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AGRICULTURAL SECTOR ASSESSMENT-THE GAMBIA

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## I. INTRODUCTION

The Gambia is a small country located on the western bulge of Africa. It is only 325 kilometers long and varies in width from about 26 kilometers to 48 kilometers. The total area is 10,690 square kilometers of which nearly 20 percent is covered by the river and associated swamps and bolons. The country is extremely flat with the highest elevation in the eastern end of the country rising only to between 40 and 50 meters. The river is tidal through its length in The Gambia. There is considerable intrusion of salt water ranging from 150 kilometers during the wet season to nearly 250 kilometers during the dry season. The variation in flow of the river ranges from  $1\text{ m}^3/\text{s}$  at the end of season to over 2000  $\text{m}^3/\text{s}$  at a peak of the wet season. There are three distinct geographical areas; a belt of mangrove along both sides of the river for a distance of nearly 250 kilometers, a narrow strip of slightly higher ground running most of the length of the river in The Gambia which becomes swamp during the rainy season and then a band of upland sandstone which forms a plateau reaching to the border with Senegal. The climate is Sudanic-Guinea which comes under the influence of the inter-tropical convergence zone. On the average there is a seven month dry period and a five month rainy season running from June to November. Rainfall ranges from an annual mean of nearly 1,200 millimeters in the west to 85 millimeters at Sapu which is located in the north bulge at

the mid-point of the country. However, rainfall can vary widely from year to year and The Gambia is subjected to periodic droughts. Temperatures are fairly similar throughout The Gambia. Mean maximum temperature ranges between 45 and 41.6 degrees Centigrade with mean minimum temperature of 9.4 degrees. Temperatures rise during the period January through May and then fall from June through August due to the cloud cover. A secondary peak in temperature occurs in November when temperature again declines. The range of temperature extremes is greater in the eastern part of the country as the diurnal variation in the western part is modified by the Atlantic Ocean.

Population of The Gambia is estimated to be almost 620,000 with an annual growth rate of about 2.8 percent. Approximately 10 percent of the population is rural with most, but not all, of the rural population engaged in farming.

## II. THE FARM SYSTEM

### A. The Farm Unit

Gambian farmers live in villages which can vary in size from 10 to 3,500 people. The village is structured architecturally so that its walls appear to separate it from the rest of the world. The larger villages are quite self contained providing within the village most of the goods and services required by the people. The farming village is subdivided into Kabilo (ward) and compounds. The Kabilo is a patrilineal

kin group of compounds. The compound is a group of buildings which is separated from the rest of the village by a fence. It is an extended family group and is the basic unit dealing with economic and social matters including agriculture.

There are three groupings within the compounds which are important to the organization and management of farm operations. First, crops are divided into two categories, Mauro and Kamanyango. Mauro crops are cultivated for consumption by the household and Kamanyango crops belong to the cultivator and may be utilized in ways that he or she decides. Second, each villager belongs to an age set called a kofo. The kofo is important economically because it supplies labor for hire to farmers. The third grouping is composed of two parts: the dabada and the sinkiro. The dabada is primarily a male agricultural working group. It works on the men's mauro crops which are controlled and stored by the dabada head. Men's Kamanyango crops are cultivated only infrequently by the dabada. Because of controversy over the allocation of dabada labor, men usually prefer to use other forms of labor; the kofo, strange farmers, migrant workers or contract labor.<sup>1/</sup> The sinkiro is primarily a female cooking group which also cultivates and rotates cooking duties. The cultivation of

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<sup>1/</sup> Strange farmers are rainy season migrants from nearby countries who provide labor in return for food, lodging and the loan of land to raise their own crop. Migrant farmers are dry season migrants who harvest and thresh crops for food and lodging or cash.

women's mauro crops is undertaken with the sinkiro while the kamanyango is cultivated by the owner. In addition women do use reciprocal, kafo, and hired labor if they can pay for it. Although the sinkiro is a women's group it is usually headed by a man, often dabada head, who allocates the grain produced on the mauro to the women. Women commonly are able to control the crops or revenue from their kamanyangos and allocate the spending of it as they choose.<sup>2/</sup>

This organization of compounds for undertaking agricultural production has important implications for the division of labor in Gambian agriculture. First, the division of labor between males and females is on a crop not a task basis. For the most part women cultivate rice and vegetables and take care of goats, sheep and chickens while men cultivate all other crops and keep cattle. Exceptions are: (1) rice produced with high technology largely for commercial purposes is grown by men; and (2) in areas where rice cannot be produced women do grow groundnuts. As a general rule, however, women do not grow crops primarily produced for commercial sale. Secondly, except for labor on crops grown for distribution among members of the compound, the cultivator must pay, in one fashion or the other,

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<sup>2/</sup> This section on village organization for crop production relies heavily on various works of Jennie Day, particularly an unpublished memo, "Gambian Women: Unequal Partners in Rice Development Projects?"

persons who work on his/her crops even if they are family members.

### B. Land Tenure

Land tenure is based on the village. Land ownership is based on the use of land. Villages, compounds and individuals establish land ownership by clearing and cultivating land.

There are four forms of ownership:

- (a) Individually owned land which may be given away or inherited by the owners' heirs. Sons inherit their fathers' private upland and irrigated rice land while daughters inherit their mothers' rice land providing it is not thereby alienated from the village;
- (b) Compound land which should not be alienated from the compound is controlled by the compound head with senior people having more or better land.
- (c) Lineage land which is usually shared out between the various compounds within the lineage, although some is attached to the position of village head.
- (d) Lease land which has been acquired from farmers in a few cases (with compensation) by the Government for public purpose.<sup>3/</sup>

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<sup>3/</sup> The Gambia Food Strategy Report Parts II & III, Peter Stutly, et al., 1981, Annex 3, pp. 1-2.

For the most part farm land is not rented except for new irrigated rice land and land provided to strange farmers or others where rent is collected through a number of subterfuges.

Access to land is determined in the following way. Within the village land is allocated among competing lineages by the village head in consultation with the village elders. In this system inferior lineage or castes, dabados/sinkiros, individuals and particularly females usually get smaller amounts and inferior quality land. Land is transferred by gift or inheritance within lineages and compounds so that initial inequitable allocations tend to persist.

The land tenure system does impose some constraint to increased crop production to the extent that it does not provide security of tenure. Such security is provided on individually owned land but not on compound or lineage land. These two types of land are reallocated with the death of the lineage or compound head and so the cultivator always has some uncertainty about whether he or she will be able to cultivate the land. As long-term exclusive use of arable lands is essential if such lands are to be improved in productivity by prudent management, the lack of secure tenure on compound and lineage land is a disincentive to production.

There are definite land tenure problems with respect to livestock and forestry. Livestock in The Gambia are free to graze on any land not under cultivation or fenced. Land tenure

arrangements do not govern the use of the land by livestock. The land is open to use as rangeland by anyone who chooses to use it. Because forage is available to the first claimant, the landowner would be unable to plan on the utilization of forage on his land in an integrated crop/livestock farm operation. Security of tenure for the owner is essential for all potential uses of the land including livestock production if an efficient farming system is to be developed.

