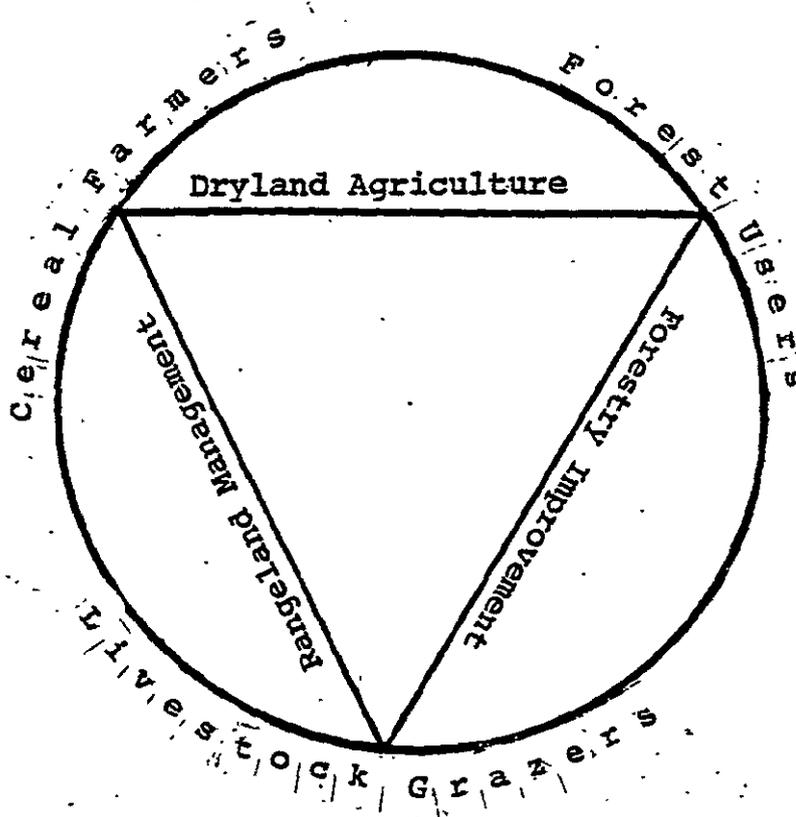


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DRYLAND AGRICULTURE SUB-SECTOR STRATEGY
MOROCCO

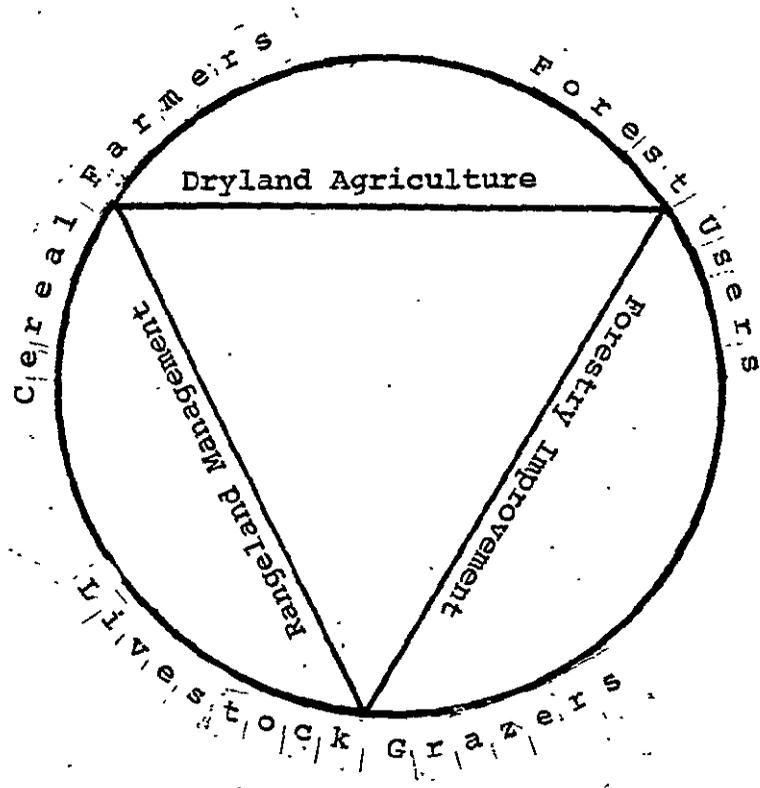
Jonathan A. Sleeper, Agricultural Economist

Thomas H. Eighmy, Program Economist

M'Hamed Hanafi, Agricultural Specialist

USAID/Morocco

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Executive Summary

This document describes USAID/Morocco's agricultural strategy, which is focused on the poor dryland sub-sector. The approach here is to: 1) briefly describe the dryland sub-sector; 2) explore the constraints to increased productivity faced by each major dryland group (cereal farmers, livestock grazers and forest users); and 3) describe how the USAID/Morocco with its limited resources can assist these groups to overcome production constraints.

In this paper, the dryland, or rainfed, agricultural zone refers to those areas receiving annual average rainfall of 200 mm or more but specifically excluding irrigated areas. "Dryland farmers" refers to the great majority of small farms (under 10 ha) in the rainfed region which produce cereal grains and raise some livestock for subsistence. This group is often called the "traditional" sector as opposed to the "modern" or commercial sector. The latter minority of large farms is not a major subject of this paper.

Durum wheat is the preferred wheat for human consumption in the dryland zone and is the ingredient of the national dish, couscous. Small farmers produce primarily durum wheat for subsistence, and the country is self-sufficient in production. Barley is also a very important grain, used to feed livestock but also grown and consumed by the very poorest dryland cereal farmers. Morocco is self-sufficient in barley production. Bread wheat (low in gluten and used primarily for baking) is grown in the higher rainfall areas mostly by modern farmers. Morocco in a normal rainfall year imports about three quarters of its bread wheat consumption but only one quarter of its total grain needs.

Imports of bread wheat feed Morocco's rapidly growing cities. Government pricing policy, which influences the structure of cereal prices through administered "support" or target prices, is favorable to farmers. However, as the government target price stands considerably higher than the import price, it is cheaper for the government to buy wheat abroad than pay its own target price. In short, Moroccan bread wheat farmers are not competing successfully with more efficient farmers in wheat exporting countries. Thus, the reasons for Morocco's stagnating grain production must lie elsewhere than in government pricing policy. The answer must be sought in production constraints. Meanwhile, imports of bread wheat are being financed by exports from the more highly productive irrigated sub-sector.

The dryland target group is comprised of about 7.5 million Moroccans, whom we have classified as cereal farmers, livestock grazers and forest users (see Section III). However, their economic activities are highly interdependent. Most small

cereal farmers raise sheep and goats, most herders raise some cereals but also use the forested areas for grazing, and both groups depend upon the forested areas for fuelwood.

The constraints to increased productivity faced by cereal farmers, livestock grazers and forest users are numerous (see Section III). Limited resources require USAID/Morocco to be highly selective in focusing on those constraints where demonstrated U.S. proficiencies can best be brought to bear. Nonetheless, our portfolio of projects goes a long way in helping to remove some of these constraints. Our dryland agriculture applied research project will help solve the problems of soil fertility, certain tillage practices, inadequate livestock feed resources and lack of applied research. The range management project will help remove the constraint to productivity presented by malnutrition and overstocking. The forestry project will help the GOM overcome its failure to reforest cut-over lands. The PL 480 Title I self-help measures also encourage the GOM to support both dryland cereal and forestry programs. Other related activities, some of them centrally-funded, complement this portfolio.

The end objective of our project portfolio is to improve productivity and incomes of the dryland target group. However, all of the projects in our portfolio have some means of delivery to the target groups with one exception. Our program would be more effective in increasing productivity of dryland cereal farmers if it included an extension project to complement the dryland agriculture research project. Such an activity would get improved practices off the research stations and into the fields of small farmers, thereby diminishing a major constraint to small farmer productivity (inadequate extension) and providing a basis to accelerate current IBRD assistance in small farmer credit.

Dryland Agriculture Sub-Sector Strategy

I. INTRODUCTION

A. Scope of this Paper

This document is a general description of the dryland sub-sector of Moroccan agriculture and USAID/Morocco's agricultural strategy. As such, it offers somewhat more detail than can be provided in the Country Development Strategy Statement (CDSS) while at the same time being more general than the project descriptions which appear in our project identification documents and project papers.

The approach in this paper is to: 1) briefly describe the dryland sub-sector; 2) explore the constraints to increased production faced by each major dryland group (cereal cultivators, livestock grazers and forest users); and 3) describe how USAID with its limited resources can assist these groups to overcome some of the constraints to increased productivity. In the opening section, we take a broad look at the dryland sub-sector. As most cereal production takes place in this sub-sector, the section includes a brief examination of trends in production, imports, prices and marketing and how these affect the small farmer. The second section assembles available information on the size and characteristics of target groups, and examines more closely the constraints to productivity. The final section deals with USAID's agricultural strategy. We believe that the strategy flows logically from a general understanding of the dryland sub-sector, and we hope this paper contributes to that understanding.

B. Rationale for a Dryland Strategy

Over the past five years, USAID/Morocco has progressively concentrated its efforts on increasing productivity and incomes in the dryland agricultural sub-sector. Such focus derives from a dual rationale:

1. The dryland region contains over half of Morocco's rural population (almost eight million people), who are very poor because of low productivity. Moroccan officials freely admit that the emphasis of government investment and interest has long been placed upon the nine major irrigated perimeters and smaller irrigation projects to the exclusion of the dryland sub-sector. We do not believe this emphasis to be

in error (see below). However, a more balanced approach appears warranted when considering that the dryland region produces most of the cereal grains in the country. Improved productivity of this region could not only improve incomes of the target group but supply grain to the growing urban centers and thus reduce wheat imports which, given a deteriorating balance of payments, Morocco can no longer afford.

2. Dryland agriculture is a field where the US holds a distinct comparative advantage relative to other donors. USDA statistics indicate that areas of the US with similar rainfall distribution and climate achieve significantly higher cereal yields than Morocco (Table 1). Sustained range off-take and average carcass weights are at least twice as high in the US. Yields of softwood are substantially higher in the US inland West, an area with strikingly similar climatic and ecological conditions to forested regions in Morocco.

C. The "Dryland" vs. "Irrigated" Dichotomy

While the scope of this paper is limited to the dryland sub-sector, it is necessary to say a word about the "dryland" vs. "irrigated" dichotomy. As noted in our 1983 CDSS, this dichotomy is both simplistic and disabling. The 1980/81 drought which halved grain production only points up the necessity of a balanced dryland and irrigated approach to Moroccan agriculture. Only 17 per cent or 7.9 million hectares of Morocco's land (excluding the Sahara) are arable. The irrigated perimeters (about 0.6 million hectares) earn scarce foreign exchange by producing export crops which still account for 20 per cent of the value of all exports. There are many small farms and many poor people in the irrigated areas. A full third of the smallest farms in the country have some form of irrigation (see Section II). USAID has contributed to long term loans for the development of two irrigated perimeters (Doukala and Moulouya), and initial evaluations indicate that both projects may be considered successful in financial and distributional terms. USAID therefore supports the GOM policy of continued investment in irrigation as part of a balanced approach to its agriculture. The productivity maintained this past year despite the worst drought in forty years attests to the wisdom of such a strategy. Should future circumstances permit, we intend to maintain the option for a further agricultural loan in the irrigated sub-sector, although this is not currently a part of our strategy.

Table 1

US and MoroccoComparative Dryland Cereal Yields,
Sheep Off-Take and Softwood Yields

	<u>US</u>	<u>Morocco</u>
Cereal Yields ^{1/}		
Wheat (qx/ha)	16.2 (24b/a)	9.3 (13.8b/a)
Barley (qx/ha)	20.0 (37b/a)	10.0 (18.5b/a)
Sheep and Lamb ^{2/}		
Off-Take (%)	74	31
Average Carcass Weights (kg)	23	11
Average Softwood Yields (M ³ /ha/year) ^{3/}	8-9	5-6

1/ Five year average, 1975-79. It is conventional in Morocco to express weights in quintals. One quintal equals 100 kg. Ten quintals equals one metric ton. US figure is for Texas. Source: USDA and GOM MARA.

2/ Off-Take defined here as number of animals marketed divided by total population. Figures are for 1975. Source: USDA and GOM Livestock Service.

3/ Intensively managed pine stands. US figure is for the Western Inland Empire ecological zone. Source: R.D. Forbes, Forestry Handbook, and GOM Forest Service.

D. Dryland Sub-Sector Defined

For the purposes of this paper, the terms "dryland" agriculture and "rainfed" agriculture are synonymous. In Morocco, the dryland (bour) agricultural zone refers to those areas receiving an annual average rainfall of 200 mm (8 inches) or more but specifically excluding irrigated areas. The term "dryland farms" refers to the majority of farms located in the dryland zone which are small and produce cereal grains and some livestock for subsistence. This group is also referred to as the "traditional" sector as opposed to the "modern" or commercial sector.

The latter minority of large farms (over 50 hectares) is not a subject of this paper. These farms are generally located in the nine irrigated perimeters and the northern provinces of higher rainfall, occupy about fifteen per cent of the arable land and comprise less than one per cent of all farms in the country (see Appendix Table 6). They produce fruit, vegetables, industrial and oil crops, use most of the commercial inputs (improved seed varieties, chemicals, machinery), have well-developed markets for their produce and receive first priority in the use of credit and other services. They also produce fifty per cent of the bread wheat and about a quarter of the durum wheat in the country (see Appendix Table 8). Due to their relatively small percentage of cultivated area, the high productivity of these farms is not reflected in over-all cereal production, which is stagnating.

The dryland zone in Morocco is extremely heterogeneous due to varying soil conditions and rainfall which is highly unpredictable from year to year and from place to place within the same year. Nonetheless, a few generalizations can be made.

1. 200-300 mm rainfall zone -- Areas with 200-300 mm of rainfall may be considered "arid" and are characterized by barley cultivation where soils and microclimates permit and the grazing of highly mobile herds of sheep and goats on scrub range. The group of provinces in the region directly west of the area enclosed by the 400 mm isohyet in Figure 1 (El Jadida, El Kelaa, Safi, Essaouira and northern Marrakech Provinces) typify the 200-300 mm arid zone. This zone also includes some 700,000 hectares of forested area, located between Essaouira and Tiznit. The area is populated by

the Argan tree (*Argania spinosa*), a highly drought-tolerant species unique to Morocco and a major source of charcoal, forage for small ruminants and domestic cooking oil.

2. 300-400 mm rainfall zone -- Areas within 300-400 mm of rainfall are classified in Morocco as "semi-arid". Barley cultivation predominates except in areas receiving 350-400 mm rainfall where durum wheat is grown, while smaller, less mobile herds are comprised of larger numbers of sheep and a few cattle. Southern Settat Province, which includes part of the Dryland Agronomic Research Project, typifies the semi-arid region.

3. 400-600 mm rainfall zone -- The area enclosed by the 400 mm isohyet (Figure 1) includes the most favorable rainfed agricultural land in the country as well as the Rif and Atlas Mountains complex. About half of the country's wheat and pulses is produced in the Northern Atlantic Plains region, an area North of a line drawn from Settat to Oujda, bordered on the east and north by the Atlas and Rif Mountains. Because it is less drought-tolerant than durum wheat, most of the bread (soft) l/wheat is produced in this area as a cash crop by the largest farms. Most of the country's commercial dairy and poultry operations are located in this area. The most important agricultural provinces in this zone are Casablanca, Benslimane, northern Settat, Khemisset, Meknes, Fes and especially Kenitra.

4. 600 mm + rainfall zone -- With the exception of the Mamoura cork forest in Kenitra Province, the major forested areas are located within the Atlas Mountains above the 600 mm isohyet. The severely degraded Rif Mountains which border the northern coastline along the Mediterranean also contain important forested areas. Chaouen Province in the Rif and Ifrane Province in the Middle Atlas have substantial populations dependent upon forestry activities. Both the Rif and the Middle Atlas forests provide an extremely important watershed to the Atlantic Plains and the irrigated perimeters in the north.

More will be said about the principal dryland subsistence livelihoods and characteristics in Section II.

1/ In Morocco, "bread" wheat conventionally refers to soft wheat (ble tendre), which is low in gluten, high in starch and used for baking European-style bread, as well as pastries and cakes. "Durum" wheat refers to hard, semolina wheat (ble dur) used for baking a traditional flat bread, and for manufacture of couscous and pasta. Some confusion of terminology can result, as "bread" wheat in the U.S. conventionally refers to hard wheat.

