



GROWTH AND EQUITY: POLICIES AND IMPLEMENTATION IN INDIAN AGRICULTURE

J. S. Sarma

With commentaries on the experiences of Europe
by Ester Boserup, Japan, by S. Hirashima, and the
United States by Olaf F. Larson

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FOREWORD

A tightening global food situation during the next few decades will bring increased emphasis on expanding food production in developing countries. To the extent that these efforts fall short of matching demand increases, real prices of food will rise with consequent reduction in the real incomes, food consumption, and nutritional status of low-income people. IFPRI's research program deals with several key aspects of means to accelerate food production growth and to mitigate the onerous burden of food shortages on low-income people. In this context the direct effects of production growth on equity are of considerable importance.

Policy in India has consistently reflected explicit concern for equity issues and their interaction with processes of growth. This concern, stated and discussed at length in each of the Five-Year Plans, has recognized both the conflicts and the potential complementarities in policies for equity and growth. The plans have set forth a multitude of policies and programs for increasing equity early in the growth process.

Since the early 1950s J. S. Sarma has directly observed and participated in the efforts of the Government of India to deal with growth-equity interactions in agriculture. At various times he was economic and statistical adviser to the Ministry of Agriculture and head of the Directorate of Economics and Statistics, member secretary of the National Commission on Agriculture, and chief executive officer of the National Sample Survey Organisation. Thus, his perspective is that of a person in government who is concerned with implementing policies and, in particular, with interpreting their intent and with diagnosing and measuring their success. His is not the detached view of the cloistered scholar but, rather, the practical, direct view of a person in the middle of efforts to administer. His judgments tend to

be direct, stripped of the qualifications and hopes that may go into plans and proposals. His observations will be useful primarily to persons wrestling with these questions in other developing countries. These countries may have adopted policies in these complex areas more recently than India or they may have less experience in approaching these problems.

One of the major difficulties in judging efforts to stimulate growth and to deal with equity in contemporary developing countries is to judge the pace and perfection of the effort. Too little reference is made to the benchmarks provided by the more mature developed economies of Europe, North America, and Japan. Each of those economies has been concerned with the interplay of growth and equity policies, although often with less self-consciousness than found in today's developing countries.

Ester Boserup, S. Hirashima, and Olaf Larson have each read the manuscript by J. S. Sarma and then written a commentary about the experiences in Europe, Japan, and the United States. The commentaries are brief and can only touch upon issues selectively. Collectively, however, they give a valuable perspective on this important issue and set the Indian experience in a somewhat larger frame. It is clear from their presentations that policies to achieve growth with equity are complex, perhaps poorly understood, and slow to show results. In the modern world, with its conflicting pressures for quick results, this last reminder is particularly needed.

John W. Mellor

Washington, D.C.
November 1981

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I am deeply indebted to John W. Mellor, from whom I received helpful comments at various stages of the draft. But for his encouragement and advice, this report could not have been completed.

I also wish to thank my colleague, Guntant M. Desai, with whom I had several discussions that helped me to see the issues in a clearer perspective. I also have been greatly benefited by the comments of other reviewers.

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J. S. Sarma
November 1981

1

SUMMARY

Although social justice has been a policy goal in each successive five-year plan since India's Independence, the strategy adopted for agricultural production responded to the urgent needs of growth perceived at each point in time throughout the period. At the end of the Second Plan, when a food crisis threatened, efforts were concentrated on those areas most conducive to rapid growth, particularly under the Intensive Agricultural Area Programs. Thus, in the 1960s the emphasis was on rapid growth in production. Following the severe droughts of 1965 and 1966, when India faced severe food deficits that could be met only through large imports, achieving self-sufficiency in foodgrains became the major concern. The success achieved under the new strategy for growth in agricultural production based on the high-yielding varieties (HYVs) of foodgrains eventually led to self-sufficiency in the mid-1970s. The annual rate of growth in foodgrains, however, averaged only a modest 2.8 percent during 1967/68-1978/79 and severe rural unemployment and poverty persisted. Nearly half of the rural population is still below the poverty line.

On the basis of field observations and evaluation studies, the fear arose that this new strategy with its inherent reliance on capital-intensive irrigation and chemical inputs might lead to a widening of disparities between large and small landholders and landless laborers and between naturally endowed regions and those not so endowed.