There are two aspects of the land tenure system which adversely affect tree maintenance and growth. Because livestock are permitted to roam freely and use any land available without respect to tenure they are destructive of trees and tree growth in two ways. In open woodlands livestock will eat the seedlings and retard multiplication of trees. In closed forests cattle herders will want to open up the forest to encourage growth of forage grasses and bush and they will burn the forest to make this possible.

Secondly, because tenure arrangements only apply to cleared land, rural residents do not have a proprietary interest in protecting open woodlands or closed forests. There is no one with an interest in preserving and fostering tree growth by preventing destructive practices. In addition, because land ownership can only be established by clearing land, people will burn and destroy forests and woodlands in order to establish use rights over the land.

While current land tenure arrangements probably do not seriously interfere with crop production increases at current levels of technology, it is apparent that they are not conducive to improving management and productive capability in livestock or forestry. Modification of tenure arrangements for land not in use for crop production could perform an important function in creating a framework in which livestock and forest improvement activities could be carried out at all levels.

### C. Significant Elements of the Farm System

There are four characteristics of Gambian agriculture which exert a strong influence on agricultural production and consumption. Not all of these are peculiar to The Gambia but the effect of the combination of these four factors on agriculture needs to be kept in the forefront in assessing the agricultural situation in The Gambia.

#### 1. Risk Aversion

Farmers in The Gambia, like peasant farmers everywhere, are risk averse. "The typical compound head maximizes a utility function in which elements of risk aversion, the fulfillment of social obligations and a desire for higher income are identifiable.<sup>4/</sup> The risk aversion element in The Gambia

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<sup>4/</sup> Agricultural Development of The Gambia: An Agricultural, Environmental and Socio-Economic Analysis, J.R. Dunsmore, et al., 1976, p. 351.

is heightened, as in a number of other African countries, because the ecology is drought prone. While the amount of rainfall in The Gambia in normal years is ample, the recent trend appears to be one of increasing frequency of drought. In this circumstance farmers become more conscious of food security and tend to accord it highest priority in the production decision making process. In The Gambia, because of the relation of groundnut production to rice consumption and the crop basis for the division of labor, the concern for food security has not led to a shift in production to food grains. Rather, risk aversion has manifested itself in a reluctance to change cropping patterns of production practices unless the perceived rewards substantially exceed possible losses. This has been a major factor in the use of production subsidies in The Gambia.

## 2. Relationship Between Groundnuts and Rice

The relationship between two agricultural products, groundnuts and rice, is critical in determining the production and marketing of agricultural crops in The Gambia. The preferred cereal for consumption in The Gambia in both rural and urban areas is rice. Other cereals consumed are mostly sorghum and millet and it is estimated that they make up only about 30 percent of the grain diet in rural areas and 90 percent in urban areas. The Gambian capacity to produce rice without irrigation and high technology inputs falls far short of demand. At current levels of efficiency, costs of producing

rice under irrigation with high technology inputs substantially exceed the CIF price of rice in The Gambia. Additionally, water currently available for irrigation falls far short of that needed to produce a sufficient quantity of rice to meet demand. To meet the demand for rice The Gambia produces groundnuts, of which about 85 percent are sold on the international market. "Arguably the most important feature of cereal marketing is the strong preference for rice. Provided that coos (sorghum and millet) were considered as an acceptable substitute for rice then The Gambia could very easily be self sufficient in cereal production. For in such a case a shift from groundnut to coos production of about 15 percent of the groundnut area would result in enough extra coos for farmers to eliminate any purchase of rice. It is obvious from the above that Gambian farmers (while growing as much rice as their resources permit) do not try to produce an amount of coos needed for their own total self-sufficiency. They prefer proportionately more cash for groundnuts, with some of which they can buy rice."<sup>5/</sup>

Thus the pattern of production and the high degree of commercialization of agricultural production in The Gambia is determined by the demand for rice. For this pattern of consumption and production to assure adequate returns to farmers

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<sup>5/</sup> The Gambia Food Strategy Report, Part II & III, Peter Stutley, et al., 1981, p. 47.

there must be a comparative advantage in producing groundnuts. In recent years with falling productivity in groundnut production and the terms of trade turning from groundnuts to rice, farmers have not been able to produce enough groundnuts to earn sufficient income to purchase the amount of rice necessary to feed themselves throughout the year. Consequently agriculture has become a net drain on the economy rather than a contributor to economic development.

### 3. Rural Urban Migration

As in many other African countries The Gambia has been experiencing an outmigration of labor from rural to urban areas. Because those leaving the farm for the cities and towns are characteristically young people between the middle teens and the middle thirties, this has led to an aging of the agricultural work force. At the same time an increasing percentage of a larger population must be provided with agricultural products by a relatively smaller farm labor force. Thus a relatively smaller and less vigorous agricultural labor force is expected to provide an increasing surplus of agricultural commodities. This situation is exacerbated in The Gambia by another trend. Gambian farmers have typically relied on migrant workers, mostly from nearby countries, to supply needed labor inputs at critical times during the growing and harvesting season. Over the past few years the number of migrant workers appears to have decreased sharply. This has further reduced

the size of the work force which must supply increased quantities of agricultural products for the urban population.

#### 4. Division of Labor

Finally, the way labor is divided among family members has important effects on agricultural production. In The Gambia the division of labor among the sexes is based on crops rather than tasks. There are some exceptions to this in terms of who is responsible for what crops as will be noted below but work is never divided among the sexes on the basis of tasks to be performed. Men are responsible for the production of all crops except rice and vegetables. In addition, men are responsible for the production of all crops which are grown primarily for sale on the market. Traditionally this has meant that men were responsible for growing groundnuts for the market and women rice for consumption. With the introduction of high technology rice production schemes being grown primarily for sale on the commercial market, men have become the producers of this rice. In this exception to the rule on the division of crops between the sexes, the men's right to grow crops primarily intended for the market proved stronger than the traditional right of women to grow rice. The other exception to the traditional division of labor by crops is in some areas of the country where rice cannot be grown. Here women may grow groundnuts even though they are grown primarily for sale on the

market so that the women will have a source of income to meet their social responsibilities!

The division of labor by crops means that there are within the farm unit rigidities to labor availability during period of peak labor requirements such as weeding and harvesting. These rigidities can only be overcome through the use of hired labor. This is true even within the extended family farm unit. If a husband or wife wants the other to assist on his or her crop, that labor must be paid for. It may not be payment in the form of wages but there is always a reciprocal obligation owed by the person responsible for the crop to the person that helps out. If the availability of hired labor declines as it is certain to do with the movement of youth to the urban areas and a decline in the flow of migrant labor from surrounding countries, then the rigidities imposed by the specialization of family labor by crops may have serious adverse consequences for agricultural production.

#### D. Farm Practices

##### 1. Introduction

Gambian agriculture is characterized by small farms growing a variety of crops and keeping some livestock. Although livestock may be grazed over a wide area during the dry season there is not a separate nomadic livestock owning element among the agricultural population. While the basic compound farm unit includes both crops and livestock they are not managed so

there is a functioning integrated mixed farming system. There is some use of animal manure on crops and oxen, donkeys and horses are used as draft animals. However management of livestock and crops is not done in a way which makes use of complementarities to maximize output and returns. For example, the use of crop residues is haphazard at best and livestock grazing is often conducted in ways that are destructive of crop and wood lands.

