WORLD BANK RESPONSE TO THE BRANDT COMMISSION

RECOMMENDATION ON AGRICULTURE AND FOOD

Economics and Policy Division
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Contents

I. INTRODUCTION ................................................................. 1

II. OUTLOOK FOR WORLD FOOD SUPPLY ..................................... 2

Consumption and Trade ..................................................... 2
Food Distribution and Nutrition ......................................... 6
Agricultural Production .................................................... 10

III. COMMISSION RECOMMENDATIONS ON FOOD AND AGRICULTURE .......... 12

Specific Proposals for Action ............................................. 15

Institution building ......................................................... 16
Agrarian reform ........................................................... 17
Farming systems and agricultural research ......................... 18
Supplies of agricultural inputs .......................................... 19
Fisheries development .................................................... 20
Forestry and rural energy ................................................. 21
Storage and marketing infrastructure ................................ 22
Rainfed agriculture ......................................................... 23
Water resource development ............................................ 24

ANNEX I Tables
I. INTRODUCTION

1. The Brandt Commission Report calls for a concerted action program to put an end to mass hunger through a series of measures to assist "low-income food-deficit" countries. It recommends the large-scale transfer of financial and technical resources as an essential part of an effort to abolish hunger from the world. It proposes that such a program should focus particularly on the low-income countries of the "poverty belts" whose population numbers around 1.4 billion. The intermediate goals suggested are increased self-sufficiency in food production, removal of onerous food import burdens and provision of reliable supplies through freer trade and the creation of buffer stocks.

2. The program proposed by the Commission comprises short-run measures to meet the immediate food needs of the "low-income food-deficit" countries, as well as longer-term measures in resource development, support services for agriculture and rural structural change. The primary thrust is seen as the abolition of hunger through:

   (i) major improvements and expansion in soil and water management, particularly irrigation;

   (ii) increases in the flow and quality of inputs to agriculture;

   (iii) additional infrastructure and more efficient institutional arrangements to facilitate storage and distribution of food;

   (iv) freer international trade in food together with the creation of buffer stocks; and

   (v) better income distribution to increase purchasing power of the nutritionally vulnerable groups in each country.

3. In response to these proposals this paper: (i) examines the current outlook for world food supplies and reassesses priorities in this context; (ii) reviews the measures proposed by the Commission for this sector.
and outlines what is being and can be done in response to them; and (iii) on
the basis of the foregoing, proposes a major Bank initiative in the area of
water resource development.

II. OUTLOOK FOR WORLD FOOD SUPPLY

Consumption and Trade

4. There have been significant recent developments in the world food
situation which, when viewed collectively, somewhat modify the scenario
presented in the Brandt Commission Report. In the early 1960s many analysts
suggested that population growth would be the critical determinant of increased
demand for food exports. In fact, rising incomes in the more affluent
countries of Europe, East Asia and Latin America, not population growth,
proved most important. As incomes rose so did consumption of higher value
foods including tropical products, vegetables and, most important of all,
livestock products from grain fed animals. The resulting increase in livestock
production had a profound effect on international trade. In the early 1950s
only about 5% of total grain production entered world trade and very little of
this was used for feed. Since then international trade in grain has grown by
about 6% a year, twice the rate of increase in global output. The proportion
of total grain consumption going to livestock has grown from less than 20% in
the 1950s to more than 40%. Today more grain is fed to animals than is
consumed by the 1.4 billion people living in low income countries (Annex Table 1).

5. Concurrently, international grain prices have shown increased
instability in recent years. This is caused in part by the agricultural
support policies in various OECD countries and the Soviet Union. The EEC and
Japan have kept their farm sectors isolated from world price variations
through the use of import quotas and substantial subsidies, exporting surplus
production (with export subsidies) or relaxing quotas to ensure supplies.
Similarly, the USSR has used imports on a large scale in recent years as
its source of residual supply. Both sets of policies have tended to transmit internal production instabilities to the world market (Annex Table 3).

6. Middle income countries. The major expansion of grain imports has come from middle income developing countries. Growth in demand has been steady, reflecting in large part the increase in consumption of livestock products and the growth of urban populations. In particular, oil countries have achieved a dominant position taking approximately 60% of total incremental wheat imports in 1976-79. For the middle income countries as a whole, approximately 250 million more people are living in cities today than in 1960. About half of total cereal consumption in these cities is now imported. Given the likely continued shift of diets to wheat and animal products, and because current Soviet imports may be approaching the maximum possible with present port capacity, middle income importers should account for half to three-quarters of total incremental food imports through 1985.