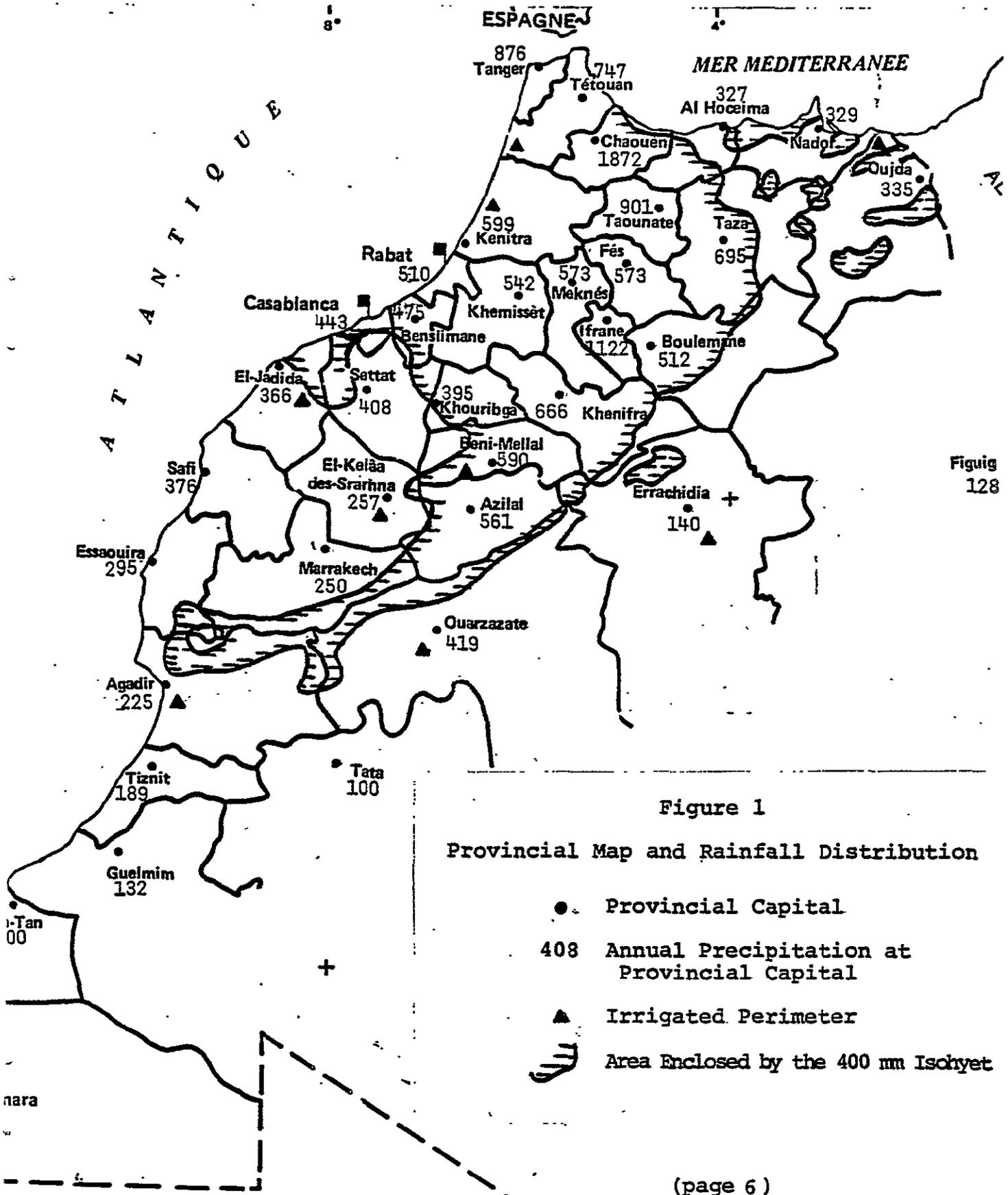


Figure 128

Figure 1
 Provincial Map and Rainfall Distribution

- Provincial Capital
- 408 Annual Precipitation at Provincial Capital
- ▲ Irrigated Perimeter
- ⏟ Area Enclosed by the 400 mm Isohyet

E. Summary Land Use

The ten million rural inhabitants dependent upon agriculture in Morocco derive their livelihoods from only 7.9 million hectares, or 17 per cent of the country's total land area (Table 2). Another 26 per cent or 12 million hectares (excluding the Sahara) is marginal arid rangeland which provides most of the feed for the country's small ruminant livestock. Another five million hectares is comprised of forest of extremely variable quality used for fuelwood and grazing. Almost half of Morocco (excluding the Sahara) is non-agricultural, primarily desert, unvegetated mountains and urban areas.

Cereals cover about half of the arable land (Table 2). Barley, the bread grain of the poor and a major animal feed, accounts for half the area cultivated in cereals. Durum wheat, the preferred wheat for human consumption and the main ingredient in the national dish couscous, accounts for almost a third of the area planted to cereals. Area in bread wheat is only one third the area in durum wheat. Maize is considered a relatively minor crop with an area equal to that of bread wheat.

F. Cereal Production and Import Trends

For outside observers, two sign posts point the way to stagnating cereal production in Morocco. First, Morocco has been a net importer of grain, with imports increasing at almost ten per cent per year since 1960. Secondly, the value of total food imports has exceeded total food exports each year since 1974, thus contributing to Morocco's chronic trade deficit (Table 3).

The raw data on estimated production of the major cereals (durum wheat, bread wheat, barley, maize and others) and their corresponding import is found in Appendix Table 1. The same information is graphed in Figure 2. Appendix Table 2 presents an analysis of production and import trends over both the long and short run.

As can be seen in Figure 2, there are wild fluctuations in the production data which appear to be due to more than just climatic variation and normal sampling error.

Nonetheless, trends can be discerned (see Appendix Tables 1 and 2). Total grain production and disappearance (total grain

Table 2

Summary Land Use1979/80

	<u>1000 hectares</u>	<u>Per Cent Total Area All Grains</u>	<u>Per Cent Total Area Morocco (excluding Sahara)</u>
Durum Wheat	1,269	(29%)	-
Bread Wheat	445	(10%)	-
Barley	2,150	(49%)	-
Maize	412	(9%)	-
Other Grains	<u>140</u>	<u>(3%)</u>	-
Total All Grains	4,416	(100%)	-
Fallow	2,218	-	-
Other Crops ^{1/}	<u>1,260</u>	-	-
Total Cropped Area	7,894	-	(17%)
Forest	5,000	-	(11%)
Rangeland	12,000	-	(26%)
Non-Agricultural ^{2/}	<u>20,979</u>	-	<u>(46%)</u>
Total Mor. (Excl. Sahara)	45,873	-	(100%)
Total Morocco	71,085		

^{1/} of which irrigated land comprises about 600,000 ha or under eight per cent of cropped area.

^{2/} Primarily desert, unvegetated mountains and urban areas.

Sources: Ministry of Agriculture and Agrarian Reform, Enquete Agricole 1979/80 and Donnes Essentielles; Ministry of Plan, Annuaire Statistique, 1979, and Maroc en Chiffres, 1974. See also Appendix Table 5.

Table 3

Value of Selected and Total Agricultural Trade

(millions of Dirhams)

	E X P O R T S			I M P O R T S			Net ^{2/} Coverage %
	Citrus, other fruit & vegetables ^{1/}	Other	Total	Bread Wheat	Other	Total	
1974	980	1,005	1,985	708	1,783	2,491	(80)
1975	905	759	1,664	1,004	2,214	3,218	(52)
1976	1,115	925	2,040	726	1,736	2,462	(83)
1977	1,159	752	1,911	655	1,957	2,612	(73)
1978	1,431	768	2,199	856	1,787	2,643	(83)
1979	1,626	812	2,438	973	2,024	2,997	(81)
1980 ^{3/}	1,332	1,026	2,358	1,099	2,017	3,206	(74)

^{1/} Includes: Fresh tomatoes and other vegetables, including potatoes, canned vegetables, canned fruits, fruit and vegetable juices, dried fruit, dehydrated vegetables, and cotton.

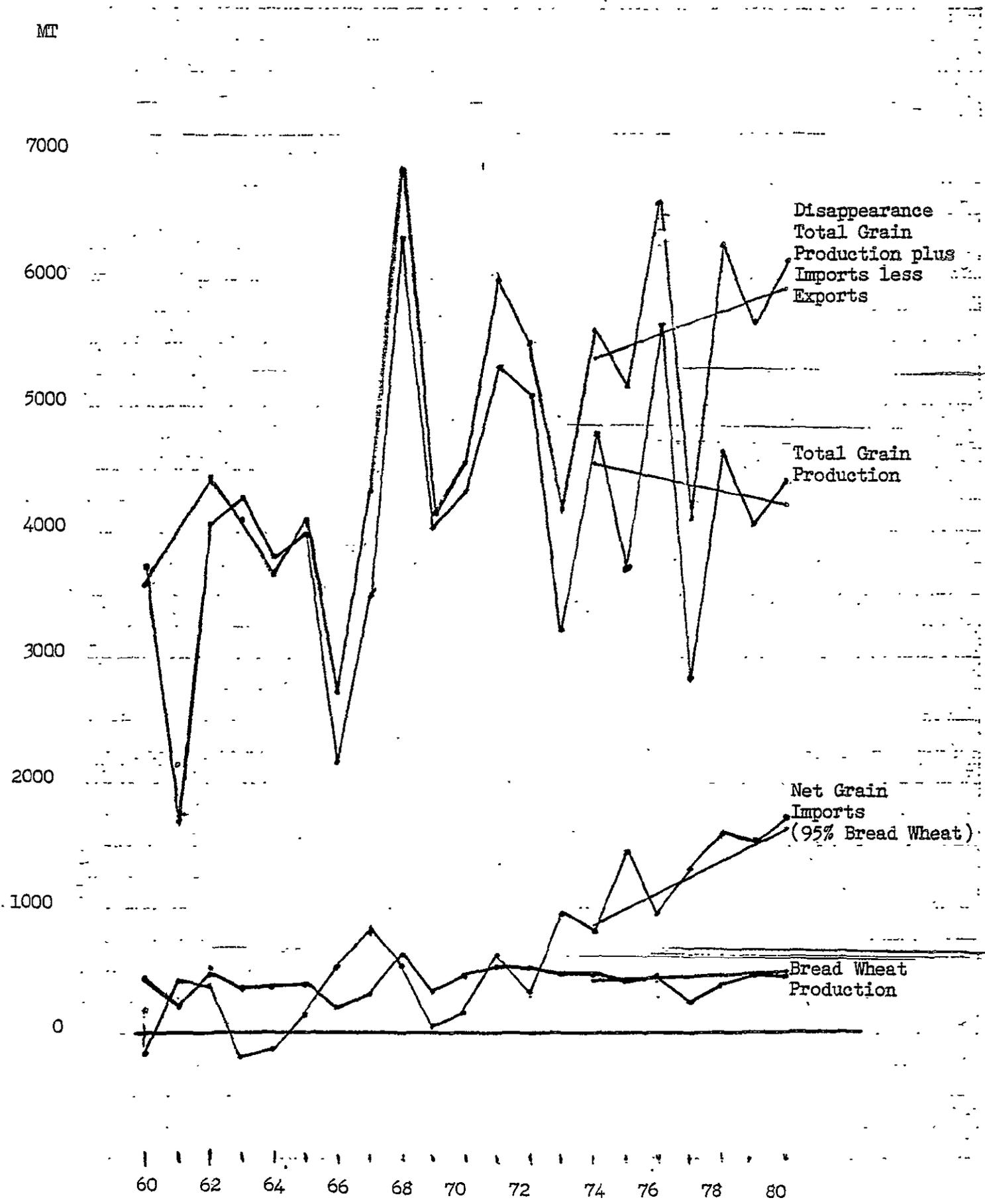
^{2/} Per cent of total agricultural imports covered by agricultural exports.

^{3/} January - November

Source: USDA

FIG. 2

10
GRAIN PRODUCTION AND IMPORT TRENDS



production plus imports less exports) increased at 2.9 per cent per year since 1960, a figure remarkably close to the standing estimate of three per cent population growth. Total grain production is increasing at only slightly above one per cent per year, the deficit being made up by wheat imports. About 95 per cent of grain imports are comprised of bread wheat. As can be seen from Figure 2, bread wheat production with some drops due to dry years has remained stagnant.

Over the short run (1974-80), the available data indicates that disappearance increased by 1.5 per cent per year, while production of all cereals decreased by 1.2 per cent per year (Appendix Table 2). Over the same period, imports of bread wheat increased by 9 per cent per year while bread wheat production increased by less than one per cent per year due to yield increases (short run trend lines are graphed in Figure 2).

Again assuming that we are not at the mercy of wildly inaccurate data, an analysis of area and yields of the major cereals also indicates production stagnation (Appendix Table 3). From 1974, the area in durum wheat has declined at almost two per cent per year, while yields increased only slightly. It is possible that farmers may be withdrawing durum wheat from marginal areas. Bread wheat hectareage is also declining (by almost 1.5 per cent per year) where there is also a very weak positive increase in yields with the same basic interpretation. Barley on the other hand is increasing in hectareage during the same period at about a steady two and a half per cent per year, while yields are slowly declining. It appears that barley is being extended into marginal areas replacing wheat. Maize inexplicably is declining in hectareage and yields vary widely with no discernable short run trend. Fallow, inexplicably, is increasing. The final interpretation speaks as much of faulty data as of discernible trends 1/.

Further analysis of the production and import data was attempted in the hopes of revealing the interplay of such factors as rainfall, prices, adoption of new varieties and use of additional inputs (Appendix Table 2). This was not possible.

However, two important factors may be noted concerning wheat import trends. First, their great increase since 1970 can be largely attributed to Morocco's steadily high rate of population

1/ The USDA and USAID are cooperating with the GOM Ministry of Agriculture in developing an area sampling frame, which should lead to more accurate area and yield estimates for grains and other crops.

growth. During the 1970-1981 period, the country's population increased from 16 million to more than 21 million, an increase of almost 30 per cent. In particular, it has been the growth of urban populations in the Atlantic plains (due to rural-urban migration) at five per cent per year which has fueled the increased imports.

Wheat imports are comprised almost entirely of bread wheat for consumption in urban areas. Little bread wheat is consumed in rural areas nor do many small farmers wish to grow it. Up to the colonial period in Morocco, barley flour was the traditional staple in rural areas, while durum wheat made the preferred bread flour in urban areas. The flour was used to make a traditional flat bread which is still consumed in rural areas. However, Moroccan urban consumers appear to have developed a preference for bread wheat flour (for European-style baking), which has remained after the departure of the French.

Secondly, 70-80 per cent of national consumption of bread wheat is comprised of imports. It can be noted from Table 3 that since 1974 the value of wheat imports averaged about two thirds of the value of exports of citrus, other fruit and vegetables. By far the majority of these export crops are grown on Morocco's 600,000 hectares of irrigated land and are destined for the winter food market in the European Economic Community. Thus, it could be said that the country's most productive agricultural sub-sector (the irrigated perimeters) is financing wheat imports to feed the growing cities. However, this will become more difficult as Portugal, Spain and Greece enter the Common Market, and the period during which Moroccan fresh food products may enter Europe is shortened. At the same time, domestic consumption of irrigated fresh fruits and vegetables is increasingly important in both balance of trade and nutritional terms.

G. Cereal Prices and Marketing ^{1/}

1. Overview

Government pricing policy, which influences the structure of cereal prices through administered support prices, is favorable to farmers and exerts an upward pressure on producer prices. However, as the government support price stands considerably higher than the import price, it is cheaper for the government to buy wheat abroad than to pay its own support price. In short, Moroccan bread wheat farmers are not competing

^{1/}For a dated, but still the best, review of cereal prices and marketing in Morocco, see: A. Ackles and J. Pederson, Grain Storage, Handling and Distribution in Morocco, Kansas State University, 1969.

successfully with more efficient farmers in wheat exporting countries. Thus, the reasons for Morocco's stagnating grain production must lie elsewhere than in government pricing policy. By implication, the answer must be sought in constraints to production (discussed in the next section). Part of the answer also lies in urban consumer preferences. Imported wheat (comprising three quarters of bread wheat disappearance) is consumed primarily in urban areas which are growing at five per cent per year, while rural areas remain self-sufficient in durum, maize and barley.

On top of this, the government maintains an expensive system of consumer subsidies designed to reduce the price of bread flour, vegetable oil, sugar, tea and milk below free market levels. This practice especially has captured the attention of the IMF. Consumer subsidies have been reduced twice in recent months. In March, increased consumer prices were balanced by increases in minimum wage rates and rent reductions for the (predominantly urban) poor. Thus, actions required by foreign exchange constraints were mediated by domestic actions without foreign exchange repercussions. Such domestic actions were neither applied nor readily available for the second (June) round of subsidy reductions and consequent retail price increases for bread and other staples. Rioting in Casablanca severely embarrassed the government which hastily rescinded half of the price increase. Yet foreign exchange pressures mounted with the severe 1981 drought and the need to import more wheat (with American wheat suddenly costing about 50% more as a result of the strengthened dollar and the IMF-imposed de facto dirham evaluation). The differential pricing policy employing subsidies on staples for the poor, while leaving other commodities (meat, fruit, vegetables) uncontrolled, is the same policy recently advocated in a major review of food subsidies ^{1/}.

2. Target Prices and the Role of ONICL

The government influences producer prices through a system of "support prices" (prix de soutien). The support price is more correctly a target price by which the central cereal marketing board manipulates the supply of grains between deficit and surplus areas to keep prices stable throughout the country. The exception to the above is the price for bread wheat, which is fixed for the relatively small amount purchased in government channels.

^{1/} Peter Timmer, "Food Prices and Food Policy Analysis in IDCs", Food Policy (8/80), pp 188-199

The fixed price for bread wheat and target prices for other grains are administered by ONICL (Office National Interprofessionnel des Cereales et Legumineuses), a public marketing enterprise. ONICL acts as a commodity stabilization board serving as the sole contractor for government importation of cereals and pulses. ONICL only controls about 25 per cent of total cereal production, which passes through licensed dealers, cooperatives and industrial millers.

The remaining 75 per cent of production is utilized on the farm or traded locally in the souks without governmental control. As rural subsistence needs are met first, the amount of national production commercialized varies widely with the size of the crop. Most surplus grain marketed by producers passes from production to deficit areas and urban centers.

There is a problem in fine-tuning the support price mechanism. In principle, support prices should bear some discernible relation to average cost of production. Where production technology is relatively uniform and production costs relatively invariable, the support price can be set to provide a profit margin sufficiently high to encourage production. In Morocco, production technology, input availability and the resource base are far from uniform. GOM officials maintain that average production costs are unknown and that in any case for each season there are as many production costs as there are farmers. Such a response overstates the difficulty of the task but it does mean that the GOM sets support prices without close reference to actual production costs. The price setting mechanism apparently started with some linkage to world prices and has been subsequently advanced at or faster than the price of imported agricultural inputs where costs are known.

3. Producer Response

Prices received by producers vary with place, season and quality, and represent a response to supply and demand forces prevailing in a particular market (souk).

Small farmers -- Many small farmers do not have adequate incentive to grow bread wheat because they first produce durum wheat or barley for subsistence with market considerations taking second place. Durum wheat is the preferred cereal for human consumption in rural areas. However, most farmers do market some surplus grain. But they receive higher prices for durum wheat than bread wheat (see Tables 4 and 5).

Furthermore, small farmers who do market bread wheat receive prices substantially lower than the government fixed price because: 1) they do not meet quality and delivery standards; and 2) due to heavy debt burdens, they are often required to release their produce outside of official marketing channels at harvest time when seasonal prices are at their lowest.

Most small farmers market their surplus grain production through the local souks and do not sell to licensed dealers or cooperatives because the relatively small amounts marketed do not meet standards of quality, place and time of delivery. Discounts for bread wheat are given for up to six per cent foreign matter, broken kernels or other detrimental materials, while beyond 6 per cent no market is guaranteed.

Because they are in heavy debt by harvest time, many small farmers market their surplus production in June, July and August when producer prices are seasonally lowest. In the Haouz region of Marrakech, a survey of 32 souks indicated that average producer prices of durum wheat rose by 20 per cent from harvest (June) to the end of the year. Prices paid to small farmers do not reflect storage and interest payments by ONICL to licensed dealers.

