were 155,000 MT per year, of which 96,000 were imported commercially. While some of this was rice for the Bamako market (in which Mali's comparative advantage is questionable), much of it was to make up a shortfall in coarse grains (as well as in rice outside of Bamako), for which Mali does have a comparative advantage. (Commercial contacts of Malian traders and the poorly developed world market for millet and sorghum have resulted in a situation where much of the rice imported commercially in bad years is to fill a deficit in coarse grains.) The value of commercial grain imports in the 1981-85 period on average was \$29 million a year. Mali's commercial imports have on a temporary basis fallen off considerably during the last two years due to a ban on commercial rice imports (lifted in June 1988), a good harvest in 1986, and, for the most recent year, a record breaking production season.

Mali's grain import position is somewhere between that of Burkina Faso and Niger on the one hand and Senegal on the other. All of these countries, like Mali, have seen continuous growth in their food deficits and grain imports over the past decade. In Burkina and Niger, imports between 1982 and 1987 have remained on average approximately 7% and 9% of average production, respectively, whereas in Senegal, imports have been half of average production levels. Mali's grain imports during the same period were equivalent to approximately 14% of its average production. Unlike Senegal, Mali's imports remain cyclical and can be minor in some years (as in 1987 and 1988). The cost of these grain imports were, in Burkina, approximately 18%-21% of its available foreign exchange (as defined by USDA), in Senegal, approximately 25% of its available foreign exchange, and in Mali between 20% and 30% of its available foreign exchange.

Table 2 below examines different scenarios of grain imports for the next twenty years. Table 2 does not distinguish between food aid and commercial imports. Rather, it looks at total likely food imports (from any source) and total likely overall import levels (a substantial portion of imports being funded not by GRM foreign exchange but by donor grants), to illustrate the share of

total imports that grain could take in the future.

Table 2: Grain Imports in the years 2000 and 2010
(in 000 tons and \$ millions)

YEAR	Stagnant grain production		Slow growth in grain prod.		Moderate growth in grain production	
	2000	2010	2000	2010	2000	2010

Past economic growth						
Imports in tons (000 MT)						
Rice and coarse grains	731	1595	495	1095	208	396
Coarse grains alone	1595	999	214	603	0	105
Imports in dollars (\$ millions)						
Rice and coarse grains	203	590	139	409	61	152
Coarse grains alone	107	355	29	214	0	37
Total projected import value (\$mlns)	860	1600	860	1600	860	1600
Projected cotton export receipts	450	800	450	800	450	800
Slow economic growth						
Imports in tons (000 MT)						
Rice and coarse grains	441	879			137	107
Coarse grains alone	183	467			0	0
Imports in dollars (\$ millions)						
Rice and coarse grains	124	329	62	147	41	42
Coarse grains alone	49	166	10	25	0	0
Total projected import value (\$mlns)	600	1020	600	1020	600	1020
Projected cotton export receipts	300	350	300	350	30	350

NOTE: Zeros under moderate growth in grain production denote surpluses. The extent to which these surpluses would in fact be produced would be highly dependent on marketing, processing, and export opportunities.

Exports are currently running at about \$200 million per year, of which cotton and livestock make up about 75% while import cutlays are about twice this (\$400 million per year). Taking into rough account likely international or regional price developments for Mali's principal export products (cotton, livestock, and gold) over the next twenty years, and the potential for expanding production of these commodities for export, it can be estimated that Mali's export receipts could range anywhere from \$300 million to \$450 million in the year 2000, and between \$350 million and \$800 million by the year 2010. To reach the \$800 million level would almost certainly take a considerable development of currently minor or not yet existent new exports.

Mali benefits from considerable foreign assistance on highly concessional terms, and can expect to continue to do so in the future even with rapid growth, since even with rapid growth it will remain among the world's poorest countries, but the flow of foreign assistance is not enough to eliminate the balance of payments deficit. With slow growth and an imports-to-GDP ratio at the current level of 27%, the total import bill for all imported commodities in

2010 would be 1.02 billion dollars, while with rapid economic growth the import bill could reach \$1.6 billion (about the level of today's GDP).

Despite Mali's trend of growing grain imports, the value of grain imports to date is only a small proportion of overall imports. The important insights to be drawn from Table 2 have little to do with absolute grain import levels, but rather the relationship between grain import levels and available resources for imports. It is clear from Table 2 that increases in grain imports could comprise an increasingly large share of total outlays on imports if grain production stagnates or grows very slowly.

The major impact of improved cereals productivity, in either a rapid or a slow economic growth case could be more on the composition than on the level of imports. With a more productive cereals agriculture, Mali could spend more of its foreign exchange earnings on investment goods and services than would otherwise be the case, thereby permitting an increased share of imports to be devoted to the kinds of goods and services which would speed economic growth.

It is important to note that the import bill figures in Table 2 are not predictions. They are rather the best estimates of what could happen were current trends to continue. The estimates were made selecting a base period which was fairly favorable for production (the 1985-87 period). Were a different base period selected (eg, 1981-85) the projected grain production levels would be substantially lower. There are a number of factors which could prevent the food import bill from ballooning as implied in Table 2. First, of course, the moderate growth rate scenario for grain production would eliminate coarse grain deficits, though not rice deficits. Second, negative per capita economic growth or no growth would of course be accompanied by substantially less demand for coarse grains. Third, reduced grain intake, rather than increased imports, might also occur, especially as would take place either in a negative growth situation or in a situation where the government decided to close its borders or put strict limits on food imports in the future. (Table 1 illustrates on a per capita basis, in the "Slow Growth" columns on the right how slow economic growth would be accompanied by a reduction in grain consumption levels.)

Fourth, rapid (rather than moderate) growth in food productivity (as examined in Annex 1) could eliminate or substantially reduce the coarse grain deficits projected in Table 2. This scenario is not included in the table however because it would require increased yields in excess of what it is reasonable to expect over the course of next few years. By contrast, the moderate growth scenario is based on modest yield increases that under a sustained and healthy research program could be maintained.

The last possible way to neutralize the problem of large and growing coarse grain imports would be to generate sufficient export revenue so that the imports were a relatively less important factor than they are made out to be in Table 2. This would require a broad and successful effort in export diversification and market research, and since Mali's comparative advantage in exports is largely in agricultural exports, it would require a major effort in agricultural diversification. Over the course of the next ten years such an approach might be productive if promising crops and market opportunities are identified and thoroughly explored. However, it is not productive for the present, although it remains important to examine alternatives and continue to look into possible new export crops and markets. Despite a lot of work done on various alternative crops by IER, Mali has at present no promising alternative crops on which to base an agricultural diversification strategy

sufficiently broad for it to have any appreciable effect on exports. Were such alternative crops and marketing outlets identified, it would make sense to devote a great deal of attention to them. It would not, however, make sense to reduce USAID efforts in improving coarse grain productivity at least unless and until such alternative export opportunities were well established and had proven themselves as reliable and substantial foreign exchange earners. Moreover, as discussed in Section 2 above, the marketing problems faced by Mali in any such strategy are far greater than those faced by many other African countries.

Coarse grains as the number one economic priority for Malian farm household production

In addition to the economy-wide explanations lying behind USAID/Mali's work on coarse grain productivity, there is an important complementary microeconomic explanation at farm household level. This microeconomic foundation of USAID/Mali's strategy relates to the behavior of the millions of rural people who are integral to any successful economic growth strategy in Mali, both as consumers and producers. It is also related to the economic growth linkages discussed in section 2 above.

With very few exceptions, the key objective of rural Malians is household food security. Food security does not mean autarky. Across zones and income classes farm households engage in a large number of economic activities, and rely on the market and other transactions for earning important portions of their income and for purchases of goods and services. The idea of a self sufficient subsistence farmer is therefore an inaccurate characterization of the Malian farmer. However, when it comes to food consumption, the market is perceived as too risky, and farm families prefer to rely as much as possible on home production. The market is risky due to both physical conditions (huge supply fluctuations due to climate and pests) and institutional ones (changing government marketing policies, underdeveloped marketing channels, and hence unpredictable changes in price or availability of food).

Farm households with adequate resources (accounting for between 35 and 50% of families in the productive southern zones) use their resources to produce all the food they need rather than purchase it. These are the better off families in those zones. Poorer families, with inadequate resources to produce all of their consumption needs, rely on the market to purchase food. But if their resource endowments increase, the additional resources are used to increase the proportion of family food needs produced at home. The economic objective of household self-sufficiency in food production has a cultural correlate, with a farmer's wisdom and basic competence called into question if the granary is not full enough to meet responsibilities for feeding the family.

It is possible to misinterpret some recent results on non-farm income sources of rural households in the Sahel. Recent research by Michigan State in Mali and others in other Sahel countries has documented the important role of non-farm income sources as a source of cash to purchase food for more than half of rural households. It is important to keep in mind that almost all these income sources are related to agriculture and have as their market not the rest of the world or even Bamako, but rather other rural people. By far the majority of non-farm income sources are from rural or agriculturally based activities such as hunting, weaving, mat-making, carpentry, masonry, and the sale of small ruminants. These activities could not provide the basis for an

agriculture export diversification strategy capable of generating the foreign exchange required to meet a growing grain import need.

The "food first" strategy of rural households presents a dilemma. Any successful economic growth strategy requires rural Malians to produce more than food, and to increase their production of other goods and services for domestic and export markets. But given the motivations of farm households in their resource use, under what circumstances would they produce more non-food commodities? For households in the productive southern zones, any activity which permits them to achieve household food security with fewer resources is likely to free up resources for non-food income-producing activities. USAID/Mali's Farming Systems Research and Extension project has confirmed the implications of the Michigan State research, that when households have achieved their target level of food production, they shift their labor and land resources into production of other crops. So increasing the productivity of household food production activities leads to a reallocation of resources, in the aggregate, towards the non-food activities required for sustained growth in rural incomes, exports, and production of goods in addition to food for sale on domestic markets.

Projects in Mali whose objective is to increase export production (specifically cotton and livestock production) build their intervention strategies on the basis of the household food security strategy discussed above. For example, in CMDT zone, the cotton-based intensive farming system developed over the past decade includes a cereal rotation which permitted farmers to maintain their millet/sorghum production levels, and increase their corn production levels, while increasing production and income from cotton. Without this attention to maintaining basic grain staple production levels, the number of farmers participating intensively in the CMDT activities, and overall cotton production, would likely have been far less than current levels.

Similarly, livestock activities focussed on increasing forage production have tried to increase labor productivity on coarse grain fields in order to free up working time for forage production activities. It is unlikely that farmers will devote any substantial time to forage activities which compete with grain production activities, so an approach to forage production which increases coarse grain productivity has been judged by ILCA and other livestock sector activities as the most promising approach to encourage farmers to increase forage production.

The experience in Mali thus lends support to conclusions emerging from other African countries, that the distinction between cash crops and food crops is often overdrawn. As discussed above, household food security concerns mean that any cash enterprise on the farm is likely to be enhanced and receive more resources, not fewer, to the extent that household food security and food production increase. Also, both cotton and livestock serve to directly increase food crop productivity, as a result of the complementary inputs provided by cotton and cattle to food crop production. But in addition, food crops increasingly become cash crops as economic growth proceeds. They become cash crops for export (as with Malian corn in Cote d'Ivoire, Malian millet in Mauritania, and Nigerien cowpeas in Nigeria). Also, as domestic incomes increase, the opportunity cost of time for home food processing and preparation increases, and processed food products become increasingly important. Processing of local food products has very important linkages with the growth of small, efficient private firms, increased off-farm employment, and the expansion of secondary cities. In addition, as demand for food and local food processing services increase, rural incomes will increase and create a growing market for non-farm goods and services, thereby

further enhancing economic growth.

Economic growth linkages with coarse grain production

Due to the "food first" strategies of farm households and the risky and variable nature of grain production in Mali, better off households in good years often "overshoot" their grain production goal. The result is marketed surplus. If the weather patterns of the past four years hold up, then Mali will occasionally have surplus coarse grains over and above normal coarse grain consumption requirements. This in no way obviates the need for continued increases in productivity in coarse grain production, since these surpluses and even larger ones could be absorbed by local and export markets, but it does suggest some important opportunities. USAID/Mali examination of these opportunities is only beginning, and will continue as part of the proposed agricultural research activities as well as other activities.

There are three important opportunities where coarse grains could provide important growth and income linkages. These opportunities could exist in any production year, but especially in better years. First, Mali is already an exporter of some grain to Mauritania, Senegal, and Ivory Coast. Developing and encouraging these export channels (especially through policy change to facilitate exports) could help increase Mali's import receipts. The conventional wisdom that when one Sahel country has extra grain they all do is simply inaccurate, as is amply demonstrated this year.

Second, there appears to be real promise in several products derived from millet, maize, and sorghum to create value-added through the production of time-saving convenience foods which could substitute for rice and thereby also contribute to reducing the rice import bill. The food technology laboratory at the agricultural research institute is actively pursuing these possibilities with USAID encouragement and assistance. Its efforts are focused on small-scale flexible production processes requiring neither large milling operations nor government intervention. Its efforts are being undertaken in full knowledge of the disappointments of attempts to do this (via overambitious industrial-scale approaches) in Senegal and other African countries in the recent past.

Finally, the possibilities of developing a small feed industry based in part on coarse grain are only in the very early stages of examination, but show some promise, especially in light of likelihood of increased availability of vaccines for poultry. This will substantially reduce risks to poultry producers and thereby create an situation where feed purchase becomes an economically viable option.

Question No. 3:

"Should AID make a 20-25 years commitment to developing a self-sustaining agricultural research program?"

Mali needs to sustain its commitment to agricultural research over the long term. It is clear from the previous sections that increased productivity in the coarse grains subsector is a necessary condition for sustained economic growth in Mali. Increased productivity requires long term support to agricultural research. It took several decades for functioning agricultural research systems (such as those in the US and in some exceptional eastern and southern African countries) to produce a steady stream of productivity-enhancing techniques and varieties, but the rates of return from such efforts have been extremely high.

Fertility, hydrological, biological, and labor constraints are important contributing factors to the slow growth of food crop production in Mali. Only by developing improved technologies to overcome these constraints can the productivity of land and labor be increased, and food crop production be put on a path to keep up with population growth and enhance rather than hinder economic growth. Agricultural research is required to develop not only varieties producing higher or more stable yields per unit of land, but in many cases to develop soil and water management techniques to uncrease yields or to devise tools and methods for sustainable increases in area cultivated.

AID does not have a twenty-five year planning horizon. Discussion of USAID/Mali commitments in terms of such long time periods has little operational value. The more important questions are: Does agricultural research merit continued support (from whatever quarter, including most importantly the GRM) for an extended period of time? If so, has the GRM itself indicated its long term commitment to support agricultural research? If the answers to those two questions are affirmative, then within USAID/Mali's long term planning mechanisms (principally the CDSS) plans to support agricultural research are appropriate. The sections below deal with the need for long term research as a complement to other important actions in the agriculture sector, to the government of Mali's commitment, to the past and prospective accomplishments of agricultural research in Mali, and to benchmarks to assess its impact.

Relationship between technology, policy and other constraints

Over the past two CDSS periods, USAID/Mali has learned that focusing on a single "key" constraint in isolation brings unsatisfactory results. Experience since the initiation of Sahel Development Program activities in Mali has been that an interrelated set of policy, institutional, infrastructure, and technical constraints block Mali's agricultural development, and hence put severe constraints on its contributions to economic growth. After several years of focusing primarily on one or another of these constraints, the last CDSS period (1985-89) saw a coherent program addressing the complex of these constraints broadly across the agriculture sector, but also specifically in the millet/sorghum subsector.

The new DHV project, through direct and indirect assistance to village cooperatives, private firms, and extension agents, will increase agricultural production and in particular food crop production in one of the high potential southern zones. The PRMC projects have created, and now will sustain and improve, the price and marketing environment for production. The VRP

redesign now focuses principally on agro-forestry with an objective of sustained increases in food crop production. Other donors support, in collaboration with USAID/Mali, policy changes to encourage coarse grain production, and, separately, extension, seed multiplication, and other institutional and infrastructural actions needed for sustained increases in coarse grain production.

Through these projects USAID is addressing the policy, infrastructure, and institutional constraints on food production in Mali. Investment in complementary research and development activities through agricultural research is required to develop more productive technologies if the USAID/Mali food crop activities through existing projects are to reach their fullest impact.

In addition to increasing coarse grain productivity, increased stability in coarse grain production is also needed for agriculture to contribute importantly to economic growth. Agricultural research is targeting improved productivity (in the better favored southern zones with less rainfall risk) while targeting stability (drought and pest resistance) in the less favored zones. Stability of production is important for two reasons. First, as discussed in Section 3 above, at the household level, more stable production leads to greater household food security and therefore to increased willingness and ability of households to produce non-food goods and services for the market. At the same time, some key economic growth linkages to agriculture, in particular forward linkages with feed and food processing firms located in secondary cities, will require stable supplies of commodity inputs if they are to develop and survive. The PRMC and DHV project are helping private firms gain access to the credit, information, and storage needed for more stable supplies. But improved technology is also a very important factor in reducing the extreme variability now resulting from crop response to drought and pests.

Long term commitment to agricultural research

Successful production of a continuing stream of improved technology takes a long time. A continuing stream of new technology, not a one shot increment, is required, because each new technology brings in its wake a new set of pest and other problems, and because just to keep up with coarse grain demand will require continued increments in production for the foreseeable future under any scenario of economic growth (See Annex 2. Major successes in agricultural research with a broad based impact on agricultural production and economic growth (eg, Zimbabwe and Kenya for corn, Nigeria for palm oil before bad policies ruined the palm oil industry) are based on a slow and incremental process of development of varietal collections, breeding lines, human resources, and experience which began in the 1930's and 1940's. Mali is already well on its way to having in place the necessary staff, infrastructure, and research plans required for an effective and sustainable research system. But continued support will be required for a substantial period of time before these material and human resources develop the experience, linkages, and breeding material required for a productive, self-sustaining research system having a broad and continuing impact on food production.

The GRM is committed to the development of food crops and specifically to long term research to develop improved food crop technologies. Its food crop commitment is most clearly stated in its Food Sector Strategy, whose implementation continues to be monitored through a GRM interministerial working group. The GRM's continued support to the PRMC food crop

marketing liberalization process is additional evidence of the GRM's commitment to food crop development.

The GRM's specific long term commitment to agricultural research is manifested through several recent developments. First, the agricultural research agency (IER), during a period of major GRM retrenchment and cutback, recently requested and was granted an increase in its budget. Second, IER continues to have a broad and competent staff of Malian researchers and professionals, despite major personnel cutbacks in other government agencies during the continuing GRM fiscal crisis. Third the GRM recently made a very difficult bureaucratic decision which is crucial to a well-functioning agricultural research system. It decided to merge the crops research institute with the livestock and natural resources institute despite substantial political and administrative cost since each is currently assigned to a separate ministry. Fourth, the GRM with World Bank and AID encouragement and funding has undertaken an intensive six month review of its agricultural research activities, resources, organization, and priorities, and is developing a comprehensive national agricultural research strategy.

The final indication of the GRM's commitment to a long term agricultural research program on food crops is the seriousness with which the GRM has assisted USAID/Mali respond to AID/W questions regarding agricultural research. In depth discussions of research accomplishments to date and their effects on economic growth have not only shown GRM's interest in long term sustainable agricultural research, but have also helped strengthen the planning exercise that IER is currently conducting.

Mali's agricultural research accomplishments to date and their economic impact

A serious and intensive effort to improve coarse grain production technology began in 1977. The early years were years of trial, error, disappointment, and little progress. Asian millet and sorghum varieties yielded below local varieties on Malian farms. Crosses between Asian and local lines showed no promise. Varieties which yielded well on station were unacceptable to farmers because they were much more vulnerable to the inherent instability and risks involved in on-farm grain production.

However, since then agricultural research has made significant progress for a young agricultural research system. Its institutional accomplishments include a large number of Malian scientists trained at US, French, and Nigerian universities, as well as at ICRISAT-Center in Hyderabad, and increasingly productive linkages, especially in the past twelve months, between agronomic, farming systems, and livestock researchers on the one hand and extension organizations on the other. Another critical institutional linkage, missing in many other countries in Africa, is a very strong consumer acceptability component to all the varietal work.

The accomplishments of the agricultural research system in laying the technical basis for a continuing stream of improved technology are essentially threefold. First, from a void 12 years ago, through disappointing and unusable results during the first several years of variety trials, there now exists high potential breeding material based both on local selections and Asian or other African selections, permitting a number of promising developments in breeding and varietal selection. Second, an infrastructure of on-farm trials is in place, which, while it needs improvement, provides an important complement to existing on-station research. Third, many of the key interactions and problems involving field crops, pests, soil moisture, fertility,

and livestock are identified.

Finally, and most importantly, the institutional and technical progress has permitted a limited but nevertheless impressive set of varieties and recommendations to be extended and *adopted at farm level*, in spite of the other constraints (specifically seed multiplication and extension, constraints which are now being addressed) preventing their broader adoption. Some of these results adopted at farm level have improved yield stability (thereby increasing yield averages across a period of several years by providing an acceptable yield in poor years when other varieties produce very little); others have increased yield in good and bad years alike; others have permitted yield maintenance at a lower and cheaper level of inputs. The GRM's own enumeration of new techniques and varieties which it has produced (Annex 3) as well as the Agricultural Research Annex to the CDSS provide details on accomplishments of Mali's agricultural research system to date.