7. Middle income countries have shifted away from concessional imports and are now buying on commercial terms. As Table 4 shows, most grain exports to developing countries in the early 1960s were on concessional terms; today the middle income countries buy more than 95% of their grain at full commercial rates. At the same time, total export earnings of these countries have risen faster than the cost of food imports. The proportion of total foreign exchange earnings devoted to cereal imports by the middle income countries has, despite the shift to commercial purchasers, dropped by about one-fifth since the early 1960s.

8. The low income countries: The food situation in the low income countries is a striking contrast to the trend in middle income countries toward

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1/ Defined as those with average GDP per capita at no more than $360 (1978), as in WDR III.
greater dependence on trade and increased feed grain consumption. Usually less than half of total food produced in these countries enters commercial market channels and over a billion individuals depend largely on the output of their own small farms for their food supply. Production statistics for such countries are frequently questionable and it is difficult to judge progress since the 1960s. Perhaps 500 million people living in these areas depend on non-cereal, traditional crops for a significant proportion of their consumption in normal years. When cereal harvests fail, an even larger proportion of the diet comes from these crops for which there are few reliable production statistics. It is in these relatively autarkic food systems that the great bulk of the absolute poor live and where the Commission wants additional aid efforts to be focused.

Some studies tend to over-emphasize the financing problems associated with low income country imports of food. Self-sufficiency levels of the low income countries as a whole have not declined, although the position of particular regions has worsened in terms of the net cereal trade balance (Annex Tables 5 and 6). The perception is widespread that the low income countries are becoming seriously burdened by foodgrain imports. In fact, these countries are not only marginal actors in the international grain economy but foodgrain import bills have remained a modest burden in foreign exchange terms. Most of their foodgrain imports are obtained on concessional terms so that the proportion of total export earnings devoted to purchases of commercial cereal imports has remained constant or declined over the last twenty years. Taken together, foodgrain import costs for these countries are less than 20% of their export earnings from agriculture and about 5% of total foreign exchange earnings. More important are the specific situations at a country or sub-regional level.

1/ The food import bill contrasts with the real burden imposed by petroleum imports. In 1960 the cost of energy and food imports were roughly equal. Today petroleum imports of these countries cost five times commercial foodgrain imports.
- **India.** Per capita food production has improved significantly as has the stability of production. The determinants of this change are numerous and complex, but the expanded use of irrigation and fertilizers has played a major role. On the other hand, the pattern of growth within India has been extremely uneven with per capita production remaining stagnant in many of the poorer subsistence farming states. Grain surpluses, generated in the northwestern states in particular, have replaced imports, placing considerable strains on internal distribution systems.

- **Other South Asia.** The foodgrain situation in Bangladesh has not improved significantly since the early 1970s and average per capita production remains below levels achieved prior to Independence. However the natural resource base is adequate to provide the potential for self-sufficiency in foodgrains. Elsewhere in South Asia per capita production has remained relatively stable in recent years. Pakistan continues to earn more from its rice exports than it pays for wheat imports.

- **Indonesia.** Food production per capita has shown little increase in recent years, although it is up slightly from the early 1960s. Steadily increasing imports reflect income growth, particularly in urban areas. Indonesia has become the world’s largest importer of high quality rice and has used its market strength to obtain favorable prices.

- **Other Southeast Asia.** Several other countries of Southeast Asia have shifted from being important rice exporters to large importers. The performance of their food sectors has been highly unsatisfactory. Serious food shortages and deprivation are widespread. Political disturbances have prevented effective utilization of a generally favorable natural resource base. Kampuchea’s per capita output appears to be roughly one-tenth that of 15 years ago.

- **Sahelian Zone, Ethiopia and Somalia.** These countries have suffered a serious decline in food grain self-sufficiency and an equally disastrous fall in output of livestock products from pasture lands. Some studies suggest that the problem relates to long-term climatic shifts. Others suggest more mutable causes. Average import levels equal urban consumption with little external food reaching the countryside.

- **High Growth Subsaharan Africa.** These countries, comprising Burundi, Kenya, Madagascar, Rwanda, Sudan and Tanzania, have, at least until recently, increased per capita food production at rates above those in India. The most productive subregions of these countries can be compared favorably to the surplus states of India and Pakistan.
Low Growth Subsaharan Africa. While possessing comparable resource endowments to countries with more satisfactory rates of growth, these countries, including Angola, Benin, Mozambique, Togo, Uganda and Zaire, have not been able to increase per capita food or agricultural production. Roughly three quarters of all urban food consumption is imported as compared to almost complete self-sufficiency 20 years ago. Agriculture’s unsatisfactory performance, in large part, must be attributed to political instabilities.