## 2. Cropping

In the fashion of most African agriculture, crop production is practiced either as shifting cultivation or long bush fallow with the latter becoming much more important as population increases. Most agricultural production is accomplished with human power and hand tools. However, the use of animal powered farm implements is somewhat more widespread in The Gambia than in many African countries and it is estimated that as many as four out of ten compounds have some access to animal power. Nevertheless the hoe remains the dominant farm tool for breaking the land, cultivating crops and some harvesting. For women's crops it remains the only tool other than a knife. Harvesting of grain crops is typically done with a knife. With this major reliance on hand tools the size of farms cultivated by the compound is necessarily small. The compound farm unit, which is composed of plots farmed by individuals and communally farmed land, varies normally from 4 to 17 hectares. Farm size

depends on the number of people in the compound, the relative wealth of the compound and access to animal powered equipment. Compound farm land of the village chief in a large village may be as large as 50 hectares but farm units of this size are very rare.

New soils brought into cultivation in The Gambia are generally pretty good. The major problem is excessive soil salinity in much of the alluvial area in the western third of the country. However soil salinity often varies seasonally. With the onset of the rains salinity is often reduced sufficiently for rice to be grown. Except in alluvial soils where salt water has intruded, soil acidity is, for the most part, not a problem. Liming is not necessary unless very acid sensitive crops such as some vegetables and legumes are grown. The major soil nutrient deficiency is a lack of phosphorous. "Field trials have shown that the yield of all major crops in The Gambia can be increased by application of phosphatic fertilizer; these crops include groundnuts, cotton, millet, sorghum and rice."<sup>6/</sup> Nitrogen content is generally low where the organic content of the soil has been reduced. Potassium levels are absolutely low but the level of K saturation appears satisfactory for crop growth. At current levels of productivity there is not sufficient evidence to suggest that

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<sup>6/</sup> Agricultural Development of The Gambia: An Agricultural, Environmental and Socio-Economic Analysis, J. R. Dunmore, et. al., 1976, p. 169.

crop production would be significantly affected by application of nitrogen and potassium but the evidence does show that substantial increases in output, particularly of groundnuts, can be obtained from the application of phosphorus.<sup>7/</sup>

Both soil and water management in The Gambia leave much to be desired. New or fallow land is prepared for cultivation using familiar slash and burn techniques. Land used the prior year is prepared for cultivation by raking crop residues and weeds into piles and burning them. These methods of land clearing leave the soil bare and subject to erosion. They also lead to a depletion of humus in the soil. Use of animal manure is haphazard at best, though some farmers will arrange for cattle to be held at night on their land in order to obtain adequate supplies of manure. Most farmers appear to practice some form of crop rotation to the extent that they would not grow a crop (other than rice) two years in succession on one piece of land. However, rotations designed to maintain productivity without fallow and which integrate livestock and crop production with the complementary use of crop residues, soil improving crops and animal manures are not used by farmers. Soil management practices for the most part lead to soil degradation rather than soil enhancement.

There appears to be little attempt on the part of Gambian farmers to conserve water resources through water management.

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<sup>7/</sup> Ibid., pp. 168-70.

The absolute amount of normal rainfall, averaging between 850 and 1200 millimeters, falling during the one rainy season would appear to be adequate for a large variety of crops. While the rainy season only extends over a four and one-half month period, it should be long enough for most grain, root, seed, legume and fibre crops. Even in dry years rainfall ranges from 600 to 850 millimeters, an amount that would be considered quite satisfactory in dry countries such as Somalia.

Soil cultivation practices do not appear to be designed to conserve moisture. In fact, they appear rather to facilitate water runoff. Cropland is prepared for planting either on the flat or with raised rows. No attempt to prevent runoff either by contouring or impounding water is made. The use of raised rows increases the amount of runoff with consequent losses of water and topsoil. While there is some interplanting in The Gambia, most crops are grown individually and planted in rows so that adequate use is not made of interplanting to conserve soil moisture and maintain fertility. Minimum tillage or no tillage practices seem to be unknown among the farm population.

In common with much of Africa, Gambian farmers produce a fairly wide variety of crops. Most notably lacking are oil-seeds and legumes other than groundnuts and legumes. There are some wild oil palms from which palm oil is gathered. The most frequently grown annual crops are shown in the table below.

## CROPS AND HECTARAGE, 1979

Crop	Area
Groundnut	101,215
Rainfed rice	21,550
Late Millet	14,500
Sorghum	11,600
Maize	9,500
Early Millet	9,300
Irrigated rice	2,430
Cotton	1,040
Total	<u>171,085</u>

In addition, farmers grow cassava, occasionally cowpeas and a variety of annual and perennial vegetables and fruits. These include onions, beans, peppers, tomatoes, bitter tomatoes, eggplant, cabbage, melons, oranges, limes, pawpaw and mangoes.

Agricultural crops in The Gambia are subject to most of the diseases and pests common throughout much of Africa. Except as associated with particular development projects, chemicals are not used either for disease or pest control. Pest and disease control is generally not well managed. Some control is exercised as a result of crop rotations but better husbandry could give better control. For example, removal of sorghum stalks from the fields after harvest would reduce the incidence of stalk borer and early planting at proper plant densities would reduce leaf spot on groundnuts which can cause up to 30 percent crop losses. Birds are a serious problem, particularly for rice where it is necessary to expend considerable labor on keeping birds away from the crop.

### 3. Livestock

Livestock kept by Gambian farmers includes cattle, sheep, goats, donkeys, horses, chickens and pigs (by Christians). The

cattle are the N'Dama breed which is trypanosomiasis tolerant a necessity given the prevalence of the tsetse fly. Survival is more important than milk or meat producing capability. Cattle are kept as a store of value, for milk production and as oxen. Some are sold on the market for meat when cash is required. Sheep and goats are not milked but serve as the main source of meat. Donkeys and horses are used as draft animals, more frequently to haul carts than to pull plows or cultivators.

While statistics on livestock are not very reliable, the best information indicates there are around 300,000 cattle and 600,000 sheep and goats. About 90 percent of the compounds own at least one head of livestock, not counting chickens, and about 66 percent own at least one draft animal -- oxen, donkey or horse. Of the people who own cattle, 49 percent own from 1 to 5 head, 43 percent own 6 to 30 head and 8 percent own 31 or more head. Livestock are typically free to graze where they want. Because of this fencing is common to keep livestock out of the crops.

#### 4. Summary

In summary, it can be concluded that the technological and management level on Gambian farms is quite low. Gambian farmers, in common with peasant farmers throughout the world, operate fairly efficiently within existing technological, ecological, social and economic constraints. However, meaningful

production increases will come about only as present constraints are removed.

