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THE WORLD FOOD PROBLEM—AN OVERVIEW

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The concern of U.S. leadership about our domestic agriculture has shifted since 1952, and rather abruptly within the last two years. President Johnson, in his message to Congress on the foreign aid program on February 1, 1966, stated:

The problem of hunger is a continuing crisis. In many parts of the world we witness both the ravages of famine born of natural disaster and the failure of food production to keep pace with rising needs.

This is a catastrophe for all of us. It must be dealt with by all who can help. In many other countries food output is also falling behind population growth. We cannot meet the world food needs of the future, however willing we are to share our abundance. Nor would it serve the common interest if we could.

The solution is clear: an all-out effort to enable the developing countries to supply their own food needs, through their own production or through improved capacity to buy in the world market.

Mr. William S. Gaud, who became the Administrator of the Agency for International Development on August 1, considers the solution of the problem of food and hunger our most important job. The staff of the Agency has been directed to give special emphasis to this aspect of our foreign aid effort.

WORLD FOOD NEEDS AND PRODUCTION PROSPECTS

The developing countries are importing approximately 30 million tons of food grains in 1966. It is estimated that by 1985 they will require an additional 88 million tons. If the United States were to restore to production the more than 50 million acres now in reserve, there would still be a world shortage of approximately 12 million tons in 1985.

It is increasingly clear from the drawdown of stocks in the major grain exporting countries this year that these countries must gradually increase their production and that concurrently food deficit nations must raise their levels of self-sufficiency.

The U.S. Department of Agriculture announced on August 8 an increase of 8.9 million acres for wheat production. This, together

with the 7.7 million acre increase announced last May, raises total allowable acreage for harvest in 1967 to 68.2 million acres. It is hoped that the harvest in 1967 will reach 1.6 billion bushels, as compared with an estimated 1.2 billion in 1966.

Since world demands for wheat are growing at the rate of 300 million bushels annually, it is apparent that restoration of a sizable portion of our reserve agricultural lands to production this year will have only a limited impact on long-term needs. There is, of course, no real assurance that the new U.S. production goals will be achieved. The final decision to plant rests with the farmers, who may yet require assurance that long-term world food requirements will justify their added investments in machines and other production inputs.

BUILDING SELF-HELP CAPABILITY

The President said in his foreign aid message:

The United States can never do more than supplement the efforts of the developing countries themselves. They must supply most of the capital, the know-how, and the will to progress. If they do, we can and will help. If they do not, nothing we can supply will substitute.

U.S. foreign aid efforts, from the initiation of the Point IV program, have given only limited assistance to the developing countries in increasing production of commodities in surplus in the United States, including the major food grains, wheat, and rice. Instead, emphasis has been on developing outlets for U.S. farm surpluses.

Future Public Law 480 food imports from the U.S. will be analyzed carefully to determine their impact on efforts of food deficit countries to improve their agricultural economy and to increase their own food production to reduce dependence on concessional food. In this regard, food deficit nations will now be expected to make some hard decisions and chart their courses for greater agricultural self-sufficiency.

A significant question is whether we have given sufficiently broad attention to the major "production" components of the agricultural sector. As a minimum, the following components or elements should be carefully analyzed to be sure adequate attention is given to them:

1. **GENERAL GOVERNMENT POLICIES.** Government leaders must allocate sufficient foreign exchange resources as well as local funds for investment in agriculture to achieve a growth rate that will move beyond national subsistence levels.

There is substantial evidence that farmers throughout the world are economic men; they will respond if furnished fair and equitable prices for what they produce, together with reasonable prices for the inputs they must purchase. Other incentives such as equitable credit and land tenure arrangements also should be reviewed.

2. NEW TECHNOLOGY, INCLUDING RESEARCH, EXTENSION, AND EDUCATION. Sustained development and application of new knowledge through science and technology has been the major force in the growth of American agriculture. This aspect of agricultural development has been seriously neglected in the food deficit nations. Our cooperative foreign aid activities also have failed to emphasize the building of indigenous bases of science and technology.

As Dr. T. W. Schultz of the University of Chicago said to the House Committee on Agriculture on February 18, 1966:

Although we have developed an outstandingly productive agriculture in the United States, we have not done well as builders of agriculture abroad. We have long been hampered by the "extension bias" and as a consequence agricultural research has been postponed, put off, and grossly neglected. When research has been undertaken, altogether too little attention has been given to the development of viable agricultural research centers.