Food Distribution and Nutrition

10. Increased food supplies are a necessary, but not always sufficient, condition to ensure adequate nutrition. Experience with low income countries suggests that even if per capita food supplies are increased the incidence of malnutrition can rise in the short run. The major problem is limited access to food, frequently reflecting inadequate purchasing power. Education and social factors also play a role. Recent surveys indicate that the majority of those malnourished are children. Evidence suggests that: (i) the absolute number of those seriously malnourished at some time during the year has increased over the last twenty years; (ii) given prevailing social structures, likely patterns of asset or income distribution, and realistic growth scenarios for low income countries, the absolute number of malnourished cannot be expected to decrease significantly through the current process of economic development; and (iii) it is extremely difficult to ensure adequate nutrition in isolation from effective action on the general problem of poverty.

11. Governments of most low income countries have attempted to increase the food security of vulnerable groups through extra market interventions in pricing and distribution. The most common instrument is subsidized retail prices to benefit urban consumers. Studies of such programs indicate that

1/ The assured provision of minimum nutrition throughout the year at acceptable prices.
operating costs are relatively high (in the order of $70-100 per ton distributed) but that it is possible to benefit the poor. However, such programs usually benefit only urban consumers and are often financed by implicit taxes on rural areas and farmers. Evidence about targeted feeding schemes is less encouraging. It appears that intra-household leakages are frequently sufficiently large to make such programs uneconomical.

12. In many areas of Asia and Africa malnutrition is largely a rural phenomenon. The effect of the Green Revolution technologies on income distribution in rural areas is controversial, although there is no doubt that they have significantly increased the overall volume of food production. Ex-post analysis of irrigation projects in South and East Asia has documented the substantial indirect employment benefits from intensifying output. Recent studies by the International Rice Research Institute (IRRI), the Center for Research in Maize and Wheat (CIMMYT) and the International Food Policy Research Institute (IFPRI) show that the principal beneficiaries from increased farm productivity generated through the adoption of new technologies are low income consumers who typically spend a disproportionate amount of total income on staple foodstuffs and thereby gain from lower prices. In many instances small farmers have been able to increase their own output and real incomes. But for producers in areas not well adapted to high yielding varieties of cereals, the Green Revolution has produced few benefits.

13. Existing efforts to reduce poverty by raising rural productivity have generally focused on helping those who have access to land. There are millions of people in the rural areas who either do not have access to land or whose holdings are too small to sustain themselves and their families. Today
perhaps a third of all rural inhabitants are primarily engaged in non-farm activities. The plight of the landless has proved most difficult to alleviate directly. Without improved access to land or other assets, the prospects for many of the landless remain bleak. Moreover, employment and poverty problems in the rural sector cannot be resolved on their land alone. Productive opportunities to absorb migrants arriving in central and regional urban areas as well as off-farm rural employment are also essential.

14. Rural malnutrition is inexorably linked to more general problems of poverty and agricultural development. No simple methods exist to eliminate inequitable patterns of asset ownership, changing adverse ecological circumstances or inadequate marketing infrastructure necessary to move food into deficit areas. The scope for direct action programs to effectively address consumption problems in rural areas is limited. Experience indicates that increased food production and greatly enhanced food distribution infrastructure are prerequisites to reducing malnutrition in these areas. Effective measures to reduce rural malnutrition require consideration of:

- **Seasonal malnutrition.** Intra-seasonal variation in nutritional well-being is a central problem in rainfed farming systems in many areas. The "hungry season" phenomenon has been correlated with higher child mortality and other indirect measures of malnutrition. Intra-seasonal price variations often exceed the real costs of storage and can result in pricing low income consumers out of the market during certain times of the year.

- **Micro famines and shortages.** Understanding is limited of price formation in small-scale, modernizing farming systems. Field work in various countries supports the view that interseasonal variations in the output of a particular production/marketing unit (generally an isolated village) can cause serious hardship to small producers and increase malnutrition. ICRISAT has documented the disincentive effect of variable weather conditions and the inability of many local marketing systems to move surpluses to deficit areas.
National security reserves. Emergency stockpiles have had important benefits in times of tight supply. India’s recent experience confirms this. However the relatively high cost of maintaining such reserves ($45-80 per ton per year) has prompted a serious re-examination of their economic efficiency. Even more important, low income countries have found that inadequate internal distribution systems frequently prevented the timely use of existing stockpiles outside of urban centers. Increasing imports has proven equally effective and far less costly a mechanism for maintaining per capita food consumption than using emergency stockpiles. A poor crop will provide adequate food for rural population for some months immediately after the harvest, and most importing countries have adequate stocks to cover urban demand for the two months it takes to arrange imports. With certain exceptions, present buffer capacity in developing countries is adequate. Incremental managerial and financial resources could better be used to improve the efficiency of the food distribution pipeline.