To counteract this, toward the end of the Fourth Plan, under a policy to encourage growth with social justice, special programs were initiated to assist small and marginal farmers, agricultural laborers, and the inhabitants of drought-affected and backward areas in increasing their production, employment, and income. These special equity programs have not had any measurable effect to date because of their inadequate coverage, ineffective implementation, and failure to integrate crop production and subsidiary activities programs.

A detailed analysis of the effect new technology based on HYVs has on production

shows that the overall rate of growth has varied widely among different crops and different regions. Although production and productivity of wheat in irrigated areas have increased phenomenally, the overall growth rate has not responded to the new technology with as large an increase as one might expect because other crops have not kept pace with wheat. With the increased emphasis on irrigation and fertilizer programs in the draft of the Sixth Five-Year Plan (1978-83), meeting the higher growth rates proposed is feasible.

Nevertheless, where land distribution remains skewed, the direct effect of a technology that raises the output per unit of land is to widen disparities in absolute family earnings from HYV crops. Similarly, a technology that is suited only for irrigated and assured-rainfall areas results in the widening of differences between regions. The relevant issues are whether the new technology can be adopted successfully by small and marginal farmers and whether they have, in fact, benefited from it. The available evidence shows that although they have been somewhat late in adopting the new technology, many of them have participated in it, particularly in areas where adoption of technology has been rapid. Small and marginal farms account for one third of the irrigated area, fertilizer used, and institutional credit borrowed, though they hold a little less than one fourth of the area. In numbers, however, nearly three fourths of the total holdings are small and marginal farms. The amount of low-cost institutional credit to procure needed inputs and make other land improvements falls short of their requirements. By providing small and marginal farmers with preferred access to irrigation, fertilizers, and credit and by removing other constraints, their wider participation in the new technology could be facilitated.

The three approaches adopted for economic development in developing countries include: emphasis on rapid growth with an expectation that benefits will trickle down to the poor; growth with redistribution of the increments of growth to the poor; and

the basic-needs approach, implying a major redistribution of total income and stock of productive assets. All three have been tried in India at different times with only limited success. Does this imply that there are basic conflicts between growth and equity that make it impossible to evolve an agricultural strategy that can achieve both simultaneously?

In considering growth-equity conflicts, one has to keep in mind that there are two different dimensions of equity; first, reduction in the gap between the incomes of the rich and the poor; and second, improvement in the incomes of the poor so that they can have a reasonable standard of living. Because the new technology works as well on small farms as large, provided the necessary inputs are available, it is possible to raise the incomes of small and marginal farmers by giving them access to credit, inputs, and marketing and extension services. For marginal farmers and landless laborers, subsidiary activities and rural industries need to be developed to supplement their incomes from crop production and wages. If these steps are taken, both growth and equity can be achieved simultaneously.

The strategy proposed in this report for achieving growth with equity in agriculture has six components. First, where potential for irrigation exists, its development should be accelerated and small and marginal farmers should be given preference; states and areas with low irrigation percentages should also be given higher priority in irrigation development. Second, small and marginal farmers having irrigation facilities should be enabled to adopt the new technology through the provision of inputs, credit, extension, and other facilities. Third, a 10-year program for the improvement of crop yields in dry areas should be drawn up; simultaneously, research in dryland agriculture should be intensified with a view to evolving appropriate technology. Fourth, marginal farmers with irrigation facilities, small and marginal farmers in dry areas, and landless workers should be provided subsidiary occupations, such as livestock raising or fishing, to supplement their incomes from crop production and wages. Fifth, because, even then, agriculture may not be able to absorb all the backlog of unemployed and underemployed persons, nonfarm rural employment in cottage and small industries should be promoted. Finally, well-planned rural works programs, food-for-work programs, or employment guarantee

schemes should be organized on a massive scale and on a decentralized basis to alleviate the immediate problem of rural unemployment.

The implementation of this strategy needs the support of appropriate institutions. No radical redistribution of land will solve the problems of inequity with the existing land/man ratio in India. However, strict enforcement of "ceilings" legislation, limiting the amount of land one person can hold, and regulation of tenancy are needed. A satisfactory solution must also be found for the cultivation of lands leased out by small and marginal absentee landowners.

Many other steps need to be taken. A multiagency approach to the supply of inputs is favored, but in each area an appropriate agency must be specifically earmarked to provide small farmers with their needs. To assure that small farmers receive fair prices, arrangements are necessary to open more purchase centers in rural areas or to pool their surpluses and transport them to purchase centers. Further, functional cooperatives linked to farmers' service societies or cooperative credit societies need to be organized specifically to handle processing and marketing of perishable products such as milk, poultry, meat, fish, fruits, and vegetables. Extension services for disseminating the new techniques to small and marginal farmers should be organized on a group basis, and the Training and Visit System of extension should be reoriented to meet their needs. In agricultural research higher priority should be given to research on improvement of crop yields in dry areas, poor soils, crops grown and consumed by the poor, and mixed farming.