### III. THE AGRICULTURAL SITUATION

#### A. Crop Production

Agriculture is the most important sector of The Gambia in terms of its current contribution to GDP, employment, trade and revenue. Income from farming directly supports over seven-tenths of the population and indirectly probably one-eighth of the population. It accounts for over 90 percent of export earnings and contributes through exports over 15 percent of Government revenues. Given the lack of mineral resources and limited markets for manufactured products, agriculture must be the major contributor to economic growth. Yet, during the 6-year period 1976 to 1981 agriculture had a net negative growth rate of 6 percent per annum. This decrease in agriculture production affected all crops except irrigated rice and maize but the major decline was in groundnut production. This decline in production is usually attributed to drought, and undoubtedly drought had its effect. However, this does not explain why production of groundnuts in the dry years of the late '70s should have been substantially below groundnut production during the dry years in the late '60s. Neither does it explain why groundnut production was decreasing while maize production was increasing. It appears that there is a secular decline in groundnut production which can by no means be fully explained

by the weather. A similar trend can be discerned in Senegal. The reasons for this decline in production are not known. What is known is that it has occurred despite a \$20 million Bank project largely focused on groundnut production, a fivefold increase in the amount of fertilizer used on groundnuts over the past six years, a similar increase in the use of animal powered agriculture implements and an increase in the price paid to producers of 64 percent. A number of possible reasons for this decline in groundnut production have been advanced but not confirmed. These include: adverse weather has led farmers to become more preoccupied with food security and they have switched from groundnut (sorghum or millet) production (the data do not confirm this), over the past few years, the number of strange farmers and migrant workers coming into The Gambia has declined and labor shortages have brought about a decline in production; groundnut seed has deteriorated and this has adversely affected production and, farmers find they can increase their income by switching to other crops and outmigration of young farmers.

In addition to problems with production, the price of groundnuts in international markets has been steadily declining. Over the past three years decreasing prices for groundnuts on the international markets, increased prices paid to producers and increased operating expenses for marketing

groundnuts has led to a situation in which groundnut production is being subsidized.

The situation in cereals is similar to that in groundnuts, except for irrigated rice and maize, though production has tended to be more stable. At current prices paid for maize, returns to farmers are greater than for groundnuts. Farmers have responded in those areas where maize production is possible by switching from groundnut production.

The situation with respect to rice production is quite different. Rice is the main staple food consumed in The Gambia. Over the past six years approximately 60 percent of the rice sold in the market was imported. Most of the rice produced in The Gambia is consumed by the producer or traded at the village level. However, the portion of the crop entering the organized commercial market is increasing as irrigated rice production increases: In 1974-75 only 1.8 percent of rice production was moved through formal marketing channels; by 1979-80 this had increased to 10.2 percent. During the same period irrigated rice production increased from a low base of 4.6 thousand tons to 9.1 thousand tons. The output of non-irrigated traditional grain crops did not increase during this period. The following factors explain most of the increase in irrigated rice. During this period the third phase of a major rice production project was being implemented with Chinese assistance. Improved high yielding varieties were

introduced, cultivation was done with power equipment, fertilizer was applied and production practices, including water application, were closely supervised.

In sum, irrigated rice was produced with a well managed, high technology package. In addition, costs of production were heavily subsidized by the Government, up to 85 percent for such things as plowing, fertilizer and seed. No charge was made for water use. An additional de facto subsidy has been provided by the failure of farmers to repay over Dalasis (D) 3 million in loans. Finally, farmers are paid a generous price, about 47 percent above import parity. The rice is also heavily subsidized at the consumer level. The producer subsidy per ton of paddy is estimated to be about D200 and the consumer subsidy to be about D203 per metric ton of milled rice. Clearly, the increase in irrigated rice production has been obtained only by transferring resources from the rest of the economy to rice producers. "But the policy on local rice has resulted in large losses per MT, Tables 4.1 - 4.4 (not included) show that to pay D463/MT for paddy and to sell the milled rice at D780 in Banjul involved a loss of D256/MT milled. With only about 4.5 thousand MT of paddy bought, this loss amounted in 1980-81 to about 'only' D668 thousand. In the future it is planned to increase the marketed surplus to many thousand MT. If so the subsidy losses will become very large." 8/

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8/ Studies relating to marketing and pricing policies for agricultural produce and inputs in The Gambia, PPMU, Ministry of Agriculture, 1981, p. 34.

Given the financial condition of the Government and The Gambia Produce Marketing Board (GPMB), which is currently operating at a loss, it would be difficult indeed to sustain current levels of subsidy let alone pay the additional subsidies needed to substantially increase rice production as is planned.

The problems related to rice production are particularly important because the Government plans over the long term to increase rice production substantially. The Organization Pour la Mise en Valeur du Fleuve Gambia (OMVG), whose members are Senegal, Guinea and The Gambia, is planning to construct a bridge/barrage at or near the place where the Trans-Gambia highway crosses the Gambia River as a part of a comprehensive Gambia River Basin development program. If the OMVG is successful in raising the necessary financing from donors (probably \$125 million or more), construction of the bridge/barrage is scheduled to begin in 1984-85. The barrage is expected to provide irrigation for 24,000 hectares. Crop production from this irrigated scheme would probably not begin until after 1990.

The Gambia currently plans to produce rice on this 24,000 hectares. Such a plan would not be feasible at current costs of production. The 24,000 hectares would enable The Gambia to produce a significant surplus of rice. However, unless The

Gambia is successful in reducing per unit costs of rice production substantially it would face the following problems. Either production would have to be subsidized at a high level or rice prices would have to rise. Either way it would entail a substantial drain on the treasury to pay the subsidy or to increase wages because of the increase in price of the wage good. There would be similar problems with rice exports. Because costs of production are high in Gambia in comparison to other rice producing areas in the world, it is likely that The Gambia would have to sell on the world market at a loss. Neither alternative is acceptable from the balance of payments or budgetary perspective. On the technical level, rice is a prodigious consumer of water compared to other possible crops which, on an opportunity cost basis, may make rice even more uneconomic to produce.

Because rice prices along with other grain prices are expected to increase secularly as world demand increases, it probably makes good economic sense for The Gambia to explore ways and means of reducing per unit costs of rice production so that Gambian rice is competitive on the world market. However, in order to assure that comparative advantage is maximized, taking into account food security, research on alternative cropping possibilities is essential.

It is obvious that Gambian agriculture is plagued by both production and marketing problems. Some of the constraints to production can be identified but further study and

analysis is required to obtain a comprehensive understanding. The major constraints are technology, labor and management. The level of technology at which farmers operate is relatively low. Except for irrigated rice production there has been no introduction of a package of practices which has had any discernible positive effect on either per hectare or per labor day of output. As indicated earlier the situation with respect to groundnut production is negative. The available evidence is that there has been a secular decline in groundnut yields since 1974-75 so that in 1980-81 per hectare yields of groundnuts may have been only 50 percent of yields in 1974/75. This has occurred despite a large World Bank financed Rural Development project which increased utilization of fertilizer and animal power. One can only conclude from this that an appropriate technical package has not yet been developed and that other constraints such as labor or management have become more important.