Modern farmers -- Large farmers in the northern regions produce half of the bread wheat in the country (Appendix Table 8). They are the primary beneficiaries of the GOM support pricing policy, because they sell through official channels and meet standard quality and delivery requirements. Furthermore, it is the large farmers who benefit primarily from government subsidies (or import tax rebates) for fertilizer, pesticides, seeds and tractors (see Section II). Modern farmers using commercial inputs are not considered part of USAID/Morocco's dryland target group.

4. Government Pricing Policy

Recent price history for bread and durum wheat, barley and maize are presented in Tables 4 and 5. There are several points to be made regarding government pricing policy with reference to these tables.

It appears that support prices do indeed exert an upward pressure on producer prices, in spite of the fact that only a small proportion of production actually passes through ONICL channels. The national average of producer prices (paid in the souks) tends to follow support prices quite closely, with the exception of durum wheat, 70-80 per cent of which is consumed at the point of production.

Table 4

Bread Wheat: C.I.F., ONICL Fixed Price,
and
Producer Price, 1969 - 1980
 (DH/quintal)

	<u>C.I.F. 1/ Casablanca</u>	<u>Fixed Price</u>	<u>Producer Price</u>
1969	40	35	NA
1970	36	35	NA
1971	36	39	NA
1972	36	42	42
1973	53	41	40
1974	91	45	58
1975	74	60	69
1976	72	60	69
1977	49	85	100
1978	55	85	95
1979	77	105	103
1980	75 2/	125	112

1/ Based upon unit value of imports, Office des Changes.

2/ January - October

Note: r^2 for target and producer price = 91%

Source: MARA; and BMCE, Revue Bimensuelle d'Information,
 30 Oct., 1977

Table 5

Other Cereals: ONICL Target Prices
and
Producer Prices, 1972 - 1980 1/
 (DH/quintal)

	<u>Durum Wheat</u>		<u>Barley</u>		<u>Maize</u>	
	<u>Target</u>	<u>Producer</u>	<u>Target</u>	<u>Producer</u>	<u>Target</u>	<u>Producer</u>
1972	77	47	27	30	NA	30
1973	49	46	28	31	NA	31
1974	63	88	28	58	45	70
1975	63	92	40	62	45	67
1976	63	87	40	52	45	87
1977	85	115	65	85	65	89
1978	85	111	65	81	80	90
1979	105	127	80	86	80	90
1980	125	131	90	94	90	97

1/ Producer prices are national averages. Producer prices for 1980 are predicted

Source: MARA; de 1974-75 and BMCE, Revue Bimensuelle d'Information, 10/3/1977

Note: r^2 for durum wheat target and producer prices = 60%

r^2 for barley target and producer prices = 84%

r^2 for maize target and producer prices = 92%

Estimates of producer prices as shown in Tables 4 and 5 are based upon a recently published Ministry of Agriculture survey of souk prices. The fact that fixed and target prices vary significantly from producer prices is due to the complexity of government and souk marketing systems described above. The steady increase in government prices has narrowed the gap between the two in the case of durum, barley and maize, and reversed itself in the case of bread wheat 1/.

It should also be noted from the Tables that the government prices have been increased quite rapidly, doubling over the five years 1976-80. This increase has been faster than the general and food price index:

Mid-Year Cost of Living Index
(1972/73=100)

	<u>General</u>	<u>Food</u>	<u>Bread Wheat Support Price</u>
1976	140.35	148.65	60
1977	162.15	175.10	85
1978	174.05	181.50	85
1979	189.05	197.20	105
1980	211.10	217.80	125
% Increase per year	9.6%	8.7%	16.3%

Finally, it will be noted that with the dramatic increase in support (and producer) prices since 1977 and the decline or stability of CIF prices for imported bread wheat, it has become cheaper in dirham terms (excluding the foreign exchange complication) for the GOM to import bread wheat than it is to pay its own farmers 2/. Considering that imported bread wheat is largely consumed in the coastal cities (principally Casablanca with some three and one half million people) while local bread

1/ There are several explanations for this seeming paradox including lower quality of bread wheat traded in the souks vs. that sold to ONICL.

2/ The weakening of the dirham against the dollar, and to a lesser extent other foreign currencies, may well reduce this difference in 1981.

wheat must pay inland transport and handling charges to reach the same urban market, the difference between the CIF and domestic prices at the point of consumption may be even greater. The situation is aggravated by the EEC practice of "dumping" bread wheat in Morocco, which exerts a downward pressure on the prices of imports 1/.

In summary, government pricing policy per se cannot be faulted for providing insufficient producer incentive. It has apparently acted as an upward lever on prices. If pricing policy is not the culprit behind stagnating grain production, the answer must lie in the more intractable issues affecting efficiency of production. These are discussed in more detail in the next section.

II. TARGET GROUP ANALYSIS: PRINCIPAL DRYLAND ACTIVITIES AND THEIR RELATIONSHIPS

Current information on the size of population involved in agriculture is dependent upon the 1971 General Census of Population and the 1973-74 Agricultural Census. While the latter does attempt to break out those agricultural households fully or partly dependent upon irrigated agriculture, neither census defines those households residing in or adjacent to the country's five million hectares of state-owned forests. In order to gain some spatial detail and take a fresh look at the available data, we have developed independent estimates of rural population groups dependent upon agriculture. These are presented in Table 6.

The one quarter to one third of agricultural population (2.8 million persons) dependent upon irrigated agriculture is represented as Group I in Table 6. While not a subject of this paper, it is important to note that a full one third of the very smallest farms in the country have some form of irrigation (see Table 7). Many of these farms are located outside the irrigated perimeters and are watered by traditional means (gravity channels, and more recently, diesel pumps).

1/See Appendix Table 7. The EEC practice of production and export subsidies and the resultant "dumping" of low cost (baking) bread wheat has long been a point of contention in the International Wheat Agreement negotiations since 1974. In 1979 and 1980 EEC bread wheat comprised over half of total Moroccan wheat imports and was purchased at a price averaging 3-7 DH/quintal lower than US imports. However, part of this differential is due to a slightly higher premium paid for higher quality US bread wheat, as well as lower transportation charges from Europe.

Groups II, III and IV (cereal cultivators, livestock grazers and forest users) are the target groups for USAID/Morocco's dryland strategy. The economic activities characteristic of each group are highly interdependent, i.e., most small cereal farmers raise livestock, most livestock farmer/herders utilize forested areas for grazing, and both groups depend upon the forested areas for fuelwood. Below are brief descriptions of these activities and the constraints to increased productivity facing each dryland target group.

A. Dryland Cereal Farming ^{1/}

1. General Description

As indicated in Table 6, a full half of the agricultural population are dependent upon rainfed agriculture. By far the majority of livelihoods are based upon a mixture of dryland cereal subsistence farming and livestock husbandry.

According to the 1973-74 agricultural census (Table 7), over half of dryland farmers cultivate somewhere between 0 and ten hectares (a fifth are landless). Ten to fifteen hectares of bour (dryland) are considered to be the minimal amount of land to support a family of six. Most holdings are highly fragmented (i.e., include several parcels) and at least ten per cent are absentee-owned.

Barley is the principal subsistence grain and comprises at least half of the value of crops produced by the typical dryland farmer. It is the primary subsistence grain in the dryland region because it is better adapted to low or erratic rainfall and poor soils. Varieties used mature two weeks earlier than wheat, permitting the farmer to spread out his labor requirements during the peak harvest period. Maize is also an important subsistence crop and is planted late in the spring. Both barley and maize are used for livestock feed while corn stover is used for fuel.

Durum wheat is the most prestigious crop and the preferred cereal for human consumption. Small dryland farmers choose to grow durum wheat because it makes both a traditional flat bread and couscous (the national dish). Also, rural souk prices tend to be slightly higher relative to bread wheat. The shorter cycle bread wheat varieties used also compete with barley at harvest time.

^{1/} For a more complete description of the traditional dryland farmer and constraints to productivity in the dryland subsector, see: Mid America International Agriculture Consortium, Applied Agronomic Research Program for Dryland Farming, January, 1977.

Table 6

Estimated Rural Population Dependent Upon Agriculture, 1980

<u>Rural Population Dependent Upon:</u>	<u>1000 persons</u>	<u>%</u>
I. Irrigated agriculture associated with livestock husbandry (Of which reside in or adjacent to forested areas)	2,787 (464)	26 %
II. Rainfed agriculture associated with livestock husbandry (Of which reside in or adjacent to forested areas)	5,409 (2,512)	51 %
III, Livestock husbandry only (Of which utilize forested areas)	1,922 (423)	18 %
IV. Forestry only	343	3 %
V. Other	173	2 %
TOTAL: Population Directly Dependent Upon Agriculture	10,634	100 %
(Total population partly or wholly dependent upon forested areas)	(3,742)	(29 %)
Total rural population	13,085	
Total urban population	6,915	
Total population	20,000	

Notes

Categories I and II (combined) and III, IV and V based upon estimates of economically active persons by occupational category in rural areas from the 1971 census increased to assumed 1980 levels (Direction de la Statistique, Resultats de Recensement General de l'Habitat de 1971, August, 1976).

Population dependent upon irrigated agriculture in category I based upon a Statistical Service estimate (Recensement Agricole 1973-74, November 1976), and a "panel" procedure. The panel method used a list of Cercles (administrative units) with their rural population in 1971, an administrative map showing the Cercle boundaries, a population distribution map derived from the 1971 census, and maps of irrigated areas and forested areas. The panel, comprised of both Moroccans and Americans who had travelled extensively in the country and were familiar with local conditions, then used these maps to estimate the percentage of rural population dependent upon irrigation. The resulting independent estimate of 26% by coincidence duplicates that given by Mr. El Faiz and A. Seddiki in "les 9 Perimetres Irrigues"; Maroc Agricole, Decembre/Janvier, 1981.

Population residing in or adjacent to forested areas in categories I and II based upon same panel evaluation of maps and GOM Forest Service estimates. Livestock producers who utilize forested areas based upon Livestock Service estimate (Direction de l'Elevage, Enquete 1975).

Category IV includes individuals residing in urban areas but dependent upon: processing of wood, cork and vegetative matter; paper and carton manufacture; retail wood and pulp; and cabinet-makers and carpenters.

Category V is comprised essentially of persons dependent upon fishing and service industries but excluding agricultural processing.

The difference between population directly dependent upon agriculture and total rural population is due to numerous agricultural households dwelling in rural areas who are dependent upon agricultural processing, trade or other services.

Table 7

Summary Results of 1973-74 Agricultural Census
for the 0-10 ha Farm Category^{1/}

	<u># Farms</u> <u>(000)</u>	<u>% of Farms</u> <u>(%)</u>
Farms less than 10 ha	1,309	
Which have no irrigated land	850	(65%)
Which have some irrigated land	464	(35%)
Which are absentee-owned	167	(13%)
Which own livestock	1,037	(79%)
Which utilize only animal power	914	(70%)
Which utilize mechanical power	233	(18%)
	<u>0-10 ha Category</u>	<u>All Categories</u>
Average area dryland farm (ha)	3.4	7.7
Average area irrigated farm (ha)	0.6	1.4
Average area absentee-owned (ha)	1.9	3.1
Average no. parcels per farm	5.7	6.0
Average no. cattle (head)	1.8	2.0
sheep (head)	4.8	6.2
goats (head)	2.7	2.6 ^{2/}
work animals (head)	1.1	1.5 ^{2/}

Notes:

^{1/} The 0 to less than 10 ha category represents 68 per cent of all farm households surveyed. There were estimated to be 1,928,020 farm households of which 450,290 were landless. See Appendix Table 6.

^{2/} Excludes landless laborers and farms over 50 ha.

Source: Direction de la Statistique, Recensement Agricole 1973-74, November 1976.

Production practices of the small farmer for the four major cereals are essentially the same, except for the use of fertilizer. Many small farmers will use the small amount of purchased fertilizer on wheat, the higher value crop. Both fertilizer and seed are hand-broadcast and then covered with an animal-drawn plow. However, many small farmers who have a large enough area of contiguous land will pay an entrepreneur with a tractor and tandem disk to prepare their land for wheat.

Expenses for production are small. Tools include a wooden plow with steel point, hand sickles (for cereal harvest), wood forks, simple harnesses and related items. In most years, the typical farmer will use his own grain for seed.

Cereals are harvested by June. Because of peak labor requirements during that period, most farmers are obliged to hire harvest labor. However, many small farmers with enough contiguous land will pay an entrepreneur or a cooperative to combine wheat. The proportion of small farmers using some form of mechanical power is likely higher than eighteen per cent (Table 7), as custom-plowing and especially custom-combining has increased considerably since 1973-74.

Most farmers raise livestock. Many have a milk cow for family consumption needs, several sheep and goats and at least one work animal, usually a donkey. Sheep and goats provide important cash income (particularly for women in the case of wool) from the sale of meat, wool, and milk, and are a means of storing capital. The donkey is used for plowing, hauling and is the main form of transportation in rural areas. A farmer generally pairs his animal with that of a neighbor to perform heavy plowing for wheat. Tandem plowing with a camel is common in the south.

2. Typical Farm Budget

Averages can be misleading. Great differences exist among the 850,000 small dryland farm units in the country, and a description of the "typical" farmer may neither describe a typical farmer nor any specific farmer. Nonetheless, the composite small farm presented in Table 8 is valuable in giving a clearer perspective of the dryland farmer target group.

Economic data for the farm in Table 8 are drawn from: the first returns of the socio-economic research component of the dryland research project (608-0136); the 1973-74 Agricultural Census (Table 7 and Appendix Table 6); IBRD Analysis of certain model farms in the Fourth Agricultural Credit Project; the 1975 livestock census; and other sources. Assumptions made are presented in notes to the table.

The farm is located in Settat Province, which is one of the largest producers of cereals and the site of the main research station of the dryland agriculture research project (608-0136).

What is immediately evident from Table 8 is the low farm income (including subsistence) of 3,833 Dirhams. This estimate in 1980 Dirhams for a typical family of six falls under the 7-8,000 Dirhams per family "poverty line" level below which more than half of the rural population exists. ^{1/}

3. Production Constraints

Some of the major constraints to increased production and therefore increased income of the typical dryland farmer are: soils; climate; current agronomic practices; land tenure; inadequate feed resources; lack of credit; lack of access to commercial inputs; and lack of research and demonstration adapted to the typical farmer.

Soils -- Soils in many areas (typified by Settat Province) are shallow, often rocky, low in fertility and low in capacity to store moisture.

Climate -- Annual rainfall in Settat Province is about 400 mm, but one year in two receives less than 300 mm, which is generally considered the cut-off point above which growing wheat is profitable without too much risk. Furthermore, while wheat can be grown under 300-320 mm and barley at 200-300 mm, neither will respond to nitrogen fertilizer at these low levels of rainfall. Nonetheless, climatic conditions are conducive for production far higher than is being obtained.

Current Agronomic Practices -- There is evidence that certain practices such as deep plowing, hand broadcasting of seed, inadequate rotation and other practices serve to depress yields and increase risks of cereal production. "Deep" tillage (disking) as currently practiced may contribute to loss of soil moisture and erosion. The common method of planting seeds by hand-broadcasting may fail to meet requirements of the seed for germination and encourages weed growth. The current system of "fallow" is not practiced to conserve water and control weeds for the next cereal crop, but rather provides an annual crop of weeds and volunteer that is grazed closely and continuously. A larger amount of quality forage for livestock feed could be produced if this land were planted to an annual forage crop.

^{1/} T. H. Eighmy, Statistical Description of Morocco's Poor, USAID/Morocco, 1979.

Table 8
INDICATIVE FARM BUDGET - SETTAT PROVINCE, 1980

(Family of six cultivating 7.0 ha owning 1 cow, 10 sheep, and 1 mule)

Value of Production	Area (ha)		Yields (qx/ha)		Total Production (qx)			Average Producer Prices, Settatt Province, 1980 DH/Ox	Total Value of Production DH
	Own	Share	Own	Share	Own	Share 1/2	Total		
Hard Wheat	0.54	.79	10.0	7.4	5.4	2.9	8.3	122	1,012.6
Soft Wheat	0.41	.26	9.5	6.9	3.9	0.9	4.8	109	523.2
Barley	1.02	1.38	12.6	10.8	12.9	7.5	20.4	89	1,815.6
Maize	0.46	1.57	5.3	4.5	2.4	3.5	6.0	78	468.0
Fewe	0.12	0.10	8.0	7.0	1.0	0.4	1.4	114	159.6
Fallow	-	0.33							
	2.57	4.43							
								Sub-Total	3,979.0
Milk Sales: (during March/April/May) 100 litres x 1.2 DH									120.0
Lamb Sales: 7.2 lambs at 125 DH/head									900.0
Wool Sales: 8.6 sheep sheared at 1.25 Kg/head x 8 DH/Kg									86.0
								Sub-Total	1,106.0
								Total Value of Production	5,085.0
PRODUCTION COSTS:									
Custom disking on all wheat @ 50 DH/ha									100.0
Work ration for mule: 60 days x 1 Kg barley									53.4
August/November ration for cow: 120 days x 1 Kg barley									106.8
Seeding Rates:									
Own crops: hard wheat 100 Kg/ha; soft wheat 80 kg/ha; barley 100 Kg/ha; maize 30 Kg/ha; feve 30 Kg/ha									207.3
Share crops: hard wheat 80 Kg/ha; soft wheat 70 Kg/ha; barley 80 Kg/ha; maize 20 Kg/ha; feve 25 Kg/ha									222.5
Fertilizer (N-P) for own wheat: 130 Kg/ha x 0.50 DH/Kg									61.8
Harvest labor for all wheat: 5 men x 20 DH/days x 5 days									500.0
								Total Production Costs	1,251.8
								Net Income (including subsistence)	3,833.2

(Table 8)

Notes to Table 8

Unless otherwise indicated, assumptions concerning crop mix, area, yields and cultivation practices in the budget were based upon a survey of 24 farmers in: L. Zagdouni, La Mecanisation Agricole en Zone Bour: Cas de la Haute Chaouia, Memoire de 3eme Cycle Agronome, Institut Agronomique et Veterinaire Hassan II, Vols. 1-11, 1979-80. Family is comprised of six persons (slightly above 1971 census estimate for rural areas) and owns one cow, ten sheep and one mule. Many small farmers own considerably more sheep and goats, but it is assumed here that the farmer has access to neither communal land nor state-owned forested land to graze his animals. Crop Mix.—Crop mix is more or less representative of dryland zone. Hard wheat is the family subsistence cereal par excellence, while some bread wheat is grown for market. Farmers in the dryland zone put considerable hectareage into barley and corn for the following reasons: they are lower risk crops when rainfall is erratic; they serve as food for both humans and livestock (corn stover is used as fuel); and their cultivation demands lower levels of animal power. Yields.—Higher yields (typical of a "good average" year) on farmer's own crops are due to higher levels of inputs (fertilizer, seeds). Yields on shared land are five-year averages for the dryland area. Share-cropping.—As the poorest of the small dryland farmers lack cash to rent, they must share crop to meet family subsistence needs. Landlord usually takes a flat one half of production as payment regardless of level of inputs. Average Producer Prices.—These are based upon straightline regression of 1974-79 national average producer prices but adjusted to the lower levels characteristic of Settat Province (Division des Affaires Economiques, Prix Payes aux Producteurs, April 1981). Milk Sales.—One hundred litres sold in local souk as milk production (300 l) from a cow (local breed) exceeds subsistence needs. (Estimated at 30 Litres/person in Division des Statistiques, Consommation et Depenses des Menages, April 1972) during peak period. Lamb Sales.—Flock has nine ewes, 1 ram. One ewe drops 0.8 lamb/year (Direction de l'Eleavage, Enquete 1975). Wool Sales.—86 per cent of sheep sheared at 1.25 kg/head (Direction de l'Eleavage, Enquete 1975; and USAID estimates). Cultivation Practices.—Farmer owns wooden plow, harrow, harness and one mule. Soil is prepared for barley with first rains using own and a borrowed mule or camel (a very common practice) for a week period. However, soil for wheat is prepared with a tractor-drawn tandem disk (cover crop) by local entrepreneur. Seed is then hand-broadcast and mixed into the soil surface using the mule. Many small farmers in dryland areas such as this one do not have available feed resources and animal power to prepare the soil well enough for the first rains and therefore have their wheat custom-plowed. Furthermore, many farmers believe that "deep" tillage is necessary for protection of the wheat crop from weeds. As they are essentially spring crops, corn and feve (broad beans) do not require timely soil preparation and can therefore be worked by the mule. The farmer buys commercial fertilizer for his own wheat and manures his own barley. He uses his own seed. Because peak labor requirements for rapid harvesting of wheat exceed family labor availability, the farmer is required to hire seasonal labor. One laborer harvests 0.1 ha/day. Lower seeding rates for shared land were drawn from: P. Pascon, "La Main-d'Oeuvre et l'Emploi dans le Secteur Traditionnel", Etudes Sociologiques sur le Maroc, 1971.