These proposals do not differ in substance from the macro-level policy enunciated in the draft Sixth Plan, although they differ in detail and emphasis. The main difficulty has been in translating the policies into operational plans and in implementing them. To ensure better implementation of the policies and programs, it is important that the "top-to-bottom" approach in planning be replaced by decentralized planning. Agricultural schemes and programs should be formulated at lower levels, wherever such programs are amenable to local planning, and then aggregated at the district and state levels, keeping equity objectives in view. Land use and crop planning should form an essential element of decentralized planning.

To streamline implementation, the field organizations of the state agricultural departments should be reorganized into agricultural development departments with a chief agricultural development officer heading each district and a block agricultural development officer heading each block. Accountability for the achievement of results should be fixed on them and the requisite authority given to them.

The twin problems of rural poverty and unemployment are massive, but these problems could be ameliorated substantially over the next 10-15 years if strategies were adopted to achieve growth and equity simultaneously. Given India's experienced administrative structure, its reservoir of educated manpower, and its many educational institutions, organizational problems can be overcome.

2

INTRODUCTION

Improving the standard of living and promoting the welfare of the population have been the basic objectives of the successive five-year economic development plans in India, although the relative emphases placed on measures for achieving rapid growth and securing social justice have varied from time to time. To deal with rising food imports and the specter of famine raised by the severe droughts of 1965 and 1966, accelerating foodgrain production and achieving self-sufficiency were highest priorities during the 1960s. The success achieved in the mid-1960s in adopting new technology based on the HYV program held promise of rapid growth in foodgrain production. But this strategy resulted in a widening of interpersonal and interregional disparities with a potential for social unrest in rural areas. Concern for equity and social justice grew and was explicitly expressed in public policy pronouncements in 1970. This led to the launching of equity programs superimposed, as it were, on the programs aimed at maximizing production.

These special programs designed to remedy imbalances could not, for various reasons, make a visible dent in the massive problems of rural unemployment and poverty. In 1977/78 nearly half the population were below the poverty line, having an income too low to provide them with the recommended nutritional requirements of 2,400 calories per person in rural areas and 2,100 calories in urban areas. Moreover, out of an estimated labor force of 272.8 million in 1978, about 4.4 million were usually unemployed and the "current" unemployment for that year was estimated at 19.5 million person-years, using the criteria adopted by the National Sample Survey.¹

This study attempts to review the agricultural policies as they have evolved, assess their impact on the economy in terms of

growth and income disparities, and suggest possible outlines of strategies and policies to be adopted to achieve growth with equity. Chapter 3 provides a brief review of the agricultural policies and strategies during the preplan and planning eras. Chapters 4 and 5 deal with the impact of new technology and special programs on growth and equity. Growth in agricultural production, with particular reference to foodgrains, is examined both before and after the "green revolution." The effects of new technology and special programs on the disparities between farms and between regions are considered. In the light of this analysis, a policy framework outlining the main features of a proposed agricultural strategy is suggested in Chapter 6. Chapter 7 discusses institutional reforms, including the agrarian structure needed to make the strategy successful, whereas Chapter 8 deals with the reorganization of planning and implementation procedures. Some concluding observations about the feasibility of the approach are made in Chapter 9.

The two most important causes of rural poverty are low agricultural productivity and lack of adequate employment opportunities in the rural areas. Unless these problems are tackled through appropriate agricultural policies and programs, no significant alleviation of rural poverty and unemployment is possible. This is not to suggest that other fiscal and nonfiscal measures, such as operation of public distribution systems for essential commodities, provision of basic needs, and development of infrastructure, are unimportant. This report focuses attention on agricultural policy for growth and equity in the firm belief that if appropriate strategies are evolved and implemented in this sector, the development goals can be achieved faster. Such a partial approach also has the merit of narrowing the range and scope of issues under discussion.

¹ India, Planning Commission, *Draft Sixth Five-Year Plan (Revised), 1978-83* (Delhi: Controller of Publications, 1979).