That there is a labor constraint to production at current levels of technology appears certain but is not quantifiable. Such studies as have been made on farm labor utilization have focused on total labor requirements and have not examined task labor requirements. A qualitative assessment indicates that labor constraints occur as would be expected at planting, weeding and harvesting. These are the periods of peak demand for hired labor. It has been demonstrated that

using draft animals will lessen labor constraints at sowing and weeding times but not at harvesting. Determination of the magnitude and effect of labor constraints can only be ascertained through additional studies; however, it is possible to identify some of the reasons for labor shortages. There has been a decrease in the number and an increase in age of village farm workers. This has occurred because farm youth, particularly males, are moving from farm villages to urban areas. Based on a population of 620,000, a farm/non-farm division of population of 70/30 and a population growth rate of 2.8 percent, the rural to urban migration of adults is about 2.5 percent of the adult farm labor force. This group is largely made up of young males between 15 and 35. A decrease in migrant labor of various kinds has also reduced labor availability. Finally, health problems adversely affect labor utilization. Morbidity is highest during the growing and harvesting season. As agricultural activities increase with the coming of the rains, the supply of food decreases and the incidence and severity of common diseases such as respiratory ailments, diarrhea and malaria increase substantially. The labor force is thus weakest at the time the greatest demands are placed on it.

Management of farm resources, land, technology, inputs and labor, is a constraint to agricultural production and so is management of agricultural support services. The leadership

in the Ministry of Agriculture is aware of management shortcomings and is in the process of developing a reorganization of the Ministry to cope with it. Included in the reorganization plan will be the development of training to increase both management and technical capability at the middle staff levels.

Farm management problems manifest themselves in the inability of farmers to effectively manage the resources at their disposal and to absorb into their farming practices new methods and technologies. Because of this it is difficult to reach solid conclusions about relative importance of labor shortages or technologies on production. Apparent labor shortages may really be reflections of management deficiencies as may be the failure of new technologies to bring about increases in output. Of course, "management inefficiencies" may well be the result of conflicts between production objectives and other objectives of the farming unit. Whatever the cause of the failure to maximize use of resources through proper management, the impact on production is negative and a factor which must be taken into account in developing programs to increase agricultural production and incomes.

### 3. Marketing

The major marketing problem in The Gambia is with groundnuts. About 85 percent of the groundnuts produced are sold in the international market in which prices to The Gambia are perfectly elastic. Until the 1978-79 crop year the GPMB, which

has a monopoly on groundnut exports, made a substantial profit on sales of groundnuts, accumulating excess profits which they invested in other enterprises or transferred to the Government. While groundnut prices paid to farmers were substantially below export parity prices there is no evidence that groundnut prices have been a disincentive to production. Certainly increased prices since 1974-75 have not had a positive effect on groundnut production.

In 1978-79 the profit of GPMB dropped sharply and moved to a deficit position in 1979-80 and 1981-82. From 1978-79 through 1981-82 the FOB price declined by 22 percent, marketing costs increased by 53 percent and prices paid to farmers increased by 19 percent. By 1981-82 the world price of groundnuts had decreased and the farmgate prices increased to levels which would have resulted in a deficit even if GPMB marketing costs had not increased after 1975-76.

The Gambia is clearly facing a major crisis because of its dependence on groundnut exports. With decreasing output, increasing costs of production and marketing and declining world prices, groundnuts can no longer provide the foreign exchange earnings necessary to sustain the high level of imports characteristic of an open economy like The Gambia. The situation is deteriorating to the point where the continued importation of rice which is the basic staple food of The Gambia people may be in jeopardy. There does not appear to be any

relief in sight. While World Bank commodity price projections indicate that groundnut prices<sup>1</sup> may reach their nadir over the next two years and start to move upward again, the price is not projected to increase sufficiently over the next few years to reverse the adverse terms of trade for groundnuts, including the groundnut/rice terms of trade.

There appears to be little future in The Gambia continuing its almost total dependence on groundnut production. While, for a variety of reasons, it is important for The Gambia to continue production of groundnuts, it is essential for the well-being of The Gambia and its farmers to begin now to seek out alternatives to dependence on the groundnut export trade.

Prices paid by GPMB for other agricultural products do not appear to be a problem except for rice where it is improbable to suppose that the Government can continue to maintain prices and subsidies at present levels. Prices paid for cotton and maize appear to provide incentives to farmers. In the case of cotton the incentive would undoubtedly be lower without current subsidies but with projected increases in world cotton prices, it should be possible for GPMB to increase prices paid to farmers and phase out fertilizer subsidies over the next few years.

The price of food grain crops such as sorghum and millet is determined in the marketplace. Most sorghum and millet produced is consumed on the farm but some enters into village

trade and some is sold in urban markets. It is estimated that sorghum and millet form about 10 percent of food consumption in the Banjul-Kombo-St. Mary area so that market prices are not an important factor in determining levels of output.

### C. Institutions

The institutions important to agriculture production and marketing are the GPMB, research, extension and cooperatives.

#### 1. Gambia Produce Marketing Board

GPMB is a large conglomerate originally developed during colonial times as a semi-autonomous agency to manage the export of groundnuts and the import of rice. In the middle 1970s it had a turnover of more than D150 million which was about twice as large as Government's current budget. <sup>9/</sup> GPMB has a monopoly for the purchase, processing and exporting of groundnuts and two minor crops, cotton and palm kernel. It also imports and wholesales all rice brought into the country; buys, sells and processes domestically produced rice and maize, and imports and distributes fertilizers and seed. The GPMB owns a river transport company, oil mills, a lime juice and oil plant, two groundnut processing plants, a rice mill, soap factory, and a poultry feed plant, and has investments in a hotel and GCDB. The GPMB has also been a major contributor to the public sector, D58.9 million during the 1974-75 to 1978-79 period.

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<sup>9/</sup> The Gambia Country Economic Memorandum, Vol. 1: The Main Report, World Bank, 1980, p. 16.

The largest and, until recently, by far the most profitable of its operations has been groundnuts. The GPMB uses six licensed buying agents, five privately owned firms and The Gambia Cooperative Union (GCU), which handles between 60 to 80 percent of the buying, as buying agents. The agents operate through about 160 private traders and in the case of the GCU through 60 primary societies. The groundnuts procured by buying agents are delivered to GPMB storage units, transported to two processing plants, transformed into decorticated oil nuts, oil and cake and confectionary nuts. In recent years GPMB operating costs have been increasing at a rate which cannot be explained by inflation. The reasons for this apparent decline in efficiency are unclear but may be related to changes in volume of groundnuts processed or management problems associated with expansion into a wide variety of operations. What exactly the problems are can only be determined by a detailed examination of GPMB's operations by someone thoroughly familiar with British accounting practices.

## 2. Cooperatives

The cooperative movement in The Gambia consists of the Gambia Cooperative Union (GCU) and 62 primary societies and 36 thrift and credit societies. Under a women's program, there are 35 pre-cooperative associations which are treated as cooperative societies but have no legal status. The coops play an important role in groundnut marketing by purchasing between 60

and 80 percent of the crop for delivery to GPMB. In addition the coop sells fertilizers and farm equipment to farms and is the major source of farm credit. There are three types of credit furnished by GCU, subsistence credit, input credit and production credit. The largest by far is subsistence credit, about 60 percent of the total, which is loaned to farmers for buying food during the "hungry season", the two to three months before harvest. The GCU finances the credit operation by borrowing from The Gambia Commercial and Development Bank (GCDB) at 7 percent and on-lending to primary societies at 10 percent rate that in turn on-lend to farmers at 15 percent. In 1979-80 loans by the Cooperatives to farmers were D.9.2 million for subsistence and input credit and D2.1 million for short-term and medium-term loans under the Bank-assisted Rural Development Project, for a total of D11.3 million.