Land Tenure -- By traditional Islamic law, land is divided equally among sons with daughters receiving half of the sons' share. As a consequence, a typical farm has five or six non-contiguous parcels (Table 7). Also important is the extent of share-cropping (prendre en association) of parcels by the poorest dryland farmers. The estimate that 13 per cent of small farms are absentee-owned (Table 7) only represents the survey year and is likely very low. The majority of share-cropping arrangements are made annually and usually with a different proprietor each year. In the typical arrangement the proprietor takes half of production. For the very poorest of the dryland farmers, sharing provides additional food security by helping to meet family consumption needs and does not require cash rent. However, the proprietor does not share proportionally the cost of inputs. Thus, the farmer in Table 8 uses lower levels of inputs (seeds, fertilizer) on shared land.

Inadequate Feed Resources -- The pressure for livestock feed is great. There are many small farmers in the dryland zone who own considerably more sheep than the farmer depicted in Table 8. (The IBRD model budget for a farm of the same size assumes ownership of eighty sheep). However, like many dryland farmers, the farmer depicted in Table 8 has neither access to communal grazing land nor to the state-owned forests. Feed resources are limited to fallow, crop stubble and village-grazing (roadsides, etc.). Income from livestock husbandry is therefore very low. Forage cultivation in rotation with other crops and increased cereal production (increased amount of by-products used as feed) could increase the farmer's cash income from improved livestock production.

Lack of Credit -- Many small farmers do not have access to institutional credit and are heavily in debt to private creditors at the end of the growing season. As a result they are required to market their cereals immediately at harvest instead of waiting to take advantage of the rise in prices which begins one to two months after harvest. While the charging of interest is against Islamic law, it has been estimated that the effective compounded interest rate on a small production loan (e.g. to buy ordinary seed and a few bags of fertilizer) from private creditors may range from 20 to 30 per cent. It is only this year that the GOM is making a sincere effort to re-orient agricultural credit programs towards the small farmers, with IBRD assistance. It is too early to judge the effect of this effort.

Lack of Access to Commercial Inputs -- The typical dryland farmer uses very little, if any, commercial inputs on his farm.

Thus, there is little development of supply services in the communities. More progressive small farmers who are members of cooperatives or cooperate with the extension service have a better opportunity of obtaining such supplies. But even in these situations there are many reports of the failure of the suppliers to deliver on time or not at all.

By observation one can conclude that the weekly souks are more adequate in meeting the small farmer's needs for marketing than for providing needed farm inputs. Since his major demands are steel points and wood poles for wooden plows, draft animals, twine and rope for harnesses, sickles, wooden forks and maybe a little fuel for a lantern, little commercial supplying develops due to the demand. Services for maintaining bicycles and molyettes are growing more rapidly in dryland communities than commercial farm services.

Nor do small farmers benefit from farm input subsidies administered by the government to offset low cereal prices. Subsidies given for the purchase of fertilizer, high yielding seed varieties, tractors and combines benefit primarily the larger farms (over 20 hectares) in the better rainfall and irrigated areas 1/.

Lack of Applied Research and Demonstration Adapted to Small Farmers -- In spite of the fact that some useful varieties have been tested on various stations, the central seed multiplication center does not reproduce seeds of barley, maize and forage varieties which are adapted to small farmers. This is largely because it is the larger farmers who determine the demand for seed, and they grow primarily bread wheat and malting barley as cash cereal crops and alfalfa and other forage varieties which do best in higher rainfall and irrigated areas. Of particular interest are promising two-row (but not malting) varieties of barley which have been shown to yield 15-60 per cent more than currently used six-row varieties in the arid (less than 300 mm) rainfall zones. These varieties should be reproduced in enough quantities for demonstration purposes and given to small farmers to try on their own.

Inadequate Extension Service -- Morocco's extension service is oriented primarily towards the largest farmers in irrigated and higher rainfall areas. This is logical, as the emphasis of GOM planned investment in agriculture has always been placed upon the highly productive irrigated sub-sector. It is generally considered that the extension service is oriented from the top down (the more wealthy "leaders" in the communities get first consideration), does not have adequate information to diffuse

1/M. Milourhmane, "L'Investissement Prive dans l'Agriculture a travers le Cas du Gharb", 3eme cycle these, Institut Hassan II, 1979.

in the dryland areas, and is not generally effective in bringing about changes in dryland farming practices.

B. Livestock Husbandry

1. Description

Morocco has more sheep and goats than any other country in the Arab World except Sudan. The some five million rural inhabitants in the dryland cereal farming areas are dependent upon about a third of the country's fourteen million sheep and six million goats to supplement their income. An additional two million rural inhabitants are dependent exclusively upon livestock husbandry (Table 6). The latter group is comprised of a minority of cooperative and private dairy enterprises and large poultry farms in the higher rainfall provinces to the north and around irrigated areas; and a majority of medium-sized (30-100 head) and large (over 100 head) herds of sheep and goats.

Livestock-owning groups in the dryland region can best be understood by examining the distribution of ownership of sheep, the preferred meat animal (Table 9). By far the largest livestock-owning group is comprised of sedentary cereal farmers whose herds are very small. Another group of cereal cultivators may be considered to be semi-migratory farmer herders, though during a good rainfall year they may not move their flocks at all. The smallest group of owners are the migratory herders whose flocks generally average over 100 head ^{1/}.

All three groups give their animals some supplementary feed (barley, corn, bran, hay) at certain periods of the year, but the largest source of feed is the country's 12 million hectares of rangeland and five million hectares of state-owned forest lands (Table 10). Almost half of the rangeland is collectively owned where grazing rights have been traditionally defined by tribal membership.

2. Production Constraints

Meat and wool production is very low due primarily to malnutrition. Other important causes of low production are poor management and disease. Overstocking is a major problem. It is estimated that the collective grazing lands are overstocked by more than twice their carrying capacity, while removal of about a million hectares into barley production

^{1/} For a more detailed description of livestock-owning groups, see Range Management Improvement Project Paper 608-0145.

Table 9

Sheep-Owning Groups, 1975

	Herd Size (head)	No. Herders or Farmers		No. Sheep	
		(000)	%	(000)	%
Sedentary Farmers	1 - 30	450	(78%)	5,138	(37%)
Semi-Migratory Herder-Farmers	30 - 100	110	(19%)	5,460	(39%)
Migratory Herders	100 +	20	(3%)	3,360	(24%)
		580	(100%)	14,000	(100%)

Source: Direction de l'Elevage, Enquete 1975

Table 10

Estimated Available Grazing Resources, 1980

	1000 hectares	
Rangeland (Of which collective lands)	12,000 (5,100)	(49%)
Crop Stubble	5,500	(23%)
Forested Lands	4,400	(18%)
Fallow	2,218	(5%)
Cuttings from Olive and Fig Trees	200	(1%)
Cultivated Forage	70	-
	24,338	(100%)

Source: USAID estimates, G. Jaritz and F. Kuba, Production Fourragere au Maroc, DTZ, August 1978; and Appendix Table 3.

has aggravated the problem. Overstocking is also aggravated by the breakdown of tribal grazing rights and grazing exchange agreements between tribes residing on the plains or plateaus with low elevation and those residing in the Atlas Mountains.

C. Forestry Activities 1/

1. Description

Forestry has great economic importance in the livelihood of rural inhabitants of the dryland sector. Unlike crop and livestock production activities, forestry is a natural resource which indirectly affects agriculture by providing watersheds, erosion and siltation control, and storage of ground water. Forestry more directly affects human populations because it provides wood for fuel and construction, and other industrial products, as well as grazing for small ruminant livestock.

In rural Morocco, those who are primarily dependent upon forestry for their livelihoods comprise only three per cent of the rural population. Most heads of families in this group are employed in charcoaling and lumbering operations, harvesting of cork, esparto and eucalyptus (coppice), and the pulp mill in Sidi Yahia. In addition, there are some 7,000 day laborers in rural areas employed under the current GOM reforestation program.

Those who benefit from the forests in a secondary manner comprise more than three million inhabitants or 25 per cent of the rural population (Table 11). The majority of these individuals reside in or adjacent to forested areas and benefit by: firewood collection; harvest of other volunteer vegetation; and livestock grazing. Although forested lands are owned and managed by the state, local inhabitants are permitted to utilize the lands during certain times of the year for grazing sheep and goats. It is estimated that the forest zone supports some six million sheep and goats (about a third of the national herd) during the dry summer months.

Local inhabitants also benefit indirectly from wood harvest, as municipalities (communes) in or adjacent to forested areas have the right to receive 80 per cent of all revenues from the sale of cutting contracts or forest products by the Forest Service. These revenues go into local municipal treasuries and are used to help pay for the construction and maintenance of municipal hospitals, schools, water works and roads.

1/For a more detailed description of forestry in Morocco, see D.L. Adams and K.A. Christopherson, Review of Forestry Needs in Morocco, University of Idaho, January 30, 1980.

Table 11

	<u>1000 Persons</u>	<u>% of Rural Pop.</u>
Total Rural Population	13,085	(100%)
Rural Population Dependent Upon:		
Irrigated agriculture with livestock husbandry residing in or adjacent to forested areas	464	(4%)
Rainfed agriculture with livestock husbandry residing in or adjacent to forested areas	2,512	(19%)
Livestock husbandry utilizing forested areas	423	(3%)
Forestry only	343	(3%)
	<hr/>	<hr/>
<u>Total</u>	3,742	(29%)

Source: Table 6.

Table 12

Forestry Revenues to Villages
(Communes), 1977

<u>No. of Communes</u>	<u>Total Revenues (DH) ^{1/}</u>
12	1 - 6 million
10	500,000 - 1 million
59	100,000 - 500,000
27	50,000 - 100,000
408	Less than 50,000
<hr/>	
516	

Source: GOM Forest Service

^{1/} \$1.00 = DH 5.00

2. Production Constraints

All forested land (about five million hectares) in the country belongs to the government and is managed by the Forest Service, while revenues from exploitation are allotted to local communities. Reforestation activities are managed by the Forest Service. Since 1970, the Service has reforested about 20,000 hectares a year. However, about 50,000 hectares are harvested each year, leaving an annual net loss of 30,000 hectares.

The inability of the Forest Service to keep the land in production is due to an inefficient system of seed-handling (collection and processing), nursery production and plantation, as well as a failure to perform badly needed reforestation research on certain species, notably the Argan tree. This tree grows under extremely arid conditions and is a major source of charcoal, forage and cooking oil in rural areas in the south.

Besides the failure to reforest cut-over areas, another constraint to increased productivity is illegal cutting. Possibly 30 per cent of the annual harvest is cut illegally for firewood and other purposes. The Forest Service does have some infrastructure for policing, but one ranger may be responsible for an area as large as 20,000 hectares.

Livestock grazing during seedling growth is another impediment to increased forest productivity. A third of the national flock of sheep and goats depends upon grazing areas adjacent to forests. It is often very difficult for the Forest Service to persuade local communities to defer grazing from planted areas.

III. DRYLAND AGRICULTURE SUB-SECTOR STRATEGY

Before discussing the USAID/Morocco's approach to the dryland sector, it is first necessary to examine briefly the GOM agricultural strategy, as well as the activities of the IBRD and other donors.

A. GOM Agricultural Strategy

During the past two decades, the GOM has given high priority to the development of irrigated cash crops such as vegetables and citrus for export. In the First National Development Plan (1965-68), over 50 per cent of government investment in agriculture was devoted to large scale irrigation works (Appendix Table 9). Development of support services and infrastructure in the nine irrigated perimeters inaugurated under that plan has

remained strong ever since. Under the recent 1978-80 "austerity" plan, the GOM placed 60 per cent of investment in irrigated areas in an increased effort to complete on-going projects having considerable sunk costs. The Ministry of Agriculture has set a goal of 1.2 million irrigated hectares by the year 2000. To date half of this amount has been attained^{1/}.

While investment in large scale irrigation continues to average about 50 per cent of planned expenditure in agriculture, the GOM has gradually given increasing attention to small farmers in dryland and irrigated areas. The current plan (1981-85 Five Year Plan) continues this trend. Stated goals of the plan are to: 1) continue substantial efforts in the irrigated sector; 2) put a greater emphasis upon small and medium scale irrigation; and 3) initiate a greater effort to develop the dryland sector. Other goals are to continue efforts in agrarian reform and land distribution, and to increase extension and outreach activities in rural areas.

Half of planned agricultural investment in the current plan (about 5.3 billion DH) is again earmarked for irrigation, but a full third of this amount will be devoted to small and medium scale works. Emphasis remains heavy upon vegetable crops, citrus and sugar. However, for the first time irrigated wheat production will be encouraged with a goal of 200,000 hectares of irrigated wheat set for the five year period. Thirty thousand hectares will be planted this crop year in the nine irrigated perimeters.

Thirty-two per cent (3.3 billion DH) of investment in agriculture will go to the dryland sector (see Appendix Table 9). This is the largest proportion of GOM planned expenditures ever devoted to dryland development. These dryland developments are comprised of: increases in ORMVA (regional irrigation office) budgets to provide extension and other services in the dryland areas adjacent to and within irrigated zones^{2/}; an increase in credits to the Division of Crop Production for implementation of three integrated rural development projects in dryland areas (Fes, Karia-Tissa, El Hajeb and Oulmes-Rommani); and an increase in the Livestock Division's budget for range management activities, which include implementation of the IBRD Middle Atlas and the USAID Range Management Projects.

^{1/} If the rate achieved over the last three year plan can be maintained (about 25,000 ha/year), the GOM will fall only about 125,000 short by the target year.

^{2/} The primary reason why estimates of land currently under irrigation range from 600 to 800,000 ha is because a considerable amount of dryland is located within the irrigated perimeters.

The expanding GOM investment in the dryland sector is in part attributable to IBRD integrated rural development projects (see below), as well as AID activities in range management and dryland research. The availability of expertise and research capabilities in these fields has provided a basis for these new GOM initiatives.

B. IBRD and Other Donor Activities

Bank and IDA lending to Morocco has supported about 50 active or completed projects totalling \$1.7 billion, with disbursements at the end of 1980 standing at 71% of life of project forecasts. Several major projects will be completed in 1981 and others are in various stage of preparation. Overall, the Bank regards Morocco's project execution performance to be satisfactory and improving.

About 30 per cent of IBRD sectoral allocations has been in agriculture, principally large scale irrigation and credit to large farmers. The IBRD's agricultural strategy for Morocco maintains a strong interest in completing large scale irrigation projects for reasons stated in section I.C. However, the Bank has recently shifted its emphasis to include integrated rural development projects with range management, forestry and rainfed agriculture components (see Appendix 10). This has been concurrent with the increase in emphasis in the IBRD Fourth Agricultural Credit Project upon provision of medium and long-term loans to small farmers in dryland areas.

The new emphasis of IBRD loan activity upon integrated dryland projects is one which USAID, with its more limited resources, also supports. USAID has been in contact with the Bank's staff on the development of these projects. The Bank is very interested in the proposed AID forestry project which would assist the GOM Forest Service to provide more meaningful inputs to the forestry components of the integrated IBRD-funded projects.

Other donor activities in the agricultural sector have been relatively dispersed, with the exception of irrigation. In 1980, the UN group provided some \$1.3 million worth of experts, short-term consultancies, and limited equipment and scholarships in areas ranging from date production to sylvo-pastoralism. The latter activity will end in 1981, and will contribute to the yet inadequate knowledge of pastoralism. The Federal Republic of Germany is providing technical assistance in the areas of crop protection, seed multiplication and irrigation. Both France and Belgium provide a large number

of scholarships in European agricultural curricula, as well as a considerable amount of technical assistance in the nine irrigated perimeters. France also provides substantial balance of payments assistance for purchase of potato seed, nitrogen and agricultural produce. Bulgaria has also been providing technicians in irrigation.