Use of improved varieties has been the subject of a well-conducted study. Combining the results of this study with reporting from the cotton zone on adoption of an improved corn/millet intercropping recommendation permits some rough estimates about the contributions of some of the accomplishments of agricultural research to GDP (see Annex 9). Based on actual *on-farm* yield increases and adoption rates these improved varieties and the intercropping recommendation are estimated to have produced net incremental benefits annually of about \$16 million. This is in excess of past, current, or planned annual levels of total donor and GRM investment in agricultural research.

It is the economic impact of varietal improvement and intercropping which are discussed above mainly because it just happens that the best information on farm-level adoption rates is available for those particular activities. However, the agricultural research efforts to date have not been confined to varietal work. Work on agronomy, soil and water conservation, and natural resources management is also underway. Under the new GRM strategy, greater research resources will go into soil, water, and natural resource management research. In addition, from the beginning of Mali's serious work on varietal yield improvement in the 1970's, research on consumer acceptability has been a critical supporting element of such research. This partnership between crop scientists and food technologists has recently produced a new food product in the early phases of consumer testing. The product is a parboiled millet or sorghum product, which if consumers accept it as a rice substitute, could, in years of millet/sorghum surpluses, serve as an outlet for the surplus.

Some of the most important agricultural research accomplishments adopted to date at farm level are listed below:

- o Corn/millet intercropping in rotation with cotton
- o Substantial adoption of local improved varieties and introduced varieties (corn, sorghum, cowpea, cotton)
- o Improved rice varieties in all major rice producing ODRs
- o Rapid and spontaneous adoption of high yielding cowpea varieties
- o Substantial replacement of chemical fertilizer by locally produced rock phosphate and manure, beginning with 1987/88 production year
- o Cotton sector performance based in substantial measure on improvements

in varieties, input mix, and cultural practices coming out of agricultural research

These improvements need to be built on, expanded, and continually increased in order for agricultural research to have a sufficient impact on food production, thereby enhancing economic growth rates.

Projected agricultural research accomplishments for the short and long term

The most important accomplishments of agricultural research for the next five to fifteen years are likely to be as follows:

5 Years from now at farmer adoption state

- o More varieties which are drought-resistant
- o Several better yielding or more stable intercropping combinations.
- o Improved soil-water management
- o Improved stability/yield from improved physiological/plant nutrition factors.
- o 25-50% average yield increase among adopting farmers in semi-arid zone
- o Yield increase for adopting farmers in sub-humid zone.
- o Processed food or feed products developed by research being widely used.
- o Broader use of rock phosphate in more productive mixtures.
- o Increased use of mechanical seeding/weeding and of donkey plow.

5 Years from now at institutional/scientific level.

- o Close collaboration between disciplines (eg breeder, entomologist, physiologist working on same problem) and divisions (eg DRA/DRSPR/On-farm test service)
- o Critical mass of Malian scientists for both millet and sorghum
- o Constraints beyond station research (on-farm testing and seed multiplication) overcome.

10 to 15 years from now at farmer adoption stage

- o Pest-resistant varieties and practices (especially headbug, molds, birds)
- o Alternative crops
- o Soil amendments (chemical and organic) especially in sub humid zones
- o Relay cropping and/or ratooning

- o *Striga* resistance
- o Agroforestry practices
- o Alternative crops.

Benchmarks for measuring agricultural research impact

While available information permits the rough order-of-magnitude assessment calculated above for the contributions of agricultural research to economic growth, more refined benchmarks are needed for future evaluation of agricultural research impact. As with many AID projects, some of the most useful and revealing benchmarks are only proxy measures of the key success variable, which itself may be harder to measure, or take longer to change, than the proxy variable. For example, the effects of tax and regulatory reform activities on GDP are difficult to directly measure because they depend on the decisions made, in an environment of improved incentives, by thousands of dispersed businesspeople. This is analogous to the situation with agricultural research, whose impact on GNP is determined by the technology adoption decisions of hundreds of thousands of small farmers. It is important to attempt to directly sample the population affected, but also (especially because of the long lead time required in agricultural research) to assess proxies for farm level impact, as well as to assess the effectiveness of agricultural research in producing promising technologies which are not yet at the farm level adoption stage.

The following proposed benchmarks include measures of both impact probability (the research productivity benchmarks) and actual impact on farm production and GDP (the economic growth benchmarks).

Proxy indicators of research productivity

- o Number of experimentally confirmed research hypotheses.
- o Years of experience/years of training/disciplinary mix of research staff.
- o Numbers of, and channels for, on-farm tests of promising varieties and practices.
- o Numbers of collaborative linkages (meetings, working groups, field days, training sessions, joint research activities, peer review activities) between farmers, extension, seed multiplication, and policymakers.
- o Institutional memory: Number of current research activities explicitly building on past experience.
- o Planning and strategy competence: Percentage of documents, trials, and research activities based on clear and explicit identification of key constraints and on priority research planning based on constraints analysis.
- o Number of technical journal articles published

Real indicators of research productivity

- o Numbers of interim research inputs developed (eg, breeding lines, animal traction experimental prototypes, ridging or weeding methods tested.)
- o Number of research outputs: Varieties, practices, or other recommendations entering on-farm testing, pre-extension, or extension stages.
- o Number of the two above sets of indicators which explicitly target priority problems or opportunities which have been clearly identified.

Proxy indicators of economic growth impact

- o Number of farmer collaborators or pilot farmers using new varieties inputs, or technical recommendations developed by agricultural research.
- o Percentage of agricultural research recommendations tested, used, extended, or sold by private firms, NGO's, and donors.

Real indicators of economic growth impact

(These are the most important, but the most difficult to measure and the hardest for which to disaggregate the portion of benefits attributable to agricultural research. The lag time between these and agricultural research actions is also the longest. It is therefore inadequate as a measure of economic growth impact to attend only to this set of measures and avoid the three preceding ones.)

- o Number of hectares in improved technology
- o On-farm yield or area increases resulting from farmer adoption of recommendations, net of costs
- o Percentage of the incremental crop production used for household home consumption, export, cattle feed, food processing for sale, or sale in cities.
- o Multiplier reflecting impact on national income of an increase in farm income
- o Increased farm income resulting from technical adoption
- o Given a rough assessment of value added in agriculture for each group of crops, and an assessment of the farm to non-farm income multiplier, proceeding from the economic growth benchmarks to an actual assessment of the rough impact on GNP is fairly straightforward, as outlined in Annex 9.

Question No. 4:

Is an agriculture sector grant an appropriate instrument for USAID's agriculture sector activities?

A sector grant is generally but not always most appropriate as a means to effect policy change in a sector. It is not the most appropriate instrument in the case of USAID support to Malian agriculture. USAID/Mali's current approach to agricultural policy reform, an approach whose results have been strongly positive, and whose rationale forms part of the CDSS strategy, is to effect policy changes in the agricultural sector through a mix of several discrete but related activities.

USAID/Mali's current and planned approach to sector policy reform in agriculture is the best approach available, in terms of its past and expected achievements, and in terms of the Malian institutional environment and the resources available to USAID/Mali. Three separate ministries (Agriculture, Livestock and Natural Resources, and Finance and Commerce) each have critical decision-making as well as policy implementation roles in the agricultural sector. A sector grant would face the unacceptable choice of either diminishing program linkages with two of the three key ministries in the agricultural sector, or else of creating an interministerial coordinating mechanism whose prospects would not be favorable in the Malian institutional environment. Beyond the institutional problems attendant on a sector grant, the resources available to USAID/Mali for use in an agricultural sector grant are not conducive to such an approach. These resources comprise DFA and food aid, with two different sets of management guidelines and regulations, and, again, different sets of institutional linkages with the GRM. USAID/Mali's current approach to sector reform in agriculture is both more effective and less complex than a sector grant approach would be.

The most effective approach to USAID/Mali's policy reform activities is through individual projects. USAID/Mali's agricultural projects have already produced substantial quantifiable results in the policy area. A shift from the current, highly effective, project-based policy reform approach in agriculture to a sector grant approach would be disruptive and cause a loss of momentum, and would be less effective than the current approach.

Agricultural policy reform in Mali is a complex process requiring different instruments and mechanisms to achieve different objectives. Among USAID agricultural activities, only in PRMC are major sector grant-type resource transfers now a specific part of the policy reform process. In the Upper Valley Development (DHV) and Village Reforestation (VRP) projects, the nature of the policy dialogue dictates that the individual project is a much more effective instrument by which to achieve policy reform.

As discussed in the CDSS and in more recent reporting, USAID/Mali's approach to policy reform in the agricultural sector has produced and continues to produce results. These results, and anticipated upcoming policy reform actions, include the following: Under PRMC activities, OPAM staff has been cut by 50% and its activities limited to humanitarian and market information functions; official grain prices have been abolished; cross-border trade in grain has been substantially liberalized. In the DHV project, the first restructuring of a GRM Rural Development Organization has begun with a 50% staff reduction underway; transport of cotton has been shifted from the OHV organization to the private sector; equipment and input supply functions are being devolved to the private sector. The Livestock project is working to privatize the delivery of veterinary services and may review the tax and

licensing system for live animal exports. Under the VRP, a study of land and tree tenure policies affecting natural resource management will be conducted. USAID/Mali has an active and productive project-based policy reform agenda, which has effected major changes in agricultural policy, and which will continue to do so.

ANNEX I - SCENARIOS OF ECONOMIC GROWTH, GRAIN CONSUMPTION, EXPORT REVENUES AND FOOD IMPORT NEEDS
TO THE YEAR 2010

I. Background

1986 1987 1988 1989 1990 1995 2000 2005 2010

Income or Expend-
 iture elasticities (% change in consumption / % change in income or expenditure)

Mali and the Sahel:	Mali	Sahel av.
	-----	-----
millet & sorghum	?	0.190
urban	0.514	?
rural	?	?
rice	?	0.930
urban	0.593	?
rural	?	?

Mali:

Purchases of millet and sorghum pc pa	
urban Mali -- kgs	54
Purchases of rice pc pa	
urban Mali -- kgs	
Consumption of millet and sorghum pc pa	80
rural Mali -- kgs	164
Consumption of rice pc pa	9
rural Mali -- kgs	
Consumption of millet and sorghum pc pa	
Mali average -- kgs	132
Consumption of rice pc pa	
Mali average -- kgs	26

ANNEX 1 - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

II. GDP and Consumption Projections: High growth Scenario (3% p.a.)

	1985	1987	1988	1989	1990	1995	2000	2005
GDP pc in dollars	\$ 207	213	220	226	233	270	313	363
urban GDP pc	311	314	317	321	325	352	390	444
rural GDP pc	171	176	182	188	194	228	266	309
GDP pc check	207	213	220	226	233	270	313	363
urban GDP pc/rural GDP pc	1.82	1.78	1.74	1.71	1.68	1.55	1.47	1.43
rate of growth of GDP pc	3.0%	rate of growth of urban						
rate of growth of urban GDP pc	1.0%	pop.: 6.70%pa PLUS						
		-0.18%						
		p.a.						
rate of growth of population	2.7%							
share of population urban	25.8%	26.8%	27.8%	28.8%	29.8%	34.2%	37.7%	39.8%
share of population rural	74.2%	73.2%	72.2%	71.2%	70.2%	65.8%	62.3%	60.2%
rate of growth of urban population	6.7%	6.5%	6.3%	6.2%	6.0%	5.1%	4.2%	3.3%
rate of growth of rural population		1.3%	1.3%	1.3%	1.3%	1.4%	1.7%	2.2%
rate of growth of GDP pc		3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
rate of growth of urban GDP pc		1.000%	1.100%	1.200%	1.300%	1.800%	2.300%	2.800%
rate of growth of rural GDP pc		3.176%	3.195%	3.211%	3.224%	3.238%	3.152%	2.971%
pc demand for millet and sorghum								
urban	54.0	54.3	54.6	54.9	55.3	57.6	60.8	64.9
rural (mid-range estimate)	164.0	166.7	169.4	172.2	175.1	190.1	206.3	223.0
pc demand for rice								
urban	80.0	80.5	81.0	81.6	82.2	86.2	91.7	99.0
rural	9.0	9.2	9.3	9.5	9.7	10.7	11.7	12.8
population (millions)								
urban	7.60	7.81	8.02	8.23	8.45	9.66	11.04	12.61
rural	1.96	2.09	2.23	2.37	2.52	3.31	4.16	5.02
	5.64	5.71	5.79	5.86	5.94	6.35	6.87	7.59
GDP - billions of \$	1,573	1,664	1,760	1,862	1,970	2,609	3,455	4,576
total demand for millet & sorghum MTs	1,030,712	1,065,792	1,102,109	1,139,738	1,178,763	1,398,301	1,670,424	2,017,363
urban -- MTs	105,883	113,558	121,646	130,156	139,097	190,470	253,094	326,217
rural -- MTs	924,829	952,234	980,463	1,009,582	1,039,666	1,207,831	1,417,330	1,691,145
total demand for rice	207,617	220,752	234,586	249,142	264,440	352,771	462,336	594,356
urban -- MTs	156,864	168,366	180,514	193,324	206,815	284,978	381,793	497,107
rural -- MTs	50,753	52,386	54,073	55,818	57,625	67,792	80,544	97,249
National pc demand for								
millet and sorghum	135.6	136.5	137.5	138.4	139.4	144.8	151.4	160.0
rice	27.3	28.3	29.3	30.3	31.3	36.5	41.9	47.1
Percentage change in								
total demand								
millet and sorghum		3.40%	3.41%	3.41%	3.42%	3.52%	3.70%	3.95%
rice		6.33%	6.27%	6.20%	6.14%	5.79%	5.40%	4.98%
urban demand								
millet and sorghum		7.2%	7.1%	7.0%	6.9%	5.2%	5.6%	4.9%
rice		7.3%	7.2%	7.1%	7.0%	6.4%	5.8%	5.2%
rural demand								
millet and sorghum		3.0%	3.0%	3.0%	3.0%	3.1%	3.4%	3.8%
rice		3.2%	3.2%	3.2%	3.2%	3.4%	3.6%	4.0%
Percentage change in total GDP		5.78%	5.78%	5.78%	5.78%	5.78%	5.78%	5.78%

25

ANNEX 1 - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

	1986	1987	1988	1989	1990	1995	2000	2005
Global elasticities of total demand with respect to GDP millet and sorghum		0.589	0.589	0.591	0.592	0.609	0.640	0.684
rice		1.094	1.084	1.073	1.062	1.001	0.934	0.862
Percentage changes in pc demand millet and sorghum								
total		0.68%	0.69%	0.70%	0.70%	0.80%	0.97%	1.22%
urban		0.51%	0.57%	0.62%	0.67%	0.93%	1.18%	1.44%
rural		1.63%	1.64%	1.65%	1.66%	1.66%	1.62%	1.53%
rice - total								
total		3.53%	3.47%	3.41%	3.35%	3.01%	2.63%	2.22%
urban		0.59%	0.65%	0.71%	0.77%	1.07%	1.36%	1.66%
rural		1.88%	1.89%	1.90%	1.91%	1.92%	1.87%	1.76%
Percentage change in pc incomes								
GDP pc		3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
urban GDP pc		1.00%	1.10%	1.20%	1.30%	1.80%	2.30%	2.80%
rural GDP pc		3.18%	3.19%	3.21%	3.22%	3.24%	3.15%	2.97%
Elasticity of demand pc with respect to GDP pc millet and sorghum								
national		0.223	0.230	0.232	0.235	0.266	0.324	0.407
urban		0.514	0.514	0.514	0.514	0.514	0.514	0.514
rural		0.514	0.514	0.514	0.514	0.514	0.514	0.514
rice								
national		1.177	1.158	1.138	1.117	1.003	0.876	0.741
urban		0.593	0.593	0.593	0.593	0.593	0.593	0.593
rural		0.593	0.593	0.593	0.593	0.593	0.593	0.593

Data and parameter estimates:

Urban per capita population growth (5.7% in 1966) is assumed to decline by one tenth of one percentage point per year.

Average amounts of millet and sorghum and of rice purchased per year per person in urban areas in Mali -- from Rogers and Lowdermilk, p. 15. Note -- these understate actual consumption, perhaps seriously (see further below), since not all millet and sorghum or even rice consumed by urban households is purchased, and since urban millet/sorghum prices were high and supplies short during the 1984-85 data Tufts used. This paper's estimates of urban and rural per capita incomes are consistent with the levels and trends described in LecCaillon and Morrisson for the early 1980's.

Urban Pc expenditure elasticities for Mali are from Rogers and Lowdermilk, 1988 Total income elasticities are from USDA 1981, p. 36.

Mali urban elasticities are with respect to cash expenditures, USDA with respect to GDP per capita (apparently).

Country-wide and rural consumption figures are estimated as discussed in section 2 above ("Consumption Background") Rogers and Lowdermilk data provide urban per capita estimates.

Either the Rogers and Lowdermilk estimates seriously understate urban millet and sorghum per capita consumption, or the proportion of calories supplied by cereals is much lower in urban areas than in the countryside.

According to data in the paper by Gabas et al. (p. 5) per capita availability of rice in Mali from 1981 - 1985 averaged 27 kg per capita (far below such countries as Senegal (70 kg), Guinea (63 kg) and Cote d'Ivoire (120 kg), but higher than Ghana (6 kg) where root crops are important. Cote d'Ivoire and Senegal are both more highly urbanized than Mali (46 % and 35 % respectively are living in urban areas); Guinea is at a comparable level of urbanization.

With the price of rice reaching as high as 185 PCFA per kilo, 84 kilos of rice would cost 15,540 PCFA or about \$52. Assuming average per capita income in the urban areas is about \$300 (for lower income groups) it might be only half of this), purchases of rice would take about 17 % of per capita income. Outlays on millet and sorghum, at 90 PCFA/kilo would amount to only 3600 PCFA per person per year, or about \$12. Total pc outlay on cereals would thus amount to about \$64 out of \$300 in income.

The value of rural cereals consumption, at farm gate prices of about 35 PCFA per kilo for millet and sorghum, would amount to about 200×35 7000 PCFA + $19 \times 200 = 3800$ PCFA, or \$36 per person, out of an income in cash and in kind of about \$170 per capita..

Observing that urban income pc is substantially higher than rural income pc, while urban consumption pc of millet and sorghum is much lower than rural consumption, we might conclude that millet and sorghum are indeed highly inferior goods and that demand for them will shrink with time. Such a conclusion, based on the following comparison of urban and rural GDP pc and consumption levels, would be incorrect, as the projections figures of this paper has shown.

urban consumption pc of millet and sorghum - rural consumption of millet and sorghum per capita / rural consumption of millet and sorghum per capita = $40 - 200 / (40+200) \times 100 \% = - 67 \%$

(urban pc income - rural pc income)/rural pc income = $300 - 170 / 170 \times 100 \%$

Apparent expenditure elasticity of demand for millet and sorghum = $-.67 / + .76 = -.88$, which is indeed negative.

However, this ignores some important facts:

1) The bulk of the population is rural. Even with continuing rapid urban growth only a small proportion of the population adopts an urban, rice-intensive diet each year.

2) Expenditure figures understate urban consumption of millet and sorghum, almost certainly by a very large margin.

3) In the cities millet and sorghum have a positive and high (0.514) expenditure elasticity. However, since urban pc income appears to be on a longterm declining trend, and this is likely to continue, urban demand per capita for millet and sorghum will decline rather than increase for the foreseeable future precisely because millet and sorghum are NOT inferior goods in urban consumption. It appears likely that urban pc income will increase ONLY if and when overall pc growth increases significantly above its past trend value of 1 % pa.

4) In spite of the downward trend in urban pc demand for millet and sorghum, urban demand for millet and sorghum will continue to increase because of urban population growth, at about 7% per year.

5) The actual global elasticity of demand for millet and sorghum for Mali, taking into account rural-urban migration flows and differences in consumption preferences between city and country, is about 0.591 when per capita GDP grows at 3.0% p.a. and urban per capita income is growing at 1.0% p.a.

Note: the numbers used for certain key parameters are subject to revision when and if better empirical estimates become available.

Comparative data

1,986	Sahel =====	Mali =====	Senegal =====	Niger =====	Burkina =====
pc income in 1986 dollars	---	207	444	300	180
pc millet and sorghum consumption	---	160	88	260	195
pc rice consumption	---	28	89	18	13
total pc millet and sorghum and rice consumption	---	188	177	278	208
percentage urban	---	25.8%	36.0%	15.0%	8.0%

Note: Per capita consumption figures for the other Sahelian countries are taken from USDA/BBS, World Food Availabilities. These data seem to indicate that millet and sorghum are inferior goods in consumption and that rice is highly income-elastic. However, even within the Sahel, simple one-point-in-time intercountry comparisons are likely to be relatively meaningless and even misleading because of differences in the comparative advantage of the respective countries for producing millet and sorghum vs. producing rice and differences in transport costs.

28

Using region-specific time series data, the authors of the 1981 USDA/ERS study, *Food Problems and Prospects in Sub-saharan Africa* (p. 36) found low but positive income elasticities of demand for millet among all the regions of Africa. These elasticities ranged in size from 0.01 in East Africa to 0.28 in Central Africa. Central Africa was defined to consist, somewhat arbitrarily, of CAR, Congo, Zaire, Gabon and Angola. An intermediate value of 0.15 was found for the Sahel as a whole. The independent income variable in the USDA equation was total private expenditure, converted to a US dollar equivalent and summed over the countries of each region. These low elasticities with respect to total private expenditure imply, taking into account population growth, that elasticities of per capita millet consumption with respect to per capita income are probably close to zero or even negative, however not enough so as to outweigh the effects of population growth on millet and sorghum.

