Agricultural Diversification: Implications for Crop Production-The Case in the Middle East and North Africa Region

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INTRODUCTION

The purpose of this paper is to describe briefly the work of the Agriculture Dept. of the World Bank on agricultural diversification. Diversification within agriculture and between agriculture and nonagricultural sectors has become a live issue in policy and strategy formulation in a number of developing countries. With the current low international commodity prices, all countries face the prospect of poor export earning. For some economies, the overproduction of agricultural commodities is motivating a concern for the diversification in the annual crops subsector. The contribution of weak trade potential, a price-inelastic demand for cereal crops combined with a sluggish demand world-wide, has caused deterioration in prices of cereal crops and, in time, in farm income. The countries of the Middle East and North Africa face similar conditions in the changing role of the agricultural sector and its contribution to export markets.

CHANGES IN THE AGRICULTURAL SECTOR OF THE MIDDLE EAST AND NORTH AFRICA

In this Region, agriculture continues to play a key role as a source of foreign exchange earning and employment. While declining in its contribution to the GDP (see Annexes I and II) in these countries, the agricultural sector has witnessed remarkable changes and modernization. Much of this modernization has been made in the irrigated subsector. A recent study on Jordan agriculture sums up this situation: "A wide variety of the latest products of scientific and technological advances in the world have been made available to vegetable farmers in Jordan. This has been possible because of effective and somewhat aggressive private sector companies that market these products. These inputs include plastic houses, tunnels and mulches, soil fumigation chemicals, improved hybrid varieties (including parthenocarpic varieties), drip irrigation systems, and soluble fertilizer delivered through these systems, hormones, systemic fungicides, systemic insecticides and nematicides" (Qasem,

1986). While irrigated areas constitute $\approx 12\%$ of the annual cultivated area in Jordan, they produce $\approx 65\%$ of the total value of crop production in the country. Similar situations are evolving in other countries in this region. In Tunisia, for example, 40% of current agricultural production value comes from the irrigated areas, which constitute only $\approx 5\%$ of total arable land in the country. Also, in Morocco, several World Bank sector studies indicate that the contribution of the irrigation areas to the national agricultural value added has now reached $\approx 45\%$, while these areas cover $< 10\%$ of the cultivated land.

The diversification problem facing this region is a product of advanced irrigation technology employed for the production of high-value crops, stagnant rainfed crop technology, increased domestic demand for both staple and high-value food crops, and a significant shift in labor out of agriculture as employment opportunities in other sectors are becoming available and more attractive.

A key element in the evolution of investment in agriculture is the expanding role of irrigation in the region. This region is witnessing a highly contrasted performance between the irrigation and rainfed sectors. Important progress has been made in advancing production techniques for irrigated commodities (largely fruits, vegetables, and industrial crops). An increasing proportion of the agricultural value-added is generated by the production of high-value irrigated crops. The significant growth of demand for higher-value products with high income elasticities (fruits, vegetables, and livestock products), which results from the urbanization process, has played a major role in this trend. Other factors influencing this trend include, on the one hand, stagnation of rainfed crop production caused by poor technological base and variable climate conditions. On the other hand, irrigated crop technology has advanced significantly and has made it possible for farmers to apply improved production systems and efficient water control. There does not seem to be any long-term improvements in the production of the rainfed areas of the region, which, on average, produces $\approx 80\%$ of cereals and pulses, oil seeds, and livestock. The productivity of rainfed agriculture in the region, which traditionally accounts for the bulk of the basic food supply and supports the large majority,

remains low and investment in rainfed agriculture has stagnated.

Associated with this evolution of agriculture in the region has been the continued widening of the food gap and its consequences on the agricultural trade balance. Food production in recent years has not kept pace with the increased domestic demand generated by the combination of rapid population growth, a very high rate of urbanization, and declining real prices for staple food resulting from government subsidies. This situation has led to a substantial increase in food imports and to a serious decline of the self-sufficiency ratios for major food stuffs (cereals and edible oils).

The changing role of agriculture in the economy of the region was strongly associated with parallel changes in investment in this sector. Investment in the early 1970s was in agricultural credit, rural development, and irrigation. Special attention was given to agricultural projects that created job opportunities and improved living conditions of lower income groups. More efficient use of available financial resources became a priority. The second half of the 1970s witnessed increasing concern for agricultural projects that provided adequate food supplies and improved nutritional standard. In more recent years, increasing agricultural export to reduce foreign exchange deficit became a priority, and export marketing studies were undertaken in support of this end. It has become apparent that new-style projects are needed to address the growing demand for a modern and diversified agriculture. These projects may have to be designed to adjust the agricultural development process and to reform research, extension, and marketing institutions with the objective of improving domestic food supplies, promoting export diversification and expansion, and increasing employment (Operation Evaluation Dept., 1987).