C. USAID Dryland Agriculture Sub-Sector Strategy

The USAID/Morocco dryland sub-sector strategy is to increase the productivity of the three major dryland groups: cereal farmers, livestock grazers and forest users.

To put the strategy proposed by USAID/Morocco in proper perspective, it should be recalled that the North African region now encompassing Morocco, Algeria and Tunisia once served as the bread-basket of the Roman Empire. Areas in the southern regions of these nations, which only a few centuries ago produced ample barley and wheat, are now characterized by little topsoil and sparse vegetation. It is a grim reminder that the desert is moving north into the southern periphery of the Mediterranean Basin, as well as south into the Sahelian countries. When the first U.S. Consulate was established in Morocco at the end of the 18th century, this country was described as having vast forests extending over its Rif and Middle Atlas Mountain Ranges. The barren eroded hills in both of these ranges today, portions of which are beginning to resemble the badlands of the Dakotas, are stark testimony to what transpires at an accelerated rate once the ecological balance is disrupted.

The AID activities proposed for the dryland sub-sector are designed to restore this balance. The three major activities proposed in Dryland Agriculture, Range Management and Forestry Development represent the three essential components of an integrated trilateral strategy. The steady deterioration of the Mediterranean Basin, particularly since World War II, can be traced largely to the inability of planners to recognize what has now become an almost obvious fact of life in the rural sector of these nations. This is that one cannot proceed unilaterally in any one of these activities, or any two for that matter, without having project targets undermined or obliterated by failure to address the third as well in a coordinated approach.

The tombstones of unsuccessful agricultural projects in the Mediterranean Basin all have singular inscriptions: Soil Stabilization in Turkey; Reforestation in Libya; Range Improvement in Algeria. A simultaneous multidisciplinary effort is required if Morocco is to successfully address the problems in any one of them.

The GOM is very aware of the interdependencies within the farming, grazing and forestry triangle, and the proficiencies the U.S. can bring to bear in each. The recent almost precipitous deterioration in Morocco's balance of payments situation has made GOM planners aware of the necessity of striving for self-sufficiency in food grain requirements. They realize that the best chances of a quantum jump toward this goal within the next decade lie in new emphasis being put on dryland farming, with concurrent efforts in range and forestry management.

In dryland farming, the U.S. is expected to direct an applied research program in an area where no other donors have been asked or are able to make an effective input. Applied research into yield-increasing agronomic practices and adapted varieties of cereals and forages will be made available for extension to small farmers.

In range management, the formation of grazing associations and improvement of vegetative conditions on communal grazing lands will increase livestock feed resources for both farmers and herders and thereby relieve grazing pressure on forested lands.

An increase in reforestation activities will permit sustained harvest of fuelwood and other products utilized by all three groups of farmers, herders and forest users. In addition, reforestation will help preserve the country's most important watersheds. Study of artificial regeneration and genetic improvement of the Argan tree will permit wider planting of this unique tree which is so important to the livelihood of rural poor in arid areas, and which serves as a defense against desertification.

Not all the constraints to increased productivity facing cereal farmers, livestock grazers and forest users can be addressed simultaneously with USAID/Morocco's limited resources. Nonetheless, with one exception the portfolio of projects and related activities of the USAID go a long way to overcome some of the major constraints facing each group. All the projects

described below have some direct means of delivery to the target group except Dryland Agriculture Applied Research (608-0136). This latter undertaking would be more effective in increasing the productivity of dryland groups if it included an extension project to complement the research project. Such an activity would get improved practices and varieties off the research stations and into the fields of small farmers.

1. Mission-Funded Dryland Projects

USAID/Morocco has three mission-funded projects (one at the PID stage) directly relating to dryland agriculture: Dryland Agriculture Applied Research; Range Management Improvement; and Integrated Forestry Development.

Dryland Agriculture Applied Research (608-0136) -- Because the US holds a distinct comparative advantage in technical dryland agriculture, USAID assistance can help to increase cereal yields on small farms by developing a research program with the GOM which would improve current practices of tillage, seeding and weed control. The program would help remove the production constraints of certain cultivation practices and lack of applied research and demonstration discussed in Section II. Research into adapted varieties of forage which can be grown in rotation with other crops can also help to remove constraints of inadequate livestock feed resources and low soil fertility.

Such an applied research program, which would help remove technical constraints to increased wheat, barley and forage production, has been initiated under the Dryland Agriculture Applied Research Project. In January 1981, three US scientists began to assist the GOM to develop this program at the Sidi El Aidi station in central Settat Province, a region typical of the 200-400 mm rainfall zone. The information produced under the project will be made available for extension to small farmers in the dryland zone.

Accompanying the agronomic research under the same project is a socio-economic research component currently being performed in Settat Province by the Rural Sociology Department of Hassan II Institute. This activity will be completed by early 1983 and covers the following areas: household consumption; cultivation practices; labor requirements; land tenure; local political system; production costs and returns; marketing; credit; mechanization; and social history. A completed study from this project component was used to construct a typical dryland farm budget in Section II.

Range Management Improvement (608-0145) -- As explained in Section II, there are two main groups of livestock grazers: a majority of cereal farmers who own small flocks of sheep and goats; and a minority of herders, many also cultivating cereals, who manage larger, more mobile herds. It is often the case that the latter group manages the animals owned by the former group. Besides crop residues and some grains, these groups utilize some five million hectares of communal grazing land (about 40 per cent of the country's 12 million hectares of rangeland) to feed their livestock. In addition, cereal farmers residing near forested areas and many herders utilize some 5 million hectares of (state-owned) forest lands for grazing.

Malnutrition and overstocking are primary constraints to increased productivity. To overcome these problems, USAID under the Range Management Improvement Project, is assisting the GOM Livestock Service and local communes to set up grazing associations and improve vegetative conditions on the communal range lands. Improvement of range conditions is to be brought about by some reseeding and by the introduction of management practices in a program of range extension with the associations.

This project is highly complimentary to IBRD efforts in range management. In particular US technical assistance made available by this project will greatly help the GOM Livestock Service in setting up range management perimeters under the IBRD Middle Atlas project.

Integrated Forestry Development (0165) -- The forestry component of the USAID dryland strategy is currently at the PID stage. Under this project, USAID will provide technical assistance, commodities and participant training to upgrade the technical and administrative capability of the GOM Forestry Service to streamline the sequence of steps from seed collection to planting and to perform applied research on the Argan tree in the arid south.

This project will address the first of two major constraints to increased forestry production discussed in Section II, i.e., failure to reforest cut-over lands. Given the current funding constraints of A.I.D., a production-oriented project such as the one currently conceived in the PID will have a greater impact over the shortest period than a project which would attempt to address simultaneously illegal cutting, the other major constraint to forestry production. However, USAID has proposed a follow-on Phase II project which would more directly address this latter problem.

A.I.D. has a unique opportunity to help the GOM better coordinate range and forest utilization by livestock grazers (sylvopastoralists). Many of the areas to receive extension assistance under the range management project, such as the Timhadite, Midelt, and Missouri regions, are within migrating distance of forested areas in the Middle Atlas. The latter areas provide a very important source of summer grazing. At the same time, livestock grazing is a major impediment to reforestation. The range management project should help to relieve grazing pressure on these areas thereby making it easier for the Forestry Service to defer grazing for reforestation activities.

2. Other USAID Activities Relating to Dryland Agriculture

The GOM has recently signed a PL 480, Title I agreement in which it has pledged direct support to dryland cereal and forestry programs utilizing the total \$25 million in local currency generations for self-help measures in these fields.

Half of this amount will be used to encourage the GOM Division of Crop Production to increase the production and distribution of varieties of barley seed adapted to arid areas of the country. This Self-Help measure is highly appropriate considering that barley is the bread wheat of the very poor and its area under cultivation appears to be increasing rapidly (see Section II).

The GOM has pledged to utilize the remaining half of Title I funds for reforestation. The Forest Service's budget was severely cut during the recent austerity plan, permitting only 5,000 ha/year to be planted, instead of 20,000 usually realized in a normal year. Title I credits to the reforestation budget will permit the Forestry Service to undertake an additional 15,000 hectares over the next year, as well as strengthen its soil conservation program. This Self-Help measure fulfills an essential component of the AID/GOM dryland strategy in that generated funds can be used to pay local currency costs for planting labor. The USAID forestry project will provide the foreign exchange components of technical assistance and equipment.

It should also be noted that USAID is involved in a centrally-funded project related to range management. Under the Small Ruminant Collaborative Research Support Grant (SR-CRSP), research will be performed on selected aspects of sheep and goat husbandry (management, breeding, nutrition). One US researcher is currently collaborating with a Moroccan rural sociologist and animal scientist from Hassan II Institute on a study of pastoralism at the Timhadite Perimeter located

adjacent to forested areas in the Middle Atlas. This research will increase knowledge of herders' management decisions, particularly migratory movements between communal and forested rangelands.

3. Other Activities

The fourth mission-funded agricultural project has been in operation since 1970. Under this institution-building undertaking, the University of Minnesota is assisting Morocco's only agricultural university, Hassan II Agronomic and Veterinary Institute, to train students and develop the faculty members required to staff the departments of horticulture, crop production, and veterinary science. Graduates of the institute have returned to Morocco with M.S. degrees in agronomy, range management, and forestry. They have begun to form a cadre of trained technicians within the Ministry of Agriculture. For example, five individuals in the GOM Range Service responsible for implementation of the Range Management Project have U.S. graduate degrees received under this project. In addition, individuals with Ph.Ds are now returning to Morocco to head departments within the institute and replace their U.S. counterparts. By 1984 the majority of Ph.D participants will have returned and the remaining U.S. staff will have departed.

USAID/Morocco also has a mission-funded project with a research component affecting forestry activities. Under the Energy Development Project (608-0159), research will be performed on more efficient ways to produce wood charcoal at the village level. These new techniques to convert wood to charcoal more rapidly and efficiently may accelerate wood cutting and contribute to deforestation. It underlines the necessity of proceeding with the Forestry Project on schedule in FY 1982.

Other centrally-funded activities in agriculture include assistance to the GOM Agricultural Statistics Service to set up an area sampling frame for the entire country.

D. Proposed New Project: Dryland Cereals Extension

With a relatively modest increase in resources, USAID/Morocco would be able to tackle one of the major infrastructural constraints to increased small farmer productivity mentioned in Section II: inadequate extension.

What is needed now is a Cereals Production Project which would complement the current research efforts at the Sidi El Aidi and other research stations under the Dryland Agriculture Applied Research Project. Such an activity would fill the gap

remaining in an otherwise well-rounded program aimed at the poorest agricultural sub-sector. Also, this effort would complement the IBRD Fourth Agricultural Credit Project under which credit is being made available to an increasing number of small farmers in dryland areas.

A Dryland Cereals Extension Project would take the applied research off the stations and put it into farmers' fields. Emphasis would be on promoting improved seeds and cultural practices for barley, the subsistence grain of the very poor. Meanwhile, as research is being developed at the Sidi El Aidi station, and as the final results of the socio-economic research program are being completed USAID/Morocco is gathering and analyzing the technical and social data to be used as the basis for this undertaking.

PRODUCTION AND IMPORT OF WHEAT - BARLEY - AND CORN (000 MT)

Year	W H E A T			Import	B A R L E Y		C O R N		O T H E R C E R E A L S		T O T A L			Production plus import Less Export	Import as % of Disappearance
	Durum	Bread	Total		Product.	Import	Product.	Import	Product.	Import	Product.	Import	Export		
1960	1030	442	1472	175	1599	-	541	-	134	*	3746	175	308	3613	4,8
1961	608	220	828	369	656	197	150	-	65		1699	566	126	2139	26,5
1962	1353	472	1825	359	1633	84	483	-	140		4081	443	41	4483	9,9
1963	1158	398	1556	118	2016	1	552	-	160		4284	119	295	4108	2,9
1964	1156	400	1556	150	1610	2	460	-	135		3761	152	271	3642	4,2
1965	1396	421	1817	241	1645	-	380	10	117		3959	251	100	4110	6,1
1966	924	226	1150	579	702	27	219	13	103		2174	619	65	2728	22,7
1967	1172	335	1507	855	1518	5	357	13	117		3499	873	33	4339	20,1
1968	1900	650	2550	592	3210	-	380	3	202		6342	595	40	6897	8,6
1969	1100	369	1469	102	2040	3	430	2	120		4059	107	32	4134	2,6
1970	1417	484	1901	358	1953	4	320	-	148		4322	362	168	4516	8,0
1971	1641	547	2188	682	2572	5	390	10	194		5344	697	33	6008	11,6
1972	1631	530	2161	382	2466	2	368	10	167		5162	394	44	5512	7,1
1973	1182	392	1574	905	1255	60	218	32	173		3220	997	34	4183	23,8
1974	1380	473	1853	778	2387	5	390	30	189		4819	813	30	5602	14,5
1975	1204	371	1575	1352	1585	91	371	34	191		3722	1477	34	5165	28,6
1976	1651	484	2135	1012	2860	-	493	-	161		5649	1012	27	6634	15,3
1977	1036	256	1292	1317	1345	26	184	41	40		2861	1384	11	4234	32,7
1978	1441	436	1877	1555	2326	17	390	76	61		4654	1648	19	6283	26,2
1979	1306	489	1795	1497	1890	10	310	102	79		4074	1609	17	5666	28,4
1980	1331	480	1811	1652	2210	10	333	115	67		4421	1777	22	6176	28,8

APPENDIX
TABLE 1

* Other cereals: Oats, canary grass, sorghum, rice, millet, rye.
The import of the other cereals has always been negligible.

Drafted: AGR:MIanafi/za-5/7/81

Source: Production - Ministry of Agriculture
Import - Office des Changes

Appendix Table 2

Summary Production and Import Trend Data

	r ²	Long Run (1960 - 1980)				r ²	Short Run (1974 - 1980)			
		a	b	\bar{Y}	$b/\bar{Y}^{1/}$		a	b	\bar{Y}	$b/\bar{Y}^{1/}$
1 Hard Wheat Production	13%	1101	16.9	1287	1.3%/Yr	0	-	neg.	1336	-
2 Bread Wheat Production	5%	382	3.7	423	0.9%/Yr	3.5%	397	7.5	426	0.9%
3 Total Wheat Production	11%	1482	20.6	1110	1.21%/Yr	negli.	1755	2.0	1763	0.23%
4 Barley Production	14%	1448	39.3	1880	2.09%/Yr	72.8%	815	123.4	1309	9.43%
5 Maize Production	7%	419	-4.68	368	1.27%/Yr	10.5%	410	-14.14	353	-4.01%
6 Four Major Cereals	10.4%	3360	55.1	3956	1.39%/Yr	0.5%	4315	-28.75	4200	-0.68%
7 Other Cereals	2.6%	145	-1.26	132	-0.96%/Yr	66.8%	211	-24.64	113	-21.89%
8 All Cereals	9.5%	3494	54.0	4088	1.32%/Yr	1.68%	4527	-53.0	4314	-1.23%
9 Bread Wheat Imports	75%	-66	71.1	716	9.93%/Yr	73%	815	123.4	1309	9.43%
10 Total Imports	70.1%	-42	73.4	765	9.59%/Yr	69.7%	815	137.8	1366	10.1%
11 Disappearance ^{2/}	45.6 %	3256	137.59	4770	2.88%/Yr	5.2%	5342	84.75	5680	1.5%

^{1/} Average increase per year.

^{2/} Total production plus total imports less exports.

See notes to this table on next page.

Notes to Appendix Table 2

Model 1: In the long run hard wheat production is increasing at 1.3% per year but with no noticeable trend in the short run. Model 2: Bread wheat production is increasing at slightly less than 1% per year in both the long and short runs. Model 3: Total wheat production is increasing by 1.2% per year over the long run and by less than a quarter of a per cent per year over the short run. These three models together indicate a very minimal increase in wheat production probably within the bounds of sampling error and certainly not as fast as population growth. Model 4: Barley production, if the figures can be believed, is increasing over 2% per year in the long run and over 9% per year in the short run. Model 5: Maize is in a both short run and long run decline which is somewhat surprising considering the increasing popularity of livestock feed of which maize is a major component. Model 6: The four major cereals together show an increase of about 1.4% per year in the long run but a negligible decrease in the short run as is the case for Model 8, all cereals. We have somewhat greater faith in the quality of the import data. Model 9 shows bread wheat imports increasing at over 9% per year in both the long and the short run. And Model 10 shows that total imports are increasing at a slightly faster rate of 9.6% per year in the long run and 10.1% in the short run. While we may have little faith in the accuracy of the production figures, especially the older data, the stagnation or per capita decline of grain production shows up most clearly in its correlary, the steady increase in total grain imports with simple linear trend predictors explaining about 70% of variability. Model 11 is the disappearance, that is total grain production plus net total imports. Being a combination of the more reliable import data and possibly defective production data, its results lie between the production and import data figures. For Model 11, R^2 s are lower; 45% in the long run but only 5% in the short run, and the long run growth is 2.88%.

Appendix Table 3

Evolution of Cultivated Area and Yields of Major Cereals

	Cultivated Area in Major Grains (1000 Hectares)						
	Season						
	73/74	74/75	75/76	76/77	77/78	78/79	79/80
Durum Wheat	1388.5	1238.0	1454.1	1392.4	1297.1	1166.9	1269.0
Bread Wheat	528.5	453.1	467.5	537.0	456.5	489.5	445.3
Barley	1972.6	1819.1	2117.5	2316.2	2388.6	2177.0	2149.8
Maize	447.3	491.7	431.8	424.5	394.4	415.5	411.4
All major cereals	4336.9	4001.9	4470.9	4670.1	4536.6	4248.9	4275.5
Fallow	1641.3	2097.4	1800.0	1836.1	1973.6	2150.4	2218.2

	Yields (Quintals/Hectares)						
	73/74	74/75	75/76	76/77	77/78	78/79	79/80
Durum Wheat	9.9	9.7	11.4	7.4	11.1	11.2	10.5
Bread Wheat	8.9	8.2	11.5	4.7	9.5	10.0	10.8
Barley	12.1	8.7	13.5	5.8	9.7	8.7	10.3
Maize	8.7	7.5	11.4	4.3	9.9	7.5	8.1
Weighted Average Yield	10.7	8.8	12.4	6.0	10.1	9.4	10.2

	Production (1000 Quintals)						
	73/74	74/75	75/76	76/77	77/78	78/79	79/80
Durum Wheat	13800.0	12039.8	16618.3	10358.0	14408.6	13069.3	13309.6
Bread Wheat	4473.0	3708.4	5171.1	2518.6	4355.9	4895.0	4800.4
Barley	23810.0	15853.1	28604.0	13450.0	23261.9	18861.6	22096.7
Maize	3900.0	3707.6	4925.0	1842.7	3901.6	3116.2	3327.4
Total Major Cereals	46300.0	35308.9	55318.4	28169.3	45928.0	39942.1	43534.1

Source: MARA Enquete Agricole, January, 1980.