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PROG/ECOM/JBelliott/11/10/89/ailrice

Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

III: GDP and Consumption Projections: Low Growth Scenario

	1986	1987	1988	1989	1990	1995	2000	2005
GDP pc in dollars	\$ 207	209	211	213	215	226	238	250
urban GDP pc	311	307	305	302	300	294	296	305
rural GDP pc	171	172	175	177	180	191	203	214
GDP pc check	207	209	211	213	215	226	238	250
urban GDP pc/rural GDP pc	1.82	1.78	1.74	1.70	1.67	1.54	1.46	1.42
rate of growth of GDP pc	1.0%	rate of growth of urban pop.:		6.70%pa PLUS				
rate of growth of urban GDP pc	-1.0%	p.a.		-0.18%				
rate of growth of population	2.7%							
share of population urban	25.8%	26.8%	27.8%	28.8%	29.8%	34.2%	37.7%	39.8%
share of population rural	74.2%	73.2%	72.2%	71.2%	70.2%	65.8%	62.3%	60.2%
rate of growth of urban population	6.7%	6.5%	6.3%	6.2%	6.0%	5.1%	4.2%	3.3%
rate of growth of rural population		1.3%	1.3%	1.3%	1.3%	1.4%	1.7%	2.2%
rate of growth of GDP pc		1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
rate of growth of urban GDP pc		-1.000%	-0.900%	-0.800%	-0.700%	-0.200%	0.300%	0.800%
rate of growth of rural GDP pc		1.199%	1.217%	1.233%	1.245%	1.258%	1.167%	0.980%
pc demand for millet and sorghum								
urban	54.0	53.7	53.5	53.3	53.1	52.5	52.7	53.5
rural (mid-range estimate)	164.0	165.0	166.0	167.1	168.2	173.7	179.2	184.1
pc demand for rice								
urban	80.0	79.5	79.1	78.7	78.4	77.5	77.7	79.1
rural	9.0	9.1	9.1	9.2	9.3	9.6	10.0	10.3
population (millions)								
urban	7.60	7.81	8.02	8.23	8.45	9.66	11.04	12.61
rural	1.96	2.09	2.23	2.37	2.52	3.31	4.16	5.02
	5.64	5.71	5.79	5.86	5.94	6.35	6.87	7.59
GDP - billions of \$	1,573	1,632	1,693	1,756	1,821	2,187	2,626	3,153
total demand for millet & sorghum MTs								
urban -- MTs	1,030,712	1,055,106	1,080,120	1,105,797	1,132,189	1,276,987	1,450,320	1,664,996
rural -- MTs	105,883	112,397	119,171	126,205	133,498	173,671	219,273	268,578
	924,829	942,710	960,949	979,591	998,691	1,103,315	1,231,047	1,396,419
total demand for rice								
urban -- MTs	297,617	218,164	229,119	240,483	252,258	317,273	392,067	475,287
rural -- MTs	156,864	166,381	176,284	186,571	197,241	256,191	323,588	397,286
	50,753	51,783	62,835	53,912	55,017	61,082	68,478	78,001
National pc demand for								
millet and sorghum	135.6	135.2	134.7	134.3	133.9	132.2	131.4	132.1
rice	27.3	28.0	28.6	29.2	29.8	32.8	35.5	37.7
Percentage change in								
total demand								
millet and sorghum		2.37%	2.37%	2.38%	2.39%	2.48%	2.65%	2.90%
rice		5.08%	5.02%	4.96%	4.90%	4.55%	4.17%	3.76%
urban demand								
millet and sorghum		6.2%	6.0%	5.9%	5.8%	5.2%	4.5%	3.9%
rice		6.1%	6.0%	5.8%	5.7%	5.1%	4.5%	4.0%
rural demand								
millet and sorghum		1.9%	1.9%	1.9%	1.9%	2.1%	2.3%	2.7%
rice		2.0%	2.0%	2.0%	2.0%	2.2%	2.4%	2.8%
Percentage change in total GDP		3.73%	3.73%	3.73%	3.73%	3.73%	3.73%	3.73%

70

Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

	1985	1987	1988	1989	1990	1995	2000	2005
Global elasticities of total demand with respect to GDP								
millet and sorghum		0.635	0.635	0.638	0.640	0.665	0.712	0.779
rice		1.362	1.347	1.331	1.314	1.221	1.118	1.009
Percentage changes in pc demand								
millet and sorghum								
total		-0.32%	-0.32%	-0.31%	-0.31%	-0.21%	-0.04%	0.20%
urban		-0.51%	-0.46%	-0.41%	-0.36%	-0.10%	0.15%	0.41%
rural		0.62%	0.63%	0.63%	0.64%	0.55%	0.60%	0.50%
rice - total								
total		2.32%	2.26%	2.20%	2.14%	1.80%	1.43%	1.03%
urban		-0.59%	-0.53%	-0.47%	-0.42%	-0.12%	0.18%	0.47%
rural		0.71%	0.72%	0.73%	0.74%	0.75%	0.69%	0.58%
Percentage change in pc incomes								
GDP pc		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
urban GDP pc		-1.00%	-0.90%	-0.80%	-0.70%	-0.20%	0.30%	0.80%
rural GDP pc		1.20%	1.22%	1.23%	1.25%	1.26%	1.17%	0.98%
Elasticity of demand pc with respect to GDP pc								
millet and sorghum								
national		-0.324	-0.321	-0.314	-0.305	-0.214	-0.044	0.199
urban		0.514	0.514	0.514	0.514	0.514	0.514	0.514
rural		0.514	0.514	0.514	0.514	0.514	0.514	0.514
rice								
national		2.318	2.260	2.201	2.139	1.803	1.430	1.032
urban		0.593	0.593	0.593	0.593	0.593	0.593	0.593
rural		0.593	0.593	0.593	0.593	0.593	0.593	0.593

ANNEX 1 - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

IV. Estimates of food deficits to the years 2000 and 2010
cases 1 through 5 ...

Scenario	1986	1987	1988	1989	1990	1995	2000	2005	2010
CASE 1: STAGNANT AGRICULTURE									
Total demand for millet & sorghum MTs	1,030,712	1,065,792	1,102,109	1,139,738	1,178,763	1,398,301	1,670,424	2,017,363	2,470,152
Gross production m/s	1,210,000	1,228,150	1,246,572	1,265,271	1,284,250	1,383,502	1,490,424	1,605,610	1,729,695
Net production (.85)	1,028,500	1,043,927	1,059,586	1,075,480	1,091,612	1,175,977	1,255,861	1,364,769	1,470,244
Millet/sorghum deficit (surplus)	2,212	21,864	42,522	64,258	87,150	222,324	403,563	652,594	999,908
Total demand for rice	207,617	220,752	234,586	249,142	264,440	352,771	462,336	594,356	748,696
Gross production rice paddy	219,000	221,854	224,744	227,673	230,639	246,062	262,516	280,071	298,799
Net production (.51)	111,690	113,145	114,620	116,113	117,626	125,492	133,883	142,836	152,388
Rice deficit (surplus)	95,927	107,607	119,967	133,029	146,814	227,279	328,453	451,520	596,308
CASE 2: SLOW AG GROWTH									
Total demand for millet & sorghum MTs	1,030,712	1,065,792	1,102,109	1,139,738	1,178,763	1,398,301	1,670,424	2,017,363	2,470,152
Gross production m/s	1,210,000	1,240,432	1,271,628	1,303,610	1,336,396	1,513,116	1,713,204	1,939,752	2,196,258
Net production (.95)	1,028,500	1,054,367	1,080,894	1,108,058	1,135,936	1,296,148	1,456,224	1,648,789	1,865,819
Millet/sorghum deficit (surplus)	2,212	11,425	21,225	31,670	42,827	122,153	214,200	369,573	603,333
Total demand for rice	207,617	220,752	234,586	249,142	264,440	352,771	462,336	594,356	748,696
Gross production rice paddy	219,000	226,698	234,655	242,915	251,453	298,864	355,214	422,189	501,791
Net production (.51)	111,690	115,616	119,680	123,887	128,241	152,421	181,159	215,316	255,913
Rice deficit (surplus)	95,927	105,136	114,907	125,255	136,199	200,350	281,177	379,040	492,783
CASE 3: MODERATE AG GROWTH									
Total demand for millet & sorghum MTs	1,030,712	1,065,792	1,102,109	1,139,738	1,178,763	1,398,301	1,670,424	2,017,363	2,470,152
Gross production m/s	1,210,000	1,252,713	1,296,934	1,342,716	1,390,113	1,653,413	1,966,583	2,339,071	2,782,111
Net production (.85)	1,028,500	1,064,806	1,102,394	1,141,308	1,181,596	1,405,401	1,671,595	1,998,210	2,364,795
Millet/sorghum deficit (surplus)	2,212	986	(285)	(1,570)	(2,833)	(7,100)	(1,172)	29,152	105,357
Total demand for rice	207,617	220,752	234,586	249,142	264,440	352,771	462,336	594,356	748,696
Gross production rice paddy	219,000	232,250	246,301	261,292	277,004	371,570	498,418	668,570	896,810
Net production (.51)	111,690	118,447	125,613	133,213	141,272	189,500	254,193	340,971	457,373
Rice deficit (surplus)	95,927	102,305	108,973	115,929	123,168	163,270	208,143	253,385	291,323
CASE 4: FAST AG GROWTH									
Total demand for millet & sorghum MTs	1,030,712	1,065,792	1,102,109	1,139,738	1,178,763	1,398,301	1,670,424	2,017,363	2,470,152
Gross production m/s	1,210,000	1,264,995	1,322,489	1,392,596	1,445,435	1,805,156	2,254,401	2,815,448	3,516,121
Net production (.95)	1,028,500	1,075,245	1,124,115	1,175,206	1,228,619	1,534,383	1,916,241	2,393,130	2,988,703
Millet/sorghum deficit (surplus)	2,212	(9,454)	(22,007)	(35,468)	(49,857)	(136,082)	(245,817)	(375,768)	(518,551)
Total demand for rice	207,617	220,752	234,586	249,142	264,440	352,771	462,336	594,356	748,696
Gross production rice paddy	219,000	245,718	275,696	309,330	347,069	617,135	1,097,347	1,951,230	3,469,546
Net production (.51)	111,690	125,316	140,605	157,759	177,005	314,739	559,647	995,127	1,769,469
Rice deficit (surplus)	95,927	95,436	93,982	91,383	87,435	38,032	(97,311)	(400,771)	(1,020,773)

32

ANNEX 1 - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

	1986	1987	1988	1989	1990	1995	2000	2005	2010
CASE 5: ACCELERATED RICE AREA GROWTH									
Total demand for millet & sorghum MTs	1,030,712	1,065,732	1,102,109	1,139,739	1,179,753	1,398,301	1,570,424	1,817,363	2,170,150
Gross production m/s	1,210,000	1,228,150	1,246,572	1,255,271	1,284,250	1,383,502	1,490,424	1,605,610	1,729,699
Net production (.85)	1,028,500	1,043,927	1,059,586	1,075,480	1,091,612	1,175,977	1,266,861	1,364,769	1,470,244
Millet/sorghum deficit (surplus)	2,212	21,864	42,522	64,258	87,150	222,324	403,562	552,594	999,306
Total demand for rice	207,617	220,752	234,586	249,142	264,440	352,771	462,335	594,355	749,595
Gross production rice paddy	219,000	238,710	250,194	293,511	309,136	475,645	731,939	1,126,024	1,732,527
Net production (.51)	111,590	121,742	132,699	144,642	157,660	242,579	373,237	574,272	980,595
Rice deficit (surplus)	95,927	99,010	101,888	104,500	106,780	110,192	89,099	20,084	(134,995)
CASE 6: SLOW ECONOMIC GROWTH, STAGNANT AG.									
Total demand for millet & sorghum MTs	1,030,712	1,055,106	1,080,120	1,105,797	1,132,189	1,276,987	1,450,320	1,664,996	1,937,640
Gross production m/s	1,210,000	1,228,150	1,246,572	1,265,271	1,284,250	1,383,502	1,490,424	1,605,610	1,729,699
Net production (.85)	1,028,500	1,043,927	1,059,586	1,075,480	1,091,612	1,175,977	1,266,861	1,364,769	1,470,244
Millet/sorghum deficit (surplus)	2,212	11,179	20,534	30,317	40,577	101,010	183,459	300,227	467,399
Total demand for rice	207,617	218,164	229,119	240,483	252,258	317,273	392,067	475,287	564,640
Gross production rice paddy	219,000	221,854	224,744	227,573	230,639	246,062	262,516	280,071	298,799
Net production (.51)	111,690	113,145	114,620	116,113	117,625	125,492	133,883	142,836	152,388
Rice deficit (surplus)	95,927	105,019	114,499	124,370	134,632	191,781	258,184	332,451	412,255
CASE 7: SLOW ECONOMIC GROWTH, MODERATE AG. GROWTH									
Total demand for millet & sorghum MTs	1,030,712	1,055,106	1,080,120	1,105,797	1,132,189	1,276,987	1,450,320	1,664,996	1,937,640
Gross production m/s	1,210,000	1,252,713	1,296,934	1,342,716	1,390,117	1,653,413	1,966,583	2,339,071	2,792,111
Net production (.85)	1,028,500	1,064,806	1,102,394	1,141,308	1,181,596	1,405,401	1,671,596	1,988,210	2,364,795
Millet/sorghum deficit (surplus)	2,212	(9,700)	(22,274)	(35,511)	(49,407)	(128,414)	(221,276)	(323,214)	(427,150)
Total demand for rice	207,617	218,164	229,119	240,483	252,258	317,273	392,067	475,287	564,640
Gross production rice paddy	219,000	232,250	246,301	261,202	277,004	371,570	498,418	669,570	896,810
Net production (.51)	111,690	118,447	125,613	133,213	141,272	189,500	254,193	340,971	457,373
Rice deficit (surplus)	95,927	99,717	103,506	107,270	110,986	127,773	137,874	134,316	107,270

Notes on growth projections for cereals agriculture and GDP:

Case 1: Fast economic growth, stagnant agriculture
 Economic growth per capita 3% p.a.
 Millet/sorghum: Area increases by 1.5% p.a.
 No yield increase
 Rice: Area increases by 0.3% p.a.
 Yields increase by 1% p.a.

33

ANNEX 1 - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

Case 2: Fast economic growth, slow agricultural growth

Economic growth per capita 3% p.a.

Millet/sorghum: Area increases by 1.5% p.a.

Yield increase 1% p.a.

Rice: Area increases by 0.5% p.a.

Yields increase by 3% p.a.

Case 3: Fast economic growth, moderate agricultural growth

Economic growth per capita 3% p.a.

Millet/sorghum: Area increases by 1.5% p.a.

Yield increase 2% p.a.

Rice: Area increases by 1% p.a.

Yields increase by 5% p.a.

Case 4: Fast economic growth, fast agricultural growth

Economic growth per capita 3% p.a.

Millet/sorghum: Area increases by 1.5% p.a.

Yield increase 3% p.a.

Rice: Area increases by 2% p.a.

Yields increase by 10% p.a.

Case 5: Fast economic growth, accelerated growth in rice area

Economic growth per capita 3% p.a.

Millet/sorghum: Area increases by 1.5% p.a.

No yield increase

Rice: Area increases by 3% p.a.

No yield increase

Case 6: Slow economic growth, stagnant agriculture

Economic growth per capita 1% p.a.

Millet/sorghum: Area increases by 1.5% p.a.

No yield increase

Rice: Area increases by 0.3% p.a.

Yields increase by 1% p.a.

Case 7: Slow economic growth overall but moderate agricultural growth

Economic growth per capita 1% p.a.

Millet/sorghum: Area increases by 1.5% p.a.

Yield increase 1% p.a.

Rice: Area increases by 0.5% p.a.

Yields increase by 3% p.a.

ANNEX 1 - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

As a check on the likelihood of the assumptions it is useful to see how per capita grain consumption (in terms of both calories per day (from grain) and weight) would change in the different scenarios. The fast economic growth scenarios (cases 1 through 5) are based on the following per capita consumption assumptions for the years 1988, 2000, and 2010

	1988		2000		2010	
	kg/yr	cal/day	kg/yr	cal/day	kg/yr	cal/day
Urban						
rice	81	777	87	834	92	882
mil/sor	54	518	58	556	61	585
total	135	1,295	145	1,390	153	1,467
Rural						
rice	9	86	12	115	16	153
mil/sor	169	1,621	213	2,042	270	2,589
total	178	1,707	225	2,158	286	2,742

It is clear that at least from now to the year 2000 the projections of growth in caloric intake and grain consumption are quite reasonable.

The slow economic growth scenario is based on the following assumptions:

	1988		2000		2010	
	kg/yr	cal/day	kg/yr	cal/day	kg/yr	cal/day
Urban						
rice	79	758	73	700	69	662
mil/sor	53	508	50	479	47	451
total	132	1,266	123	1,179	116	1,112
Rural						
rice	9	85	10	96	12	115
mil/sor	166	1,592	185	1,774	212	2,033
total	175	1,678	195	1,870	224	2,148

Note on projected export surpluses: Export surpluses will not necessarily materialize. To the extent domestic net production of millet and sorghum outstrips domestic demand for these cereals for human consumption, it is possible that domestic consumer prices may decline enough to induce increases in domestic consumption sufficient to absorb the theoretical export surplus. In addition, or alternatively, new uses (i.e. animal fodder for sedentarized livestock operations) may develop, or farmers may allocate more land and time to alternative food and/or industrial export crops.

35

ANNEX I. - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

V. Cereals import outlays in millions of dollars

	1986	1987	1988	1989	1990	1995	2000	2005	201	
Price of sorghum CAF, West African ports, \$/ton	0.90	162	198	235	191	197	228	264	306	357
Price of rice CIF, West African ports, \$/ton	181	209	262	212	218	263	293	340	390	390
Transport from coastal port to Mali, \$/kg \$ price growth rate projection	75 3.0%	75	75	75	77	90	104	120	140	140
Consumer price of millet, Bko \$/kg	0.232	0.264	0.357							
Consumer price of rice, Bamako \$/kg	0.493	0.561	0.713							
Consumer price of millet, Bko \$/MT	232	264	357							
Consumer price of rice, Bamako \$/MT	493	561	713							

Cereals import outlays in millions of dollars

CASE 1: FAST ECONOMIC GROWTH, STAGNANT AGRICULTURE									
Import bill for millet & sorghum	0.4	4.1	10.0	12.3	17.1	50.7	106.6	199.8	354.9
Import bill for rice	17.3	22.4	31.4	28.2	32.1	57.5	96.4	153.6	235.0
Import bill for millet, sorghum and rice	17.7	26.5	41.5	40.5	49.2	108.2	203.0	353.4	590.0
CASE 2: FAST ECONOMIC GROWTH, SLOW AG GROWTH									
Import bill for millet & sorghum	0.4	2.1	5.0	5.9	8.4	25.6	56.6	112.8	214.0
Import bill for rice	17.3	21.9	30.1	26.6	29.7	50.7	82.5	128.9	194.0
Import bill for millet, sorghum and rice	17.7	24.1	35.1	32.5	38.2	76.3	139.1	241.8	408.0
CASE 3: FAST ECON GROWTH, MODERATE AG GROWTH									
Import bill for millet & sorghum	0.4	0.2	0.0	0.0	0.0	0.0	0.0	8.9	37.4
Import bill for rice	17.3	21.3	28.6	24.6	26.9	41.3	61.1	86.2	114.9
Import bill for millet, sorghum and rice	17.7	21.5	28.6	24.6	26.9	41.3	61.1	95.1	152.3
CASE 4: FAST ECON GROWTH, FAST AG GROWTH									
Import bill for millet & sorghum	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import bill for rice	17.3	19.9	24.6	19.4	19.1	9.6	0.0	0.0	0.0
Import bill for millet, sorghum and rice	17.7	19.9	24.6	19.4	19.1	9.6	0.0	0.0	0.0
CASE 5: FAST ECON GROWTH, ACCELERATED RICE AREA GROWTH									
Import bill for millet & sorghum	0.4	4.1	10.0	12.3	17.1	50.7	106.6	199.8	354.9
Import bill for rice	17.3	20.6	26.7	22.2	23.3	27.9	26.1	6.9	0.0
Import bill for millet, sorghum and rice	17.7	24.7	36.7	34.4	40.4	78.5	132.7	206.6	354.9
CASE 6: SLOW ECONOMIC GROWTH, STAGNANT AG.									
Import bill for millet & sorghum	0.4	2.1	4.8	5.8	8.0	23.0	48.5	91.9	165.9
Import bill for rice	17.3	21.9	30.0	26.4	29.4	48.5	75.8	113.1	162.9
Import bill for millet, sorghum and rice	17.7	24.0	34.8	32.2	37.4	71.5	124.2	205.0	328.8
CASE 7: SLOW ECONOMIC GROWTH, MODERATE AG. GROWTH									
Import bill for millet & sorghum	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import bill for rice	17.3	20.8	27.1	22.7	24.2	32.3	40.5	45.7	42.3
Import bill for millet, sorghum and rice	17.7	20.8	27.1	22.7	24.2	32.3	40.5	45.7	42.3

ANNEX I - Scenarios of Economic Growth, Grain Consumption, Export Revenues and Food Import Needs to the Year 2010