Global food security and market stabilization reserves. In assessing the level of total global interseasonal stocks needed to guard against production shortfalls or price swings, a number of critical conditions must be considered: (i) overall production remains relatively stable in the developing countries as a whole; (ii) substantial global production variations and associated export price fluctuations primarily result from exceptional variations in yields in the USSR or North America; (iii) support policies in the USSR, EEC and Japan which keep domestic feedgrain consumption steady have the effect of transferring domestic production instabilities into the world market; and (iv) a cataclysmic fall in world output that could only result from an unprecedented level of uniformly poor weather could be compensated for by diverting part of the 500 million tons of grain used to feed livestock. The indications are that buffers for stabilizing commercial export prices or mitigating the effects of world production shortfalls will have only a marginal impact on food security in individual developing countries, particularly where those most prejudiced by shortage are found largely in rural areas.
Agricultural Production

15. *Sources of growth.* In the middle 1960s the advent of the Green Revolution technologies, and the synergism between water and fertilizer, fundamentally altered the structure of agricultural production in developing countries (Annex Table 9). Area expansion became relatively less important as a source of growth. In South Asia about 75% of total incremental output was the result of higher yields or double cropping. In the high growth regions of Subsaharan Africa more than half of incremental production was the result of higher yields; elsewhere (including the Sahel) the figure was about a third. The rate of area expansion continued to slow in the 1960s and the 1970s. Most of the expansion of cultivated area occurred in Subsaharan Africa.

16. FAO has estimated that almost 80% of total cereal yield increase since the middle 1960s in developing areas is due to incremental fertilizer use and better water management. Nutrient consumption of chemical fertilizers has increased by about 15% each year. High growth developing countries use twice as much fertilizer per hectare as lower growth countries and use water more effectively at the farm level. India today uses seven times as much fertilizer per hectare of farmland as it did 15 years ago and the area irrigated has increased by over a third. The low income developing countries as a group consume three times as much fertilizer as they did in the mid-1960s and probably twice as much water from irrigation systems. Despite these growth rates, fertilizer application and water usage remains much below optimum levels.
17. **Constraints to growth.** It is difficult to generalize about the constraints to increasing production by large numbers of small producers in ecologically different circumstances. However, several general points have emerged from Bank experience:

... There is no substitute for suitable price policies. Farmers require a credible assurance of adequate returns before undertaking the effort required to increase productivity.

... Domestic resource mobilization is important. In most countries the scale of public investment in agriculture has not kept pace with requirements and in some areas has not even matched physical depreciation rates. Typically, the investment rate in agriculture, in proportion to GDP, is about half that for the economy as a whole despite evidence that the returns to agricultural investments are no less, and frequently higher, than those in other sectors.

... The weak administrative capacity of authorities in implementing agriculture projects has proven to be a critical bottleneck. Government priorities in the allocation of scarce managerial resources are frequently as important to project success as the availability of financial resources.

... Low cost investments can have a large impact on agricultural productivity. The two most important examples are extension and research. Well-designed, low-cost extension programs can raise small farmer yields by a third. Returns to adaptive agricultural research are similarly large.

... Private sector investments in agriculture are important and depend critically on a favorable economic environment in the sector. Experience with irrigation projects has shown that on-farm private investments which account for a small proportion of total expenditure, are crucial. Private investments in marketing and distribution systems for production inputs have proven equally important.

... All high growth regions within the low income countries have had the advantage of better developed distribution infrastructure and markets. Experience has shown that these are prerequisites for subsistence farmers to begin producing and selling surpluses.
III. COMMISSION RECOMMENDATIONS ON FOOD AND AGRICULTURE

18. In contrast with the foregoing, the Commission sees little progress in improving the world food situation in either consumption or production terms. The "low-income food-deficit" countries are seen to be characterized by chronic, and frequently acute, malnourishment, and to be heavily burdened by the necessity for food imports. Food is regarded as the first priority, with the ultimate goal as self-sufficiency in food for all regions, with commensurate action to ensure food security for all country and population groups. To this end they propose a substantial investment program of $7 billion per year between 1980 and 2000.

19. More specifically, on the consumption side the Commission recommends:

(i) programs at the national level to improve food storage and distribution and support agrarian reform to increase incomes and food consumption by the rural poor;

(ii) efforts at the international level relating to grain agreements, increased food aid, buffer stocks, and more flexible arrangements for financing reserves and trade in food. It is considered that international food security can be best improved by establishing buffer stocks in low income countries as part of a new international agreement to stabilize world grain markets.