Available data on cost of production indicate that producing wheat or other cereal crops under irrigation may not be rewarding, especially when this production is challenged by both cheap imports and government's distorted pricing policies in favor of the urban consumers. Improved irrigation technology for fruits and vegetables lead to price declines that are larger in a relative sense than is the increase in output that arises from the adoption of new production technology. Thus, in the aggregate, the income to farmers can actually decline as a consequence of technological improvements. This can be a powerful source of growth for the economy as a whole, however, since consumers will benefit significantly, with increases in real incomes broadly diffused in the economy. The challenge facing producers and policymakers is largely concerned with how to diversify agriculture production for the benefit of producers while, at the same time, maintain an acceptable level of stability to the consumers at low cost intervention by the government. In the following section, I describe briefly the World Bank's experience in studying the diversification process, the approach being used in addressing main issues affecting this process, and the scope for addressing these issues.

THE WORLD BANK'S EXPERIENCE IN DIVERSIFICATION

The World Bank has recently conducted a series of studies and sector work dealing with agricultural diversification (focusing on the principal rice-producing countries of Indonesia, Philippines, Malaysia, and Thailand). A major point of concern is the dependence the agricultural economies of these countries on a very limited number of export crops, especially as they are currently facing low international market prices. The World Bank has assessed that projects currently under implementation in these countries now face unacceptable low returns to investment under forecast price. The studies also note that, from a World Bank lending portfolio perspective, an over-concentration of its lending to projects with a very limited crop range is undesirable.

World Bank studies state that, in these countries, the motivation of the governments are very important in the pursuit of crop diversification. In these economies, the governments have large financial and investment stakes in existing export and food crops. Any significant crop diversification is essentially a government decision. For export crops, this would be reflected in management de-

cisions within parastatal organizations responsible for these crops, and for annual crops, through changes in crop-specific production incentives by changing government-controlled farmgate prices and price support for farm inputs (fertilizers and machinery).

In their effort to assess the potential for diversification, these countries approached the problem in market and supply terms, but there is no evidence that market implication have been assessed in any depth. While short-term motivation seems clear to bolster export earnings through other crop options, and to reduce budgetary burden of strategic food production, the longer-term crop strategy seems to establish as broad a basket as possible. There is, however, economic policy and strategy in crop selection that have to be considered in the formulation of a diversification strategy. The World Bank studies have recognized the potential limits of current international markets for major export products, and the dependence that has been created by specialization in a limited range of export crops and import substitution crops. Diversification options considered by these countries were primarily approached in terms of production potential (the agronomic factors), with some consideration given to market forces. Thus, elements of a diversification strategy focus on how to reduce the impact of currently unfavorable market conditions by offering the international, and, in some cases, domestic markets a broader range of crops.

The World Bank assessed diversification potential in several countries by focusing on motivation for diversification, assessment of technical (agronomic and irrigation) potential for diversification, assessment of market prospects for existing and potential crops, and analysis of implications on agricultural research and extension sector policies, especially prices and subsidies for strategic food production, agricultural credit, and agricultural institution development. The studies conclude that the potential appeal of diversification is that it may identify viable areas for investment in agriculture and rural development to reduce the cost of price stabilization program, and transfer some of the burden of instability to farmers and away from the budget. Very large budgetary expenditures on behalf of stabilizing agricultural prices to keep farmers from having to adjust to external market realities are unsustainable in the long-run. A more flexible agricultural system can alleviate much of the political and economic need for such large budget expenditures.

The World Bank studies and reports have served to highlight a number of issues that need further examination within the general context of lending operations, rather than that on either a country- or region-specific basis. The first is the question of the economic rationale for diversification, and the analysis of the markets that prompts a desire to lessen the country's exposure to that market. This includes the concepts of volatility, risk, "over-exposure", and dependence. Depending of the countries level of economic development, and the intentions of development in other sectors, the strategies that would be appropriate for diversification will be different. The role of agriculture in the national economy presents contrasting examples of countries that essentially are in the same export markets. When the development strategies of some countries put future emphasis on industrial and urban growth as the major source of employment and export earning generation, the diversification strategy (within the context of vegetables and fruits and industrial crop product) tends to be very different from other countries that view these product exports as perhaps the major source of economic growth for the medium term, in conjunction with a more diversified basket of new export crops. Thus, a very clear linkage of the overall economic strategy of the country to the diversification strategy is necessary.

Related to this topic is the question of a realistic assessment of the benefits and costs of diversification-the relinquishing of market position in some traditional crop; expanding into new markets yet not having the professional manpower to adequately manage the marketing demands of such new ventures; the concept that not every diversification opportunity is clearly more profitable than existing crop opportunities, but that considerations of risk (dependence, volatility) may nevertheless make this new opportunity attractive.

The issue of current agricultural pricing and subsidy policies as a disincentive to diversification is perhaps one of the most difficult of all. This issue is central to such concepts as cereals self-sufficiency and forms the basis for much of the rural income support, or, *more often*, urban income policy.

The impact of diversification on the servicing institution and the role of the ministry of agriculture needs far more in-depth consideration from a conceptual view point. The concept of the process of diversification-the need to introduce cropping flexibility and market responsiveness and not just new crops-is very different from the directive approach to agriculture development that has been characteristic of the past 20 years in many developing countries. Some of the consequences for extension, research, agricultural credit, and the ministries of agriculture should receive in-depth attention.