	1985	1987	1989	1993	1997	1995	2000	2005	2010
VII. Arable land area under cultivation									
% of arable land suitable for millet and sorghum under millet and sorghum cultivation									
Case I	17.00%	17.25%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
Case II	17.00%	17.25%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
Case III	17.93%	17.26%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
Case IV	17.00%	17.26%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
Case V	17.00%	17.26%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
Case VI	17.00%	17.26%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
Case VII	17.00%	17.25%	17.51%	17.78%	18.04%	19.44%	20.94%	22.55%	
% of arable land suitable for rice under rice cultivation									
Case I	15.00%	15.04%	15.09%	15.14%	15.18%	15.41%	15.64%	15.88%	
Case II	15.00%	15.07%	15.15%	15.23%	15.30%	15.69%	16.08%	16.49%	
Case III	15.00%	15.15%	15.30%	15.45%	15.61%	16.41%	17.24%	18.12%	
Case IV	15.00%	15.30%	15.61%	15.92%	16.24%	17.93%	19.79%	21.85%	
Case V	15.00%	16.35%	17.82%	19.43%	21.17%	32.58%	50.13%	77.12%	
Case VI	15.00%	15.04%	15.09%	15.14%	15.18%	15.41%	15.64%	15.88%	
Case VII	15.00%	15.07%	15.15%	15.23%	15.30%	15.69%	16.08%	16.49%	

PROG/ECON/ADO/JElliott&DAwood:rev.02/01/89:milriz3

VII. Consumption Background Information

Table 1

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	MOYENNE 81-85	MOYENNE 81-84	MOYENNE 81-87	MOYENNE 85-87
CONSUMMATION MOYENNE	153	172	203	177	194	189	162	180	176	179	182
Mil/Sorg/Fonio	119	129	135	110	133	140	122	125	123	127	132
Riz	17	26	40	37	37	23	17	31	30	28	26
Mais	11	13	24	29	21	24	20	20	19	20	22
Ble	5	4	5	1	3	2	3	4	4	3	3
POPULATION	7,123	7,244	7,367	7,492	7,620	7,812	8,015	7,369	7,307	7,525	7,816
QUANTITE DISPONIBLE	1,090	1,246	1,493	1,326	1,482	1,474	1,302	1,328	1,289	1,345	1,419
Mil/Sorg/Fonio	849	936	992	826	1,016	1,091	981	924	901	956	1,030
Riz	124	185	292	274	283	183	138	232	219	211	202
Mais	81	95	175	217	162	184	157	146	142	153	168
Ble	36	30	34	10	20	15	25	26	28	24	20
PRODUCTION GROSSE	1,195	1,322	1,507	1,111	1,670	1,737	1,464	1,361	1,284	1,429	1,624
Mil/Sorg/Fonio	999	1,080	1,147	901	1,245	1,288	1,097	1,074	1,032	1,108	1,210
Riz	135	153	216	109	232	236	189	169	153	181	219
Mais	61	89	144	101	193	213	178	118	99	140	195
PRODUCTION NETTE	967	1,067	1,200	902	1,331	1,386	1,171	1,094	1,034	1,146	1,296
Mil/Sorg/Fonio	849	918	975	766	1,058	1,095	932	913	877	942	1,029
Riz	69	78	110	56	118	120	96	86	78	93	112
Mais	49	71	115	81	154	170	142	94	79	112	156
IMPORTATIONS GOUVERNEMENTALE	11	0	18	21	0	0	0	0	0	0	0
Mil/Sorg/Fonio	0	0	6	13	0	0	0	10	13	7	0
Riz	11	0	12	4	0	0	0	4	5	3	0
Mais	0	0	0	4	0	0	0	5	7	4	0
Ble	0	0	0	0	0	0	0	1	1	1	0
IMPORTATIONS PRIVEES	59	96	148	166	120	49	36	0	0	0	0
Mil/Sorg/Fonio	0	0	0	0	0	0	0	0	0	0	0
Riz	29	80	120	166	100	29	16	118	117	96	68
Mais	0	0	0	0	0	0	0	0	0	0	0
Ble	30	16	20	0	20	20	20	0	0	0	0
AIDES ALIMENTAIRES	53	83	127	237	81	0	21	0	0	0	0
Mil/Sorg/Fonio	0	18	11	47	18	0	0	118	125	86	34
Riz	15	27	42	48	33	0	21	19	19	13	6
Mais	32	24	60	132	30	0	0	33	33	27	18
Ble	6	14	14	10	0	0	0	56	62	40	10
CHANGEMENT DES STOCKS	0	0	0	0	(50)	39	74	0	0	0	0
Mil/Sorg/Fonio	0	0	0	0	(60)	(4)	49	116	125	86	34
Riz	0	0	0	0	32	34	5	19	19	13	6
Mais	0	0	0	0	(22)	14	15	33	33	27	18
Ble	0	0	0	0	0	(5)	5	56	62	40	10

The above figures come from DNSI and Min Ag production statistics, and OSCE production and trade statistics, adjusted for some better trade data available in past USAID food needs assessments. Change in stocks information for recent years comes from OPAM and from surveys of large private traders conducted by USAID in October of each of the past three years.

TABLE 2: URBAN AND RURAL CONSUMPTION PER CAPITA

	QUANTITIES CONSUMED (2)		QUANTITIES PURCHASED (1)	
	Rice calories/day	kg/year	Rice kg/month	kg/year
BKO, etc	858	89	7	80
Kayes	392	41	3	40
Timbuctou	932	97	7	86
Gao	1054	110	7	82
	Millet/Sorghum(3)		Millet/sorghum	
BKO etc	637	66	5	54
Kayes	163	17	1	10
Timbuctou	265	28	2	25
Gao	402	42	3	40
	Corn		Corn	
BKO etc	109	11	1	10
Kayes	76	8	1	7
Timbuctou	136	14	1	12
Gao	333	35	3	30
	Wheat/other		Wheat/other	
BKOetc	59	6	0	5
Kayes	75	8	0	4
Timbuctou	102	11	1	11
Gao	123	13	1	8

The BKO etc category includes Bamako, Koulikoro, Sikasso Segou, and Mopti, which all displayed similar patterns in the Tufts study. Since the other towns in the Tufts study displayed quite different patterns and in some cases (Gao) showed anomalies in results, the BKO, etc. cluster will serve as the basis for our consumption estimates. The three cities we are not using represent only about 18% of urban population, and for the purposes of our economic growth projections are cities which will grow very little in the next few years, unless disaster strikes again and destitute people congregate there. It is unclear to what extent the consumption patterns of the BKO etc cluster are representative of the smaller urban centers which did not figure in the Tufts and DNSI data.

TABLE 3: URBAN AND RURAL CONSUMPTION
SHARES BASED ON PROJECTIONS OF CONSUMPTION BASED ON TUFTS DATA 1984-85

	Aggreg. per caput		Urban consumption		Rural consumption		
	Aggreg.	per caput	Aggreg.	Per caput	Aggreg.	Per caput	
rice	279000	37	170138	89	108862	19	9
mil/sor	921000	122	126170	66	794830	141	105
corn	189500	25	21028	11	168472	30	22
wheat	15000	2	11470	6	3530	1	0
total		186		172		191	137

TABLE 4: URBAN AND RURAL CONSUMPTION
SHARES BASED ON PURCHASES ALONE WITHOUT NON-PURCHASED CONSUMPTION PROJECTIONS 1984-85

	Aggreg. per caput		Urban consumption		Rural consumption		
	Aggreg.	per caput	Aggreg.	Per caput	Aggreg.	Per caput	
rice	279000	37	152933	80	126067	22	17
mil/sor	921000	122	103230	54	817770	145	108
corn	189500	25	19117	10	170383	30	22
wheat	15000	2	9558	5	5442	1	
total		186		149		198	148

TABLE 5: URBAN AND RURAL CONSUMPTION
SHARES FROM TUFTS DATA ADJUSTED FOR 1985/86-1987/88 PERIOD

	Aggreg. per caput		Urban consumption		Rural consumption		
	Aggreg.	per caput	Aggreg.	Per caput	Aggreg.	Per caput	
rice	202000	26	170138	89	31862	6	
mil/sor	1030000	132	126170	66	903830	160	
corn	168000	22	21028	11	146972	26	
wheat	20000	3	11470	6	8530	2	
total		183		172		193	

TABLE 6: URBAN AND RURAL CONSUMPTION
SHARES BASED ON PURCHASES ALONE WITHOUT NON-PURCHASED CONSUMPTION 1985/86-1987/88

	Aggreg. per caput		Urban consumption		Rural consumption		
	Aggreg.	per caput	Aggreg.	Per caput	Aggreg.	Per caput	
rice	202000	26	152933	80	49067	9	
mil/sor	1030000	132	103230	54	926770	164	
corn	168000	22	19117	10	148883	26	
wheat	20000	3	9558	5	10442	2	
total		183		149		201	

Several adjustments have been made to the Tufts results for them to be usable for long term consumption projections.

In Table 2, calories per day and kilograms per month have been adjusted to a kilograms per person per year figure. In addition, for quantities consumed in Table 2, the "all other grains" category was disaggregated into millet/sorghum, corn, and wheat on the assumption that the ratio of all other grain purchased to all other grains consumed held individually for each of the three sets of grains. The Tufts "quantities purchased" figures were then adjusted by this percentage to arrive at grain by grain quantities consumed figures.

Rural per capita and rural aggregate consumption in Tables 2 through 5 was calculated as the residual after total urban consumption (arrived at by applying total population and urban percentage population information against urban per capita figures from Tufts) was subtracted from total overall food consumption, available from Table 1.

The difference between Tables 2 and 3 on the one hand and Tables 4 and 5 on the other is that Tables 2 and 3 take the 1984/85-1985/86 grain availability at national level as the basis on which to calculate the rural residual. 1984/85 and 1985/86 (the years from which the Tufts data come) were years of exceptional shortage in coarse grains due to drought and exceptional abundance of rice due to food aid. Without adjusting the urban consumption figures (which we are unable to do due to lack of any data other than Tufts' on urban consumption) we can nevertheless make some overall adjustment to better reflect a more normal situation. The overall and rural residual calculations in Tables 4 and 5 are based on national 1985/86 to 1987/88 average food availability.

Since we are unable to adjust the Tufts per capita urban figures what this means is an implicit assumption that all of the adjustment in consumption habits resulting from the unusual 1984/85 to 1985/86 situation came in rural rather than urban areas. To the extent this assumption is in error, it means that we are overestimating average rice demand in cities, and underestimating average coarse grain demand. Also, by not adjusting upward the average 1985/86-1987/88 nationwide consumption figures from which our rural residual consumption is calculated, to reflect the increase in aggregate consumption due to increased population (which even if it had no impact on imports or food aid would have led to a slight increase in production and area cultivated) we are further somewhat underestimating consumption and demand in the projections which are based on these figures. Finally, by using the quantities purchased figures from Tufts, rather than the quantities consumed figures (which are as much as 20% higher) we are further underestimating urban demand for both millet/sorghum and rice.

Income or Expenditure elasticities (% change in consumption / % change in income or expenditure)

Mali and the Sahel:

	Mali	Sahel av.
millet & sorghum	?	
urban	0.514	0.190
rural	?	?
rice	?	?
urban	0.593	0.930
rural	?	?

TABLE 7: NET CHANGE IN STOCKS 1985 - 1988

	Rice			Mil/Sorg			Corn			Wheat			Total		
	85/86	86/87	87/88	85/86	86/87	87/88	85/86	86/87	87/88	85/86	86/87	87/88	85/86	86/87	87/88
OPAM															
begin	12	36	10	11	71	77	11	33	19	0	0	0	34	140	106
end	36	10	13	71	77	29	33	19	4	0	0	0	140	106	46
change	-24	26	-3	-60	-6	48	-22	14	15	0	0	0	-106	34	60
Other public															
begin	0	0	13	0	0	0	0	0	0	0	0	0	0	0	13
end	0	13	0	0	0	0	0	0	0	0	0	0	0	13	0
change	0	-13	13	0	0	0	0	0	0	0	0	0	0	-13	13
Private															
begin	80	24	3	3	3	1	0	0	0	0	0	5	83	27	9
end	24	3	8	3	1	0	0	0	0	0	5	0	27	9	8
change	56	21	-5	0	2	1	0	0	0	0	-5	5	56	18	1
Total stocks															
begin	92	60	26	14	74	78	11	33	19	0	0	5	117	167	128
end	60	26	21	74	78	29	33	19	4	0	5	0	167	128	54
change	32	34	5	-60	-4	49	-22	14	15	0	-5	5	-50	39	74

BACKGROUND PAPER ON MALI AGRICULTURAL SECTOR AND USAID/MALI
AGRICULTURE STRATEGY
(12-23-88)

Overall Role of Agriculture in the Economy

Mali's performance in economic growth and the evolution of incomes of low income people is closely linked to its agricultural performance. The broad economic developments and policy constraints adversely affecting economic performance and income growth in general have had a negative effect on the agricultural sector. At the same time, agriculture's poor performance has exacerbated, indeed been a major proximate cause of, negative trends in overall economic performance and stagnation in the incomes many low income people. Despite increases in GDP due to increased agricultural production during the two exceptionally good rainfall years of 1985/86 and 1986/87, and despite recent major progress on agricultural policy reform, Mali's agricultural growth independent of short-term rainfall variation remains marginal. An exception in recent years has been Mali's continued growth in cotton exports, which has had a major role in improved export growth performance overall, as well as Mali's dynamic livestock sector.

Agriculture's crucial role in the economy is evidenced by the average 48% it has contributed to GDP over the past five years, and by the fact that 75% of the population is in rural areas, of which 70% directly employed in agriculture. Agriculture absorbs a disproportionately small 2.3% of the national budget (5.6% prior to the current debt service crisis). Agriculture has contributed on average 70% to 80% of Mali's foreign exchange earnings over the past five years, almost entirely cotton and livestock, barring substantial new mineral discoveries, Mali's foreign exchange earnings can be increased only by an increase in agricultural production.

Agriculture's poor performance has been a constraining factor in raising per capita incomes for several reasons.

1. Agriculture has failed to earn or economize enough on the foreign exchange needed for economic growth. Chronic food deficits require commercial imports for consumption purposes. These compete for scarce foreign exchange for investment purposes, slowing down the rate of technology development, capital formation, and income growth. Average food deficits for the last eleven years have been 155,000 MT per year, of which 96,000 MT have been imported commercially, at an average annual cost of approximately \$29 million, or more than half of average cotton export value during the same period. With substantially higher rice prices and imports for the foreseeable future, and long term stagnation in world cotton prices, rice imports are likely to use an even higher portion of foreign exchange generated by cotton exports.

2. Agriculture's inability to generate increased rural demand for non-farm goods and services has prevented it from promoting broader economic growth and increasing incomes. Without a progressive rise in demand from that part of the economy where 70% of people are employed, overall economic growth prospects must rest largely on urban demand and export markets; for the medium term these are not as promising as they once appeared.

3. The third and final respect in which the agricultural sector constrains broader economic growth is in the persistent failure of agriculture to reduce the cost of rice which together with millet/sorghum comprise the key urban wage good. This failure substantially raises the political cost to the GRM (and reduces its resolve) to undertake the full range of painful measures required to get the Malian economy onto a path of market oriented economic growth.

Resources

Mali has abundant arable land, a substantial portion of it receiving adequate and reliable rainfall (averaging in excess of 1,000 mm/year) and located out of the Sahel geographic zone. Of the 124 million hectares in the country, between 14 and 20 million are arable, of which in any given season between 10% and 15% is cultivated. In some areas, especially in the South and including those where AID or other project assistance has been an important factor, Mali has managed to improve technologies and effect increases in yield from the land. (These include substantial increases in cowpea yield, development of good-yield maize varieties, improved local varieties of sorghum, and adaptation and spread of animal power (unparalleled elsewhere in West Africa) to increase production of food and cash crops.) However, in many other areas yields continue to be stagnant, while in others land quality is declining due to poor management and soil degradation.

Rangeland. Mali's livestock herd and range resources represent another major resource. Livestock contributed 18% of GDP in the 1981-85 period, and approximately 40% of export revenue. Rangeland areas capable of sustained support to large numbers of livestock are estimated at between 29 and 44 million hectares. Export prospects for Malian animals remain strong for the 1990-94 period, despite some recent problems. Animal traction technology, which has been widely adopted in the past 15 years, will continue to see an expansion in its use during this period. Approximately half of Mali's population rely on livestock as an important income source.

Water. Despite the major effects of drought and a downward shift in rainfall in the past twenty years, Mali has abundant water resources from its extensive river system, groundwater resources, and still-generous rainfall in the more productive zones. However, productive use of these water resources faces several problems. Rainfall is highly variable, and technologies which simply increase yield do not have drought-resistant properties required in years of bad rainfall. Technologies which can mitigate the effects of rainfall variation in bad years have limited yield response under more favorable conditions. Soil moisture is adequate for crop production in many areas thought of as marginal, but soil management techniques to fully utilize available soil moisture are seldom used.

Estimates of irrigable land vary considerably. The lowest but probably most realistic estimate (of a recent joint United Nations/World Bank assessment) is 500,000 hectares. Other estimates as high as 2.2 million hectares have been made. Since only about 180,000 hectares of this total is currently under partial or total water control, it is clear that even under the most limiting assumptions of potential expansion Mali has abundant underutilized water resources for irrigation.

Expansion of irrigated area poses several problems.

1) Irrigation management is crucial to ensure productive sustained use of large irrigation systems but is at rudimentary levels in Mali. 2) Irrigation competes the rest of the agriculture sector and the economy more broadly for critical management skills which are in very short supply. 3) Costs of major irrigation infrastructure are extremely high, as in the rest of the Sahel. 4) Yields are very low on the large irrigation schemes, except in some new promising pilot zones in limited areas.

Under these circumstances, large scale irrigation is highly problematical in the short term. For irrigation to expand sufficiently to keep otherwise ballooning food deficits down even to an acceptable level (226,000 MT) in the year 2000 would, at current low yields, require the addition of approximately 20,000 hectares of irrigation every year for the next 12 years, at a rough cost of \$200 million per year. This is of course inconceivable. Irrigation infrastructure has been added at the rate of approximately 1500 hectares per year for the past fifteen years. The constraints facing irrigation development lead to the conclusion that the most important irrigation water for the short term is that which is already under some form of control, where modest yield increases could have an impact, as well as irrigation water capable of being controlled in small scale works which face neither the costs nor management problems of large scale irrigation projects.

Natural resources problems. Mali's rich natural resource base is nevertheless subject to severe degradation problems in some important areas. These areas have seen degradation due to a combination of climactic change and human pressure. This is evidenced by widespread reduction of floating rice, loss of rich perennial grass areas, major permanent shifts of livestock and people to the south, loss of important forest cover, and a host of more localized, less perceptible natural resource problems.

People. Another major resource is the country's people. Mali's farmers, despite poverty, a harsh policy environment, and devastating droughts during the past two decades, have made productive changes in their agricultural activities, ranging from adoption of animal mechanization and new crop varieties to integrating animals and forage production into their farming systems.

As with the other resources, however, a closer examination shows problems. 1) It is not easy to adapt new techniques and new crops or varieties to the variable environmental and rainfall situation, both of which have changed considerably in the past twenty years. 2) Some of the most poorly endowed farmers, including large numbers of women, have largely been left out of changes in technology, crops, and productivity. 3) Despite some efforts to increase literacy, overall literacy and education levels (which have a major effect on farm productivity in LDC's) remain low. 4) Many of the most productive rural people, including the better educated, leave farming, not because economic development is drawing them into more productive and rewarding sectors, but rather because agriculture has little to offer them.

Mali's private entrepreneurs, including many rural people, are a major asset. Many of Mali's people come from a long tradition of trade and enterprise which remains vibrant despite the policy impediments imposed since Independence. These impediments have, however, limited the effectiveness of this resource.

Institutions. The agricultural institutions producing or extending technology are also an important resource for Mali. Over the past few years, a number of important rainfed farming technologies have been adopted by farmers thanks to these institutions, including improved corn, sorghum, and cowpea varieties, and animal traction more widely used in Mali than in any other West African country. Thanks in part to AID activities over the past ten years, there is a small but growing cadre of competent agricultural researchers now working in Mali. However, there remain important gaps in trained human resources in agriculture, including management training. However, the GRM budget decisions and institutional linkages required to make trained human resources in agriculture effective have been lacking. In agricultural extension, the institutional reforms required to make extension an effective partner of agricultural research and of the private sector, rather than an ineffective deliverer of all services are only beginning.

New Policy Directions. The last Malian resource to be considered is the attitude of Malian policy-makers, which has undergone a major shift since the early 1980's. Malian policy-makers in marked contrast to several years ago, now see farmers, rural people, and private sector actors in the rural areas as forming the foundation for agricultural development. Many statist, counterproductive, and paternalistic policies remain in place, but the government's resolve to lift the most critical ones for the agricultural sector has been evidenced in a number of recent events and decrees during the past CDSS period. In fact, the two critical policy issues raised in the last CDSS (economic management and cereals marketing policy) have now undergone major reforms so that they are substantially less constraining. Than several years ago. However, the

implementation of these policy reforms, as well as a number of related policy changes to be discussed below, will critically affect agriculture's performance during the CDSS period. In addition, while there has been a major change of attitude, there remains great distrust of the capability of the private sector, and this colors the implementation of policy reforms. Finally, the legacy of past bad policies and the recent macroeconomic adjustment decisions (necessary as they are for sustained economic growth and increasing the incomes of low income people) nevertheless pose very serious medium term financial constraints to agricultural investment and income growth.

During the past five years, USAID/Mali has built a solid, focused program, based on these resources in Malian agriculture. Working with the livestock and coarse grain subsectors in the more productive zones of the country, USAID activities have had numerous impacts by increasing the effectiveness of institutions in crop and livestock extension, developing more productive technologies, and reforming policies. For USAID, this experience and impact represent an additional resource on which to build our program for the next five years.