20. On the supply side, the recommendations include:

(i) programs at the national level to enhance domestic production and move toward the goal of self-sufficiency, including technical assistance to increase absorptive capacity, institutional reform, increased attention to farming systems, improved input supplies, expansion of forestry and fisheries and measures to expand and increase the efficiency of irrigation;

(ii) programs at the international level to mobilize massive capital assistance from the North for development of food production. Within the context of international assistance for water resource development, attention is to be directed to the institutional, technical and financial measures needed for "large regional projects of water and soil management" and in particular, the integrated development of those large international river basins which support the majority of the world's poor - Mekong, Brahmaputra, Ganges, Indus, Nile, Zambesi, Congo, Senegal, Niger and Volta.
21. Notwithstanding the different interpretation of recent experience, as noted above, the Bank is in general agreement with the perceptions of the Commission regarding agriculture and food problems. The Bank shares their view on the important role of agriculture in development - both as a source of food and as a generator of employment and incomes. We also agree that "agriculture is frequently neglected" (p. 92) by governments, often in those countries where it may be the most important sector in terms of short-run development. Similarly, it is accepted that agriculture cannot do it all in terms of generating employment, and that industry - with potential growth rates of 10-15%, compared with 3-5% for agriculture - has a vital long-run role to play in this regard.

22. The Bank also strongly supports the strategy of building up institutions and of institutional reforms (p. 82), including agrarian reform, with a view to "helping people to help themselves" (p. 88), this being a basic premise of the Bank's rural development approach. In this respect, again, the joint role of agriculture in relation to "hunger and incomes" (pp. 97-98) - as a source of food supply and of the wherewithal to purchase food - is of fundamental importance. However, we would have some reservations regarding the Commission's emphasis on self-sufficiency, although this is expressed somewhat ambivalently (see p. 91 last para. and p. 93 first para.). While there is a need to ensure that the development of commercial agriculture does not adversely affect the nutrition of people in any sub-region, substantial economic benefits may be derived from exploiting the comparative advantage associated with different resource endowments in particular countries or sub-regions and relying on trade to obtain food.

23. The Bank also shares the concerns, expressed strongly in the Commission Report, regarding the consumption side of the food problem.
In particular, we welcome the attention to problems of food distribution (pp. 96, 97) and the need for investment in physical infrastructure for the collection, transportation, processing and storage of food, especially foodgrains. With regard to ensuring food security, however, the Bank would advise countries to rely less on expensive national reserve stocks and more on effective infrastructure and logistical arrangements to facilitate timely movement of stocks combined with standing import arrangements. Improvements in national distribution systems are considered by the Bank to be an essential element in efforts to increase food security, without which national and international emergency stocks may be of little use and with which they may be unnecessary.

24. The potential role of food subsidy and intervention programs in ensuring access to food in rural and urban areas is recognized, but we would emphasize more strongly the interim role of subsidized food intervention programs, given the costly nature of such programs and their budgetary implications. In the long-run food production programs and steps to increase incomes of the poor are the essential requirements to meet nutritional needs. Generally investment in well conceived projects will yield a higher return than expenditure on food subsidy programs. In addition much of the money spent in development projects may itself lead to a substantial direct increase in food consumption.

25. The role of food aid in ensuring supplies and logistical support, while minimizing the need to expand scarce foreign exchange, is also recognized. However, while acknowledging that additional consideration should be given to ensuring that the low-income importing countries have adequate supplies at all times, and especially in times of global scarcity, the Bank is not convinced that an international buffer stock would be an adequate or cost-effective
mechanism to achieve this. Rather the Bank favors an efficient system of international trading and food aid as the best means of ensuring adequate supplies of food at minimum cost.

26. In respect of investment, the Bank supports the need for more international and domestic resources for agriculture and food production. However, we would stress more than the Commission Report, the importance of greater efficiency in using existing as well as additional resources. In the Bank's view, there is considerable scope for more effective policies and better management in the agricultural sector of many developing countries. We note also, however, that since FY74 external resource transfers for agriculture have increased more rapidly than internal allocations (see Annex Table 7). The proportion of total public investment for agriculture disbursed from external sources has doubled in this period. The Bank would also urge caution in estimating the flows of external financial resources required to achieve particular development objectives pertaining to agriculture and food. There are great difficulties involved in defining and estimating such requirements in widely diverse situations, with different resource endowments, both physical and human, variable seasons, differing degrees of government commitment and often uncertain technology. Apart from this, it is becoming increasingly clear that the efficiency with which available financial measures are used is no less important to the total development effort than the quantity of resources available. Major improvements in this area are considered essential.

Specific Proposals for Action

27. Within its recommendations the Commission Report specifies eight areas for particular attention and support by international transfers of resources. These are measures to improve absorptive capacity, agrarian
reform, farming systems and agricultural research, supplies of agricultural inputs, fisheries development, forestry and rural energy, storage and marketing infrastructure, and water resource development. The Bank agrees that these are areas of major concern and has already initiated programs that address them. It is accepted that more could be done in all of these areas providing additional resources were available. It is also recognized that more could be done within existing programs to meet the special needs of the "low-income food-deficit" countries and, where opportunities permit, this possibility will be pursued in the context of Bank lending.