An approach to analyzing the diversification process

Diversification is basically a variant of agricultural adjustment process, which is set in the context of structural change. As a long-term market-driven process, its pace is determined by government's agricultural policies, incentive structures, and extent of distortion between domestic and external markets. To be effective, these policies need a technological underpinning that would permit a more resilient resource use in order to respond to market signals. Many of the technological innovations will be predicated upon the investment in infrastructure. In other words, the objective of the diversification program is to create a more flexible agricultural system rather than to set targets for diversified crop production as national goals.

However, in the absence of perfect factor mobility, short-term income transfer measures may become necessary to smooth the adjustment process, specifically for the small farmers. An efficient agricultural structure conflicts with price stability unless nonprice signals and programs are used to move farmers out of production of certain crops when they are in surplus (at prevailing domestic prices). In the cereal-based agricultural economy, both investment policy and price policy motivate a focus on diversification. The former because of long-run uncertainties about the social opportunity cost of cereals (wheat, barley, sorghum, rice) and, hence, payoff to the investment, the latter because of short-run uncertainties about the border price of cereals and the attendant cost to the budget of defending domestic price stability. The alternative to a price stabilization program is to let farmers immediately bear the entire burden of the price decline (or consumers to bear the burden of price increases), an alternative that few countries are prepared to embrace except under extreme duress (price stabilization programs in the United States have made crop specialization much less risky and resulted in gains in efficiency for both farmers and consumers).

A very significant problem arises, however, if diversification programs are seen as target-oriented. Planners simply do not know how demand and prices will change in the future or what impact new technologies will have on relative costs. Consequently, target-oriented diversification programs run the risk of diversifying farmers into crops just as their prices fall (or, even worse, the added output causes the prices to fall), with farmers no better off than before. To avoid such short-run traps, the study approaches diversification as a process of adjustment rather than the target-oriented policy for changing crop patterns. The implications of the process-oriented approach are quite significant for the design of both short-term price stabilization policies and long-term development strategies.

The problem of diversification is inherently a problem of diversification out of agriculture. Diversification within agriculture will take place by means of regional and inter-farm specialization. Diversification out of agriculture requires higher levels of educational attainment on the part of the rural population to enable them to adequately make use of modern technology relevant to diversified agricultural systems. It also is needed for the agricultural labor force to adjust to new labor market opportunities as development proceeds...the ultimate diversification problem. This structural adjustment problem is likely to be increasingly important in

the 1990s and one that policymakers will need to deal with successfully if they want to realize the full benefits of the new production technology.

The dimensions to the diversification problem

Issues of diversification can be approached at four levels: farm, regional, sectoral, and intersectoral. My emphasis will be on sector and intersectoral level issues. At the farm and regional level, there may be valid reasons for specialization. The process of diversification at these levels is highly responsible to advancing modern crop production and water management technology. Technical issues at these levels cannot be analyzed in isolation of research priorities, extension strategies, incentives, marketing, and other macroeconomic issues determined at the sector or intersectoral levels. The following section deals briefly with four levels of analysis of the diversification process (Timmer, 1987).

Diversification at the farm level

Diversification is not a new concept for farmers. There is plenty of evidence to show that they are quite skilled in adjusting the mix of products they produce to reflect changes in the relative profitability and riskiness of each activity. In recent years, however, we have seen a definite trend towards more specialized farming systems, largely in response to changes in technology and the economic environment. Mixing farm enterprises rather than specializing is advantageous because: a) it enables resource requirements (e.g., labor) to be spread more evenly over the agricultural season (or year); b) it provides some protection against risk because low returns from one activity in one year may be partly compensated by a higher return than usual from another activity; and c) it enables the farmer to retain some flexibility in capital equipment and managerial skills for exploiting improved market opportunities, should they arise. It also enables the farmer to adjust more quickly if a market weakens or fails. Against these benefits must be offset the loss in average profits incurred by not specializing in the most profitable enterprises.

In situations where farmers are exposed to the winds of change in world markets, it may be presumed that many farmers are already making appropriate adjustments to their cropping patterns, at least to the extent permitted by technological and market considerations. The role of government in this process is two-fold. First, to do whatever it can to facilitate appropriate change at the farm level. Second, to deal with various externalities that might result from changes in the production mix at the regional and aggregate levels.

Crop diversification at the farmer level is determined by the nature of on-farm constraints, role of the extension service, opportunities for contract farming and mechanisms for organizing farmers, and the responsiveness of farmers to the various types of signals they receive.

On-farm constraints. The nature of on-farm constraints faced by farmers growing rainfed cereals in low rainfall areas is sufficiently different from the constraints that face farmers that irrigate in that decisionmaking models based on farmer behavior in crop systems may provide poor guidance to their behavior when encouraged to grow alternative crops. The relative control over the production environment provided by irrigation means that success in raising crop yields through adoption of new cultivars and heavy fertilizer applications does not translate directly into similar behavior of wheat or barley production in the rainfed areas. The relatively easy homogeneity of cereal research and extension in the rainfed areas must then give way to the risky diversity of on-farm cropping systems research. Irrigated agriculture is more diversified than rainfed farming, and crop production is more manageable. The implied corollary is that far more regional and local research would be needed.