Constraints

A complex interaction of policy, technical, and institutional factors constrains agriculture's contribution to Mali's economic growth and to increasing the incomes of low income people. It has become evident over the course of the current CDSS period that focusing on a single constraint alone such as price policy or varietal characteristics is unlikely to have the planned impact because of these interactions. For example, our Cereals Market Restructuring Projects have had a substantial impact on liberalizing cereals marketing and increasing the prices some farmers receive for their produce, relative to what they would have received in the absence of liberalization. However, this has not led to the increase in production expected at the beginning of the project because the GRM and donor programs have not yet sufficiently addressed the risks farmers face. These risks continue to pose a disincentive to increased production. They can only be reduced by a combination of technical change (to increase drought tolerance of crops), institutional change (to broaden the access of private traders to credit and market information so they can absorb some risks now borne by farmers), and infrastructure (to increase the regular service of remote areas by private traders).

Similarly AID and other donor agricultural research interventions have produced some new more productive crop varieties adopted and appreciated by farmers. But adoption beyond a certain limit is constrained by the institutional and policy factors (many of which have now been reformed) which have made producing for the market in Mali so risky for farmers. In the livestock sector, AID has created a capability to produce high quality vaccines, but health delivery is unsatisfactory because the institutional mechanism to ensure better and more timely coverage has not been fully developed. The constraints below therefore need to be considered in ways that highlight their mutual interactions.

Production risk is the key constraint facing Malian agriculture and Mali's farmers. Production risk is the result of both high rainfall variation and the unpredictable but often widespread impact of biological pests. Rainfall variation accounts for as much as 80% to 90% of variation in agricultural production over the past ten years. Production risk is a constraint not only because in some years there will be inadequate rain, but also because this situation discourages on-farm investment, as well as use of variable purchased inputs such as fertilizer.

Market risk also poses major problems for agriculture's making a greater contribution to economic growth and to increasing the incomes of the poor. Partly as a result of production risk and partly as a result of an institutional and policy environment, and a road infrastructure, which have discouraged private trader storage and intracountry trade, real farmgate prices of most food crops and of livestock can vary greatly, exacerbating the disincentives (already provided by production risk) for investment and for use of variable purchased inputs. In addition, transport costs, and the risks faced by traders as a result of policy and institutional factors, have led farmers to be paid lower prices than they otherwise would.

Soil fertility and structure, as in much of the Sahel, are poor, with fertility characterized by low available phosphorus and nitrogen. In some parts of the Second and Third Regions where rural population pressure is heavy, problems of low soil fertility are made worse by a shortening of fallow periods. In other areas, deforestation has exacerbated the already low fertility. In yet others, competition among livestock herds, or between herders and farmers in situations of unclear land and resource rights, has led to serious deterioration in soil fertility and structure for both rangeland, cropland, and lands amenable to reforestation.

Water, despite its overall abundance, is also a major constraint. It is clear now that rainfall has declined over much of the country in the past twenty years. Often crops in the field receive inadequate moisture, even when overall rainfall is adequate, due to poor soil structure and inadequate soil-water management. Irrigated crops, due to poor infrastructure management and maintenance, as well as to the vulnerability of many existing irrigation systems to poor rainfall, often receive inadequate water to produce well. Rainfed crops, which would yield better under improved conditions of soil water management, have low yields.

Labor also poses a constraint for some groups of people in some activities. Labor availability for some groups (women, families with emigrants elsewhere, households with inadequate resources) and some activities during labor bottleneck periods (extra weeding, some soil conservation practices) can prevent the level of participation required for the technology or activity in question to make its full contribution to increasing yields, economic growth, and the incomes of low income people.

The final major constraint on increasing agriculture's contribution to the incomes of low income people is inefficient and probably inadequate government expenditure for agriculture. Agricultural expenditure has been poorly managed and directed overall, and in particular has been far too heavily weighted towards personnel (at the expense of support and material) and towards government attempts to manage a broad range of agricultural sector tasks, including until recently marketing, milling, and irrigated production, that are better managed by private actors. As a result government institutions to provide critical services (such as information and infrastructure) that the private sector cannot supply but which are critical for effective private sector delivery of agricultural services has been inadequate. In addition, trained human resources constraints and financial mismanagement continue to limit the efficiency of government agricultural expenditure and institutions in Mali.

The next twelve years

Between now and the Year 2000, many of the policy reforms and investments of the recent past will bear fruit if Mali stays the course. The level of impact of these changes on actual food production and economic growth due to improved agricultural performance depends on three factors, rainfall; continued implementation of policy reforms, with additional policy reforms and institutional changes in support of them; and development and adoption of improved technologies to increase farm productivity.

While rainfall cannot be affected directly, there are technical and institutional changes which can directly reduce some of the deleterious effects of high rainfall variability over the next several years, thereby increasing agricultural production in unfavorable years, and providing an environment of greater stability and incentives for on-farm investment in productivity-enhancing techniques and inputs. The extent to which such changes occur (specifically drought tolerant crop development, and market improvements to reduce price variability due to major supply fluctuations) will have a major impact on agricultural sector performance during the next few years.

Policy reform has become a critical part of the changes in Mali's agricultural sector in the recent past. But it is an ongoing process. The full impact of policy changes on agriculture performance depends on their implementation and on the initiation of supporting actions during the next several years, as well as identification and implementation of additional policy reforms to alleviate new constraining factors, as the "first generation" of policy changes is implemented. For example, recent reforms increasing the participation of private firms and cooperatives in the delivery of agricultural inputs, veterinary services, and grain marketing functions will have their full impact only if adequate credit is available, marketing costs (both of road transport and of associated licensing and regulatory requirements) are kept low, and information on market conditions is available from a reliable source. To the extent that these accompanying complementary actions have not been taken, private sector actors will be constrained in providing timely, low cost,

and reliable services to increase production and reduce the risks of the market. In addition, government policies need to support the implementation of recent policy changes. Private veterinarians who cannot compete with subsidized government services are themselves unlikely to be able to provide the quality of service expected. If the very real and far-reaching policy changes of the recent past are to reach their full impact they cannot be admired as accomplishments to be proud of, rather they need implementation decrees, continued monitoring, and a series of secondary measures and additional policy changes to support their objectives.

These recent policy changes by themselves will have little impact on improving agricultural performance without other developments. Rather, these policy changes have put into place a set of very favorable conditions for technology development and adoption to take place and increase agricultural sector performance. Without the improved policy environment, the impact of technology on agricultural performance would be limited. But the improved policy environment will require major complementary technical changes in order to reach its fullest potential impact on improving agricultural sector performance.

A number of technical changes are likely to be developed and adopted between now and the Year 2000 to increase land and labor productivity. Overall agricultural performance will depend on the extent and nature of increased productivity brought about by technology change, and by the pace of technology development and adoption. There are three major areas of technical change which will affect agricultural performance: crops, livestock, and natural resources.

The major crop production improvements for the next several years are likely to be in cash crops, coarse grains, rice and diversification of crop enterprises. Cotton and other cash crops will remain extremely important, not only for their foreign exchange contribution, but for the positive effects they have on food crop production (via residual fertilizer, complementary agricultural extension and credit effects, and farm income stability due to cash cropping which makes farmers more willing to take the risk involved in producing grain for the market). With continued effective extension and more cost-effective alternative input delivery mechanisms, GRM plans for major cotton expansion in the face of stagnant world market prices could very possibly materialize. Major and careful donor attention and support already in place make this expansion of cotton production a real possibility, and an important component in improving Mali's agricultural performance to the end of the Century.

Rainfed cereals crops, despite their limited yield potential, are the highest priority food crop for improving Mali's agricultural performance. Because they constitute such an important part of overall agricultural production and area, even very modest yield increases (2% per year between now and the Year 2000, or yield increases from today's 765 kg/ha to one ton in the Year 2000 for millet and sorghum), will have far greater impact on agricultural performance, and on reducing Mali's food deficits, than would increased irrigation area or rice yields. It is likely that such modest yield levels will be achieved over the course of the next several years, by building on the scientific infrastructure now in place in Mali, and if sustained and reliable support for maintaining and strengthening Malian research and extension continue.

The technologies likely to have the greatest impact in rainfed cereal production are improved drought-tolerance and pest resistance, higher yielding varieties, improved yields due to better soil moisture management, increased residual fertilizer effects due to cash cropping, and better integration of livestock (and manure and draft power) into crop production systems. If AID and IBRD support to improved research planning and organization are successful, a more effective research system will be producing a stream of technologies targeted on priority production problems over the next several years.

Rice consumption is a major cause of Mali's food deficits, and increases in production will have measurable effects on reducing those deficits. While some expanded irrigation area is likely over the next few years, the costs of large scale expansion are prohibitive, and difficult to justify at present very low rice yields. The more promising route to increasing rice production is to increase yields in existing irrigated areas. Substantial yield increases could make a major contribution to agricultural performance, even with no addition of irrigated area. Such yields may require some modifications and adaptations of technology, but the key constraints in raising rice yields are not technical, but rather are related to organization, management, and farmer incentives. Better water control will also be required in some areas. Major policy changes recently brought about in rice pricing, marketing, and organization of extension are likely to create the most conducive environment for rice production that Mali has ever had in its decades of attempts to produce more rice. With careful and sustained support to these policy changes, and their implementation at field level (by PRMC, the World Bank, the Dutch, and the Caisse Centrale) it is likely that major increases in rice yields and production will be seen in the next few years. In addition there may be scope for development of food processing techniques which permit coarse - grain based products to substitute for rice consumption.

Agricultural diversification is likely to continue during the next several years, along several lines. Increased cowpea production, which already has a good technology basis and which is appropriate in areas where rainfall has been substantially reduced in recent years, is likely. The level of increased cowpea production will depend in part on the establishment of private marketing channels. Much of the production increase will be spontaneous, although assistance in establishing marketing channels, as well as credit and extension, could increase cowpea production even more. Urban and rural gardening, in response to increased vegetable demand, and a serious economic situation forcing many urbanites to grow some of their own food, will continue to expand, perhaps with assistance from small government or NGO support activities. Other income producing crops may also be developed, if NGO's, the GRM, or the private sector find marketing outlets. Finally, corn production, which is now quite minor but has shown itself to be very responsive to price and to marketing opportunities will see a major increase in production if it is purchased on a regular basis to serve food deficit areas or if its transformation can serve to fill some of the "convenience food" niche now filled only by rice.

In the livestock subsector, production for market, export, and draft power is likely to expand in the coming years, as a result of more effective animal health services and better targeting of research on solving the most pressing animal health problems. Production will also be enhanced by the growing use of forage and supplements in animal feeding. In addition, a growing proportion of livestock are likely to be produced in the southern areas, complementing rather than competing with crop production. A failure to devise strategies and technologies to improve animal nutrition in areas of limited range, and to increase the complementarities of livestock and crop production in cropping areas, will lead to serious negative effects on herder and farmer income and on the natural resource base.

In the area of natural resources, if climactic trends continue in the sahelian zones, climate-induced resource degradation will continue (loss of fish populations and floating rice areas), although human actions and government policies will have an important bearing on the extent of degradation and the areas where it can be stopped. Continued human pressure on range and cropland resources in the Fifth Region in particular are likely to continue, with movements of people and animals to other areas taking place spontaneously. The extent to which the pressures on range, livestock, soil, water, and tree resources, and the people who depend on them, can be mitigated depends on the level and nature of donor support and the care with which the GRM proceeds with its anti-desertification strategy and with devising land use plans (as is currently being undertaken in the ODEM area). In addition, many local activities, through NGO's, Comites de Developpement, and arising spontaneously in villages or groups of villages will help to mitigate many local natural resource degradation and deforestation problems. There will also continue to be spontaneous responses to those degradation problems which cannot be reversed (such as the level of the flood) by making major changes in cropping patterns.

In addition, in the more productive southern regions, recent attention by the GRM, donors, and farmers to soil conservation, agroforestry, and other on-farm natural resource management activities may lead in the next several years to important changes in farming systems, with greater intensification and recycling of nutrients, better management of soil moisture and fertility, and integration of livestock in farming systems in an environmentally sound manner.

USAID Agriculture Sector Strategy

In light of Mali's resources, constraints, and possibilities over the next several years, USAID's efforts will be focused on a closely related set of interventions in policy reform and implementation, technology development and transfer, and the related institutional changes needed to make our policy and technical interventions most effective. The institutional changes are best discussed within the policy and technical discussions below.

Our policy reform measures will continue to focus on implementation of privatization decisions in provision of grains, credit, agricultural inputs and veterinary services, as well as on the downstream additional policy and institutional changes needed to make earlier reforms most effective. In all three areas this means, in particular, government activities which increase, rather than undercut, efficient private sector provision of services.

In agricultural input and output marketing, we will continue to work with the GRM and the banking community to ensure private firm and cooperative access to the credit required to fill the roles finally being given up by the public sector. We will engage in monitoring, and policy dialogue regarding GRM regulations which impede efficient private sector provision of these services, and we will support critical ancillary efforts (provision of market information, possible improvements in road transport) to support more efficient private sector service delivery in these areas. The result of our continued policy reform efforts will be a more regular supply of agricultural inputs, more effective output marketing, and a more stable market environment which will thereby provide greater incentives to farmers. This environment will create the conditions required, which do not now fully exist, for greater on-farm investment in productivity - enhancing techniques and inputs. It will thereby support our own considerable activities in improving millet/sorghum technology and the activities of other donors in increasing rice yields.

In livestock development, we will work with the GRM to help implement its recent decree to privatize provision of veterinary medicine. We will assist in GRM field service delivery to complement private sector, provision of some services, and we will help GRM tackle the policy, credit, and institutional constraints to private veterinary access to pharmaceuticals. In addition, the pricing of pharmaceuticals and vaccines will be a continued focus of policy reform.

Beyond the privatization area, policy analysis and dialogue may also be undertaken on natural resource management and tenure. Our modest but carefully targeted pilot projects and monitoring in this area, together with the expertise which the USG can call on, may put us in a more important policy dialogue role than would be implied by our fairly limited resources in natural resources management. One specific focus of our policy analysis and monitoring in the area of natural resources concerns the relative rights and responsibilities of the GRM vis-a-vis local communities and individuals in using, managing, and protecting natural resources.

Two other, related policy areas we will assist the GRM in examining and reforming are organization of agricultural research and extension. Our ten years of support to region-specific research and extension will provide us a sound basis to engage in credible and effective policy dialogue. We will work with the World Bank to assist GRM research administrators to develop a new agricultural research plan, strategy, and organization which will produce more timely and efficient research results targeted on critical technical constraints faced by farmers and herders. We will also work with the World Bank in initiating dialogue on the possibility of a lean, efficient national extension service which would in many areas replace the administratively heavy and often ineffective structure of independent regional extension organizations.

In the area of technology development we will concentrate on coarse grains (millet/sorghum), animal health, livestock/crop/forage interactions, soil fertility, forestry and food processing techniques. In the first of these areas, where a solid research and scientific infrastructure exists, we will build on and strengthen it to increase labor productivity, yields, and drought- and pest-resistance in millet and sorghum production, to increasingly target the most critical animal health and nutrition problems with cost-effective techniques, and to develop more intensive mixed farming systems where animal and crop production mutually reinforce each other, increasing farmer and herder incomes in an environmentally sustainable way. In addition, we will support increased attention to the combined natural resources and soil fertility problems of erosion and soil-water management. Our geographic focus will continue to be in the high potential areas we have been working in for some time, with a possible extension of rainfed crop research (drawing on our sustained development to the Cinzana research station we started) to the better potential areas of the chronically deficit Fifth Region. Complementing and drawing on our technology development will be an effort to make substantial improvements in delivery of crop extension services to farmers in the Second Region.

Our more limited approach in forestry, because of our limited resources as well as the lack of a solid GRM research infrastructure, will concentrate on pilot testing and measuring of impact of promising technologies in a few focused on our pilot technology testing, and on providing local communities and individuals with ways of working together to protect and restore the environment.

The above strategy, working through policy reform, institutional change, and technology development will involve us in the five distinct areas to be presented in our CDSS, as follows: cereals market restructuring, rainfed crop technology development, crop technology transfer, livestock development, and natural resources management/biological diversity. Most of our activities in these areas are mutually interrelated in ways which, while not always obvious, are important in increasing the impact of the overall program. Our cereals market restructuring activities are putting into place conditions for a more stable market providing greater incentives for on-farm investment and production, conditions which will help ensure that the technologies we develop and transfer are widely adopted. In addition, many of the yield increases resulting from our technology can be sustained, only by an integration of livestock and crop production in a complementary manner, and by greater attention to farm-related natural diversity of crop species and varieties, intercropping, and improved agroforestry. Finally, in drier, non-crop areas, critical livestock, range, and natural resources problems are closely interrelated and can best be addressed in mutually reinforcing ways. We will continue to reinforce and draw on the closely related complementarities of our separate activities to achieve the highest impact. The specific components of the strategy are briefly summarized below:

1. Cereals market restructuring. This has been a major subject of policy dialogue during the current CDSS period, and significant policy reforms have been agreed to, as discussed above. To implement the reforms at the field level, however, we will encourage institutional changes which, together with better road infrastructure, will improve incentives for increased production by reducing market-related risks to small holders and other members of the private sector. We will provide support for more active participation of village organizations and private traders in grain storage and marketing, a more effective and extensive credit delivery system for both groups, and a market information system. Such developments can stimulate the creation of new small and micro-enterprises and additional sources of income and demand for farm products. We will work in concert with the multi-donor cereals policy reform program.

2. Rainfed crop technology development. Building on our ten years' investment in agricultural research, and on the research and infrastructure achievements to date, we will continue to develop technologies to increase land and labor productivity in rainfed food production (in particular, sorghum and millet) for the more productive areas of the country. We will seek improved drought- and pest-resistance, soil water management, and productivity-enhancing varieties and agronomic practices. The base already established for on-station and on-farm research (where we are one of the two major donors) and extension-research links will be strengthened. Building on this base, and on our own experience and credibility in these areas, we will cooperate with the GRM, the World Bank, and the International Service for National Agricultural Research (ISNAR) in planning and implementing a reorganization of agricultural research. The purpose will be to improve the selection of priority problems, increase efficiency, and speed the rate of technology development and testing. The results should encourage other donors to increase their assistance to Malian agricultural research.

3. Crop technology transfer. We will encourage more effective private and public provision of technology (information, inputs, varieties) to farmers. Progress already made in developing extension methods and in privatizing technology transfer functions will be expanded and complemented by a devolution of many related marketing and credit functions from the GRM parastatals to private village cooperatives. The remaining major inefficiency in agricultural extension in Mali is the current structure of separate regional extension organizations which receive little guidance or technical input from the top and have little contact with one another for exchange of experiences and ideas. We will use our accomplishments in effective technology transfer and privatization of technology transfer functions as a base from which to engage the GRM in dialogue on the issue of national extension organization in order to help overcome these inefficiencies and reduce overhead and personnel costs in extension.

4. Livestock development. Support to animal health technology development and dissemination will be continued to improve disease diagnostic capacity, applied disease research, vaccine quality control, and more cost-effective delivery of animal health services. We will build on recent GRM privatization decisions in the livestock sector to assist in privatization of some health delivery functions. Animal production technology will be further developed and extended to improve animal nutrition, the integration of forage into crop and livestock production systems, and the integration of livestock into crop production systems, in sustainable ways which increase crop yields and animal production while maintaining the natural resource base. Program effectiveness, animal productivity, and livestock/natural resources interactions will be closely monitored. Policies which constrain continued efficient, private sector-based livestock development will be identified and addressed.

5. Natural resources management (NRM) and biological diversity. Techniques to improve agro-forestry, reduce fuelwood consumption, prevent soil erosion, and reverse the degradation of resources and the decline of biological diversity will be developed, tested and extended through both our crop and livestock research and extension activities and those activities devoted strictly to natural resources management. In addition, we will seek to engage the GRM in policy dialogue on the relative rights and responsibilities of government, local communities and individuals with regard to land, tree and resource tenure. The aim will be to bring about institutional and policy change to create greater incentives for private, as opposed to government, management of natural resources, as appropriate. Although we are a minor donor in this area, our analytical resources and experience based on pilot activities, as well as our incorporation of NRM into agricultural activities, may give us an important role in such a dialogue.

An analysis of the actions necessary to conserve biological diversity and maintain tropical forests and the Mission strategy for promotion of the same will be developed and submitted for AID/W approval before the beginning of the new CDSS period.

POLICY ISSUES IN THE USAID/MALI AGRICULTURE PORTFOLIO

Operation Haute Valley/Development of the Haute Valley Projects

1. Rationalization of the roles of the:

<u>Private Sector</u>	and	<u>Public Sector</u>
Marketing of Produce		Agricultural Extension
Marketing of Inputs		Liaison with Agriculture Research
Provision of Credit		Regional Planning

2. Reduce or remove Import barriers for agriculture equipment.
3. Eliminate fixed transport rates in project zone.
4. Remove credit ceilings imposed by the BCEAO for agriculture production loans.
5. Roads maintenance funding allocations from GRM sources.
6. Cotton sector reforms in coordination with world Bank.
 - establishment of minimum guarantee farmgate price vs. fixed price
 - movement toward National Extension Service funded from federal budget vs. funding regionally from cotton revenues.

Natural Resource Management

1. Policy changes on forestry legislation to favor local participation and generate resources to meet the recurrent costs demand of on-going projects.
2. Develop village organizations in order to ensure their control over the natural resources of their traditional lands.
3. Improve land and tree tenure situations as incentives to farmers.
4. Improve policies on permits and fees for the harvest of tree products on a sustainable basis.
5. Include and capitalize on women activities and efforts in improving the natural resource base.
6. Support PVOs and ONGs working in the NRM sector.