Notes: 1 quintal = 0.1 MT = 220.46 lb = 100 kg
 1 hectare = 10000 m² (100 m x 100 m) = 2.47 Acres = 0.01 km²,
 thus 1000 ha = 10 km².

By Moroccan terminology, "Ble dur" is called "hard wheat," used for couscous. It is more important (in cultivated area and total production) than "ble tendre" or bread wheat which is imported. The terminology is confusing to Americans whose "bread wheat" exports to Morocco are "hard wheat" in US terms.

Figures do not always agree with Appendix Table 1 due to typographical errors in source and sampling errors.

Appendix Table 4

Gross Domestic Product and Agriculture's Contribution

(Billions of 1969 Constant Dirhams)

Year	Value ^{1/} of GDP	% change per year		Value of ^{2/} Agriculture	Agriculture as % of GDP
		GDP	Ag		
1969	16.082			3.545	22.0
1970	16.895	5.1	5.5	3.740	22.1
1971	17.970	6.4	9.3	4.087	22.7
1972	18.341	2.1	-2.2	3.999	21.8
1973	19.054	3.9	-8.2	3.673	19.3
1974	20.249	6.3	10.0	4.041	20.0
1975	21.282	5.1	-14.6	3.450	16.2
1976	23.802	11.8	11.7	3.854	16.2
1977	25.144	5.6	-13.2	3.347	13.3
1978	25.820	2.7	19.1	3.986	15.4
1979	26.302	1.9	0.8	4.019	15.3
1980 ^{3/}	27.350	4.0	9.0	4.380	16.0

Source: Annuaire Statistique du Maroc, 1979; Cedies Information, 1975.

Notes: ^{1/} Excludes public administration.

^{2/} Includes forestry and fishing. Finer breakdown not published.

^{3/} 1980 figures in constant dirhams not yet officially estimated.

GDP trend: $r^2 = 92\%$; $a = 14.403$; $b = 1.086$; $\bar{Y} = 21,464$; $b/\bar{Y} = 5.06\%$ per year.

Agriculture trend: $r^2 = 10.4\%$; $a = 3,669$; $b = 27$; $\bar{Y} = 3,843$; $b/\bar{Y} = 0.7\%$ per year.

Agriculture as per cent of GDP trend: $r^2 = 19.6\%$; $a = 23.7$; $b = 0.8$; $\bar{Y} = 18.36$; $b/\bar{Y} = 4.4\%$ per year.

APPENDIX TABLE 5

AGRICULTURE DATA BASE BY PROVINCE AND ECONOMIC REGION

THE SOUTH	C/UC/RC			TOTAL POPULA.	RURAL POPULA.	TOTAL AREA	ARABLE AREA	% ARABLE LAND	AG. POP DENSITY	8.	9
	1	2	3	2	3	4	5	6	7		
Agadir	5	3	52	933,300	717,400	17,460	2,982	17.0	241	ORMVA SOUSS- MASSA	
Ouarzazate	4	1	37	587,900	527,600	46,480	829	17.8	636	ORMVA Ouarzazate	
Tiznit	5	2	26	336,400	281,500	6,960	1,161	16.6	242		
Tata	3	-	8	106,100	106,100	25,925	137	0.5	774		
Goulmine	3	-	10	93,200	67,500	28,750	140	0.4	482		
Tan-Tan	1	-	4	26,500	12,300	17,295	neg	0	High		
Laayoune	2	1	6	N/A	N/A	39,360	neg	0	N/A		
Smara	1	1	4	N/A	N/A	61,760	neg	0	N/A		
Boujdour	2	-	4	N/A	N/A	100,120	neg	0	N/A		
Oued Ed Dahab	4	2	11	N/A	N/A	50,880	neg	0	N/A		
TOTAL REGION I	30	10	162	2,683,400	1,742,400	394,990	5,249	1.5	326		

KEY: Column 1 - Number of Administrative Units: "Cercles", "Urban Communes", "Rural Communes"

" 2 - Total Population, 1979 Ministry of Plan Estimate

" 3 - Rural Population, " " " " "

" 4 - Total Area (km²) " " " " "

" 5 - Arable Area (km²) 1979/80 Ministry of Agriculture Survey Estimates

" 6 - Per cent arable land (5 - 4)

" 7 - Agricultural Population Density (Rural People/km² of arable land)

" 8 - Presence of "ORMVA" Irrigated Perimeter

Neg = Negligible; N/A = not available; "ORMVA" = Office regionale de Mise en Valeur Agricole

2 (Cont'd)

<u>THE TENSIFT</u>	1	2	3	4	5	6	7	8	9
Marrakech	6 1 46	1,224,100	724,700	14,755	5,508	3.7	132	ORMVA Haouz	
Safi	3 3 19	652,200	419,800	7,285	5,503	75.5	76		
Essaouira	2 2 16	456,300	387,200	6,335	3,351	52.8	116		
El Kelaa	4 1 29	559,100	481,700	10,070	5,395	53.5	89	ORMVA Haouz	
TOTAL REGION II	15 7 110	2,891,700	2,013,400	38,445	19,757	51.3	102		
<u>THE CENTRE</u>									
Casablanca	1 7 6	2,357,200	136,600	1,615	1,259	77.9	108		
Beni Mellal	5 3 20	572,600	389,000	7,075	3,396	48.0	115	ORMVA Tadla	
Khouribga	3 3 18	424,800	215,300	4,250	2,142	50.4	101		
Settat	4 4 36	694,100	544,400	9,750	5,728	58.7	95		
El Jadida	5 3 24	703,200	556,200	6,000	5,343	89.0	104	ORMVA Doukkala	
Azilal	4 1 28	395,500	357,700	10,050	1,805	17.9	198		
Ben Slimane	2 1 11	180,200	146,000	2,760	1,635	59.2	89		
TOTAL REGION III	24 22 143	5,327,600	2,345,200	41,500	21,308	51.3	110		

(cont)

Appendix Table 5

. 3 . (Cont'd)

<u>THE NORTHWEST</u>	1	2	3	4	5	6	7	8	9
Rabat-Sale	1 3 5	865,100	96,600	1,275	717	56.2	135		
Tanger	2 2 9	377,600	97,600	1,195	550	46.0	177		
Tetouan	4 4 30	682,100	339,400	6,025	1,467	24.3	231	ORMVA Lokos	
Kenitra-Gharb	7 7 30	1,192,200	776,700	8,805	5,146	58.4	151	ORMVA Gharb	
Chaouen	4 1 23	300,200	256,200	4,350	808	18.5	317		
Khemisset	4 1 23	427,700	340,500	8,305	3,614	43.5	94		
TOTAL REGION IV	22 18 120	3,844,900	1,907,000	29,955	12,302	41.0	155		
<u>THE NORTH-CENTRAL</u>									
Fes	4 - 31	560,800	547,400	5,585	2,815	50.0	160		
Taza	2 5 19	744,900	220,600	5,400	2,603	48.2	85		
Al Hoceima	5 2 25	618,000	490,900	15,020	3,242	21.5	151		
Boulemane	3 2 19	306,400	258,200	3,550	694	19.5	372		
Taounate	3 - 13	127,800	110,800	14,395	595	4.1	186		
TOTAL REGION V	17 9 107	2,357,900	1,627,900	43,950	9,949	22.6	164		

Appendix Table 5
(cont)

. 4 . (Cont'd)

<u>THE EAST</u>	1	2	3	4	5	6	7	8	9
Oujda	4 6 28	769,100	339,300	20,700	3,178	15.3	107	ORMVA Moulouya E. Bank	
Nador	4 2 26	609,400	512,700	6,130	1,278	20.8	401	W. Bank	
Figui	2 - 7	107,800	78,300	55,990	362	0.6	216		
TOTAL REGION VI	10 8 61	1,486,300	930,300	82,820	4,818	5.8	193		
<u>THE SOUTH-CENTRAL</u>									
Meknes-Ifrane	3 5 18	774,100	324,200	8,510	3,250	38.1	100		
Errachidia	7 4 26	405,000	345,500	59,585	708	1.1	488	ORMVA Tafilalet	
Khenifra	3 2 15	299,100	215,100	11,115	1,597	14.3	135		
TOTAL REGION VII	13 11 59	1,478,200	884,800	79,210	5,555	7.0	159		
<u>TOTAL MOROCCO</u>	131 85 762	19,470,000	11,421,000	710,870	78,938	11.1	145		

Appendix Table 5
(cont)

Appendix Table 6Number of Farmers and Area Cultivated

	<u>Number of farmers (000)</u>	<u>%</u>	<u>Total Area (000 ha)</u>	<u>%</u>	<u>Average size farm (ha)</u>
Landless	450	23.3	-	-	-
Less than 5 ha	1,090	56.5	1,821	24.4	1.6
5 - 10 ha	220	11.4	1,537	20.6	6.9
10 - 20 ha	114	5.9	1,562	20.9	13.7
20 - 50 ha	44	2.2	1,247	16.7	28.3
50 -100 ha	8	0.4	535	7.1	66.8
100 ha +	3	0.1	746	10.0	248.6
	<u>1,929</u>	<u>100 %</u>	<u>7,448</u>	<u>100 %</u>	

Source: Direction de la Statistique, Recensement Agricole 1973-74.

Appendix Table 7

Unit Value of Bread Wheat Imports,
EEC and US, 1973 - 1980

<u>Year</u>		<u>EEC</u>	<u>US</u>	<u>Other</u>	<u>Total</u>
1973	Quantity (000 MT)	285.8	509.9	109.1	904.9
	Value (million DH)	151.3	289.2	42.7	483.3
	DH/quintal ^{1/}	52.9	56.7	39.1	53.4
1974	Quantity (000 MT)	268.1	450.4	59.0	777.6
	Value (million DH)	243.0	417.3	47.9	708.2
	DH/quintal	90.6	92.6	81.2	91.0
1975	Quantity (000 MT)	661.1	493.2	149.2	1,303.6
	Value (million DH)	458.7	379.2	121.8	958.8
	DH/quintal	69.3	76.9	81.6	73.6
1976	Quantity (000 MT)	416.9	579.3	16.0	1,012.2
	Value (million DH)	305.8	410.9	9.0	725.8
	DH/quintal	73.3	70.9	56.5	71.7
1977	Quantity (000 MT)	0.3	328.1	873.2	1,201.8
	Value (million DH)	0.1	157.7	429.1	587.0
	DH/quintal	47.5	48.1	49.1	48.8
1978	Quantity (000 MT)	229.2	789.3	536.2	1,554.8
	Value (million DH)	128.9	443.8	293.5	856.3
	DH/quintal	56.2	55.0	54.7	55.1
1979	Quantity (000 MT)	875.1	292.9	319.3	1,487.4
	Value (million DH)	528.4	226.7	212.7	967.8
	DH/quintal	60.3	77.3	66.6	65.1
1980	Quantity (000 MT)	1,022.7	509.4	119.3	1,651.4
	Value (million DH)	760.0	397.0	98.2	1,255.2
	DH/quintal	74.3	77.9	82.3	76.0

^{1/} DH/quintal is used here by convention instead of DH/MT.
One quintal equals 100 kg.

Source: Office des Changes, Statistique du Commerce Exterieur.

Appendix Table 8

Estimates of
Average Production, Area and Yields
of Four Major Cereals:
Modern and Traditional Farms

	Production ^{1/}		Area		Yields
	(000 MT)	(%)	(000 ha)	(%)	(MT/ha)
Durum Wheat					
modern	350	(25)	190	(15)	1.30
traditional	1,000	(75)	1,079	(85)	0.85
total	<u>1,350</u>	(100)	<u>1,269</u>	(100)	
Bread wheat					
modern	231	(55)	178	(40)	1.30
traditional	189	(45)	267	(60)	0.70
total	<u>420</u>	(100)	<u>445</u>	(100)	
Barley					
modern	100	(5)	64	(3)	1.4
traditional	1,900	(95)	2,086	(97)	0.9
total	<u>2,000</u>	(100)	<u>2,150</u>	(100)	
Corn					
modern	100	(30)	21	(5)	3.5
traditional	250	(70)	391	(95)	0.6
total	<u>350</u>	(100)	<u>412</u>	(100)	

^{1/} Production is 1975-80 average from Appendix Table 1. Estimate of area and yields from A. Ackles and J. Pederson, Grain Storage, Handling and Distribution in Morocco, Kansas State University, 1969 modified by USAID/Rabat. Yields multiplied by area do not correspond exactly to average production.

Appendix Table 9

Morocco: Planned Government Investment in Agriculture, 1965-67 and 1981-85^{1/}

(Millions of Dirhams)

	(First Plan) Three Year Plan 1965-67		(Fifth Plan) Five Year Plan 1981-85	
<u>Irrigated Areas^{2/}</u>				
Large Scale Works	453		3,943	
Small and Medium Scale Works	45		1,303	
Sub-Total	498	(58%)	5,246	(50%)
<u>Dryland Areas</u>				
Rainfed Agriculture	140		1,927	
Soil and Water Conservation, Forestry	70		893	
Range Management	27		507	
Sub-Total	237	(28%)	3,327	(32%)
<u>Other Livestock</u>	13	(2%)	649	(6%)
<u>Agronomic Research</u>	16	(2%)	209	(2%)
<u>Agricultural Education</u>	4	(-)	152	(1%)
<u>Other^{3/}</u>	88	(10%)	963	(9%)
Grand Total	856	(100%)	10,546	(100%)

^{1/}Space limitations prevented presentation of the intervening second (1968-72) and third (1973-77) Five Year Plans and the fourth (1978-80) Three Year Plan. The former two show a slightly decreasing emphasis upon irrigation activities, while the latter shows more than 50% emphasis, which represents an increased effort to complete on-going projects having considerable sunk costs. Note: The exchange rate was pegged to the dollar at 5.06 Dirhams during the First Plan and was 5.30 Dirhams at the time of this writing.

^{2/}Excludes dam construction.

^{3/}Cadastral surveys, economic and statistical studies, agricultural inspection, construction of silos, warehouses and other infrastructure.

Appendix Table 10

Active and Proposed IBRD Agricultural Projects
September, 1981.

Projects with Large Irrigation Components :

- Sebou II : (\$32 million, closing date 1981), principally for irrigated sugarcane development.
- Souss Groundwater Irrigation : (\$18.5 million, closing date 1982),
- Doukkala I and II : (\$30 million Phase I, closing date 1981 and \$41 million Phase II, closing date 1984), for irrigation works on one of the nine major irrigated perimeters where USAID is participating in the financing.
- Vegetable Production and Marketing : (\$58 million), designed to provide farm and marketing channel improvements to produce irrigated vegetables for the EEC.
- Agricultural Credit III and IV : (\$35 million Phase, closing date 1981 and \$70 million Phase IV, closing date 1984), These are seemingly successful projects to finance small and medium scale irrigation and other investments for small farmers cooperatives and farmer associations. Phase IV has increased emphasis on small dryland farmers.

Projects with Large Dryland Components

- Meknes Agricultural Development : (\$14 million, closing date 1984), providing rural works and land consolidation efforts in a relatively fertile dryland area.
- Fes-Karia-Tissa Project : (\$65 million, closing date 1986) is an integrated rural development project designed to increase incomes and improve service distribution for a favorable rainfed cereal and livestock zone.
- Loukos Rural Development : (\$34 million, closing date 1987) extends the model of the Fes-Karia-Tissa project to a poor subsistence area while providing water shed protection to a downstream irrigated perimeter. It is hoped that this project with its joint emphasis on forestry, herding and grain farming will serve as a model for extension to other impoverished and densely settled mountain areas.
- Middle Atlas Livestock : (proposed), an integrated rural development project with strong emphasis upon range management and forestry.
- Oulmes-Roumanni : (proposed), an integrated rural development project with forestry, grazing and dryland cereal components.

MEMORANDUM

TO : See Distribution DATE : 11/30/81
THRU : NE/TECH, Adolph Y. Wilburn *W*
FROM : NE/TECH/AD, Leland Voth, PRC Chairperson
SUBJECT : Issues on the Dryland Agriculture Sub-Sector
Strategy, Morocco

The attached Strategy paper was received in AID/W on October 8, 1981. A Project Review Committee (PRC) met on October 28, 1981 with the following people in attendance.

NE/TECH/AD, Leland Voth, Chairperson
NE/DP/PL, Sam Skogstad
NE/NENA, George Lewis
NE/DP/PR, Geraldine Donnelly
PPC/PB, Jerry Segal
NE/TECH/SARD, George Gardner
NE/TECH/AD, Robert Morrow
NE/NENA/M, Virgil Miedema
PPC/PDPR/RD, Edward Lijewski
NE/NENA/M, Gary Mansavage
NE/PD/NENA, Justin Williams

The PRC acknowledged the considerable effort the Mission devoted to the paper. The PRC noted that the long awaited document was titled as a sub-sector strategy paper rather than an agriculture sector study, review, or assessment as had been suggested in earlier communications with the Mission.

The PRC discussion identified broad issues concerning the Mission's rationale for supporting assistance for dryland agriculture development. Within some of the broader issues were some questions of a more specific nature which might be answered by the Mission in time for the NEAC review.

Issues:

1. Rates of Return. Well documented case needs to be made that investments in dryland agricultural production will have high rates of return. There is some existing literature to this effect. (See attached page 6-7 of "Memorandum on Morocco's Agricultural Sector: Identification of Issues and (World) Bank Strategy" May 1980).
2. Yields and Production. Only limited treatment is given to an analysis of existing yields. There is a need for a more detailed understanding of how existing yields for major crops compare with

what is possible in the Moroccan environment, an analysis of why yields are lower than they should be.

- A - The indicator on page 27 needs better explanation, i.e., "two row barley varieties have shown yield increases of 15-60 percent". Is the increase more apt to be at the 15-20 percent end or in the range of 40 percent or 50-60 percent? What are the determinants and are they manageable by large and/or small farmers and at what costs and returns? To what portion of the 2 million hectares of land devoted to barley (table 2 and appendix table 8) might such barley be adaptable?
- B - Do the reasons for encouraging the GOM to invest large amounts of the PL-480 generated proceeds into barley production provide more positive indication of production growth potential than generally comes through in the paper? What data supports this conclusion?
- C - How closely do the grain yield/production figures correlate with the annual pattern of moisture amount and timely rainfall distribution within the cropping season?
- D - Over the past 10-20 years grain imports have increased dramatically whereas production has more or less stagnated. The paper makes a case that local support price policies have not significantly depressed local production incentive.