The extension service. The implications for extension activities are equally strong. In very few settings in this region's rainfed farming areas can extension workers establish a one-to-one relation-

ship with individual farmers. There are simply too many farmers and too few extension workers. This is even more serious constraint under irrigation, where new technology and cropping practices that are extended are highly diversified for extensive areas. Can messages transmitted directly to village leaders or respected farmers be spread fairly accurately and effectively by word-of-mouth and demonstrations? Farmers using irrigation might be trying a unique combination of crops, timing, and cultivation techniques. The problems are complex. Extension agents who cannot help when problems come up, or who do not know how to grow the crops the farmers want to try, quickly lose their credibility and usefulness. Close interaction between local research stations and the extension agents is the obvious solution, but not one that can be established quickly, except on a pilot basis.

Opportunities for contract farming. One mechanism for providing appropriate technology, extension advice, and stable markets for the output is through contract farming for a central processing unit or marketing firm. Many countries are now trying to find the right set of incentives and local institutional arrangements to attract foreign and domestic investors to participate in schemes. For certain products in some locations, contract farming has been mutually profitable for farmers and processors. But, for a variety of reasons, integrating farmers into agro-processing activities has been difficult.

Responsiveness of farmers. The last issue is how to get farmers to respond to crop diversification initiatives. Information channels for prices, availability of new crop technology, and cultivation practices are likely to be quite different from crop to crop. Any crop diversification program has to deal with this reality. Several approaches would seem to be open. The first is to package the entire "deal" into a contract with a central processing facility. In some countries, cooperatives are used as a semi-autonomous arm of the government to direct farmers toward new, profitable activities. The cooperatives promise to market and process the resulting output at profitable prices for the farmers, but, frequently in such undertakings, they incur losses that must be covered by the government if the cooperative is not to go bankrupt. A more vigorous role for private-sector marketing activities is possible, especially for the new crops that may not be as storable as cereals or that have specialized quality or processing dimensions that government agencies are not skilled in meeting. However, there is a widespread distrust of the private trader throughout much of this region. Working out new arrangements for a much more active involvement of private traders and marketing agents in rural areas requires that effective competition policies be developed and enforced. One major factor keeping effective market signals from reaching farmers has been governments' attempts to limit competition in marketing, both domestic and foreign, ostensibly in the interests of domestic consumers and producers. More often than not the result has been badly fragmented and high-cost marketing systems, which work to the disadvantage of both.

Farmers are the ones who must implement crop diversification schemes. They will do so only if the new cropping patterns fit into the portfolio of choices that each farm household must make. If the government does not intervene, farmers adjust their cropping patterns when surpluses of a given crop develop, but the adjustments involve substantially lower farm incomes, potentially severe welfare effects for those farmers with few technological options, and the likelihood of inefficient investment levels and patterns for the long-term. Can government intervention make things better for farmers in the short-term and for the entire economy in the long-term? The answer depends on the role the government plays in the diversification process and on the forms of intervention it uses.

Diversification problems at regional level

The scope for diversification is affected by the ability of each region (in the country) to specialize in specific lines of enterprises based on comparative advantage. The formation of farm belts in the United States is a good example. Similar zoning of agricultural

regions also is found in Australia and some of European Economic Community (EEC) countries. Scope for regional diversification is determined by agroclimatic conditions, including suitability of the natural environment (soil, weather, water) for expanding crop production or advancing specialized technology under such environment. Crops grown in marginal environments, such as wheat in the southern section of Gezira scheme in Sudan, or on marginal rainfed areas in Jordan and Syria, may not be attractive for further investment until maximum levels of production are achieved in the high-potential zones. The other side of this approach is to analyze the production systems of a selected commodity and assess the diversity among regions where it is grown, for the purpose of determining which factors have contributed to increasing (or decreasing) efficiency of production (cost, yields, sustainability of soils fertility, etc.).

No cropping pattern is determined entirely by technology and ecological features. Part of the choice is determined by cost of production and of market demand and consumers' willingness to pay. If they are willing to pay enough, virtually any crop can be grown anywhere at any time of the year. Vegetables grown in plastic greenhouses in the Jordan Valley in winter are profitable because high-income urban consumers are willing to pay high prices for fresh produce. The production environment can be made flexible through sufficient investment in irrigation, water control, and relevant production technology and crop management under regional agro-ecological systems.

The regional diversification problems are two-fold: what is the functional relationship between investment costs and flexibility; and how should willingness to incur these costs relate to the degree of price stability for the various commodities that might be produced once the investments are made? Neither of these questions seems to have general answers. The costs of creating flexibility clearly depend on the regional environment. The irrigation systems in several parts of the region have created some of the world's most flexible farms; crop choice varies radically from season to season and year to year. At the same time, the flexibility of rainfed agriculture is rather limited and forces farmers to grow only a limited number of crops, whatever the market prospect for these crops relative to that for other crops that might be feasible if major investments were made in research and technology for rainfed fruits and vegetables.

Agricultural sector issues affecting diversification

Most of the day-to-day policy issues facing diversification efforts are addressed by the agriculture-related ministries. The framework for this policy must incorporate macroeconomic linkages, and several important farm-level issues, discussed earlier, but the agriculture sector provides the main focus for design and implementation of diversification programs. Four main topics arise: the role of the marketing sector; potential changes in the strategy and funding for agricultural research; switches in patterns of agricultural investment and the role of agricultural price policy in stimulating (or impeding) the diversification effort-

The marketing system. A fundamental principle of all successful diversification programs is that they are driven by market demand. There is no point in diversifying farmers into a crop for which the market potential is no better. Markets for new crops are very thin; significant increases in output are heavily discounted by traders who are uncertain of potential wholesale market demand; farmers lose money on their experiment with the new crop and revert to concentrating on traditional crops for which there is a guaranteed market.