The liquidity position of the GCU is precarious at best. As of January 1981 the GCU had failed to meet its obligations to the GCDB on an indebtedness of D37.2 million. This is due to failure of farmers to repay loans. There is little chance that the majority of the farmer loans will be paid off because in early 1982 the President announced that farmers' debts were cancelled.

Just what debts were canceled is unclear but GCU will certainly not receive the volume of repayments from farmers necessary to pay off all or most of its debt. The World Bank

as part of preparation for an agricultural loan to The Gambia is attempting to work out a solution to the problems but, so far, has made little progress. At this time the future of the cooperative movement is shaky but it will undoubtedly find some way to survive.

### 3. Research

Research in The Gambia is limited. There are two crop research stations, one at Yundum near the capital city and one at Sapu near the middle of the country. Research is mostly limited to variety trials on rice and maize. In carrying out the trials, the research stations have made adequate utilization of plant material from international research institutions and other sources. Some additional research is being done on cowpeas and forage under the AID financed Mixed Farming Project. Particularly with respect to rice, the research station at Sapu does a reasonable job in getting information to the extension service.

There appears to be little research being carried on in such fields as agronomy, entomology, social science, economics, engineering or livestock. Most importantly, there appears to be no research on groundnuts. Increased efforts in research on both irrigated and non-irrigated crops, livestock, integrated farm operation, alternative production possibilities, marketing, farm management, etc., is essential. Greater understanding of the function of farm societies is also necessary if

research results are going to have any real impact on production and income. Increased integration of extension with research is also necessary.

#### 4. Extension

The Gambia has a large extension staff for a developing country with one extension worker for each 300 farming units. "However, it appears that, even on a subjective assessment, the benefits in agricultural production are at present outweighed by the costs of salaries and time involved." <sup>10/</sup> As noted above, the Agriculture Department is currently working on a plan for restructuring the extension service in a way which will increase management effectiveness. The service also needs to deal with such issues as the relationship with research, the quality of information to be extended, and the most effective method of establishing two-way communication between the service and farmers. The Extension Service also needs to improve substantially its coverage of female farmers.

#### 5. Agricultural Education

Agricultural education in The Gambia is limited to one two-year certificate course to produce Agriculture Assistants and Mixed Farming Centers which provide training to young farmers on such things as cultivation practices, soil conservation, ox drawn implements, etc. Agricultural subjects do not

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<sup>10/</sup> The Gambia Food Strategy Report Parts II & III, Peter Stutley et. al., 1981, p. 102.

appear to be taught in the primary or intermediate schools. Education for agriculturalists, above the Agriculture Assistant level is done outside of The Gambia. Most Gambian agriculturalists are being educated at agricultural colleges in Nigeria.

#### D. Livestock

##### 1. Livestock for Meat

Mature cattle are sold for market in urban areas. These herds roam the countryside in the dry season, seeking forage. They are not herded. There was no evidence of segregation of the breeding herd, i.e., separating the young stock -- weanings up to 2 years of age -- from the mature animals. Such segregation would permit allocation of feed supplies and watering to meet the greater needs of the breeding animals, and for young stock. The mature herds apparently form a communal herd that are the users of permanent grazing lands located some distance from crop lands. There is little or no management of permanent grazing lands for the most effective utilization of native forage and no effort to improve feed production on such grazing lands. Information on water resources and methods of watering livestock are unavailable. It is well known that daily watering is the most effective practice in managing the herd. The breeding herd and young stock are more sensitive to water supplies than mature, non-breeding animals.

Apparently, excess males are not castrated, and mating is uncontrolled. Thus, there is little or no selection for

genetic improvement of the cattle. With better control of the cattle population, sustained selection of more vigorous animals should be feasible. At present, natural survival is a controlling force.

## 2. Small Ruminants for Meat: Goats and Sheep

The small ruminants are of the size suitable for slaughter to supply local villages and compounds. Without refrigeration larger animals are not suited for rural slaughter, and thus are moved to urban areas with slaughter houses.

The management of small ruminants is largely that of allowing free movement throughout the villages and arable land areas gleaning and scavenging for feed supplies. Unless herded to distant grazing lands, these small ruminants return to their respective compounds at nightfall. There appears to be little or no production of local feedstuffs for small ruminants. The goats are more aggressive in foraging for feed than are sheep. This aggressive behavior has earned the reputation for goats that they are destructive. In fact, this trait is highly useful when man provides intelligent management. It is probable that emphasis might well be placed on goats.

There are opportunities (not exploited) for animal improvement by selection of superior animals and controlled mating. There are promising opportunities for providing adequate nutritious feeds for increased reproduction, for rapid growth, and better fleshed carcasses. By suitable management of the

animals, their feed supplies, and watering it is probable that goats would fit in better in an integrated farming system.

### 3. Livestock for Milk

Milk from cattle is a customary food for virtually all rural families. There is some sale of milk in nearby villages, but no commercial collection or processing of milk for market.

There is no evidence of special management of lactating females, although it is well known that milk flow from any cow is suppressed or terminated when feed quality and supply is inadequate, or when water supplies are deficient. Under present management practices, the milk flow must be limited. When lactating animals are being herded by a hired herder, who has the privilege of selling the milk to nearby villages, there is certain to be loss of calves that are deprived of adequate milk in the suckling stage with milk flow of the cows reduced by limitations on feed and water.

The present system of managing milk production could be greatly improved. This would require segregation of the milk animals to give them the feed and water needed, and more reliable production of feedstuffs to sustain these animals during the long dry season. Careful allocation of daily milk is necessary to support the calf, while providing milk for human use. A feasible practice is to take only part of the milk in the morning milking, and leave the remainder for the calf. The calf stays with its mother during the day and consumes all

of the milk. The calves are penned away from the cows at night and allowed to return only after morning milking. Judicious taking of milk by man is necessary to protect the calf.

There appears to be no milking of goats or sheep in The Gambia. This is surprising since goats and sheep are widely used for milk in other developing countries. The milk from small ruminants, particularly goats, constitutes an unused resource.

The indigenous breed of goats probably would not yield much milk, although casual observation suggests considerable variation in body conformation, udders, and size of kids being supported so that selection for improved milk production would be possible. Goats like people and training them for hand milking should be no problem.

#### 4. Animal Power

Draft oxen are widely distributed, but not uniformly available to land users. They are used to draw ox carts, and for tillage of the soil. All of the oxen are in good flesh, and docile. It seems probable that they are given adequate feed and water.

The reproduction of young oxen is a potential farm enterprise as is their training. The N'Dama cattle make good draft animals. Their maintenance is provided by indigenous forage, and entails no expense. The reproduction and sale of young oxen may provide a supplementary source of income.