Livestock

1. Analyze and make recommendations on ways the GRM can begin to assume recurrent costs in the delivery of animal health services and animal production research, as well as consider ways for the GRM to reinvest some of the revenues generated by the livestock sector back into the sector.
2. Develop the capacity of the Ministry of Natural Resources and Livestock to assure the quality of veterinary pharmaceuticals available and undertake private sector initiatives for their distribution. Associated with this will be a re-examination of the public sector role in the provision of veterinary services and how to increase private sector participation.
3. Improve capacity of livestock research and extension services to address priority needs of producers.
 - Lack of market access to traditional producers;
 - Lack of adequate road infrastructure;
 - Taxation policies that discourage livestock sales and exports;
 - Fixed meat prices.
5. Analyze and make recommendations for addressing land tenure issues concerning resource utilization and land use competition between livestock and agricultural producers. The GRM is currently considering the establishment of pilot zones where grazing lands and transit corridors for livestock are designated, as well as giving village level development committees authority to manage and determine land use and access to their traditional lands.

Grain Marketing/Food Security

1. Facilitate private sector ability to purchase, store, transport, and market coarse grains and rice in all areas of Mali, including deficit zones by:
 - a. provision of credit
 - b. reform fixed transport pricing
 - c. market information system
2. Increase grain storage at the farmer/village level.
3. Develop cereal varieties and cereal transformation process to produce an acceptable substitute for rice in the Malian diet.

TECHNOLOGY DEVELOPMENT AND EXTENSION

Considering the limited resources allocated to agricultural research, the relatively young research organization, and the long timeframe required for finding technological solutions to a range of complex production problems, which are further constrained by uncertain rainfall, technologies which have been developed and transferred to the extension agencies/farmers have been substantial. These technologies have produced significant improvements in the cropping systems and overall production. With the exception of cotton, many of the improved varieties and cultural practices were developed by USAID funded projects. Summarized below is list of those technologies that have been developed and extended to farmers (especially in the OHV and CMDT zones).

I. AGRICULTURAL (AGRONOMIC) RESEARCH

A. Improved Varieties:

Maize: Tiementie
Golden Crystal
Safita 2
TZE 4
Zanguereni
IRAT-2-81

Sorghum: Tiemarifing
CE-90
SH3D2
CSM-219
CSM-388
CE111-6
Malisor 84-7

Millet: M9
NKK
IBV-8001
NKK 3/4

Rice: Dourado (upland)
BG-90-2 (lowland)

Peanuts: 47-10
28-206
55-457

Cowpeas: TVX 32-36
KN-1
TN 88-63
Gorom Gorom

Cotton: B-163

Some of the above improved varieties only marginally improved yields and are in need of further development, but they are superior to local varieties.

B. Cultural Practices

Improved Intercropping systems: Maize/Millet
Sorghum/Peanuts
Sorghum/Cowpeas

Crop Rotation: Cotton/Cereals

Combination of synthetic and organic manures

Optimum planting density and sowing dates

Shallow plowing on sandy soils

Soil erosion control through dicing and tied ridges

Soil covers

C. Animal Traction:

Use and care of: TM plow (oxen)
Multi-purpose harrow
Seeder
Donkey plow; and
training oxen

We will continue to increase utilization rates among new users and old, developing and introducing complete equipment lines

D. Complementary Practices

Preparation of organic manure

Mixing of Telemsi rock phosphate, composting with organic manure/humid soil

Forage production for traction animals and other livestock

Small scale irrigation M/pumps or stream diversion for rice and vegetables prod

Tree spacing in fields and border rows

Control of brush fires

Treatment of seed-born diseases

Seed production/conservation methods

Grain storage methods

Fruit production

Transformations of Agric. produce

- small mills

- threshers.

II. NATURAL RESOURCE MANAGEMENT

- A. Improvement of cultural practices in soil conservation and water harvesting methods traditionally used by farmers. These technologies include: ravine control and contour dicing, rock gully plugs and checks dams.
- B. Mechanical interventions will be reinforced by biological conservation of tree planting.
- C. Agroforestry technologies will be extended based on farmers needs and terrain situations, including: living fence, in-field tree planting of Acacia albida, and windbreaks. These would be applied in combination as appropriate to maximize and stabilize outputs.
- D. Run off from open slopes will be checked by strip cropping along contour lines as well as using contour beams to retain water.
- E. Soil improvement methods will be tried using green manure compost and residues to restore soil organic matter.
- F. Fire management activities will be extended in the southern zones of the OHV areas through education, prevention and fire suppression.
- G. Seedbanks will be developed on a local basis to respond to farmers needs.

III. THE LIVESTOCK SECTOR

A. Animal Health:

Animal disease diagnostic network.

Sero-surveillance program to determine effectiveness of vaccines and immunization levels in livestock.

Demonstrate producers the benefits of vaccinating small ruminants and increase numbers vaccinated.

Increase sales of preventative medications.

Extend new and improved vaccines which are more economical for producers.

Develop new strategies for treating animals against endemic disease problems.

B. Animal Production

Small ruminants, milk cows and traction animals:

- identify and extend improved nutrition rations which reduce supplemental feed costs to producers.

Forage production:

- identify and extend adapted forage legume varieties for the semi-arid and sub-humid zones which can improve animal nutrition and potentially stabilize existing cropping systems.

Natural resource management:

- establish permanent transit corridors for livestock movements through cultivation zones;
- establish a pasture and water point monitoring system for local populations to begin to better evaluate and eventually control agro-pastoral resource use; and
- Provide hands-on training to extension agents and producers in appropriate natural resource management techniques such as: living fence enclosures, in-field planting of Acacia albida, and contour dikes to improve forage production, soil and water conservation, and fallow land regeneration.

RESUME DE QUELQUES-UNS DES PRINCIPAUX RESULTATS OBTENUS
PAR LA RECHERCHE AGRONOMIQUE

L DIVISION DE LA RECHERCHE AGRONOMIQUE

1.1. MIL

- Création variétale
 - . Diffusion de variétés précoces : HKP, IBV 8001, Torogoniou de Ningari. Mais problèmes d'oiseaux.

- Agronomie-Techniques culturales-Fertilisation
 - . Densité et dates de semis.
 - . Techniques de préparation du sol.
 - . Associations mil-niébé et maïs-mil en cours de diffusion. Fertilisation du système en cours d'étude.

- Défense des cultures
 - . Inventaire et connaissance de la dynamique des principaux ravageurs. Lutte chimique contre Raghu.
 - . Variétés locales résistantes au mildiou (CMM 418).
 - . Effet association mil-arachide sur le développement du striga en cours de vulgarisation.

- Technologie céréalière
 - . Importance des farines composées (mil+niébé) comme aliment de sévrage.

1.2. SORGHO

- Création variétale
 - . Diffusion des variétés CE-90, CE-99, CSM-388 en plus des variétés locales améliorées Mailor 84-1 et 84-5 en cours de diffusion.

- Techniques culturales et Fertilisation
 - . Dates et densités de semis des principaux groupes de précocité. Techniques préparation sol.
 - . Association sorgho-niébé, sorgho-arachide en cours de diffusion. Fertilisation du système en cours d'étude.

- Défense des cultures

- . Mise au point de variétés résistantes aux insectes des panicules (Mallsor 84-7).
- . Mise en évidence de l'effet du traitement de semences sur certaines maladies cryptogamiques (charbon) et au striga (82-S-50).

- Technologie céréalière

- . Mise au point d'une méthodologie de l'utilisation du sorgho (kéninké) étuvé comme pouvant succéder au riz.

1.3. NIEBE**- Création variétale**

- . Diffusion de nombreuses variétés précoces : KN1, TN 88-63, TVX 32-36 en diverses zones de production.

- Agronomie-Techniques culturales et Fertilisation

- . Mise en évidence de réponse du niébé au phosphore.
- . Mise en évidence de sa place dans la rotation.
- . Date et densités de semis du niébé en pur et en culture associée.

- Défense des cultures

- . Mise au point de traitements phytosanitaires.
- . Sélection de variétés résistantes au striga : Gorom-gorom, TN 88-63.

- Technologie céréalière

- . Farines composées.

1.4. MAIS**- Création variétale**

- . Mise à disposition de nombreuses variétés en plus des locales améliorées : Tuxpeño, Safita 102, Tempéré X Trop. N°027.

- Techniques culturales et Fertilisation

- . Mise en évidence de la réponse du maïs aux facteurs d'intensification (densité, fertilisation, herbicide).
- . Association avec d'autres cultures.
- . Etude en cours sur fumure culture en association avec maïs.

- Défense des cultures

- . Mise en évidence de variétés résistantes à la virose.

- Technologie céréalière

- . Maïs-riz
- . Maïs-fonio

1.5. RIZ

- Création variétale

- . Diffusion de nombreuses variétés aussi bien en irrigué, en flottant qu'en bas-fond et pluvial.

- Agronomie-Fertilisation

- . Semis direct et repiquage
- . Evaluation effet de l'enfouissement de l'Azolla et de la paille.
- . Mise au point de fertilisation.
- . Rôle matière organique apportée par paille de riz.

- Défense des cultures

- . Mise en évidence de variété résistantes aux foreurs de tiges, à la cécidomie et à la pyriculariose.

1.6. COTONNIER

- Création variétale

Toutes les variétés vulgarisées par la CMDT et l'OHV ont été mise au point par la Recherche (...BJA-SM-67 et B-163). ISA-205-B en cours de diffusion et B-431-6 disponible en secours.

- Agronomie et Techniques culturales

- . Dates et densités de semis
- . Rotations culturales
- . Mise en évidence de la réponse du cotonnier aux engrais (y compris PNT et fumure organique). Formule d'engrais NPKSB.
- . Herbicide
- . Recherche sur fertilité des sols.

- Défense des cultures

- . Inventaire et dynamique des principaux ravageurs.
- . Mise en évidence de l'efficacité de produits insecticides et programmes de traitements.

1.7. FRUITIERS ET CULTURES MARAICHERES

- . La Recherche malienne dispose de l'une des plus grandes collections de manguiers en Afrique de l'Ouest (93 variétés). Malheureusement à part quelques privés qui utilisent les résultats, il n'y a pas d'Opération de Développement en aval de la Recherche et commercialisation des fruits devra être plus organisée.

- . Mise au point de différents porte-greffe pour ananas

. Engouement des ONG et autres projets de développement pour les cultures maraichères.

1.8. DIVERSIFICATION ET AUTRES CULTURES

- Arachide
- Canne à sucre
- Voantzou
- Soja
- Fonio
- Tabac
- Théier

Des variétés pour toutes ces cultures sont disponibles.

2. DIVISION DE LA RECHERCHE SUR LES SYSTEMES DE PRODUCTION RURALE

2.1. LUTTE ANTI-EROSIVE

Beaucoup de résultats sont déjà au niveau de la vulgarisation :

- Utilisation des bandes en cailloux pour freiner l'érosion (creusement des rigoles).
- Les haies vives en Euphorbia balsamifera comme haies vives.
- Les bandes enherbées avec Bracharia ruziziensis introduites permettent de diminuer le ruissellement dans les champs et de les compartimenter. Le Stylosanthes hamata également peut être utilisé. Ces deux plantes servent de fourrages pour les animaux.
- Cependant il faut noter quelques problèmes : difficulté d'approvisionnement en cailloux (remplacement des cailloux) ; test de nouvelles espèces pour les haies vives.
- Actuellement la lutte contre l'érosion doit être comprise dans un cadre plus élargi : niveau village et terroir.

2.2. INTEGRATION DE L'AGRICULTURE ET DE L'ELBVAGE

- Le recyclage des résidus de récolte est déjà vulgarisé soit par voie de litière dans les parcs soit par voie de compostage.
- L'association maïs-petit mil est pratiquée par un pourcentage élevé de paysans.
- Les deux variétés de fonio testées à Tomlan (CMF 52 et CMF 28) sont appréciées par les paysans.
- La formation des agents de la CMDT en matière de dressage des boeufs de labour peut-être considérée comme transférée à la vulgarisation.
- L'introduction de la houe asine a soulevé un intérêt chez les paysans du Nord de la zone Nord-Sud.
- Tous les éléments du crédit premier équipement sont disponibles au niveau de la CMDT.

2.3. METHODE DE PREVULGARISATION

- Le conseil de gestion a été adopté comme méthode de vulgarisation et de formation dans les zones de la CMDT. Un document concernant la formation de l'encadrement a été élaborée à cet effet.
- Introduction des variétés de riz pluvial IRAT-144, Dourado précoce (dans le cadre de la diversification).

3. DIVISION DE LA PLANIFICATION ET DE L'EVALUATION

Etudes macro-économiques réalisées et en cours.

3.1. Perspectives de production jusqu'en l'an 2010.

3.2. Orientation d'un secteur agricole 1987-91.

3.3. Etudes coûts de production des principales cultures jusqu'en 1992. Le démarrage a eu lieu en 19

4. DIVISION DES ETUDES TECHNIQUES

Nombreuses études micro-économiques.

ANNEX 4



ASSOCIATES FOR INTERNATIONAL
RESOURCES AND DEVELOPMENT

INCENTIVE SYSTEM AND ECONOMIC POLICY REFORM IN MALI

BY

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68

INCENTIVE SYSTEM AND ECONOMIC POLICY REFORM IN MALI

EXECUTIVE SUMMARY

A. Introduction

1. This report formulates recommendations concerning the system of public policy incentives in Mali. The general objective of the recommendations is to promote economic growth, increase the efficiency of the allocation of resources, and establish a structure of production consistent with available resources in the main sectors of the economy -- agriculture and industry.

2. The Malian economy has been characterized since independence in 1960 by growing economic and financial problems. During the 1980s, these reached critical proportions, leading to an unsustainable level of national expenditure relative to output. Agriculture has been severely affected by the Sahelian drought, which in many years has sharply reduced domestic supplies of cereals. In 1986, the balance of payments worsened as a result of an unforeseen fall in the world price of cotton, the appreciation of the CFA franc vis-a-vis the US dollar, and a shortfall in external financial assistance.

3. In the midst of this crisis, the Malian government has initiated a series of reforms with three broad goals. The first is to stabilize the economy by achieving macroeconomic equilibrium in the balance of payments, national income and expenditure, the government budget, and the rate of inflation. The second goal is to adjust the incentive structure and to reallocate resources in directions that are consistent with Mali's comparative advantage in international trade. The third, and final, goal is to put into place the institutions and infrastructure that will contribute over the longer run to the equitable development of Mali's economy and its people.

4. This study focuses particularly on the second goal--that of structural adjustment. It analyzes the structure of Mali's comparative advantage in agriculture and industry and examines the extent to which existing trade, tax, price, investment, and other policies encourage resources to flow in directions that are consistent with that structure and its likely evolution over time. The analysis is limited in the number of productive activities that it includes, but the results are indicative of a broader pattern that emerges.

B. The System of Incentives

5. Beginning in the early 1960s, external and internal factors in Mali have contributed to low rates of output growth, rising inflationary pressures, a worsening of the external position, and an accumulation of

domestic and foreign payment arrears. With a structure of international trade characterized by exports of agricultural products with little or no transformation and an environment of recurrent drought, Mali's balance of payments has persistently been in deficit. Additional factors contributing to the poor performance of the economy include an overly ambitious public investment program, a comprehensive system of price controls, substantial losses in the large public enterprise sector, and uncontrolled current government expenditures in the face of stagnant revenues. These have led to rising overall budget deficits, forcing the government to borrow heavily in both the domestic and external markets.

6. During the early 1980s, the government took steps to improve the deteriorating economic situation, including a number of supply oriented measures designed to reduce underlying economic and financial imbalances. The marketing system for coarse grains was liberalized, official agricultural producer and retail prices were raised, attempts were made to rehabilitate key public sector enterprises, financial management was strengthened, and domestic and external arrears of the public sector were reduced. In spite of the adverse effects of severe drought, some progress was achieved, but a number of structural bottlenecks and distortions continue to restrain economic activity.

7. In agriculture, the cereals sector is characterized by (1) dependence on imports, especially of rice, (2) subsidization of rice producers in the Office du Niger and other rural development schemes, (3) instability of coarse grain prices because of large fluctuations in production, and (4) no clear definition of the role of OPAM, the public grain marketing agency. Cotton exports are severely taxed relative to long-term prices on the world market, and the procedures and taxes required to export livestock and its products results in widespread smuggling. The livestock sector is also plagued by excessive price controls, problems in the implementation of the system of payment for vaccinations, and the vagaries of recurrent drought.

8. On the industrial side, the major problems are (1) a complex system of tariffs with widely varying rates and numerous ad hoc exemptions, (2) excessive quantitative restrictions and monopolies on imports, (3) price controls that discriminate against local industrial production and in favor of imports and commercial activity, (4) high rates of taxation, (5) inefficient operation of state-owned enterprises, and (6) an investment code that is somewhat arbitrary in the allocation of its benefits and discriminates in favor of large, capital-intensive firms at the expense of smaller, labor-intensive activities. Other areas in need of reform in the industrial sector are the system of valeurs mercuriales, the administration of trade taxation, and the lack of neutrality in the tax system.

C. Comparative Advantage and Incentives

9. Much of the analysis of this report is based on the calculation of indicators of comparative advantage and incentives in Malian agriculture and industry. This involves the estimation of domestic resource costs (DRC) and various measures of protection for the major tradable goods produced by Mali. Domestic resource cost (DRC) analysis is based on the principle of comparative advantage that states that a country should produce and export goods in which it has a relative productivity advantage and that it should import goods in which it does not have this advantage. The analysis of economic incentives is related to trade protection. If the domestic price is greater than the world price because of an import tariff, for example, the nominal protection coefficient (NPC) is greater than one, and production of the domestic good is encouraged and consumption is discouraged. The effective protection coefficient (EPC), measuring value added in domestic prices relative to value added in world prices, provides an even better indicator of the extent to which government policy offers positive or negative protection to producers. The effective subsidy coefficient (ESC) adjusts the EPC for taxes and subsidies on nontradable inputs into production.

10. A major issue in the analysis of Mali's comparative advantage is the extent of overvaluation of the CFA franc in relation to Mali's balance of payments and structure of incentives. Correcting only for the deficit in the balance of payments, the exchange rate appears to be overvalued by about 33 percent. If the structure of protection in Mali is also taken into account, the degree of overvaluation is probably considerably greater. The DRC and incentive indicators have been adjusted accordingly.

11. The DRC analysis in Chapter 2 suggests that Mali has a strong comparative advantage in a number of agricultural activities, both for domestic consumption and for export. Although no specific data are available, it also appears highly likely that Mali has a considerable comparative advantage in livestock in both the pastoral and the agricultural zones. Its comparative advantage in industry is less well established, though the DRCs for a few products, such as agricultural equipment and cottonseed oil, are favorable, and there are other products, such as textiles and processed fruits and vegetables, in which such an advantage is likely to exist.

12. The potential for developing Mali's comparative advantage in agriculture is considerable. The Mali-Sud region is one of favorable rainfall and low population density, where cultivation of cotton and coarse grains, as well as production of livestock through mixed farming, can be expanded for at least several decades. The interior delta of the Niger River also offers considerable potential, though at current world prices this is difficult to exploit profitably with rice production, and irrigated cotton, fruits, vegetables, and other products may offer greater potential. Finally, the extensive rangelands of the pastoral zone are currently understocked, and there is therefore scope for expanding herds in this area over the next few years.

13. Eventually, however, the growth of population will press on available agricultural resources to such an extent that Mali's comparative advantage at the margin can be expected to shift in favor of industry. This is already happening in some of the less favored agricultural areas. Industrial growth will require, however, the development of a skilled work force, physical infrastructure to provide power and transportation, and the financial and other institutions needed to support this sector. Before this development can successfully take place, however, an appropriate structure of incentives must be established. Given Mali's limited domestic market, moreover, these incentives should encourage the production of manufactures for export as well as for home consumption.

14. The structure of incentives in Mali, however, is heavily biased against exports. Overvaluation of the exchange rate discriminates against production of tradable relative to nontradable products. Even among tradables, exports are strongly disadvantaged vis-a-vis goods produced for the domestic market. High, and in some cases very high, rates of protection allow inefficient and costly production to take place within this sheltered market and discourage more efficient activities that would earn the foreign exchange necessary to ease Mali's balance of payments problem and permit the purchase of low cost imports from abroad.

15. A major difficulty that stands in the way of correcting these distortions is the combination of the overvalued exchange rate, which is unlikely to change given Mali's participation in the West African Monetary Union, and the fiscal problems faced by the government, which make it difficult to implement offsetting export subsidies except for a limited range of nontraditional exports. Furthermore, the government depends very much on import taxation as a way of raising revenue, and this tends inherently to protect against imports and to discourage exports, both directly and, in the long run, indirectly by causing the exchange rate to be overvalued. In the face of these constraints, the most that can be done is to reduce export disincentives to a minimum by eliminating all indirect taxes on exports, applying duty drawbacks on imported inputs used to produce exports, directly subsidizing nontraditional exports, and providing other encouragements that are fiscally feasible and economically desirable.

D. Recommendations

The following recommendations are made based on the analysis of Chapter 2. The recommendations are presented in detail in Chapter 3.

Reform of the Tariff Structure

16. The structure of tariffs in Mali should be changed in at least four respects.

13. Eventually, however, the growth of population will press on available agricultural resources to such an extent that Mali's comparative advantage at the margin can be expected to shift in favor of industry. This is already happening in some of the less favored agricultural areas. Industrial growth will require, however, the development of a skilled work force, physical infrastructure to provide power and transportation, and the financial and other institutions needed to support this sector. Before this development can successfully take place, however, an appropriate structure of incentives must be established. Given Mali's limited domestic market, moreover, these incentives should encourage the production of manufactures for export as well as for home consumption.