28. **Institution Building.** The Commission Report emphasizes the need to create local institutional arrangements for planning and financing agricultural and food programs. It proposes this as the best means of encouraging aid flows and of enabling countries to use available funds more effectively (p. 87). It also draws attention to the need for greater technical assistance (especially if it is planned jointly with recipients) to support the identification, preparation and implementation of projects, in order to improve the absorptive capacity of the poorest countries.

29. The Bank stands ready to further its efforts in helping countries increase their indigenous capacity to plan agricultural development and manage projects. Through its project lending, the Bank encourages and finances the creation and expansion of local institutions including ministries, parastatal bodies, and private sector firms. This includes the development and staffing of management units, monitoring and evaluation programs, national statistical systems, regulatory bodies, research institutions and the institutional arrangements for the support of an increasingly commercialized, science-based agriculture. Many projects make provision for management training. Through "sector lending"
the Bank endeavors to utilize and further strengthen the capacity of local institutions responsible for identifying, preparing and implementing projects. These and related activities are also supported by direct technical assistance through the Bank’s country economic and sector work in agriculture. In addition, the courses of the Bank’s Economic Development Institute provide training in agricultural sector management and the preparation and implementation of projects. Nevertheless, it is recognized that much remains to be done in this area, especially in respect of resource management.

30. Agrarian reform. The Commission Report notes that an end to hunger among many countries requires efforts to improve income distribution and thereby provide the means to purchase additional food. Agrarian reform, including improved security of tenure, land consolidation in areas of fragmented holdings, or redistribution to encourage more intensive use, is identified as an urgent need in many countries (p. 96).

31. The Bank fully supports this view. The importance of appropriate tenurial arrangements has been stressed in dialogues with member countries. Bank studies have confirmed that small farmers frequently use their lands more efficiently than do large farmers. For reasons of both equity and efficiency, the relations which govern land use are important. These matters have been addressed in the Land Reform Sector Policy Paper (1975). While the Bank cannot force social change, it can and does support appropriate adjustments in rural tenurial arrangements. It stands ready to finance activities that support tenurial reform aimed at the betterment of the poorest groups. These activities could include credit, technical services and infrastructure projects for land reform beneficiaries. Where land is held in some form of tenancy, the Bank’s projects are designed to encourage tenancy
conditions which are equitable and conducive to efficient resource use. More broadly, the Bank will not support projects where existing land rights result in major benefits accruing solely to high-income groups, unless increases in food outputs or balance of payments considerations are overriding factors.

32. Farming systems and agricultural research. The Commission Report notes some evidence of declining international support for agricultural research and states that a much greater research effort is warranted at national, regional and international centers (p. 94). The report points out the difficulties and possible dangers of transferring the "western agricultural model" to developing countries and advocates the development of farming systems appropriate to local circumstances.

33. Bank support for agricultural research at the national level has increased steadily in recent years and is today among the fastest growing components in agricultural and rural development lending. Increasingly, this has been linked to efforts to strengthen national extension services. At present, about half of all Bank-supported projects in agriculture and rural development include research components. In FY77-79, lending for agricultural research and extension constituted about 9% of total Bank lending for this sector and averaged more than $250 million per year. About one-third of this has been for research alone. Looking forward, it is proposed in the Agricultural Research Systems - Sector Policy Paper (1980) that Bank lending for research and extension should increase from more than US$330 million in FY79 to at least US$550 million in FY84 (1979 dollars), or, on present projections of lending for the sector, to about 12% of total Bank lending for agriculture and rural development.
34. The Bank has been a strong supporter of the international research system as well. It serves as cosponsor of the CGIAR and provides a Secretariat and Chairman for this Group. In FY72-79 the Bank, as the residual donor to the CGIAR, provided $42.9 million from profits, making it the second largest contributor to the Group. It is expected that the Bank will continue to expand its contribution in order to meet residual needs of the international system as it expands, up to a maximum of 10% of total requirements.

35. Supplies of agricultural inputs. The Commission Report points out that the expansion of HYV agriculture increases the demand for fertilizer, particularly nitrogenous materials, and other agricultural support services. The Report notes that, while fertilizer supplies are likely to be adequate in the near future, their price link to steadily increasing petroleum costs may cause difficulties for some developing countries. Because the marginal yield response to increased fertilizer use tends to be greater in the South than the North, efficient global use of this input would imply larger applications in the developing countries. The Report stresses the importance of providing the farmers of these countries with fertilizers at reasonable prices (pp. 100-101).