## 5. Forage

The harvest and storage of feeds from crop residues and by-products of volunteer forage produced as aftermath following crop harvest and the native forage along roadsides, on fallow lands, etc., are virtually unknown. Large amounts of such potential forage is collected in piles on crop land, and burned in preparation for the planting for the rainy season crop.

There is no growth of soil improving crops in rotation with cereal grains and groundnuts, which would provide additional nutritious feed for all ruminants. Such a practice, combined with suitable soil treatments should make possible sustained cropping on arable lands, and eliminate the relatively useless "fallowing" that is now practiced. The forage grown on crop land will provide economic returns from livestock as well as serving as a soil improving crop.

## IV. CONCLUSIONS

### A. Groundnuts

The most immediate problem in Gambian agriculture concerns groundnuts. Currently the economy is dependent on the results of groundnut production, farmers' incomes, government revenues, employment, balance of payments, development investment, indeed the well-being of most Gambians depends on the revenues from groundnut production. However, the outlook with respect to groundnuts is bleak indeed. Over the past half dozen years the decline in groundnut production has averaged about 17 percent

per year. During the same period the terms of trade have deteriorated against groundnut exports by about 45 percent. As noted earlier, the decline in production of groundnuts occurred despite the carrying out of a large World Bank project which had as the main objective increasing groundnut production. At the same time groundnut farm gate prices were steadily increasing. The project did in fact lead to increased utilization of improved inputs such as fertilizer and animal powered farm equipment. Yet, production declined.

The outlook for the next few years does not appear encouraging. Causes of the decline in groundnut production are not known and there is little reason to believe that a proposed follow-on World Bank project, which at present intends to do more of the same with respect to increasing the use of improved inputs for groundnut production, will produce any beneficial results. While current projections indicate that over the next couple of years groundnut prices may stabilize, there is no indication that the terms of trade will turn in favor of The Gambia. In particular, projections for rice prices over the next few years indicate that the groundnut/rice terms of trade will continue to turn against groundnuts in favor of rice.

It appears, whether viewed from the standpoint of the individual farmer or the economy as a whole, that continuation of the present degree of dependence on groundnuts means, at best, stagnation. Internal financing of development activity in The

Gambia has come from surpluses generated from groundnuts and farmers' purchases of the major grain staple consumed, rice, has been financed out of the receipts from groundnut sales. Even if groundnut production returned to the levels of the late 1960s and early 1970s, the projected continuing deterioration of the terms of trade against groundnuts means that The Gambia will not be able to generate the resources in needs to maintain the well-being of its population and invest in economic development.

Clearly, The Gambia is going to have to continue to produce and export groundnuts for the foreseeable future in order to generate even minimal incomes for the rural population, revenues for the government, and foreign exchange for critical imports. It is also going to have to attempt to raise groundnut productivity. To do so the causes of decreases in productivity since 1975 must be ascertained through research and study. When causal factors are determined it will be essential to commit both the human and capital resources necessary to undertake corrective action. However, it appears to be a reasonable conclusion that continuation of the current level of dependency on groundnut production would preclude The Gambia from generating resources needed to maintain the standard of living and generate resources for development.

In this situation there appears to be no acceptable alternative for The Gambia other than initiating immediately the

process of diversifying agricultural production and marketing. This means that it is essential for The Gambia to begin now undertaking the research and studies necessary to diversify production and determine market opportunities for agricultural products. Agricultural development and consequently economic development will not occur so long as The Gambia maintains the type of agricultural system developed during the colonial period -- dependence on one crop produced for export and dependence on the industrial market economies of Europe as the market for its products.

#### B. Rice

The second most serious problem in the agricultural sector concerns rice. As noted in the main body of the paper, rice is the main cereal consumed in The Gambia -- about 70 and 90 percent respectively of food grains consumed in the rural and urban sectors. The Gambia does not produce sufficient rice to meet domestic demand and must, as it has for many years, import rice to meet demand. Currently imports of 80 to 90 percent broken rice run to about 30,000 tons, between 50 and 67 percent of estimated consumption of rice. Rice imports are paid for by foreign exchange generated by the export of groundnuts. The high percentage broken rice imported is low price rice and can be imported into The Gambia cheaper than irrigated, high technology rice can be grown. (The cost of producing non-irrigated, low technology rice is not known, and, because of

the limited amount that can be grown, is not relevant.) It should also be noted that over<sup>1</sup> time the Gambians have developed methods of preparing rice that makes broken rice the preferred type of rice for most Gambians. Clearly, in the past, comparative advantage has favored producing groundnuts and importing rice, given the consumer preference for consuming rice, particularly broken rice. However, with declines in groundnut productivity, production and prices and the upward price trend of rice, the comparative advantage of producing groundnuts and buying imported rice is declining.

In this circumstance The Gambia has shown an interest in increasing the domestic production of rice by developing the capability to produce rice using irrigation and high technology. Unfortunately, experience to date has not indicated that The Gambia can produce rice under such conditions at reasonable costs. As noted earlier, the major rice production scheme in The Gambia, which over time has been supported by three donors, has been unable to produce rice that is cost competitive with rice even taking into consideration differences in quality. Part of the problem has been inefficiencies at the rice mill where the outturn of milled rice is only 58 percent of paddy. However, even if the mill operated at reasonable levels of efficiency and allowances are made for differences in quality, rice would have to be heavily subsidized to compete with imported rice.

In this situation there appear to be four alternatives open to The Gambia: (1) continue to produce groundnuts to pay for imported rice; (2) decrease consumption of rice and increase consumption and production of sorghum and millet; (3) increase the production of irrigated, high technology rice; or (4) diversify production and exports of crops which would provide a comparative advantage in importing rice. The first alternative would appear to be a "muggs game" -- it does not appear likely that there will be a comparative advantage in the future in relying exclusively on groundnut exports to pay for rice imports. There is little likelihood that the second alternative would be feasible -- the consumer preference for rice appear to be too strong and to be growing stronger as urbanism increases, particularly because of the differences in labor requirement for preparing rice or millet and sorghum. The third alternative would appear to be uneconomic unless cost of production can be substantially reduced. The fourth alternative appears to be most promising, at least in the sense that there are no known negatives. Little research or study has been undertaken on alternative cropping and marketing systems. Certainly this alternative ought to receive adequate study before substantial investments are made in either of the other three alternatives.

Because leaving the subject of rice, reference needs to be made to current government plans to increase significantly the

production of irrigated, high technology rice upon completion of a bridge/barrage across the Gambia River. Under this plan, The Gambia would become an exporter of rice. This plan needs to be re-examined from three viewpoints: (1) rice is a prodigious consumer of water in comparison to other agricultural crops -- it might be possible to substantially increase the area to be irrigated if the water was used for crops other than rice; (2) unless the costs of production are substantially reduced it is uneconomic to grow irrigated, high technology rice either for domestic consumption or export; (3) the comparative advantage of growing high value, low volume crops for export and importing rice needs to be explored. Of course, The Gambia does have to be seriously concerned about food security. In these circumstances the additional cost of producing rice within country to meet domestic demand could be considered an insurance cost and be judged a cost worth incurring. However, this would not justify rice production for export and the negative impact on total agricultural production and development investment would have to be fully considered.