14. The structure of incentives in Mali, however, is heavily biased against exports. Overvaluation of the exchange rate discriminates against production of tradable relative to nontradable products. Even among tradables, exports are strongly disadvantaged vis-a-vis goods produced for the domestic market. High, and in some cases very high, rates of protection allow inefficient and costly production to take place within this sheltered market and discourage more efficient activities that would earn the foreign exchange necessary to ease Mali's balance of payments problem and permit the purchase of low cost imports from abroad.

15. A major difficulty that stands in the way of correcting these distortions is the combination of the overvalued exchange rate, which is unlikely to change given Mali's participation in the West African Monetary Union, and the fiscal problems faced by the government, which make it difficult to implement offsetting export subsidies except for a limited range of nontraditional exports. Furthermore, the government depends very much on import taxation as a way of raising revenue, and this tends inherently to protect against imports and to discourage exports, both directly and, in the long run, indirectly by causing the exchange rate to be overvalued. In the face of these constraints, the most that can be done is to reduce export disincentives to a minimum by eliminating all indirect taxes on exports, applying duty drawbacks on imported inputs used to produce exports, directly subsidizing nontraditional exports, and providing other encouragements that are fiscally feasible and economically desirable.

ANNEX 5

**A Study of
the Business
Climate in Mali**

Prepared for the U.S. Agency for International Development under contract number PDC-1096-I-08-8043-00.

William Grant
Petr Hanel

September 1988



Development Alternatives, Inc. 624 Ninth Street, N.W. Washington, D.C. 20001

7/4/88

CHAPTER EIGHT
RECOMMENDATIONS FOR A PRIVATE SECTOR
STRATEGY FOR USAID/MALI

Based on the conclusions from the first part of this report, USAID/Mali should pursue a multi-faceted approach to private sector development designed to simultaneously increase purchasing power, remove policies detracting from market efficiency, and improve the operations and links within the private sector. The three major areas are:

- Continued concentration on the development of the rural agricultural productive sector with a focus on exports and on the introduction of privately supplied financial and commercial services to rural areas;
- Continued emphasis on the removal of policy distortions in the legal, trade, fiscal, regulatory, labor, and banking sectors to increase market efficiency; and
- Provide technical assistance directly to the private sector businesses, consulting firms, and to the banking system to help bridge the gap between the formal and informal sectors and to assist ongoing activities in the private sector.

PRIVATE SECTOR INVOLVEMENT IN RURAL DEVELOPMENT

With 80 percent of all economic activity relating to agriculture, large increases in the market for goods and services will depend on the success of agriculture to provide increased disposable income and revenue to the greatest number of consumers. The rural productive sector will be the greatest source of revenue generation for the Malian economy over the coming 7-10 years and therefore cannot be ignored in the plan for development of the Malian private sector. In fact, the rural/agricultural sector could become one of the major markets for the private sector to provide goods and services once the channels of communication are opened between the two sectors.

For many years, the formal private service sector (banking and input supply) has largely ignored the agricultural market due to high perceived risk and low anticipated returns. In addition, the government (or parastatals) controlled the distribution of inputs and credit, the marketing of the crops, and the access to most of the resources in the rural areas. One hopes that this is changing. The

expensive by removing unnecessary intermediaries as well as create greater continuity for the delivery of services.

Recommendations

In the area of rural development, USAID/MALI should:

- Continue to devote significant efforts to improving the physical infrastructure in the rural areas to facilitate the marketing of agricultural products;
- Promote private sector participation in all of its projects in rural areas replacing inefficient government services for delivery of inputs, services, and marketing production;
- Increase its emphasis on income generating activities in the rural areas particularly in the areas of export crop production or the production of goods whose by-products can be exported;
- Continue the successful work begun in the OHV project, creating specific links with the private sector to deliver credit and inputs, and ensure the transportation of marketable crops;
- Continue to strengthen village-level organizations and assist them to interact directly with government services, the banks, and other private sector suppliers;
- Continue to identify new market niches, currently occupied by the GRM or donor projects, that can be turned over to the private sector. Invest the time and resources necessary to establish the link between the private sector and the services to be provided; and
- Continue to strengthen the development of private sector capability to market cereals in the rural areas at the appropriate time.

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ANNEX 6 CDSS CABLE⁵

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E.O. 12356: N/A

SUBJECT: REVIEW AND IMPLEMENTATION OF MALI CISS

1. SUMMARY. THE MALI CISS WAS REVIEWED AND ACCEPTED BY THE EXECUTIVE COMMITTEE. SOME DECISIONS WERE SUBSEQUENTLY MODIFIED AND SOME SUPPLEMENTARY ANALYSES ARE REQUIRED. CE PROBLEMS WERE DISCUSSED AND HAVE UNDERGONE SEPARATE NEGOTIATIONS. PROPOSED AGRICULTURAL RESEARCH STRATEGY REQUIRES ADDENDUM TO CDSS BEFORE IT IS ACCEPTED. ISSUES REGARDING CEREALS MARKETING REFORM THROUGH A PI 400 SEC 226 ACTIVITY HAS BEEN REVIEWED SEPARATELY BY PROJECT COMMITTEE AND REPORTED ON IN SEPTEL. MISSION WILL BE CONTACTED BY SEPTEL CONCERNING POSSIBLE BASIC EDUCATION INITIATIVE. MISSION NEEDS TO ADDRESS CONCERNS EXPRESSED ON NATURAL RESOURCE MANAGEMENT TO NEXT ACTION PLAN. ANNEX TO CDSS OUTLINING WID STRATEGY WAS FORMALLY REQUESTED AND RECEIVED. AID/W REGRETS LATENESS OF THIS MESSAGE RECAPPIING THE MANY ACTIONS AND DECISIONS CONCERNING THE MALI STRATEGY AND REVIEW.

2. IN THE LAST THREE MONTHS THE MALI STRATEGY AND PROGRAM HAS BEEN REVIEWED AND DISCUSSED IN DEPTH AT THREE MAJOR MEETINGS: THE MALI CDSS REVIEW (MAY 10TH),

THE AES REVIEW (JUNE 22) AND THE AFR BUREAU WRAP-UP MEETING (JULY 8TH). AID/W REGRETS DELAY IN FORMALLY TRANSMITTING THIS MESSAGE WHICH CONFIRMS DECISIONS MADE AT CDSS REVIEW WITH USAID/MALI DIRECTOR AND ABS DECISIONS MADE WITH MISSION DEPUTY DIRECTOR. THE NUMBER OF OUTSTANDING AND OPEN ISSUES I.E., OPERATING EXPENSES, STAFFING LEVELS ABS AND PROGRAMS LEVELS NECESSITATED EXTENSIVE DISCUSSIONS WITH SOME DECISIONS AND ACTIONS EARLIER IDENTIFIED AT THE CDSS REVIEW BEING SUBSEQUENTLY OVERTAKEN BY EVENTS LEADING TO MODIFICATIONS DRIVEN BY LATER CLARIFICATIONS AND EVOLVING DEVELOPMENTS. THEREFORE THIS MESSAGE, FOR WHICH WE AGAIN APOLOGIZE BECAUSE OF ITS DELAY, SHOULD BE READ IN CONJUNCTION WITH THE AES REVIEW CABLE WITH WHICH IT IS CONCURRENTLY TRANSMITTED. THESE ISSUES HAVE BEEN DISCUSSED WITH USAID/MALI DIRECTOR-DESIGNATE BRENNAN DURING HIS AID/W CONSULTATIONS.

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4. ISSUE 1. MANAGEMENT/OPERATING EXPENSES/STAFFING/OYB:
THIS CDSS ISSUE INVOLVED THE QUESTIONS AS TO WHETHER THE MISSION COULD MANAGE AND IMPLEMENT ITS PROPOSED STRATEGY FACED AS IT IS WITH (1) A DECREASE IN USDE POSITIONS, (2) A DEDUCTION IN OPERATING EXPENSES, AND (3) A POSSIBLE INCREASE IN CFA FUNDS OF UP TO DOLS 8 MILLION ABOVE THE CDSS PLANNING LEVEL OF DOLS 12 MILLION/YEAR.

A. DISCUSSION/DECISION: THE SHORTAGE OF OE IS A SERIOUS, BUREAU-WIDE PROBLEM. IF IT CANNOT BE SATISFACTORILY RESOLVED, FY 89/90 BUDGET, STAFFING AND PROGRAM ADJUSTMENTS MAY WELL BE REQUIRED. SUBSEQUENT TO THE CDSS REVIEW, THE DECISION WAS CONFIRMED THAT THE OE LEVEL FOR FY 1989 OF DOLS 2.650 MILLION REMAINS IN EFFECT. WITH THE RECENT APPRECIATION OF THE DOLLAR AGAINST THE CFA WE BELIEVE THIS AMOUNT WILL BE ADEQUATE TO PERMIT THE MISSION TO CARRY OUT ITS PROPOSED PROGRAMS.

5. ISSUE 2-A. SECTOR STRATEGIES: AGRICULTURAL RESEARCH. THE QUESTION WAS CONSIDERED WHETHER A.I.D. SHOULD MAKE A 23-25 YEAR COMMITMENT TO DEVELOPING A SELFSUSTAINING AGRICULTURAL RESEARCH PROGRAM. SPECIFICALLY IT WAS QUESTIONED WHETHER WE SHOULD CONTINUE TO COMMIT RESOURCES TO THE DEVELOPMENT OF WHAT ARE ESSENTIALLY LOW VALUE CROPS OF DECLINING POPULARITY OR PIVOT ON A MORE GROWTH ORIENTED STRATEGY.

A. DISCUSSION: EARLY ON IN THE CONSIDERATION OF THIS TOPIC IT BECAME APPARENT THERE WAS CONCERN AS TO WHETHER WE HAD DEVELOPED SPECIFIC BENCHMARKS BY WHICH WE COULD MEASURE THE EXTENT OF ECONOMIC GROWTH ACHIEVED FROM OUR

PACKING OF PRODUCTION OF MAIZE, MILLET AND SORGHUM. IS OUR STRATEGY MORE LINKED TO OVERCOMING HUNGER RATHER THAN ACHIEVING GROWTH? ARE THERE VIABLE ALTERNATIVE CROPS? CAN BETTER BENCHMARKS FOR PROGRESS IN AGRICULTURE RESEARCH BE DEVELOPED. CAN THE ECONOMY OF MALI ACHIEVE SUFFICIENT GROWTH THROUGH EMPHASIS ON LOW VALUE COARSE GRAIN CROPS? THESE QUESTIONS LEAD TO THE OVERARCHING ONE: IN THE FINAL ANALYSIS IS MALI DESTINED TO REMAIN A COUNTRY OF MARGINAL ECONOMIC PROSPECTS OR IS IT CAPABLE OF ACHIEVING A SUBSTANTIAL LEVEL OF GROWTH? SEVERAL PARTICIPANTS FELT THE POTENTIAL FOR GROWTH AND DIVERSIFICATION DOES EXIST, BUT THAT MALI MUST ALSO INCREASE ITS PRODUCTION OF RAINFED TRADITIONAL CROPS TO KEEP ITS IMPORT FOOD BILL DOWN, THAT FARMERS MUST BE MADE MORE PRODUCTIVE TO KEEP THEM IN THE COUNTRYSIDE, THAT OTHER DONORS ARE WORKING IN RICE PRODUCTION WITH LIMITED SUCCESS, AND THAT THE BURDEN OF PROOF RESTS WITH CRITICS THAT VIABLE ALTERNATIVES TO COARSE GRAIN PRODUCTION INDEED EXIST.

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E. DECISION: BEFORE A LONG TERM COMMITMENT CAN BE MADE TO AGRICULTURE RESEARCH, THE MISSION SHOULD EXPAND ITS ANALYSIS OF THE IMPORTANCE OF AGRICULTURE RESEARCH TO MALI. IN THE COMING YEAR AND BEFORE SUBMISSION OF THE PID FOR THE AGRICULTURE RESEARCH SUPPORT (688-0250) IN JULY 1989 THE MISSION IS ASKED TO PREPARE A PAPER TO BE CONSIDERED AS AN ADDENDUM TO THE CDSS REVIEWING THE LINKAGE BETWEEN ITS AGRICULTURE SECTOR ACTIVITIES AND THE POTENTIAL FOR ECONOMIC GROWTH IN MALI. QUESTIONS TO BE LOOKED AT SHOULD INCLUDE ANALYSIS OF WHAT CROPS AND PRACTICES SHOULD BE PROMOTED IN THE AGRICULTURE SECTOR TO BEST CONTRIBUTE TO ECONOMIC GROWTH. WE NEED TO EXAMINE THE RELATIONSHIP BETWEEN THE NEED TO INCREASE SMALL FARMER INCOMES AND THE DESIRE TO ATTAIN FOOD SECURITY GOALS. IS MALI'S ECONOMIC POTENTIAL MOST LIKELY TO BE REALIZED WITH A GROWTH-ORIENTED STRATEGY? WHAT POLICY CONDITIONS NEED BE IN PLACE TO SUPPORT A GROWTH STRATEGY BASED ON FOOT GRAIN PRODUCTION? DOES THE GRM SHARE OUR VIEW OF THE ROLE OF FOOD GRAINS IN MALIAN AGRICULTURE AND THE NECESSITY TO PROMOTE THEIR DEVELOPMENT WITH A LONG TERM COMMITMENT TO AGRICULTURAL RESEARCH? MISSION SHOULD ALSO DISCUSS THE RESULTS BEING ACHIEVED BY THE CURRENT RESEARCH PROGRAM, THE PROSPECTS FOR DEVELOPMENT AND PROMULGATION OF DROUGHT RESISTANT VARIETIES AND THE PROSPECTS FOR FUTURE DEVELOPMENTS IN AGRICULTURE RESEARCH. (AT THE ABS REVIEW IT WAS RECOMMENDED THAT THE MISSION SHOULD EXAMINE THE

POSSIBILITY OF INCLUDING AN AGRICULTURAL SECTOR GRANT WITHIN ITS PORTFOLIO AS WELL).

6. ISSUE 2B. HEALTH SECTOR ACTIVITIES: THE COMMITTEE CONSIDERED WHETHER THE STRATEGY AND HEALTH PROJECTS PROPOSED WERE LIKELY TO ACHIEVE THE BENCHMARKS ESTABLISHED BY THE MISSION; WHETHER THE MANY PROJECTS CONSTITUTED A MANAGEMENT BURDEN ON THE MISSION; AND IF MALI SHOULD CONTINUE TO BE DESIGNATED A CHILD SURVIVAL COUNTRY.

A. DISCUSSION CENTERED ON WHETHER BECAUSE OF MANAGEMENT WEAKNESSES AND DECLINING BUDGETARY RESOURCES IN THE MINISTRY OF HEALTH OUR CHILD SURVIVAL BENCHMARK GOALS MIGHT BE OVERLY AMBITIOUS AND MALI MIGHT HAVE TO BE DROPPED AS A CHILD SURVIVAL EMPHASIS COUNTRY. THE USAID/M DIRECTOR STATED THAT HE LOOKED FOR MORE ACTIVITY IN CHILD SURVIVAL WITH THE EXPECTED ARRIVAL OF A CCCD EXPERT WHO WILL COORDINATE CHILD SURVIVAL ACTIVITIES. UNICEF IS ALSO DOING A GOOD JOB IN THIS SECTOR. IT IS CLEAR THAT MORE CONCRETE DATA IS REQUIRED IN ORDER TO BE ABLE TO MEASURE PROGRESS. THE MISSION INTENDS TO ADDRESS THIS REQUIREMENT, DEVELOPING A BETTER INFORMATION BASE. CONCERNING OTHER HEALTH SECTOR INITIATIVES, MORE COULD BE DONE IN POPULATION, IN PARTICULAR IF THE MISSION MOVES MORE INTO THE PRIVATE/PVC SECTOR, SUPPORTING THE ACTIVITIES OF THE ANPPF, DOING MORE SOCIAL MARKETING ETC.

B. DECISION: THE HEALTH STRATEGY WILL REMAIN AS OUTLINED IN THE CISS. HOWEVER (THE MISSION NEEDS TO STRENGTHEN THE INFORMATION BASE OF THE CHILD SURVIVAL PROJECT. WE WILL CONTINUE TO WATCH FOR MANAGEMENT IMPROVEMENTS IN THE MINISTRY OF HEALTH INDICATING IT IS BETTER ABLE TO SUPPORT PROJECT ACTIVITIES. THE MISSION SHOULD CONTINUE TO PRESS THE GEM TO EXPAND ITS FAMILY PLANNING ACTIVITIES AND DEVELOP A MORE DYNAMIC PROGRAM. (AT THE ABS REVIEW IT WAS NOTED THAT BY 1989 FUNDING FOR THE PLANNED NEW POPULATION ACTIVITY HAD DECREASED FROM DOLS ONE MILLION IN THE CDSS TO DOLS SEVEN HUNDRED THOUSAND IN THE ABS. IT WAS REITERATED AT THE ABS THAT THE MISSION SHOULD CONSIDER SPEEDING UP IMPLEMENTATION OF THE FAMILY PLANNING PROJECT, PROVIDING ADDITIONAL RESOURCES TO THIS SECTOR.)

7. ISSUE 2C: EDUCATION. AT THE CDSS REVIEW IT WAS JUDGED THAT WHILE THE NEED FOR ASSISTANCE IN BASIC EDUCATION/PRIMARY EDUCATION CLEARLY EXISTS, THIS MIGHT

NOT BE THE APPROPRIATE TIME FOR US TO MOVE INTO THIS SECTOR. THE BUREAU HOWEVER IS LOOKING FOR A GOOD OPPORTUNITY TO ASSIST IN EDUCATION, STIMULATED IN SOME MEASURE BY THE POSSIBILITY OF A LEGISLATIVE REQUIREMENT FOR NEW PROJECT STARTS IN BASIC EDUCATION. WE ARE THEREFORE RECONSIDERING OUR POSITION AND WILL SOON BE ENTERING INTO A COMPREHENSIVE DIALOGUE WITH THE MISSION TO SEE WHAT MIGHT BEST BE DONE. A POSSIBILITY WOULD BE TO JOIN THE WORLD BANK IN CO-FINANCING OF THEIR EDUCATION SECTOR GRANT, THUS MINIMIZING THE DRAIN ON MISSION PLANNING/MANAGEMENT RESOURCES. SEPTEL FOLLOWS ON THIS TOPIC.

8. ISSUES 3 AND 4: CEREALS MARKET LIBERALIZATION AND LOCAL CURRENCY PROGRAMMING ARE CLOSELY LINKED AND WERE CONSIDERED TOGETHER DURING THE CDSS REVIEW. USAID/M PARTICIPATES IN THE MULTI-DONOR CEREALS MARKET LIBERALIZATION PROJECT THROUGH A PL-482 SEC.206 PROGRAM ET

OF RICE IMPORTS. SEVERAL QUESTIONS WERE RAISED WHICH FRAMED THE ISSUE: IS FOOD AID THE BEST WAY TO PARTICIPATE IN THIS PROGRAM? ARE THE POLICY REFORMS BEING PROMOTED RESULTING IN PRODUCTION INCREASES? SHOULD WE BE USING PROGRAM FUNDS IN LIEU OF FOOD?

A. DISCUSSION. THE USAID DIRECTOR POINTED OUT THAT THIS MULTI-DONOR EFFORT GENERATES SIGNIFICANT AMOUNTS OF LOCAL CURRENCY FROM ALL DONORS, WITH FROM DOLS 50 MILLION TO DOLS 75 MILLION IN LOCAL CURRENCY EXPECTED AT THE END OF THREE YEARS. USAID NEEDS TO COORDINATE WITH THE OTHER DONORS AS THE FUNDS ARE PROGRAMMED, WORKING CLOSELY WITH THE GRM. HE DID NOT BELIEVE OUR RICE WAS ACTING AS A DISINCENTIVE TO LOCAL PRODUCTION.

B. DECISION: THE MISSION WAS ASKED TO SUBMIT ITS EVALUATION OF PRMC-I AND RECOMMENDATIONS FOR A PRMCII FOLLOW-ON PROJECT. THE LATTER PROPOSAL WAS SUBSEQUENTLY REVIEWED IN AID/W AND THE MISSION AUTHORIZED TO SUBMIT ITS PRMC-II SEC. 206 PROPOSAL BY SEPTEMBER, 1988 FOR FY-1989 FUNDING. (IN THE AFS REVIEW THE MISSION WAS ALERTED TO ENSURE THAT SEC. 206 PROGRAM MANAGEMENT EXPENSES ARE FUNDED BY LOCAL CURRENCY GENERATIONS OR WITH U.S. COLLAR PROGRAM FUNDS.)

G. CONCERNS: A. BENCHMARKS. CONCERNS WERE EXPRESSED AS TO WHETHER MISSION BENCHMARKS WERE SPECIFIC ENOUGH TO ENABLE EVALUATION OF PROGRESS TOWARD ACHIEVEMENT OF GOALS ESTABLISHED FOR PRIVATE ENTERPRISE, FAMILY PLANNING, CHILD SURVIVAL AND IN PARTICULAR FOR WOMEN IN DEVELOPMENT ACTIVITIES. THE MISSION WILL ENTER INTO A

DIALOGUE WITH AID/W ON WHAT IT NEEDS TO INCLUDE IN ITS EVALUATION PLAN AND ACTION PLAN CONCERNING GREATER QUANTIFICATION OF BENCHMARKS.

B. CONCERN: DISASTER PREPAREDNESS. WHILE THE MISSION HAS A DISASTER PREPAREDNESS PLAN, INCLUDING AN EARLY WARNING SYSTEM, THE CONCERN WAS EXPRESSED AT THE CDSS REVIEW WHETHER THIS WAS SUFFICIENT. (SUBSEQUENTLY AT THE AFS REVIEW THE RECOMMENDATION WAS MADE THAT MISSIONS IN DISASTER-PRONE COUNTRIES SUCH AS MALI SHOULD CONSIDER A FLEXIBLE, MULTIYEAR DISASTER PROJECT. AID/W WILL ADVISE MISSIONS IN DUE COURSE OF RECOMMENDED FINANCING MECHANISMS.)