The most important thing for the long-term efficiency of the agricultural sector is to invest in the basic infrastructure that permits low-cost marketing to take place. Marketing involves the transformation of the farmer's commodity in time, place, and form by storing, transporting, and processing it. Implicit in these talks is the exchange of ownership, as farmers sell their crops to traders, who sell to wholesalers, who sell to retailers, who sell to household con-

sumers. Each sale involves a potential risk, as the price paid may be too high relative to the price ultimately received at the next sale. For the entire marketing system to work efficiently, and consumers' preferences and willingness to pay to be reflected accurately back down the entire chain of transactions, there must be low-cost transportation, communications, access to credit, and institutional arrangements for sharing risks of price fluctuations. When the system is highly developed, patterns of urban and foreign demand are quickly transmitted back to the rural economy. Traders and farmers respond as quickly as their resources and technology permit.

Marketing infrastructure includes roads and trucks, railroad and rolling stock and ports and ships, but often investments are made in these facilities without conscious objectives for agricultural marketing. Highways opened for defense purposes offer export outlets previously unavailable; railroads built to carry minerals also move cereals and cotton; port facilities built to import wheat also can export canned vegetables and agricultural products. The policy issue is whether the economic potential of increases in agricultural marketing is adequate to justify substantial additional investments in these types of infrastructures. The mirror question is whether any significant diversification can take place without such infrastructures in place. Only specific analysis can answer these questions, but it is important to set the analysis in the appropriate context. Potential gains in flexibility of the agricultural economy made possible by diversification do not show up automatically in the cost-benefit appraisal of such investments in infrastructure. Analysts must find innovative techniques for incorporating such potential gains in efficiency (and income distribution).

Agricultural research strategy. Without productive agricultural technologies for crops and livestock no diversification program can succeed for long. Most of the countries in the region's agricultural research system have focused heavily on cereal production. This bias needs to be redressed in such a way that raising productivity in cereal cultivation is not jeopardized. There are two problems. First, most agricultural scientists in these countries are "crop-specific". They are either plant breeders (wheat and barley breeders) or specialists in diseases and pests affecting these crops. Second, many of the potential crops involved in a diversification program are not grown as specialty crops in monocultures, but will be integrated into a complicated multiproduct farming system. Relatively few scientists are trained in techniques for research on such complicated systems, and the methodologies for evaluation are not well-developed. It is unrealistic to expect substantial breakthroughs on new crop technologies from these research efforts before the end of this century.

Even with a more flexible and broader agricultural research program underway, the question of which crops to work on is difficult to answer. There are dozens of potential tree crops producing fruits, nuts, spices, and beverage products. There may be hundreds of vegetables that are produced and consumed in this region and in Europe, each with an unknown potential. Even staple crops such as corn, barley, soybeans, oil seeds, and a wide variety of legumes have received little research attention in the region: they offer opportunities for highly profitable diversification if cost-reducing and yield-increasing technologies can be made applicable to the constraint on farmers' cropping systems. Coordination of regional research centers by the CGIAR has helped establish some priorities for crop research, but only for the handful of most important food staples. Much more local attention to local crops and environments are needed to create more flexible production possibility frontiers in agriculture.

The intersectoral level of diversification

At the intersectoral level, diversification implies that the rural population seek better income-earning prospects of the farm or outside of agriculture. Such changes are desirable as a long-term response, but might be quite tumultuous in the short-term. The implications at this level are complex. The countries involved have to become more human-intensive than they presently are. All the evi-

dence we have is that investing in human capital has a very high social rate of return. To move in this direction means that heavy investment should be directed to expand nutrition program, to expand lending for education at all levels, and to increase lending for rural services, industry and technology. Increasing investments in nutrition will increase significantly the productivity of the labor in these countries. Higher levels of educational attainment on the part of the rural population in particular are needed to make use of that technology. It is also needed for the agricultural labor force to adjust to new labor market opportunities as development proceeds-the ultimate diversification problem, but one that the countries of this region are already facing.

Objectives of studying the diversification process by the World Bank

The main objectives as the study are to:

- provide sufficient background material to indicate there is in fact a diversification problem, what its dimensions are, and what its consequences are;
- provide an analytical framework for addressing the problem;
- Do the analysis to identify what barriers are impeding diversification;
- Develop a policy framework that will facilitate diversification;
- Identify what measures the bank might take to facilitate diversification.

The message of the study

The study will try to examine the following main points on the basis of available documents from the World Bank and other international and national agencies, as well as discussions with operational staff in the bank.