36. The Bank clearly recognizes the importance of providing adequate supplies of production inputs, particularly fertilizer, to permit optimum returns from high-yielding crop varieties. No less important are effective programs to provide production credit to farmers to facilitate purchase of these inputs. It is estimated that perhaps 40% of recent increases in cereal yields in developing countries derives from increased fertilizer use. The World Bank group has been the most important single source of technical and financial support for fertilizer manufacturing in the developing world.
It has loaned over $1 billion in FY74-77 for this purpose and expects that Bank-financed plants will provide almost a third of all incremental fertilizer production in developing countries in 1978-85. More recently, it has begun to finance fertilizer imports in situations where local supply shortages or balance of payments considerations made these operations necessary (e.g., a $25 million credit to Bangladesh in FY80). In addition the Bank provides agricultural credit, particularly short- and medium-term funds, which is frequently used to finance the distribution and purchase of fertilizer.

37. **Fisheries development.** The Commission Report stresses the important role that increased fish consumption could have in reducing hunger and malnutrition as well as increasing employment (p. 96). The Report notes that most developing countries consume relatively little fish despite a favorable resource base. It identifies technical and managerial difficulties, particularly for smaller countries and requests international support for finance of training and technical assistance to organize cooperative fishing efforts among these countries (p. 97).

38. The Bank supports these objectives and is currently reviewing its approach to fisheries development. Lending for this activity has been small, accounting for only about 1% of the Bank's total agricultural and rural development lending in FY74-79, but is expanding rapidly. During FY78 and FY79, lending for fisheries, either in fisheries projects or for fisheries components in other projects, totaled nearly $200 million (to be contrasted with total fisheries lending of about $360 million over the FY64-79 period). No less important is the sharp change in Bank strategy and emphasis: the early Bank-supported projects were largely oriented toward commercial fisheries development, frequently based on capital-intensive marine fisheries technology. Today most
Bank-supported projects focus on lower-income groups whose livelihood depends on capture fisheries and aquaculture. Looking forward, the Bank might lend some $200 M annually over the next 5 years for fisheries development. Projects already under preparation account for approximately one-third of that amount. Most of it is expected to be channeled into rural areas in support of small-scale fisheries while the balance would support large-scale industrial fisheries projects.

39. Forestry and rural energy. Considerable attention is given in the Commission Report to the role of forestry development in meeting key energy needs of low-income groups (p.83), and to the ecological dimensions of rapid deforestation (p. 114). The Bank views the emerging fuelwood shortage as second only to food and nutrition problems, in terms of potential adverse impact on the welfare of low-income rural people. A major expansion and reorientation of Bank support of forestry development is underway in recognition of the human welfare and ecological consequences of this depletion.

The Bank’s Forestry Sector Policy Paper (1978) proposed to lend a total of about $100 million per year in FY79-83 for forestry development, of which about 60% was to be channeled into rural development-oriented forestry (particularly for fuelwood production), while 40% would go to help finance larger industrial forestry projects. Actual lending has substantially exceeded these targets. In FY80, total forestry lending (excluding that for pulp and paper) amounted to $218 million. This represents a tenfold increase over average annual forestry lending achieved in FY73-77. Bank lending for fuelwood increased from about $12 million in FY78 to over $100 million in FY80 and now includes operation in some 25 countries. The Bank Policy Paper on Energy (1980) proposes that the Bank lend about $1 billion for wood-based energy projects over the next 5 years, but no special provisions are made for the low-income countries.
40. **Storage and marketing infrastructure.** The need for secure supplies of food staples is stressed by the Report which notes that expanded grain storage, improved transport and communication are essential to distribute food supplies efficiently (p. 96). As part of efforts to enhance "international food security", the Report suggests that developing countries need to hold 5-7 million tons of a 20-30 million tons international reserve. Acquisition and storage construction costs are put at about $1.75 billion (p. 99).

41. The Bank believes that the problem of international food security is best addressed through a combination of measures: some increase in grain storage capacity (but with recognition of the high opportunity costs for the resources involved) and much greater emphasis than in the Report on measures to facilitate smooth and efficient working of international and national grain marketing and handling systems. The availability of adequate supplies of foodgrains is of little use unless it can be moved in response to information on changing requirements in various locations. Further, the growing commercialization of food production and urbanization in developing countries will anyway require much larger capacity for these marketing systems. By 1985 another 100 million tons of domestically grown grain may be traded in commercial markets of developing countries while total grain distribution in these countries may rise from about 250 million tons in 1978 to 400 million tons by 1990. These volumes suggest that capacity of grain marketing systems, including transportation, storage and processing will have to nearly double in the next 10-15 years.

42. The Bank recognizes the need for additional investment in several components of these systems: on-farm and commercial storage, trading stocks,
processing infrastructure (including drying and milling) and grain handling infrastructure (including road, rail and port facilities and equipment). Effective information systems to link production zones and consumers are also of great importance in the efficient functioning of grain markets. It is expected that the Bank will expand substantially its operations in this area during the next five years, depending on the availability of resources. But since total investment requirements to strengthen food distribution and marketing systems are large, this will require increased efforts by other multilateral and bilateral donors as well; the Bank intends to work closely with other donors in this general area.