C. CONCERN: NATURAL RESOURCES MANAGEMENT. THE MISSION WILL DEFINE ITS STRATEGY IN THIS SUB-SECTOR IN ITS NEXT ACTION PLAN, DRAWING ON THE RECENTLY COMPLETED NATURAL RESOURCES ASSESSMENT. THE TOPIC OF BIOLOGICAL DIVERSITY WILL BE INCLUDED IN THE DISCUSSION.

I. CONCERN: WOMEN IN DEVELOPMENT. WE HAVE RECEIVED AND TEAM: THE MISSION FOR THE ANNEX REQUESTED FOR INCLUSION IN THIS CDSS. OUR COMMENTS ON IT WILL FOLLOW. SHUITZ
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E.O. 12356: N/A

SUBJECT: MALI ABS REVIEW

ANNEX 7: ABS
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1. THIS MESSAGE REPORTS ON RESULTS OF THE AFRICA BUREAU-LEVEL REVIEW OF YOUR FY 1990 ABS. THE FIRST REVIEW FOR MALI WAS HELD ON JUNE 22. IT WAS CHAIRED BY AAA/AFR, JOHN WESTLEY AND WAS ATTENDED BY REPRESENTATIVES OF THE AFRICA BUREAU (SWA, DP, PD, CONT, TR, EMS AND MEI) AS WELL AS PPC, FVA AND THE DEPARTMENT OF STATE. USAID/MALI WAS REPRESENTED BY DEPUTY DIRECTOR WILEUR THOMAS. THE BUREAU WRAP-UP, CHAIRED BY AA/AFR GLADSON, WAS HELD ON JULY 8, 1988.

2. THE ADMINISTRATOR WILL REVIEW BUREAU BUDGET SUBMISSIONS DURING AUGUST. DECISIONS ARISING FROM THE A/AID'S REVIEWS WILL OFFER THE BASIS FOR DEVELOPMENT OF THE INTEGRATED FOREIGN ASSISTANCE BUDGET IN CONSULTATION WITH STATE LATER IN AUGUST. TARGET DATE FOR TRANSMISSION OF THE FY 1990 IDCA/AID BUDGET TO OMB IS SEPTEMBER 1. MISSIONS SHOULD BEAR IN MIND THAT THE INFORMATION THAT FOLLOWS REMAINS TENTATIVE AND INFORMAL, PENDING COMPLETION OF THIS EXECUTIVE

BRANCH REVIEW/DECISIONMAKING PROCESS, AND SHOULD NOT CONVEY THIS INFORMATION IN ANY OFFICIAL MANNER TO THE HOST GOVERNMENTS AT THIS TIME.

3. THE AFRICA BUREAU'S SUBMISSION TO PPC AND THE INFORMATION THAT FOLLOWS ARE BASED ON THE ASSUMPTION THE BUREAU WILL SATISFACTORILY RESOLVE THE VERY SERIOUS OPERATING EXPENSE PROBLEMS AND NEEDS WE FACE. SHOULD THAT NOT BE THE CASE, WE RECOGNIZE THAT FY 89/90 BUDGET AND PROGRAM ADJUSTMENTS MAY WELL BE REQUIRED. WE WILL PROVIDE YOU FURTHER INFORMATION ON OE AND STAFFING WHEN EXAMINATION OF THIS ISSUE HAS BEEN COMPLETED OVER THE NEXT FEW MONTHS.

4. A SEPTETI WILL ALSO PROVIDE THE PROJECT-SPECIFIC LEVELS INCLUDED IN THE BUREAU'S SUBMISSION TO PPC. THE SEPTETI WILL PROVIDE THE BASIS FOR THE WORKLOAD SCHEDULING CONFERENCES.

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ANNEX 9: CONTRIBUTION OF IMPROVED SEED AND INTERCROPPING RECOMMENDATIONS TO MALI'S ECONOMY

A recent study has examined farm adoption rates of various improved seeds for millet, corn, sorghum and cowpeas. SAFGRAD studies of the real on-farm yield benefits of these seeds permit a rough assessment of their contribution to increased production. In addition CMDT and IER work provides good estimates of on-farm use and yield impact of ICRISAT'S improvements made on traditional corn/millet intercropping practice. These improvements have been very widely adopted in the CMDT zone. The table below summarizes use rate on-farm of improved seed:

TABLE A: USE OF IMPROVED SEED, 1986

Project or ODR	Sorgh/Mil			Corn			Miebe			Total H Improved
	Total Ha.	% Improved	Ha. Improved	Total Ha.	% Improved	Ha. Improved	Total Ha.	% Improved	Ha. Improved	
PPDVS	14,167	45%	6,375	1,148	0%	0	1,417	17%	241	
ONH	358,050	1%	4,297	0	0%	0	35,805	7%	2,614	
CMDT	414,000	10%	41,400	0	0%	0	41,400	0%	0	
ODIB	2,009	10%	201	505	26%	131	201	0%	0	
OHV	106,071	8%	8,584	12,163	61%	7,419	10,607	0%	0	
ODIPAC	84,950	10%	8,495	19,825	31%	6,146	8,495	10%	850	
Total	979,247	14%	134,177	32,841	41%	13,410	97,825	4%	3,704	151,292

The table above includes, for zone CMDT, only sorghum. CMDT millet and corn for reasons made clear below are discussed in a later section of this annex.

Note: Information on hectareage planted in improved varieties comes from Ministry of Agriculture, Institute d'Economie Rurale, "Etude Sur l'Adoption des Semences Selectionnées", March 1988, by Bakary Sekou Coulibaly and Ousmane Nafolo Coulibaly.

Since the survey was based on a random sample of villages in each zone, it can be assumed that the percentages of adoption in the studied villages are representative of adoption rates for the whole zone, and therefore total hectareage utilization of improved seed was arrived at by applying the percentage utilization rates in the study areas to total hectareage in each zone. The resulting use rates per zone appear consistent with levels of extension and seed use as USAID GRM staff are familiar with them in these zones. These estimates underestimate use of improved seed, to the extent that areas not included in the surveyed ODR's also use improved seed.

Some of the more successful and widely used improved varieties are "improved local" varieties. These are well adapted and/or higher yielding varieties used in one area which have been discovered by agricultural researchers, genetically purified to maintain their desirable attributes, and then distributed for seed multiplication and extension. It is a mistake to believe, as has sometimes been asserted, that these varieties because they are local would in any case have been widely used in the absence of agricultural research interventions. One of the most useful accomplishments to date in Mali (as well as in the early stages of agricultural research in other countries with very high agricultural growth rates) is precisely to catalog existing varieties, and widely disseminate the best ones beyond the narrow confines of the single small area where they are being used.

ANNEX 9: CONTRIBUTION OF IMPROVED SEED AND INTERCROPPING RECOMMENDATIONS TO MALI'S ECONOMY (cont.'d)

Because overall hectareage estimates are not available by zone for niébé, a rough estimate of niébé hectareage by zone was made (equal to 10% of the millet/sorghum hectareage in each zone). In the PFDVS zone where no estimates of total hectareage are available, it was assumed that the percentage of villages studied (6 out of 95) was the percentage of hectareage these village represented out of the total zone hectareage.

On the basis of the extensive SAFGRAD farmer trials and experience with the various regional development organizations at farm level, it is possible to make fairly reliable order of magnitude estimates of the on-farm effects of use of improved seeds or other practices. Of course these on farm yield levels are well below experiment station yields. Some of the improved varieties discussed above have as their key attribute yield stability. That is, in a good rainfall year, the yield difference between the improved and traditional variety will be negligible. Why are farmers, even with the limited range of improved varieties now available, eager to get more seed of these varieties? Because if on average every third or fourth year is a drought year where the traditional varieties do very poorly or fail but the improved varieties submit to only modest yield reductions, then household food security is enhanced in such years. There is also an important effect in aggregate production terms, however. The impact of improved variety maintaining yield in that one bad year out of three or four can mean in terms of average yield over a multi-year period, a 20% to 25% increase in average multi-year yield. Other improved varieties, especially for the southern good rainfall zones have as their key characteristic yield improvement rather than yield stability.

Most of the benefits to date of improved seed are for sorghum, corn, and cowpeas. The importance of improved millet varieties in the sample discussed above was minimal, except in the area around Segou. For rough purposes of calculating an order of magnitude yield increase, assume that current average yields of tradition corn and sorghum varieties are 800 kg/ha (in fact corn may be a bit higher, sorghum a bit lower). Assume also that the average multi-year yield effect both from yield stability and yield improvement in improved varieties is approximately 25%. Then the increase in production from these improved varieties is 200 kg/ha. For niébé, the traditional yield is much lower, approximately 300 kg/ha. But the yield effect on farm from new varieties is much higher, about 60% or more. Therefore, in absolute terms, the yield increase in niébé is about the same as for improved sorghum and corn varieties, approximately 200 kg/ha.

The CMDT zone, for corn and millet, requires separate treatment. The Coulibaly/Coulibaly survey cited above showed 60% of CMDT corn hectareage planted in improved varieties in the survey zones. Projecting from this to the entire corn hectareage in CMDT (53,496 ha) gives a total of 36,912 ha planted in improved varieties. This is very close to the 33,955 ha planted in improved (monocropped) corn varieties according to CMDT's own figures recorded in 1986/87. In addition a productive millet/corn intercropping recommendation, developed by the agricultural research institute (IER) several years ago is used on almost all of the remaining CMDT corn hectareage. It substitutes an intensive corn/millet rotation, which takes advantage of residual fertilizer from the previous years's

ANNEX 9: CONTRIBUTION OF IMPROVED SEED AND INTERCROPPING RECOMMENDATIONS TO MALI'S ECONOMY (cont'd)

cotton rotation, for what had been a much less intensive (and much less fertilizer responsive) millet/corn rotation before the new intercropping recommendation was adopted. The result has been to increase grain yield on millet/corn fields from an average of 2050 kg under the traditional system to about 2700 under the current widespread intercropping pattern. Most of the inputs (residual fertilizer) were already being used in the prior lower yielding system. The current practice just makes much more productive use of them. So the net increase in production from this system, on the roughly 37,000 ha of monocropped corn is 1,500 kg/ha. For the intercropped millet/sorghum fields it is 650 kg/ha.

In terms of extremely rough estimative calculations, assume that the value of niébé, millet/sorghum, and corn at farmgate is approximately 30,000 FCFA or \$100 per MT, of which 95% (\$95) represents value added. Assume the same value for corn and millet in CMDT zone, but due to heavier input use that value added is instead 80% (remembering that the primary input is residual cotton fertilizer that prior to the new intercropping system had only a limited impact on millet yield.) The following table sets out the overall value added in agriculture deriving from the use of new seeds and improved intercropping practices, both coming out of the agricultural research system during the past twelve years.

	CMDT corn alone	CMDT millet/corn	All other areas
hectarage with improved seed or practice	37,000	16,000	151,292
gross yield increase (MT)	1.50	.650	.200
value added (%)	80%	.80	.95
total value added (in \$millions)	4.4	.83	2.9
Total	8.13million		

If we multiply this by the best estimates available of the income multiplier from farm income (that is the additional rural income generated by a change in agricultural income (from Steve Haggblade, Peter Hazell, and James Brown, "Farm/Non-Farm Linkages in Rural Sub-Saharan Africa: Empirical Evidence and Policy Implications", World Bank Agricultural Research Unit, May 1987)), we arrive at a net addition of approximately 12 million dollars to GDP. With 1986 GDP of \$1.65 billion improved seeds and intercropping practices developed by the agricultural research system, may have contributed eight tenths of a percentage point to Mali's annual GDP. Valuation for purposes of GDP calculations should be based, as in the above analysis, on local market prices.

Valuation for purposes, of cost - benefit analysis should, however, rely on import parity prices to the extent that coarse grain or cowpea production would be filled with imports. If the import parity price of a ton of grain is approximately \$300, reducing it by \$100 for equivalent farm gate valuation purposes (reflecting costs of transporting a ton of

ANNEX 9: CONTRIBUTION OF IMPROVED SEED AND INTERCROPPING RECOMMENDATIONS
TO MALI'S ECONOMY (cont'd)

grain from farm to consuming center were it to substitute for imports) leaves a value of \$200/MT. This means that the annual net incremental benefit of the agricultural research investments resulting in used of improved seed and improved maize/millet intercropping is approximately \$16.26 million for benefit/cost analysis purposes. This is substantially in excess of past, current, or projected total annual donor and GRM agricultural research expenditures.

DRAFTED BY ADD: DATwood:mk (CMDT): 02/10/89

DEPUTY DIRECTOR THOMAS SUMMARIZED MALI'S FY 1990 PROGRAM STRESSING THE MAJOR ACTIVITIES SUCH AS AGRICULTURAL PRODUCTION THROUGH TECHNOLOGY TRANSFER AND RESEARCH, ECONOMIC REFORM, AND POPULATION. HE ALSO NOTED THAT MORE EMPHASIS IS BEING PLACED ON DISASTER PREPARATION AND RESPONSIVENESS. THE DISCUSSION WHICH FOLLOWED CENTERED ON THE RELATIONSHIP OF THE MALI PROGRAM (PARTICULARLY THE PROPOSED AGRICULTURAL RESEARCH PROJECT) TO THE GROWTH STRATEGY. OTHER MAJOR ISSUES DISCUSSED WERE THE NGO SUPPORT PROJECT, NEW STARTS, SECTION 205 MANAGEMENT EXPENSES, AND THE FAAS PULLOUT.

6. AGRICULTURAL SECTOR ASSESSMENT:

6.1 DISCUSSION:

THE DISCUSSION ON AGRICULTURE RESEARCH AND THE AGRICULTURAL SECTOR IN GENERAL CONCLUDED THAT THE MISSION HAD NOT ADEQUATELY EXPLAINED THE LINKAGES BETWEEN PROPOSED NEW ACTIVITIES IN THIS SECTOR AND ECONOMIC GROWTH. WHILE THIS ISSUE WAS DISCUSSED AT THE CDSS REVIEW, IT WAS UNFORTUNATE THAT BECAUSE OF THE NARROW TIME GAP BETWEEN THE MAY 10 CDSS REVIEW AND THE ABS SUBMISSION THE CONCLUSIONS OF THE CL[S REVIEW COULD NOT BE INCORPORATED INTO THE ABS. BEFORE APPROVAL CAN BE GIVEN TO THE PROPOSED NEW AGRICULTURE RESEARCH SUPPORT PROJECT, THE MISSION WILL NEED TO PREPARE A CDSS ADDENDUM REVIEWING THE LINKAGE BETWEEN ITS AGRICULTURAL SECTOR ACTIVITIES AND MALI'S ECONOMIC GROWTH POTENTIAL (REFTEL). AT THE SUBSEQUENT ABS WRAP-UP MEETING, IT WAS

NOTED THAT THE AID/W CONSULTATION WITH THE MISSION-DIRECTOR DESIGNATE SHOULD INCLUDE A DISCUSSION OF THE ISSUE.

6.2 DECISION: THE CDSS ADDENDUM SHOULD EXAMINE THE POSSIBILITY OF INCLUDING AN AGRICULTURAL SECTOR GRANT WITHIN THE MISSION'S PROGRAM FOR PROMOTING ECONOMIC GROWTH.

7. ECONOMIC POLICY REFORM PROGRAM:

7.1 DISCUSSION:

A DOLLARS 17 MILLION EPRP II PROJECT IS PROPOSED, WITH INITIAL FUNDING (DOLLARS 5 MILLION) TO BEGIN IN FY 1992. THE SECTORAL FOCUS OF THIS PROPOSED ACTIVITY IS VAGUE, AND THE DFA DOES NOT PERMIT GENERAL MACRC-ECONOMIC SUPPORT. DISCUSSING THE SOURCE OF FUNDING, IT WAS NOTED THAT THE AFRICA BUREAU HAS AN AEP RP POOL. THE AVERAGE COST OF AN EPRP PROJECT TO DATE

DECISION: WITH THE UNDERSTANDING THAT A CONCEPT
PER FOR THE NGO SUPPORT PROJECT IS SCHEDULED FOR
MISSION TO AID/W, AND SINCE BUREAU GUIDELINES FOR THE
DESIGN OF FVO/NGO PROJECTS SHOULD BE COMPLETED WITHIN
THE NEXT FEW MONTHS, THE PID AND PP FOR THIS PROJECT MAY
BE REVIEWED AND APPROVED BY THE MISSION.

11. OTHER DECISIONS:

11.1 NEW STARTS: THE MISSION SHOULD CONSIDER WHETHER
TWO NEW STARTS (AGRICULTURAL RESEARCH AND NGO SUPPORT IN
FY 1989 RESPECTIVELY) AND TWO PHASE IIS (PRMC AND EPRP
IN FY 1989 AND FY 1990 RESPECTIVELY) CAN BE DEVELOPED
AND ADMINISTERED IN LIGHT OF CE AND STAFF REDUCTIONS.
THE PID FOR THE AGRICULTURAL RESEARCH PROJECT AND PAIP
FOR EPRP SHOULD BE SUBMITTED TO AID/W FOR APPROVAL. THE
DESIGN SCHEDULE IS AS FOLLOWS. THE TITLE II 206 PROGRAM
PLAN SHOULD BE SUBMITTED BY SEPTEMBER 1988; THE EPRP
PAIP BY JANUARY 1989 AND PAAD BY AUGUST 1989; THE NGO
SUPPORT PID BY JUNE 1989 AND PP BY MARCH 1990; AND THE
AGRICULTURAL RESEARCH PID BY JULY 1989 AND PP BY JANUARY
1990.

11.2 SECTION 206 MANAGEMENT EXPENSES: THE MISSION
SHOULD ENSURE THAT WHERE POSSIBLE PROGRAM MANAGEMENT
EXPENSES FOR THE TITLE II, SECTION 206 PROGRAM ARE BEING
FUNDED BY LOCAL CURRENCY GENERATIONS FROM THE SECTION
206 PROGRAM OR WITH U.S. DOLLAR PROGRAM FUNDS.

11.3 FAAS PULLOUT: FINANCIAL MANAGEMENT HAS AGREED TO
FUND THE MISSION'S PULLOUT FROM FAAS IN FY 88 AND FY
89. THE MISSION SHOULD CABLE IN ITS ESTIMATE OF THE
COST OF THE FAAS PULLOUT. SHULTZ

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AS RANGED FROM DOLLARS 8 - 10 MILLION. THE MISSION SHOULD CONSIDER SPLIT FUNDING THEIR PROJECT OR REALLOCATING THE RESIDUAL OYB FUNDS ELSEWHERE.

7.2 DECISION: THE MISSION SHOULD FURTHER DEFINE THE SECTOR FOCUS OF POLICY REFORM IN EPRP II. TO FUND EPRP II, THE MISSION SHOULD CONSIDER REQUESTING AFR BUREAU EPRP FUNDING IN COMBINATION WITH ITS OWN FUNDS.

8. POPULATION:

8.1 DISCUSSION:

IN THE CDSS REVIEW, THE MISSION WAS ENCOURAGED TO INCREASE ITS EMPHASIS ON POPULATION PROGRAMS, PARTICULARLY GIVEN THE EVIDENCE THAT DEMAND FOR FAMILY PLANNING SERVICES IS INCREASING. HOWEVER, IN THE ABS SUBMISSION, IT WAS NOTED THAT FY 1989 FUNDING FOR THE PLANNED NEW ACTIVITY IN THIS AREA HAD DECREASED FROM ONE MILLION DOLLARS IN THE CDSS TO SEVEN HUNDRED THOUSAND DOLLARS.

8.2 DECISION: THE MISSION SHOULD CONSIDER SPEEDING UP IMPLEMENTATION OF THE FAMILY PLANNING PROJECT AND PROVIDING ADDITIONAL RESOURCES TO THIS SECTOR.

9. DISASTER PREPAREDNESS:

9.1 DISCUSSION:

THE MISSION'S ALLOTMENT OF FY 88 OYB FUNDS TO THE LOCUST/GRASSHOPPER ACTIVITY WAS COMMENDED. VARIOUS POSSIBILITIES FOR DISASTER-RESPONSIVENESS WERE DISCUSSED, INCLUDING A FLEXIBLE, MULTI-YEAR DISASTER PROJECT WITH MULTI-YEAR COUNTERPART FUNDS.

9.2 DECISION: MISSIONS IN DISASTER-PRONE COUNTRIES LIKE MALI SHOULD CONSIDER A FLEXIBLE, MULTI-YEAR DISASTER PROJECT. AID/W WILL ADVISE MISSIONS OF RECOMMENDED FINANCING MECHANISMS.

10. NGO SUPPORT PROJECT:

10.1 DISCUSSION:

THE AFRICA BUREAU IS ENGAGED IN AN ON-GOING DIALOGUE WITH THE U.S. PVO COMMUNITY RELATED TO THE IMPLEMENTATION OF THE DFA. ACCORDINGLY, WE WANT TO BE SURE NEW PVO INITIATIVES ARE CURRENT AND IN CONFORMANCE WITH THIS ON-GOING DIALOGUE. AN EVALUATION OF EXISTING PVO UMBRELLA PROJECTS IN AFRICA WILL BE INITIATED BY LATE SUMMER AND THE RESULTS WILL UNDOUBTEDLY BE RELEVANT TO USAID/MALI'S DESIGN EFFORT. AID/W WANTS TO KEEP IN CLOSE TOUCH WITH MISSIONS LAUNCHING MAJOR NEW PVO PROJECTS.

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