The main points are: Diversification is a long-term market driven process of agriculture adjustment that: a) is a desirable feature in agricultural development that can be advanced through proper investment in this sector (infrastructure, education, and training); b) is highly sensitive to policy objectives, especially for food security, economic distribution, and short-term price stability; c) is highly responsive to investment in research, extension, and modern irrigation systems; d) can reduce cost of price stabilization by making a new technology available for improved crops, irrigation, and livestock production leading to more-flexible agricultural systems; e) is determined initially by the forces of domestic marketing; f) can be advanced by the development of an efficient agro-industrial sector; g) requires well-planned investment strategy and financial resources (credit) to meet the needs of farmers and the private sector in their efforts to introduce new crops and new agro-industry; and h) is dependent on efficient systems of national and international market information on supply, demand, source of high-quality of raw materials, and on reliable markets.

ANNEX I

The changing role of agriculture in the economy of selected countries in the Middle East (Algeria, Egypt, Morocco, Tunisia, Jordan, Syria, and Turkey)

In these countries, the role of agriculture in the economy has been declining over the past several decades. Turkey has experienced a sharp decline in the contribution of its agricultural sector to the national GDP, which accounted for 41% of total GDP in 1950-60 and only 19% in 1985. Indeed, agriculture now has a subordinate role compared to industry. These countries can be divided in two main groups; Jordan and Algeria in which agriculture's share in GDP is <10%, and the other five countries, in which the share of agriculture in GDP is between 17% and 20%. In Tunisia, the relative decline of agriculture has been due to the more rapid growth of

other sector. particularly petroleum, manufacturing, and tourism. In Morocco, incremental agriculture's value comes more from irrigated areas, whereas rainfed areas still give poor performances. In Egypt, a large share of agricultural surplus was diverted for investments outside the sector.

Economically, active population in agriculture has been declining compared to total active population. In 1965, the ratio was between 35% and 75%; in 1985, it was between 5% and 50%. In Jordan, the agriculturally active population represents only 6% of total active population. In Algeria, Syria, and Tunisia the ratio is between 25% and 30%. In Morocco, Egypt, and Turkey, the ratio is between 40% and 50%. It can be noted that, although in Jordan and Algeria the agricultural sectors have the same share in GDP (i.e., 8%), active agricultural population is relatively more socially important in Algeria (24%) than in Jordan (6%).

Value of agricultural exports has decreased. They accounted for 20% to 85% of value of total exports in 1967-79, and for only 1% to 40% in 1985. In Turkey, they still represent 43% of value of exports, much more than in the other countries studied. In Syria, Morocco, Egypt, and Jordan, agricultural exports share was between 15% and 25%, and in Algeria and Tunisia, 1% and 7%. This general decline is due mostly to unfavorable trade conditions and governmental disincentive policies. Value of agricultural imports has diminished nearly by half in Turkey and Tunisia, and slightly in other countries. It represents 35% in Egypt; 20% in Jordan, Morocco, Algeria and Syria; 15% in Tunisia; and 4% in Turkey.

ANNEX II

The following tables indicate that, although the share of agriculture in total GDP is largely similar in the countries studied, except for Jordan and Algeria (8% only), there is a significant difference among these countries population. In Turkey, Egypt, and Morocco, about 40% to 50% of their active population is still active in agriculture. These three countries have agricultural exports that account for >17% of value of total exports. In Jordan, the agriculturally active population represents only 6% of total active population, and agriculture only 8% GDP, but agricultural exports account for 25% of total exports. Egyptian agricultural exports account for 23% of the value of total export, but agricultural imports still share an important place in total imports (35%).

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ANNEX II

Share of Agriculture in total GDP (in percentage)

	Average 1950-59	1960-70	1970-80	1975	80	85
EGYPT	30	29	25	29	21	20
TURKEY	41	34	24	29	23	19
SYRIA	N/A	25	19	19	18	22
MOROCCO	23	22	18	18	18	18
TUNISIA	N/A	20	18	21	16	17
JORDAN	N/A	N/A	10	10	8	8
ALGERIA	16	13	7	9	6	8

From { World Tables (1983)
 { World Development indicators (85)
 { FAO socio-economic indicators (84)

Economically active population in agriculture as percent of total economically active population

	1965	1970	1975	1980	1985
TURKEY	75	71	65	58	52
EGYPT	55	52	49	46	42
MOROCCO	61	58	51	46	40
TUNISIA	49	42	38	35	32
SYRIA	52	50	41	32	25
ALGERIA	57	47	39	31	24
JORDAN	37	28	19	10	6

From FAO Production Yearbook (1985)

ANNEX III

Value of Agricultural Exports as percent of value of total exports

	1967-70	1971-80	1981-84
TURKEY	86	69	43
JORDAN	47	33	25
EGYPT	69	51	23
MOROCCO	48	31.5	17
SYRIA	78	36	15
TUNISIA	34	22	7.5
ALGERIA	19	5	1

Value of Agricultural Imports

TURKEY	8	5	4
TUNISIA	28	19	15
SYRIA	34	28	21
ALGERIA	20.5	19	21
MOROCCO	27	25	21
JORDAN	34	28	21
EGYPT	36	38	35.5

From FAO Trade Yearbook (1985)

Self-sufficiency ratio: calories domestically produced as percent of total calories supply

	1967-70	1971-80
TURKEY	100	102
SYRIA	93	94
MOROCCO	98	86.5
TUNISIA	80,5	85
EGYPT	91	84
ALGERIA	85	67
JORDAN	63	48

From FAO socio-economic indicators (1984)