This conclusion needs to be better documented. Do high price support levels discourage domestic demand in favor of cheaper imports and thus serve a disincentive function? The paper requires micro-level farm production costs and return data to illustrate that causes of the lack of growth lie elsewhere than price/cost relationships. Such micro-data analysis would be useful to gain some idea of the supply response to various inputs and the farm level economics of input use.

- E - Lack of access to commercial inputs impacts on agricultural production, as suggested on page 26-7. Some supplies are available to some farmers. What are the supplies referred to, are they cost effective, readily available, and to what extent is production influenced?

3. Long-term Strategy. The overview of the dryland sector should integrate an analysis of what should be done, the dollar resources that are called for, what is presently being done by the GOM and other donors, and how this suggests a specific role which USAID should play. A total picture is needed of what is happening, and how proposed activities and funding levels fit into the general picture of what is needed. A plan of activities and proposed levels for A.I.D. resources during the CDSS period FY 83-87 is required.

4. Options and Priorities. The strategy needs to develop a sense of the options for AID in the sector, an explanation of why the proposed activities are the preferred course. For example, better rainfed areas may hold greater potential for increased production than drier areas. Also, a basis for prioritizing projects should be incorporated.

A - Re-forestry, an analysis should examine the relative priority of activity in this area as opposed to concentrating investment of limited resources in dryland agricultural production activities. Should project design work proceed in FY 82 regardless of the outcome of the NEAC review on this sub-sector strategy?

B - Would it be preferable for A.I.D. to engage in several diverse dryland activities rather than achieve the benefits of concentration?

5. Self-sufficiency. The GOM planners are striving for self-sufficiency in foodgrain requirements (page 36, para 2). It appears the strategy paper may be accepting this as a given goal without sufficient analysis. Should Morocco concentrate resources upon products which can be produced most efficiently, export portion for foreign exchange gains, and import that which is produced more efficiently abroad? Such action may require gradual upward adjustment of the price to the consumer of imported food, e.g., bread wheat, to actual market level.

6. Allocation of Land. Discussion is needed on whether or not the economic value of output would be increased if land were allocated to specific crops in different proportions than currently. Constraints to change should be identified and the magnitude of possible gains assessed.

7. Targets. Within the dryland region, strategy should establish priority of particular geographical areas or beneficiary groups. With respect to beneficiaries, it is understood that 80 percent of the population is either landless or has less than five hectares. Analysis of the economic activity and problems faced by these groups is desirable.

8. Impact of Current Crises. What will the impact of Morocco's severe economic/financial situation be on planned new investment under the five year plan? If there are major cutbacks how does this affect AID's strategy. Does AID proceed even if the GOM does not pursue the drylands. Also, what impact might there be on World Bank investment?

9. Actions. What are the next steps to be taken by the USAID and AID/W as regards this sub-sector strategy stemming from NEAC consideration of issues above?

MISSING PAGE
NO. 4-5

Attachment: "Memorandum of Morocco's Agricultural Sector: Identification of Issues and (World) Bank Strategy" May 1980

the organization of farmers into service cooperatives for the acquisition of farm inputs and credit; the improvement of credit and input supply distribution channels; and livestock development through introduction of new forage crops, seeding of pastureland, animal health services, and installation of milk collection centers. The Fes-Karia-Tissa Project includes soil improvement and soil conservation works, agricultural research, and infrastructure development (roads, market places, rural water supply). The Meknes Project will improve cultivation practices in the Meknes area. A legal framework is being applied under the Meknes Project for the distribution of state land to small farmers, and for land consolidation. Technical assistance is being provided to farmers through service cooperatives organized by extension agents. In addition to these "integrated" agricultural development projects, agricultural credit has been found to be highly productive in Moroccan rainfed agriculture. Agricultural credit, supplemented by farmers' own funds, finances small scale investment in wells, pumps, livestock, agricultural implements, equipment, draft animals, vegetable and fruit production. The cost to Government of distributing credit is low, since most credit is reimbursed with interest. Other agricultural projects require substantial non-reimbursable Government expenditure. An additional advantage of credit projects is that they distribute investments widely over the entire country, compared to regionally specific rural development or irrigation projects. Other interesting project possibilities for the rainfed sector include (a) integrated soil conservation, forestry and pastureland development linked to livestock production in heavily populated mountain areas (modeled after the Loukkos Rural Development and Middle Atlas Livestock Development Projects now being prepared); (b) pasture improvement (14 project possibilities covering 249,700 ha have been studied as well as Projects based on seeding of range-land and introduction of new livestock varieties such as Ranch Adarouch); and (c) farm improvement in semi-arid regions (being prepared under an existing research project entitled the "Aridoculture" project). Only DH 50 million of investment foreseen in the Three Year Plan is allocated to these three types of rainfed projects (1.7% of Government investment in agriculture). The Ministry of Agriculture recently identified several additional project possibilities which are listed in Table 17.

12. The Economic and Social Viability of Rainfed Projects Compared to Large Scale Irrigation. Since an alternative agricultural development strategy giving greater emphasis to rainfed agricultural development is technically feasible, the issue is the economic desirability of increasing the allocation of scarce public resources to such Projects, causing a relative decline in resources going to large scale irrigation. Bank experience with both irrigation and rainfed agriculture projects in Morocco, though not sufficient to permit definitive conclusions, tends to indicate that compared to large scale irrigation projects, rainfed and credit projects are less costly per hectare, per family, and per Dirham of output (i.e., have a higher economic rate of return). Recent large scale irrigation projects studied by the Bank in Morocco have projected economic rates of return varying between 7 to 12%. Projected rates of return to rainfed and agricultural credit projects studied by the Bank generally are close to 20%. Rates of return to the poverty oriented mountain, forestry, and pastureland improvement projects are probably in the 10 to 15% range (see chart on next page). In terms of Morocco's food security objective, the deficit in cereals, vegetable oils and meat cannot be covered except by an intensification of agricultural production in rainfed areas.

This intensification must be directed at increasing cereal yields, and development of forage crops and oilseeds. In addition to the economic argument for increasing somewhat the relative emphasis on rainfed projects, there is a social argument since the rural poor tend to live in areas with limited irrigation potential (para 29). Eighty percent of Morocco's rural population is dependent on rainfed agriculture. Benefits of rainfed projects tend to be lower per family, but are distributed over a much larger number of families than are benefits of irrigation projects, as is seen in the following table.

	Investment Cost per ha -----(DH)----- (1978 prices)	Investment per Farm ----- -----	Projected Economic Rate of Return (%)
<u>Bank Financed Irrigation Projects /a</u> (Large Scale)			
Souss	21,400	111,400	10.0
Doukkala I	23,800	114,500	11.4
Doukkala II	32,000	152,500	11.6
Haouz (under preparation)	44,000	190,000	7.0-9.0
<u>Small Scale Irrigation /b</u>	n.a.	1,950 ?	n.a.
<u>Vegetable Production and Marketing</u> (for export)	41,000	51,000	46.0
<u>Bank Financed Rainfed and Credit</u> <u>Projects</u>			
Agriculture Credit IV /d	700	5,600	20.0
Meknes Agriculture	790	10,500	24.0
Fes-Karia-Tissa	2,610	20,000	21.0
<u>Poverty-Oriented Agriculture</u> <u>and Forestry</u>			
Mamora, Gharb Reforestation	3,250	n.a.	n.a.
Rif	2,500	n.a.	n.a.
Bouhsoussen	460	n.a.	n.a.
Loukkos	3,360	32,300	15.0
<u>Pastureland Improvement</u>			
Middle Atlas Livestock /c	3,750	n.a.	10.0-15.0
Ranch Adarouch	800	n.a.	10.0

/a Excludes cost of dams.

/b Program undertaken during the 1973-77 Plan.

/c Presently the Plaine d'Aarid Project.

/d Ex-post analysis of the results of the Second and Third Agricultural Credit Projects suggests an economic rate of return equal to 20%.

n a = not available

UNCLASSIFIED
Department of State

INCOMING 8
TELEGRAM

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ACTION AID-35

RABAT 08739 01 OF 03 261022Z 2516 049413 AID5575

ACTION OFFICE HEMA-03
INFO NEPD-04 AANE-01 NEDP-02 HETC-04 PPCE-01 PPEH-01 PDPR-01
PPP8-03 PPIA-01 OFDA-01 AAST-01 STAG-02 STH-03 STRD-02
ENGR-02 AGRI-01 CIA-05 OMB-02 TRSY-05 TVA-01 XHB-06
RELO-01 TELE-01 MAST-01 OO-01 AGEE-01 /057 A1 427

INFO OCT-00 EB-08 NEA-07 AGRE-00 /050 W
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FM AMEMBASSY RABAT
TO SECSTATE WASHDC IMMEDIATE 1237

UNCLAS SECTION 1 OF 3 RABAT 8739

ADM AID .

E.O. 12065: N/A
SUBJECT: MOROCCO DRYLAND AGRICULTURE SUB-SECTOR STRATEGY PAPER.

REF: STATE 304379

1. USAID IS SUBMITTING HERewith SUPPLEMENTAL INFORMATION WHICH CAN BE READILY MUSTERED IN RESPONSE TO SPECIFIC QUESTIONS RAISED IN PARAS (3) AND (4) REFTEL. WHATEVER ADDITIONAL INFORMATION WE CAN PRODUCE BETWEEN NOW AND THE NEAC WILL BE CARRIED TO AID/W BY A/DIR PETREQUIN.

2. THE NATURE OF MANY OF ISSUES RAISED IN REFTEL AND PARTICULARLY THOSE GOING FORWARD FOR NEAC DISCUSSION GIVE US CAUSE FOR CONCERN REGARDING THE CONDUCT, INTENT AND END PRODUCT OF THE PRC AND NEAC PROCESS. ISSUES RAISED RANGE FROM PEDANTIC (PARA 4E) TO THE RHETORICAL (PARA 4F) TO THE INCOMPREHENSIBLE (PARA 4H). WHILE WE REALIZE THE TOTAL LITANY PRESENTED IS THE ACCUMULATION OF INDIVIDUAL QUERIES OF EACH MEMBER OF THE PRC WHO WISHES TO BE HEARD, THE REFTEL DOES UNDERSCORE THE NEED FOR SOME DEGREE OF DISCIPLINE WHICH WILL PRODUCE A CONSENSUS OF HIGHER PROFESSIONAL CALIBER. WE SUGGEST THAT THESE SUMMARY CABLES BE DRAFTED IN THE COURSE OF PRC AND NEAC MEETINGS, AND BE READ AND CLEARED PRIOR TO ADJOURNMENT. THE CURRENT PROLONGED CLEARANCE PROCESS INVITES INPUTS IN RETROSPECT, SOME OF WHICH SHOW EVIDENCE OF PRC MEMBERS NOT HAVING READ THE PAPER IN QUESTION, AND OTHERS WHICH INDICATE UNREALISTIC EXPECTATIONS FROM A LIMITED MISSION STAFF IN THIS INITIAL EXERCISE. MANY OF THE ISSUES RAISED WOULD HAVE BEEN OBTAIATED BY REFERENCE TO THE FY 1982 CDSS, OR THOSE OF PRIOR YEARS.

3. AS SUBJECT PAPER IS OUR FIRST EFFORT TO PRESENT A MORE DETAILED AGRICULTURAL SECTOR STRATEGY AND ANALYSIS THAN NORMALLY CONTAINED IN MISSION CDSS, USAID REQUESTS THAT NEAC POUCH COPIES OF OTHER NE BUREAU COUNTRY AGRICULTURE SECTOR STRATEGY PAPERS WHICH HAVE BEEN FOUND TO BE ACCEPTABLE TO THE BUREAU. A REVIEW OF THESE DOCUMENTS WILL GIVE US A BETTER INSIGHT INTO THE TYPE OF COMPREHENSIVE DOCUMENT REQUIRED BY THE BUREAU. PLEASE ADVISE.

4. BEFORE GETTING INTO SPECIFICS, WE BELIEVE IN VIEW OF THE FORGOING THAT IT WOULD BE BENEFICIAL TO PROVIDE A QUICK SKETCH OF BASIC RATIONALE UNDERLYING USAID'S PROPOSED STRATEGY IN DRYLAND AGRICULTURE. FIRST OF ALL, IT WAS IN THIS AREA THAT MOROCCO'S TRADITIONAL FOODGRAIN CROP OF BARLEY WAS GROWN, AND COULD BE GROWN AGAIN. WHEAT PRODUCTION IN THE RICHER NORTHERN ZONE AND THE IRRIGATED PRODUCTION OF COMMERCIAL EXPORT CROPS ARE FAIDY RECENT DEVELOPMENTS ON THE MOROCCAN AGRICULTURAL SCENE. THE LATTER ARE SURER UNDERTAKINGS FOR MORE MASSIVE INVESTMENTS, AND CONSEQUENTLY NO OTHER DONORS

HAVE BEE INCLINED TO EXPLORE THE RISKIER POTENTIAL OF THE DRYLAND ZONE. NONE HAVE ANY DRYLAND FARMING PROFICIENCIES THEY COULD BRING TO BEAR ANYWAY. THE USG IS UNIQUE IN THAT RESPECT. IT SHOULD ALSO BE BORNE IN HIND THAT THE CURRENT AND PROJECTED ANNUAL AID ASSISTANCE LEVELS FOR MOROCCO WOULD NOT FINANCE HALF OF A MEDIUM SIZED IRRIGATION PROJECT, SO ANY U.S. INPUT IN THAT SECTOR WOULD BE MARGINAL AT BEST NOR WOULD IT PROVIDE ANY NEW METHODOLOGY. WHAT WE CAN PROVIDE ARE TOTALLY NEW TECHNIQUES IN MOISTURE RETENTION IN CULTIVATING DRYLAND SOILS. IT IS FROM THESE SOILS THAT OVER 8 MILLION SUBSISTENCE FARMERS EKE OUT A LIVING. ALL PRIOR AGRICULTURAL PLANNING AND INVESTMENTS HAVE NEGLECTED THIS PROGRESST 44 PERCENT OF THE POPULATION. THE GOM IS NOW ATTEMPTING TO RECTIFY THESE PAST IMBALANCES, AND LOOKS TO AID AS THE CATALYST IN IMPLEMENTING ANY MEANINGFUL STRATEGY. THIS WE CAN DO IN THE SERIES OF INTEGRATED, RELATIVELY LOW-COST, TECHNICAL ASSISTANCE PROJECTS WHICH USAID HAS PROPOSED. ALL THINGS CONSIDERED, THIS IS THE BEST USE OF THE PARTICULAR PROFICIENCIES AND LIMITED RESOURCES THE USG CAN BRING TO BEAR. WE ARE AT THE BEGINNING PHASE OF A SERIES OF RELATED PILOT UNDERTAKINGS, THE FULL IMPLICATIONS OF WHICH WILL ONLY COME INTO FOCUS AS WE PROGRESS. BY ITS VERY NATURE IT IS A HIGH RISK VENTURE, BUT ONE WHICH IS NOW MORE NECESSARY THAN EVEN IN THE LIGHT OF THE GOM'S DETERIORATING BOP SITUATION, POPULATION GROWTH, AND GROWING FOODGRAIN DEFICITS.

5. FOLLOWING IS RESPONSE TO REFTEL BY PARA.

*Introduction
para 2*

6. (PARA 2). USAID SOMEWHAT PUZZLED THAT AID/W ANTICIPATED A MORE COMPREHENSIVE DOCUMENT. OUR DESIRE WAS TO HAVE THE PAPER READ BY AID/W. WE THEREFORE CONCLUDED THAT ANYTHING MUCH LONGER THAN FORTY PAGES WOULD RUN COUNTER TO THAT DESIRE. FOREGOING COMMENTS JUSTIFY THIS CONCLUSION. FOR THOSE WISHING FURTHER DETAILS ON DRYLAND SECTOR, TWO MAJOR DOCUMENTS IN ENGLISH AVAILABLE IN AID/W ARE IBRD REPORT 2667 "MEMORANDUM ON MOROCCO'S AGRICULTURE SECTOR" AND HIAC STUDY.

2A

7. (PARA 3A). PERCENTAGE INCREASE OF YIELDS OF TWO ROW VARIETIES, AS ANY OTHER VARIETIES, DEPENDS UPON AMOUNT AND DISCTRIBUTION OF RAINFALL, LAND PREPARATION, WEED CONTROL, USE OF INPUTS AND OTHER FACTORS. NOT ALL INPUTS ARE AVAILABLE TO MANY SMALL FARMERS AT THIS TIME, SO INCREASES WOULD BE IN LOWER RANGE OF 15-20 PER CENT. POINT MADE ON P.27 IS THAT PROMISING TWO-ROW VARIETIES UNDER EXPERIMENT STATION CONDITIONS NEED FURTHER APPLIED RESEARCH AND DEMONSTRATION ON SMALL FARMER FIELDS. EVEN YIELD INCREASES AT 15-20 PER CENT END HAVE GREAT IMPACT BECAUSE OF NUMBER OF SMALL FARMERS GROWING BARLEY. AN ESTIMATED 1.864 MILLION HA OR 94 PER CENT OF LAND IN BARLEY FALLS IN 200-400 MM RAINFALL ZONE REPRESENTING ABOUT 600,000 OF THE 900,000 FARM UNITS IN RAINFED ZONE COMPARED TO 450,000 UNITS IN IRRIGATED ZONE.