This component of the agricultural development process must be strengthened if food deficit nations are to build the capability for self-sufficiency.

3. AVAILABILITY OF PRODUCTION INPUTS. Increased production per acre will not be achieved and sustained unless farmers have access to the necessary inputs (improved crop varieties, fertilizers, pesticides, and improved tools or machines). These inputs must also be fairly priced if farmers are to make the investment necessary to increase production and develop a commercial agriculture.

4. MARKETS AND RELATED SERVICES. Increased attention must be given to assured markets, both domestic and foreign; also to transportation, storage, and processing organizations and facilities.

5. INSTITUTIONS. Upgrading agriculture requires the restructuring of institutions, including: (a) national programs for research and (b) institutions for education, extension, rural credit, and other services. Self-help mechanisms such as cooperatives or farmer associations should be stimulated. This will involve the masses of people on the land and help achieve agricultural and rural development.

CHANGE AGENTS FOR AGRICULTURAL DEVELOPMENT NEED IMPROVEMENT

Agricultural sectors of developing countries should be studied to determine which components may require special attention from indigenous leadership, or assistance from outside, or both. Joint review teams should be selected carefully to insure inclusion of individuals with useful experience in the respective "component" or program areas to be reviewed.

We often find single inputs being promoted too much as the essential ingredient for instant agricultural development. Experience in U.S. agriculture demonstrated long ago the importance of attention to integrated programs of soil fertility and water management, adapted and disease-resistant crop varieties, improved pest control measures, and precision in production practices.

We should not expect to achieve significant improvement in traditional agriculture by depending upon skilled U.S. farmers as the principal change agents. The man from a highly mechanized Corn Belt farm of 300 acres or more in the U.S. will most likely have more to learn than to teach when he shifts to caraboa power and the small farm operations of the rice bowl.

When we have health problems, we go to professional, medically trained people to resolve them. We know that advice from "healthy people" is not enough. When we concentrate on modernization of agriculture, we also should rely on professional agriculturists who can *produce* solutions or innovations, not on those who *utilize* them.

Our past technical assistance efforts in agricultural development have been concerned largely with the direct transfer of U.S. materials and practices. These efforts have, in many cases, involved attempts to encourage *adoption* of new materials or practices that were unacceptable to the recipient societies.

Experience in U.S. agriculture shows that transferability has reasonable limits. We do not utilize in Indiana the wheat varieties bred and selected for Kansas. We do not follow the practices for rice production in California that have been developed for Texas or Arkansas. We know that corn hybrids developed for the Corn Belt are not suited to the Southeast.

Experience in 1955-56 made it clear that we cannot transfer U.S. dent corns which were developed for livestock feed to India, where people prefer flint-type corn for direct human consumption.

We have also learned to appreciate the hazards of new and

strange crop diseases and insects in tropical areas. They include a very destructive stalk borer that attacks corn and sorghums, the shoot fly that attacks sorghums, and others.

ADAPTIVE RESEARCH IS NEEDED

The Foreign Assistance Act of 1966 provides that:

In developing countries where food production is not meeting the demands of populations, or diets are seriously deficient, high priority shall be given to increasing agricultural production, particularly through adaptive agricultural research programs based on cooperative undertakings between universities and research institutions in the United States and in the developing countries.

The benefits of such research, to fit innovations to the needs of the society that is expected to accept them, are well demonstrated. For example, wheat breeding and selection, utilizing the germ plasm of the "Norin" varieties introduced into the U.S. from Japan shortly after World War II, together with integrated experimentation with soil fertility and water management led to yields of 100 bushels or more in Mexico, Pakistan, and India last year. Further adaptive research is now under way with the high-yielding, red-grained Mexican wheats in India to breed and select for the amber grain color preferred by Indian consumers. Breeding and selection is under way also to incorporate resistance to the forms of rusts and smuts found in India.

Similar modifications are being made in the high-yielding rice varieties from Taiwan that produce three to four times the yields of indigenous varieties in India. These rice varieties must also be made more resistant to the virus diseases, bacterial leaf spot, and the blast disease that attacks them in India.

If adaptive research is to be carried on successfully, agricultural scientists will have to be trained to identify the hazards or defects in production and to apply promptly the effective corrective measures to insure harmony of biological innovations with their environment.

INSTITUTIONAL BRIDGES FOR SCIENCE AND TECHNOLOGY

One major question which must be answered is how to supply the farmer in Madras with the same level of professional backstopping that is received by the farmer in Minnesota.