Investment in agriculture as percent of total expenditure

	1975	1977	1979	1981	1983
MOROCCO	1,7	2,4	7,2	7,0	5,4
TUNISIA	1,0	8,0	12,6	17,0	N/A
EGYPT	5,2	4,1	5,4	4,6	4,7
SYRIA	6,2	4,4	7,8	4,7	N/A
JORDAN	3,5	1,8	1,4	1,6	4,3
TURKEY	N/A	2,8	2,1	N/A	2,0

From Government Finance Statistics Yearbook. IMF (1985)

Changes in Production Area, and Yield of Major Commodities (1974 - 1985)

WHEAT

	1974-76	1979-81	1983-85	Annual Growth in %
PRODUCTION (in million tons)				
TURKEY	14,16	17,05	16,90	+ 1,7
SYRIA	1,65	1,87	1,46	- 1
JORDAN	0,12	0,06	0,08	- 3
MOROCCO	1,87	1,30	2,11	+ 1,1
EGYPT	1,96	1,86	1,89	- 0,3
ALGERIA	1,52	1,27	1,21	- 1,8
TUNISIA	0,86	0,83	0,90	+ 0,4
AREA HARVESTED (in million ha)				
TURKEY	9,14	9,26	9,09	- 0,04
SYRIA	1,60	1,38	1,46	- 0,7
JORDAN	0,15	0,11	0,26	+ 6,6
ALGERIA	2,24	1,94	1,81	- 1,7
MOROCCO	1,84	1,67	1,87	+ 0,1
TUNISIA	0,96	0,88	0,95	- 0,09
EGYPT	0,58	0,57	0,51	- 1,09
YIELD (in million ton/ha)				
EGYPT	3,36	3,22	3,67	+ 0,8
TUNISIA	0,89	0,94	0,93	+ 0,4
MOROCCO	1,01	0,89	1,12	+ 0,9
ALGERIA	0,68	0,65	0,65	- 0,4
TURKEY	1,54	1,84	1,85	+ 1,8
SYRIA	1,03	1,35	1,35	+ 2,8
JORDAN	0,76	0,60	0,95	+ 2,2

VEGETABLES

	1974-76	1979-81	1983-85	Annual Growth in %
PRODUCTION				
TURKEY	10,43	13,34	14,89	+ 3,8
SYRIA	2,04	2,97	3,06	+ 4,5
JORDAN	0,31	0,43	0,52	+ 6,1
EGYPT	6,35	7,29	8,12	+ 2,5
MOROCCO	1,22	1,33	1,39	+ 1,2
TUNISIA	0,88	1,04	1,20	+ 3,3
ALGERIA	0,67	0,88	1,05	+ 5,1
FRUITS				
PRODUCTION				
ALGERIA	1,51	1,19	1,16	- 10,9
EGYPT	2,04	2,30	2,90	+ 3,8
MOROCCO	1,35	1,53	2,03	+ 4,5
TUNISIA	0,46	0,51	0,53	+ 1,3
JORDAN	0,04	0,09	0,10	+ 13,6
SYRIA	0,52	0,73	0,94	+ 7,3
TURKEY	6,35	7,66	8,24	+ 2,7

PULSES

	1974-76	1979-81	1983-85	Annual Growth in %
PRODUCTION				
TURKEY	0,69	0,81	1,35	+ 8,6
SYRIA	0,21	0,18	0,16	- 2,1
JORDAN	0,02	0,008	0,009	- 5
EGYPT	0,34	0,28	0,37	+ 0,8
MOROCCO	0,54	0,23	0,24	- 5
TUNISIA	0,08	0,08	0,10	+ 2,2
ALGERIA	0,06	0,05	0,04	- 3
AREA HARVESTED				
TURKEY	0,59	0,71	1,35	+ 11,7
SYRIA	0,26	0,22	0,21	- 1,7
JORDAN	0,03	0,01	0,01	- 6
MOROCCO	0,57	0,38	0,64	+ 1,1
EGYPT	0,16	0,14	0,17	+ 0,5
ALGERIA	0,09	0,11	0,12	+ 3
TUNISIA	0,14	0,15	0,14	-
YIELD				
EGYPT	2,05	2,00	2,11	+ 0,2
TUNISIA	0,55	0,55	0,74	+ 3,1
MOROCCO	0,95	0,59	0,38	- 5,5
ALGERIA	0,69	0,43	0,35	- 4,5
TURKEY	1,16	1,13	1,00	- 1,2
SYRIA	0,80	0,81	0,78	+ 0,2
JORDAN	0,71	0,62	0,71	-

SEED COTTON

	1974-76	1979-81	1983-85	Annual Growth in %
PRODUCTION				
TURKEY	1,34	1,26	1,40	+ 0,4
SYRIA	0,40	0,34	0,48	+ 1,8
JORDAN	-	-	-	-
EGYPT	1,10	1,34	1,12	+ 0,1
MOROCCO	0,01	0,01	0,02	+ 9
ALGERIA	0,001	-	-	-
TUNISIA	-	-	-	-
AREA HARVESTED				
TURKEY	0,69	0,64	0,66	- 0,3
SYRIA	0,19	0,14	0,17	- 0,9
EGYPT	0,56	0,50	0,42	- 2,2
MOROCCO	0,01	0,01	0,01	-
ALGERIA	0,001	-	-	-
YIELD				
SYRIA	2,03	2,33	2,79	+ 3,4
TURKEY	1,92	1,96	2,13	+ 0,9
JORDAN	0,92	-	-	-
EGYPT	1,94	2,64	2,66	+ 3,3
MOROCCO	1,15	1,55	2,07	+ 7,2
ALGERIA	0,88	0,61	-	-