43. **Rainfed agriculture.** Surprisingly little is said in the Commission Report about rainfed agricultural production, despite the fact that 60% of developing country food output in the period 1970-75 came from this source. Over the last decade about 40% of all increases in agricultural production in developing countries came from rainfed lands. Almost half of the rural people in those regions identified by the Commission as "poverty belts" are dependent for a livelihood on dryland farming and livestock production.

44. Expansion of rainfed agriculture is feasible only in the humid and semi-humid tropics, and Bank experience shows this to be a slow process. However, there is evidence that relatively low incremental capital-output ratios (ICORs) are encountered in intensification of production on already settled rainfed lands. The principal constraint is the lack of new technology suited to prevailing ecological and institutional conditions. Nevertheless, the possibility of reaching some of the lowest income rural groups and of improving their food security at relatively low cost, makes this an important area for further Bank efforts. Both in its own projects and in its
relationships with other institutions the Bank will continue to explore all avenues for increasing rainfed agriculture and livestock production.

45. Water resource development. The development of irrigation is singled out by the Commission as the principal source of increased food output in the "poverty belt" countries of Africa and Asia over the next two decades. This accords with FAO estimates that as much as 70% of increased food output between 1980-2000 may be obtained from irrigated lands. Greater control of water removes much of the random effects of weather from the farmer's calculus and paves the way for synergistic production effects between water and other inputs such as HYVs and fertilizer. By intensifying production activities it also has important employment effects. Recognizing this, the Commission suggests that "the largest single amount of investment required is for irrigation and water management". It goes on to stress the need for a relevant framework within which international resource transfers for this purpose can be made, especially to the "poverty belts" of Africa and Asia.

46. The Bank strongly shares these concerns. Since food security requires reliable supplies of food, irrigation is the preferred source of increased domestic output. Since the new land brought into production in the "low-income food-deficit" countries is largely marginal land, in the sense that soils are less fertile and seasons less reliable, irrigation has a special role to play in reducing an otherwise growing uncertainty in production. However, to provide reliable supplies of food, irrigation systems themselves have to be reliable and the use of water efficient. Although Bank lending for irrigation represents roughly one-third of its commitments in the rural sector, there seems scope for substantial further investment in this area. In this the Bank seems well qualified to take a positive new initiative.
47. An appropriate response to the Commission's concerns on water development would require formulation of an approach toward investment and technical assistance for irrigation development, built up from a typology of countries with respect to the natural resource base, institutional capabilities, investment possibilities and management issues. What can or should be done in this field depends on the state of existing systems and command areas and on the potential for additional irrigation development, on a region by region basis.

48. In assessing this potential it is necessary to distinguish between three broad climatic regions: (i) the humid tropics and sub-tropics, exemplified by much of South and SouthEast Asia and Western Africa south of the Sahel; (ii) the semi-arid and sub-humid sub-tropics of which the Sahel, southern India and eastern Africa are typical; and (iii) the arid tropics and sub-tropics which include much of the Middle East, North-East Africa and southern Pakistan. Each of these requires a separate water use technology and involves different physical and ecological problems in water storage and distribution.

49. Within each country different types of investment may be desirable in the short, medium- and long-term. In the short-run (1-3 years), and where some irrigation is already practised, there is likely to be scope for three kinds of intervention: (i) measures to improve the on-farm use of water, including new technology and volumetric water pricing where feasible; (ii) modifications to upgrade the management of delivery systems, including changes in institutions and activation of user associations; and (iii) investments to increase the use of groundwater to supplement canal water and ensure supplies. In the medium-run (4-10 years) a further three kinds of activities are feasible:
(i) projects to rehabilitate existing infrastructure, including minor reconstruction and canal lining; (ii) measures to expand the command area so that available water is fully utilized, including the construction of additional tertiary and quaternary canals to carry water to farmers' fields; and (iii) the development of services, including research and extension, credit, storage and transport, to support a science-based irrigated agriculture. Finally, in the long-run (10-25 years) there is a need for: (i) major rehabilitation schemes, including the replacement of head-works, especially where dams have silted up or become unsound; and (ii) new river basin development programs, to exploit in an integrated way the resources of underdeveloped river valleys.

50. As the largest lender in the irrigation field, the Bank is in a position to provide a focal point for a major effort to develop water resources over the next two decades. In line with the Commission's expressed concern with water resources and irrigated agriculture, the Bank could move on two fronts: first, to increase lending for expansion, rehabilitation, and on-farm intensification of irrigation systems; and second, to give greater attention to the institutional and human resource aspects in the planning and management of water resource systems. A paper outlining the scope and nature of an action program to address these twin goals will be prepared in the coming year.