#'s refer to relevant paragraphs in the Issues Paper

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2E 8. (PARA 3B). COMMERCIAL INPUTS FOR SMALL DRYLAND FARMERS REFERS TO FERTILIZER, HIGH YIELDING SEED VARIETIES, HERBICIDES, IMPROVED ANIMAL-DRAWN AND SMALL MECHANIZED IMPLEMENTS. ALL OF THESE ARE NOT READILY AVAILABLE, BUT WOULD BE COST EFFECTIVE WITH 50 PER CENT YIELD INCREASES. POINT MADE BY PAPER IS SIMPLY THAT LOW DEMAND FOR COMMERCIAL FARM SERVICES AND THEREFORE INADEQUATE SUPPLY OF COMMERCIAL FARM SERVICES IN DRYLAND AREAS PREVENTS THOSE MORE PROGRESSIVE SMALL FARMERS FROM ACQUIRING INPUTS IN TIMELY FASHION. THE OPPOSITE SITUATION IS FOUND IN THE IRRIGATED AREAS WHERE DEMAND FOR COMMERCIAL INPUTS IS VERY HIGH. E.G., BERKANE, THE REGIONAL CENTER OF HOULOUYA IRRIGATED PROJECT, NOW HAS SEVERE FERTILIZER, SEED AND EQUIPMENT COMPANIES WHERE TEN YEAR AGO THERE WERE NONE.

2B 9. (PARA 3C). SPACE LIMITATIONS PREVENTED DISCUSSION OF IMPORTANCE OF BARLEY IN MOROCCO. ANALYSIS OF MOROCCO'S IMPORTS TENDS TO FOCUS ON BREAD WHEAT YET IN TERMS OF AREA AND DOMESTIC CONSUMPTION BARLEY IS FAR MORE IMPORTANT GRAIN. HISTORICALLY BARLEY WAS MORE COMMON ELEMENT IN HUMAN DIET THAT AT PRESENT WITH WHEAT CONFINED TO HIGHER RAINFALL ZONE IN NORTH AND LARGE FRENCH FARMS. COARSE BARLEY BREAD GRADUALLY FELL FROM POPULARITY AND WAS REPLACED BY WHEAT FLOUR. PARTLY AS CAUSE AND PARTLY AS EFFECT OF POPULARITY OF WHITE WHEAT BREAD, PRICE OF WHEAT ROSE RELATIVE TO BARLEY AND WHEAT WAS EXTENDED INTO AREAS FORMERLY PLANTED TO BARLEY. PRESENTLY THERE IS EVIDENCE THAT THIS TREND IS REVERSING. AS WHEAT WAS PUSHED INTO MARGINAL AREAS YIELDS DECLINED AND PRICE DIFFERENCES NARROWED. BARLEY IS HIGHLY VALUED IN RURAL AREAS BECAUSE IT PRODUCES BETTER QUALITY STRAW FOR LIVESTOCK THAN WHEAT AND COMMANDS HIGHER PRICE THAN WHEAT STRAW. WHEN PRICE OF STRAW INCLUDED, THE RETURNS FROM BARLEY CAN EQUAL OR EXCEED RETURNS FROM WHEAT. BARLEY IS HARDIER AND MORE DROUGHT TOLERANT. HALF OF CROP AREA OR AVERAGE DRYLAND FARM UNIT IS PLANTED TO BARLEY WHICH ACCOUNTS FOR OVER HALF OF VALUE OF PRODUCTION (SEE TABLE 8). BARLEY ACCOUNTS FOR HALF OF TOTAL AREA PLANTED TO CEREALS (SEE TABLE 9). BARLEY IS THE BREAD GRAIN OF THE MAJORITY OF RURAL INHABITANTS. BREAD WHEAT MOST OF WHICH IS IMPORTED IS CONSUMED PRIMARILY IN URBAN AREAS. DRYLAND FARMERS GROW LITTLE BREAD WHEAT.

2C 10. (PARA 3D). PRODUCTION AND RAINFALL DO NOT CORRELATE AS CLOSELY AS WE WOULD LIKE DUE TO ERRATIC DISTRIBUTION NOT ABSOLUTE AMOUNT. ALSO WEATHER STATIONS OFTEN LOCATED IN PROVINCIAL COASTAL CAPITALS, NOT GRAIN GROWING AREAS.

2D 11. (PARA 3E). PARA SEEMS TO IMPLY THAT TERMS OF TRADE ISSUES DO NOT DEPRESS PRODUCER INCENTIVE AND HIGH SUPPORT PRICES DO. PAPER ARGUES INVERSE, I.E., DESPITE HIGH TARGET PRICES FAVORABLE TO PRODUCER INCENTIVES, LARGE BREAD WHEAT

FARMERS CANNOT COMPETE WITH THE IMPORTED PRODUCT. OBVIOUS IMPLICATION IS THAT MORE EFFICIENT US AND EEC FARMERS HAVE LOWER COSTS. WE CONFIDENT FURTHER MICRO-ANALYSIS OF LARGE FARM PRODUCTION COSTS WOULD BEAR THIS OUT. HOWEVER, AS STATED IN PAPER, LARGE FARMERS ARE NOT REPEAT NOT PART OF DRYLAND TARGET GROUP (P.15). AS STATED IN PAPER, DETAILED MICRO-ANALYSIS OF SMALL FARMER PRODUCTION COSTS CURRENTLY BEING PERFORMED BY HASSAN II AGRONOMIC INSTITUTE (P.22 PARA 6). BEST CURRENT ESTIMATES FROM PRELIMINARY RESULTS OF THIS STUDY ARE PRESENTED IN TABLE 8. OF THE PAPER.

5 12 (PARA 4A). WE REALIZE GOAL OF GRAIN SELF-SUFFICIENCY SUCH AS MOROCCO HAD PRIOR TO 1960 WHEN POPULATION WAS 11.5 MILLION INSTEAD OF PRESENT 21 MILLION IS DIFFICULT TO ACHIEV. WE DO NOT KNOW WHETHER MOROCCO WILL EVER BE SELF-SUFFICIENT. WE DO KNOW THAT THERE IS NO POSSIBILITY OF SUCH SELF-SUFFICIENCY WITHOUT FULL EXPLOITATION OF DRYLAND FARMING. MOST GOM PLANNERS REALIZE THAT SELF-SUFFICIENCY IS DIFFICULT TO ACHIEVE BUT JUDGE THAT PROGRESS TOWARDS IT SHOULD BE AMONG GOVERNMENT'S HIGHE PRIORITIES GIVEN IMPORT BILLS AND LACK OF OTHER ALTERNATIVES FOR THE EIGHT HILLION INHABITANTS OF THE NON-IRRIGATED AREAS. GOM HAS IN FACT FOLLOWED POLICY PROPOSED IN PARA 4A DURING LAST FIFTEEN YEARS, AND NOW FINDS ITSELF SPENDING AN ESTIMATED 70 PER CENT OF FOREX EARNED FROM COMMERCIAL AGRICULTURAL EXPORTS FOR FOODGRAIN IMPORTS IN A NORMAL YEAR. HOWEVER, AS POINTED OUT IN PAPER, EUROPEAN MARKETS UPON WHICH THIS POLICY WAS PREDICATED ARE BEING DENIED MOROCCO, SO SHE IS SEARCHING FOR ALTERNATIVE MARKETS IN THE EASTERN BLOC. EVEN ALLOWING THAT SHE FINDS THESE, ESTIMATES ARE THAT WITHIN A FEW YEARS ALL FOREX EARNINGS FROM COMMERCIAL AGRICULTURE WILL BE REQUIRED TO FINANCE GROWING FOODGRAIN IMPORTS. AS NOTED IN PARA 2 ABOVE, INCLUSION OF ISSUES SUCH AS THIS ONE IN REFTEL TAKE US BACK TO SQUARE ONE AND RAISE QUESTIONS AS TO THE SERIOUSNESS AND UTILITY OF THIS EXERCISE.

13. (PARA 4B). IT WAS NEVER OUR POSITION THAT DRYLAND INVESTMENT, ESPECIALLY IN THE 200-400 MM RAINFALL ZONE, WILL NECESSRILY HAVE HIGHER RATES OF ECONOMIC AND SOCIAL RETURNS THAN IRRIGATION PROJECTS. IBRD ESTIMATES IN DOCUMENT CITED ABOVE PARA 6 (PP.5-7) OF DRYLAND PROJECT RETURNS ARE PROJECTIONS BASED UPON SPECULATIVE ASSUMPTIONS IN A HIGH RISK ENVIRONMENT NOT ON PAST PROJECT PERFORMANCE EVALUATIONS. E.G., WE JUDGE IBRD UPPER LOUKOS WATERSHED MANAGEMENT PROJECT (SEE APPENDIX TABLE 10) AS HIGHLY DESIRABLE FROM POINT OF VIEW OF REDUCTION EROSION AND DOWNSTREAM SILTATION OF IRRIGATION WORKS, BUT 20 PER CENT OR HIGHER RETURNS ESTIMATED BY U.N. WERE BASED UPON POSSIBLY UNATTAINABLE SET OF ASSUMPTIONS AND VALUATION OF SECONDARY EFFECTS. IN SHORT, OUR CASE FOR DRYLAND PROJECTS RESTS LESS ON COMPARISONS OF ECONOMIC RETURNS BETWEEN ANY GIVEN DRYLAND AND IRRIGATED AREA AND MORE ON US COMPARATIVE ADVANTAGE, MODEST AID RESOURCE LEVELS, RELATIVE LACK OF OTHER DONOR ACTIVITY AND THE NEEDS AND POTENTIAL OF THE DRYLANDS AND THEIR EIGHT HILLION INHABITANTS.

2 14. (PARA 4C). SPACE LIMITATION PREVENTED PRESENTATION OF YIELD ANALYSIS, WHICH IS WHY SECTION 11A IS PREFACED BY A FOOTNOTE REFERRING READER TO MIAC STUDY. SEE ANNEX B OF MIAC STUDY WHICH DISCUSSES RETENTION OF SOIL MOISTURE AS ONE OF GREATEST CONSTRAINTS TO HIGHER YIELDS. MIAC STUDY IS AVAILABLE IN AID REFERENCE CENTER ROOM 1656.

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6 15. (PARA 4D). WE JUDGE IT UNREALISTIC TO DISCUSS ALTERNATIVE CROPS IN MUCH OF THE DRYLAND AREA WHICH RECEIVES 200-400 MM RAINFALL AND IN WHICH PRIMARY LAND USE IS DESTINED TO BE GRAZING OR BARLEY CULTIVATION.

3 16. (PARA 4E). WE JUDGE PAPER MORE THAN ADEQUATELY ADDRESSES POINTS RAISED IN THIS PARA (SEE SECTION III AND APPENDIX TABLES 9-10 OF PAPER). PROPOSED PLANNING LEVELS FOR 83-87 ARE FOUND ON P.66 OF MOROCCO 83 CDSS. FYI FOLLOWING IS ROUGH ESTIMATES OF PROPOSED GOM AND OTHER DONOR PLANNING LEVELS AND AID LOP EXPENDITURES IN AGRICULTURAL SECTOR FOR 1981-85 PLAN PERIOD.

(MILLION OF DOLLARS)

	IRRIGATED	DRYLAND	OTHER	TOTAL
GOM	1,009	660	379	2,048
IBRD	(285)	(113)	0	(298)
AID	4	15	8	27
FAO	0	7	1.2	8.2
BELGIUM	3	0.5	0	3.5

NOTE: IBRD FIGURES ARE LOANS TO GOM AND ARE INCLUDED WITHIN GOM ESTIMATES.

4 17 (PARA 4F). WE ARE PERPLEXED BY STATEMENT THAT USAID SHOULD EXAMINE OTHER OPTIONS THAN DRYLAND SECTOR. STRATEGY HAS LONG BEEN BASED UPON FOLLOWING CONSIDERATIONS.

A. US IS ONLY DONOR WITH UNIQUE DRYLAND CAPABILITIES. IT IS THEREFORE HIGHLY APPROPRIATE THAT AID DEVOTE ITS VERY LIMITED RESOURCES WHERE WE CAN ACHIEVE WIDEST IMPACT UPON AS MANY RURAL INHABITANTS AS POSSIBLE.

B. PAST AND CURRENT LIMITED FUNDING LEVELS OF 3-4 MILLION DOLLARS ANNUALLY SIMPLY DO NOT PERMIT ADEQUATE INVESTMENT IN IRRIGATED SECTOR. BY COMPARISON, GOM EXPENDS ABOUT 200 MILLION DOLLARS AND IBRD ABOUT 60 MILLION DOLLARS ANNUALLY IN THIS SECTOR. FURTHERMORE, AID CAN OFFER NO UNIQUE TECHNICAL ASSISTANCE IN THIS SECTOR THAT IBRD AND OTHER DONORS COULD NOT.

C. EIGHT MILLION PEOPLE OR SIXTY PER CENT OF RURAL POPULATION IS DEPENDENT UPON DRYLAND AGRICULTURE WITH MAJORITY OF THESE EARNING LESS THAN 250 DOLLARS PER CAPITA. NEITHER WE NOR GOM JUDGE IT DESIRABLE TO IGNORE THIS POPULATION WHICH DEPENDS UPON CEREAL CULTIVATION AND LIVESTOCK HERDING FOR SUBSISTENCE. THE SEVERE IMPACT OF CURRENT DROUGHT, PARTICULARLY UPON INHABITANTS OF 200-400 MM RAINFALL ZONE, ONLY REINFORCE THIS JUDGEMENT.

D. FYI DRYLAND STRATEGY HAS BEEN OVER TEN YEARS IN MAKING. STRATEGY WAS FIRST OUTLINED IN JANUARY, 1975, IN OLD 1975-79 DAP. IN THIS DOCUMENT OVEREMPHASIS ON

IRRIGATED WORKS TO EXCLUSION OF VAST MAJORITY OF SMALL FARMERS WAS DISCUSSED (PP.35-36) AND STRATEGY WAS SET TO QUOTE CLOSE THE INCOME GAP AND IMPROVE THE LOT OF DRYLAND FARMERS AND HERDSMEN IN MORE BACKWARD AREAS UNQUOTE (P.72). FY 81 CDSS SUGGESTED THAT DRYLAND SECTOR BE ANALYZED IN MORE DETAIL HERCE SUBJECT PAPER. FY 82 CDSS CALLED FOR LONG RANGE GOAL FOR INCREASED DRYLAND PRODUCTION AS A LOGICAL UMBRELLA UNDER WHICH TO ORGANIZE AN AGRICULTURAL SECTOR PROGRAM (P. 40). STRATEGY WAS AGIN REITERATED IN FY 83 CDSS WITH RECOGNITION OF US COMPARATIVE ADVANTAGE IN DRYLAND DISCIPLINES RELATIVE TO OTHER DONORS (P. 23). THROUGHOUT THIS PERIOD BOTH WE AND IBRD HAVE CONSISTENTLY PRESSED THE GOM TO DEVOTE MORE RESOURCES TO THE DRYLAND REGIONS.

4A 18. (PAR 4G). WE BELIEVE PAPER ADEQUATELY DEMONSTRATES THE INTER-DEPENDENCE OF DRYLAND SUBSISTENCE ACTIVITIES AND THEREFORE HIGH PRIORITY OF FORESTRY PROJECT. WE REITERATE: MOST CEREAL CULTIVATORS RAISE SOME LIVESTOCK; MOST HERDERS RAISE SOME CEREALS; AND BOTH GROUPS DEPEND UPON FORESTED AREAS FOR GRAZING AS WELL AS FUELWOOD. EQUALLY AS IMPORTANT, THE FORESTS SUPPORT BOTH DRY AND IRRIGATED AGRICULTURE BY PROVIDING WATERSHEDS, EROSION AND SILTATION CONTROL AND STORAGE OF GROUND WATER. THE TRIPARTITE PROGRAM DESCRIBED IN PAPER IS NECESSARY TO INCREASE SUBSISTENCE CEREAL PRODUCTION, INTRODUCE FORAGE CROPS IN ROTATION, IMPORVE MANAGEMENT OF COLLECTIVE GRAZING LANDS AND CONSEQUENTLY INCREASE REFORESTATION IN AREAS RELIEVED OF GRAZING PRESSURE. RECOGNITION OF THESE RELATIONSHIPS REQUIRES CONCURRENT PROGRESS IN EACH IF FOOD AND FUEL NEEDS OF POPULACE TO BE MET AND THE NATURAL RESOURCE BASE PRESERVED.

4B 19 (PARA 4H). WE UNABLE TO UNDERSTAND WHAT QUESTION THIS PARA ADDRESSES.

7 20. (PARA 4I). WE BELIEVE PAPER MORE THAN ADEQUATELY ANALYZES ISSUES RAISED IN PARA (SEE SECTION II). PRIORITY GEOGRAPHICAL AREA IS ENTIRE AREA WEST OF A LINE DRAWN FROM TIZMIT TO Oujda EXCLUDING IRRIGATED PERIMETERS AND RELATIVELY WEALTHY AGRICULTURAL PROVINCE OF KENITRAH FES, MEKHEB AND KHEMISSSET (SEE FIGURE 1) WHERE MOST LARGE FARMS ARE LOCATED. THE PRINCIPAL SUBSISTENCE ACTIVITY OF THE MAJORITY OF RURAL INHABITANTS IN THIS AREA IS BASED UPON A MIXTURE OF DRYLAND CEREAL CULTIVATION, LIVESTOCK HUSBANDRY AND FOREST EXPLOITATION. EMPHASIS UPON PARTICULAR ACTIVITY DIFFERS ACCORDING TO RAINFALL AND TERRAIN WITHIN THE AREA. E.G., FARMERS IN SETTAT, BENSLIMANE, KHOURIBGA AND WESTERN KHENIFRA PROVINCES MARKET SOME SURPLUS WHEAT AND DEPEND LESS UPON LIVESTOCK PRODUCTION TO SUPPLEMENT INCOMES. HERDER/FARMERS IN AZILAL, EASTERN KHENIFRA AND BOULEMANE PROVINCES RAISE BARLEY FOR FAMILY CONSUMPTION BUT UTILIZE HIGHER ALTITUDE FORESTED AREAS AS SUMMER PASTURE FOR LIVESTOCK. HERDERS IN TAZA AND Oujda PROVINCES WITH LARGE HOBILE HERDS DEPEND LESS UPON CEREAL PRODUCTION FOR SUBSISTENCE. IN ADDITION TO THE THREE PER CENT OF RURAL POPULATION DIRECTLY DEPENDENT UPON FOREST EXPLOITATION IN RIF AND ATLAS AREAS, A QUARTER OF THE POPULATION ENGAGED IN ACTIVITIES DESCRIBED ABOVE DEPEND UPON FORESTED AREAS FOR FUEL AND GRAZING (SEE P.30).

8 21. (PARA 4J). A/DIR PETREQUIN TO ATTEND NEAC AND WILL PRESENT UP-DATE ON DROUGHT SITUATION AND ITS EFFECTS ON RESOURCES AND PLANNING.

22. PLEASE POUCH TWENTY (20) COPIES SUBJECT PAPER. REED