BARLEY

Source: FAO Trade Yearbook (in million tons)

	1974-76	1979-81	1983-85	Annual Growth in %
<u>PRODUCTION</u>				
TURKEY	4,24	5,48	6,14	+ 4
SYRIA	0,77	1,12	0,79	+ 0,2
JORDAN	0,02	0,02	0,02	-
MOROCCO	2,27	1,71	1,57	- 2,8
ALGERIA	0,55	0,69	0,77	+ 3,6
TUNISIA	0,25	0,27	0,43	+ 6,5
EGYPT	0,11	0,11	0,14	+ 2,4
<u>AREA HARVESTED</u>				
TURKEY	2,59	2,85	3,13	+ 1,3
SYRIA	0,96	1,22	1,39	+ 4
JORDAN	0,05	0,05	0,05	-
MOROCCO	2,02	2,19	1,50	- 2,3
ALGERIA	0,82	0,87	0,95	+ 1,4
TUNISIA	0,36	0,45	0,60	+ 6
EGYPT	0,04	0,04	0,05	+ 2,2
<u>YIELD</u>				
EGYPT	2,77	2,68	2,66	- 0,3
ALGERIA	0,67	0,78	0,77	+ 1,3
MOROCCO	1,12	0,78	0,74	- 3
TUNISIA	0,70	0,60	0,69	- 0,1
TURKEY	1,53	1,91	1,95	+ 1,7
SYRIA	0,80	0,92	0,55	- 2,9
JORDAN	0,38	0,39	0,51	+ 3,1

	1974-76	1979-81	1983-85	1974-76	1979-81	1983-85
<u>CEREALS</u>						
TURKEY	0,006	0,74	1,15	0,62	0,11	0,94
JORDAN	0,002	0,04	0,05	0,22	0,55	0,70
SYRIA	0,02	0,04	0,01	0,31	0,74	1,62
EGYPT	0,15	0,09	0,03	3,39	6,35	8,54
MOROCCO	0,03	0,01	0,005	1,21	2,07	2,35
ALGERIA	0,0007	-	-	2,06	3,21	4,36
TUNISIA	0,05	0,001	-	0,34	0,89	0,97
<u>MEAT</u>						
TURKEY	0,01	0,01	0,06	-	-	0,006
JORDAN	0,0005	0,0001	0,0001	0,004	0,01	0,03
SYRIA	0,00005	-	-	0,004	0,002	0,002
MOROCCO	0,002	0,002	0,001	0,0008	0,004	0,004
TUNISIA	0,0008	0,00008	0,0001	0,001	0,005	0,01
EGYPT	0,00004	0,00009	0,00002	0,01	0,14	0,27
ALGERIA	0,00007	-	-	0,001	0,01	0,03
<u>VEGETABLE*</u>						
TURKEY	0,003	0,08	0,25	-	-	-
JORDAN	0,06	0,13	0,12	0,007	0,01	0,04
SYRIA	0,02	0,004	0,005	0,03	0,06	0,01
EGYPT	0,08	0,03	0,03	-	-	-
MOROCCO	0,13	0,09	0,08	-	-	-
ALGERIA	-	-	-	-	-	-
TUNISIA	0,00009	0,0004	0,0006	-	0,00003	-

* VEGETABLE - TOMATOES & ONIONS

Changes in Major Agricultural Export in the Region (1974 - 1985)

EXPORTS (FAO - million tons)

	1974-76	1979-81	1983-85	Annual Growth in %
<u>CEREALS</u>				
TURKEY	0,006	0,74	1,15	+ 1733,3
JORDAN	0,002	0,04	0,05	+ 218,1
SYRIA	0,02	0,04	0,01	- 4,5
EGYPT	0,15	0,09	0,03	- 7,2
MOROCCO	0,03	0,01	0,005	- 7,5
ALGERIA	0,0007	-	-	-
TUNISIA	0,05	0,001	-	-
(1) <u>WHEAT</u>				
TURKEY	0,004	0,57	0,39	+ 877,2
JORDAN	0,001	0,02	0,05	+ 445,4
(3) <u>BARLEY</u>				
SYRIA	0,02	0,04	0,01	- 4,5
TURKEY	-	0,15	0,33	-
(4) <u>RYE</u>				
TURKEY	-	0,007	0,007	-
(5) <u>RICE</u>				
JORDAN	-	0,0009	0,00005	-
EGYPT	0,15	0,09	0,03	- 7,2
<u>MEAT</u>				
TURKEY	0,01	0,01	0,06	+ 45,4
JORDAN	0,0005	0,0001	0,0001	- 7,2
SYRIA	0,00005	-	-	-
MOROCCO	0,002	0,002	0,001	- 4,5
TUNISIA	0,0008	0,00008	0,0001	- 7,9