### C. Production and Productivity

Agriculture in The Gambia has been declining. The evidence indicates this has been due both to a decline in productivity per hectare and a decline in productivity per unit of labor. The exact causes of these declines in productivity are not clear. Analysis in the earlier sections of this paper suggests

avenues that need exploration: (1) poor management of soil and water resources is likely to have reduced the capability of the land to support crop production; (2) the efficiency of labor may have declined with the outmigration of rural youth; (3) at existing costs of production prices may not offer adequate incentives; (4) government policies, such as making subsistence loans to farmers during the "hungry season" may reduce incentives; (5) rigidities in the labor system coupled with a decline in the supply of migrant labor may adversely affect labor productivity; (6) poor management of such things as livestock, technology, and insect and pest control may contribute significantly to decreases in output; and (7) there may be social dislocations which are poorly understood that have adversely affected the productivity of the farm production unit.

What is needed is careful study to identify and evaluate the importance of these and other factors that may be adversely affecting productivity. In some areas such as water and soil management the severity of the problem is apparent and work can commence on bringing about the necessary changes. On the other hand, the issue of labor productivity is not well understood and possible remedial action can be undertaken only after the facts have been ascertained. The entire area of technology needs particular attention and examination. Technological changes which have been introduced and/or spread during the last few years -- the use of fertilizer and animal powered farm

equipment in particular -- appear to have made little or no contribution to increasing per hectare or per labor hour yields. Production has declined despite their introduction and use. Yet whether this is due to inappropriate technology or some other reason is by no means clear. Tests have demonstrated that on Gambian soils groundnuts are responsive to application of phosphorus. Yet, use of phosphatic fertilizer by farmers appears not to have generated any positive production response. The reasons for this and for the lack of positive results from other technological changes need to be examined and determined. Only when this has been accomplished will it be possible to go forward on developing or adapting the kinds of technological changes that will result in increases in production.

One last issue related to production and productivity needs to be emphasized. Analysis, research and study should not be limited to existing cropping patterns. While attention needs to be addressed to per hectare and per labor hour yields on crops such as millet, sorghum, groundnuts and rice, it is equally as important to examine productivity issues related to the introduction of new crops or the expanded production of minor crops. For example, it appears that there might be scope for increasing significantly the production of cassava in The Gambia because of the market potential in neighboring

Senegal. To do so requires the use of technology and management practices which reduce the risks associated with mosaic and mealy bugs. It is equally important that this research include integration of crop and livestock activities.

#### D. Marketing System

Internally, the current major weakness in the Gambian marketing system appears to be the cost of processing agricultural commodities, particularly groundnuts and rice. As has been noted elsewhere in this paper, processing costs for groundnuts have increased significantly over the past few years. The rice mill also operates at a very low level of efficiency. Why the Gambia Produce Marketing Board has, over the past few years, become less and less efficient in its operations is unclear. It is essential that this trend be reversed for it has meant lower farm gate prices, higher consumer prices, higher subsidies and less resources available for investing in development. The same kinds of increases in per unit costs and total costs that have occurred in processing have also been observed in storage and transport. Current or planned physical facilities appear to be adequate. What is needed is better management of available resources and the reduction of administrative constraints. What precisely needs to be done can only be determined after a thorough study of the operations of the Gambia Produce Marketing Board.

For the future, the marketing system will need to be modified so that it can market a larger number of agricultural products among a wider selection of countries. Given The Gambia's position as an entrepot for West African trade the possibility of expanding to market domestically produced agricultural crops throughout West Africa should be good. This would, of course, require substantial changes in the present agricultural marketing system which is focused on marketing one crop to a narrow geographical area.

#### E. Institutions

Strengthening the agricultural institutional structure in The Gambia will be essential to support the kinds of changes that will be necessary in production and marketing. Indeed continuing functioning of the present system at reasonable levels of effectiveness is doubtful given the situation in which institutions such as the cooperatives find themselves. Yet, given the small size of The Gambia and the limited amount of human and capital resources available, institutional development needs to be very carefully planned.

##### 1. Cooperatives

The most critical institutional problem in The Gambia concerns the survivability of the cooperative system. Unless some progress is made in working out a system for handling its current debt structure The Gambia Cooperative Union will not be able to survive. Fortunately, this is a problem to which the

World Bank is currently giving major attention. Hopefully, they will be able to develop with the government of The Gambia a solution that will maintain the viability of the GCU without placing undue strain on government revenues and expenditures.

## 2. Research

As has been indicated throughout this paper the need for research analysis and studies on a wide variety of agricultural issues is great. In the best of circumstances the financial and human resources available for this research effort are going to be scarce. Research institutions are going to have to be increased. However, these research institutions are going to need to be structured in such a way that they take every possible advantage of research that is being conducted outside of The Gambia. This means that much of the research will need to be adaptive research which will consist largely of trials of plant material, disease control methods, and land and water management systems which have been developed at research institutions in nearby countries, the international research institutions, etc. There are some issues, however, that will need to be researched within The Gambia. For example, it is likely that research and study of labor productivity will have to be undertaken in its entirety within the framework of Gambian research. The critical choices that will need to be made are between those things on which The Gambia

can rely on external institutions to provide and those that must be undertaken by Gambian institutions.

### 3. Gambia Produce Marketing Board

The Gambia Produce Marketing Board has been dealt with under the section on marketing. The alternatives that need to be addressed are the prospects for increasing the operating effectiveness of the GPMB and/or hiving off some of its marketing functions for operation as private firms.

### 4. Extension

The evidence indicates that the extension service does not operate effectively in establishing two-way communications with farmers or the research institutions. However, there is also little reason to believe that even if such communications were established that the extension agents would have really useful information to convey to the farmers or that the research service would use information brought to them by the extension service. In this situation it is doubtful that there would be useful benefits from putting additional human or capital resources into the extension service. Rather, the appropriate action would be to focus on restructuring the extension service so that it is able to communicate effectively with farmers and the research service. Then, in the future, it can facilitate work by the research service on read production and marketing problems and convey the results to the farmers.

## 5. Agricultural Education

Agricultural education in The Gambia is limited to a two-year certificate course. Given the size and limited resources of the country, it is probably appropriate for The Gambia to continue to rely on external institutions for training of Gambian agricultural scientists above the certificate level. There is, however, scope for increasing the agricultural content of the curriculum at the primary school level.

## V. RECOMMENDATIONS FOR AID ASSISTANCE

The two most critical problems in Gambian agriculture that need to be dealt with are increasing output from the current agricultural system and diversifying agricultural production. The World Bank is planning to undertake a large project which will focus on increasing total output from the current production system. AID should not attempt to duplicate or, given the present structure of the project, participate in this project.

AID should focus its efforts on diversification of production including efficient management of that production. The current AID financed Mixed Farming project appears to be addressing some diversification and management problems. This project should continue. AID should, as its other agricultural activity, undertake to support the research and studies that will make it possible for The Gambia to diversify agricultural

production and marketing using improved management and technology. Specifically, it is recommended that AID work with the Gambian government to develop a major research effort to develop a variety of agricultural products which can be produced and marketed using improved management and technology.