Considerable progress has been made toward this goal through multidisciplinary adaptive research. An example is the Norin wheat varieties from Japan that have been adapted for use not only in

India and Pakistan but also in the U.S., Mexico, the Near East, and Africa. Also improved corn hybrids and production practices have been adapted by the Rockefeller Foundation in Mexico, Central and South America, India, and other countries in Asia. The Rockefeller Foundation and the Agency for International Development are furnishing cooperative guidance for corn improvement research in Africa. These transfers through adaptive research have been relatively successful because of substantial U.S. experience.

Special institutions or facilities can help build the technological base or assemble innovative components for increased productivity of farmers in developing countries. The International Rice Research Institute, established in the Philippines by the Rockefeller Foundation, the Ford Foundation, and the Government of the Philippines in 1962, is such a center. It provides a base for rice research and development, as well as for training. Similar centers could hasten the improvement of production of other crops, and also livestock, in many developing countries.

An immediate task is to determine how such regional or international centers can be utilized most effectively in: (1) furnishing leadership for adaptive research and (2) developing trained manpower and indigenous institutions necessary for effective national systems of research, education, and extension. Toward this end, the Agency for International Development is working out arrangements for the International Rice Research Institute to participate more actively and fully in the All India Rice Improvement Scheme that is under the leadership of the Indian Council of Agricultural Research.

We must give more attention to administrative mechanisms that will facilitate such cooperation within a "multilateral structure" to achieve maximum benefit in developing nations from the combined resources of the U.S. Government, other national and international organizations, private foundations, universities, and private industry.

The transfer and adaptation of innovations from abroad is an essential immediate measure for increasing agricultural production in developing countries. However, it can provide only part of the remedy. The other part is development of a continuous flow of innovations, not only to add new productive materials and techniques but also to assure a ready response to the hazards that increase under intensified agriculture.

Our experience in the United States demonstrates fully the importance of an indigenous research and development program. The real change in our productivity and efficiency has been achieved

through the orderly application of our own science and technology from the U.S. Department of Agriculture, the land-grant colleges, and the private industries related to agriculture. Only about half of our increased production traces from foreign introductions.

IMPROVING U.S. CAPABILITY FOR FOREIGN AGRICULTURAL DEVELOPMENT

There is a critical shortage of people who understand the development challenge or who are willing to make substantial career commitments in this area. Most professions are oriented to the tightly structured needs of highly developed societies and cannot be transplanted easily to foreign cultures. Furthermore, less developed nations often produce demands which cannot be met through any established body of Western expertise. New skills must be developed to meet these requirements.

In recognition of these special needs, Senator George McGovern of South Dakota proposed last year, through a bill, S. 1212, that additional capability be built into U.S. institutions, particularly U.S. universities. Although this bill was not acted upon by the Congress, its basic concepts have been incorporated as an amendment to the Foreign Assistance Act of 1966.

To help meet these needs, the Foreign Assistance Act of 1966 (Section 211) provides up to \$10 million of funds to assist research and educational institutions in the United States to strengthen their capacity to develop and carry out programs concerned with the economic and social development of less developed countries. It is expected that this support will take the form of grants for the purpose of building long-range capability.

To develop this capability, new organizational arrangements in universities may be required to insure institutional commitments. Also, long-range planning and forward funding commitments will likely be required for the development of special curricula, the recruitment of career professors and graduate students for the international development field, and the establishment of special library facilities.

The AID administrator has assigned responsibility for development of this program to the Office of Technical Cooperation and Research. It is expected that an external advisory committee, representing various professional areas and broadly representative of universities, foundations, and other agencies that are most directly concerned with the Agency's program, will be established to help guide the Agency in selecting recipients for its grants.

SUMMARY

1. The critical nature of the world-wide food and population problem has come into sharper focus during the past two years. There is an increased dedication on the part of U.S. government leadership to resolution of this problem.

2. There is a determined effort to build world-wide food production capacity through greater self-help and self-sufficiency in the food deficit nations.

3. Positive action has been taken to improve U.S. resources and capability to meet this challenging international problem.

4. The goals for increasing world food supplies will not be achieved easily, and it will be essential to energize the cooperative world-wide agricultural development effort through new commitments for effective participation by the U.S. research and educational institutions, and by the private industries that must furnish the essential guidance and leadership.