3

AGRICULTURAL POLICY—A BRIEF REVIEW

Preplanning Period

In the early phase of British rule in India, there was no deliberate state policy to improve the utilization of natural agricultural resources nor indeed was there any welfare orientation. "The unspelt out agricultural policy of India in the beginning of the Century had a colonial bias, exporting food and raw materials to feed the Colonial power and its industry."² Even the irrigation schemes implemented in the deltas of the major rivers were motivated mainly by revenue considerations.³ Introduction of land tenures and settlements, which were also revenue-oriented, resulted in rack renting, exploitation of tenants, and depriving the ryots (peasants) of their land. This is not to say that there were no positive changes. Indeed, the restructuring of land relations and the availability of irrigation led to an expansion of area under cultivation; after a famine some attempts usually were made to provide irrigation facilities in scarcity-affected areas; debt-relief measures for farmers were undertaken; and the idea of cooperative institutions with particular emphasis on credit was introduced. But, by and large, neither the Imperial Government nor the provincial governments had any positive policy to develop the agricultural sector or to attain social justice. For example, little was done to support agricultural prices during the Great Depression.

Following the recommendations of the Royal Commission on Agriculture in 1928, some steps were taken to promote agricultural research and education, but action on several

equally important recommendations was not taken due to constraints on financial resources following the depression.⁴

After Japan's entry into World War II, the food strategy of the government of India was upset by the fall of Burma and the consequent loss of imports of Burma rice. Government intervention in and assistance to agriculture became much more direct and production-oriented with the launching of the Grow-More-Food campaign (GMF) in 1943. The central government gave loans and grants to provincial governments for undertaking schemes to increase foodgrain production. In the early phase of the GMF campaign, no targets for foodgrain production were set. The measures undertaken were diversion of area from cash crops (mainly cotton) to food crops; extension of cultivation to current fallows and cultivable wastelands through reclamation schemes; and intensive cultivation through increased use of improved seeds, fertilizers, and irrigation.

In January 1946, after the conclusion of World War II and before the Partition, the government of India issued for the first time a "Statement of Agriculture and Food Policy in India." The overriding goal of the policy was "to lead the country away from the menace of famine to a new vigor and prosperity."⁵ The policy statement took into account the reports of the policy committees set up by the Post-War Reconstruction Committee of the Executive Council. The objectives of the policy included: to increase the production of foodgrains and subsidiary foods, to improve the methods of agricultural production and marketing, to stimulate production of raw materials for industry and

² J. S. Sarma, "Agricultural Policy in India: Presidential Address at the 33rd All-India Agricultural Economics Conference," *Indian Journal of Agricultural Economics* 29 (January-March 1974): 1-15.

³ It is, however, true that the present food surplus areas in northwest and southeast India are those where the irrigation systems were constructed during the British period.

⁴ For a detailed review of the main changes in agricultural policies and the development of an institutional framework since 1928, see India, Ministry of Agriculture and Irrigation, *Report of the National Commission on Agriculture*, vol. 1: *Review and Progress* (Delhi: Controller of Publications, 1976), Chapter 2. Also see M. L. Dantwala, Preface to *Comparative Experience of Agricultural Development in Developing Countries of Asia and the Southeast Since World War II*, ed. M. L. Dantwala (Bombay: Indian Society of Agricultural Economics, 1972), pp. 1-55.

⁵ India, Department of Agriculture, "Statement of Agriculture and Food Policy in India," Delhi, January 1946.

exports, to secure remunerative prices for producers and fair wages for agricultural laborers, to distribute the food produced fairly, and to promote national research and education. The statement also defined the responsibilities of the central and provincial governments for carrying out these tasks, and defined the principles of financial assistance from the central government to the state governments. The implementation of the policy, however, faded into the background after Partition and Independence in August 1947.

In addition to a food deficit, imbalances between domestic production and demand developed in cotton and jute as a consequence of Partition. This led to the modification of the GMF campaign into the Integrated Production Program (IPP) in 1950/51 to include these crops; the earlier policy of diversion of area from cash crops was reversed.

In March 1950, soon after Independence, the Planning Commission was appointed to formulate a plan for the most effective and balanced utilization of the country's resources, based on an assessment of material, capital, and human resources; to periodically appraise progress achieved; and to recommend policies and measures needed to achieve the objectives.⁶

Five-Year Plans

Agriculture, including irrigation and electric power, was given top priority in the First Five-Year Plan (1951-56). It was recognized that without a substantial increase in the production of food and raw materials needed for industry it would be impossible to sustain a higher tempo of investment. The plan also emphasized diversification of agri-

culture and the need to make agriculture more efficient. Specific statements of policy about the structure of prices and levels of foodgrains prices were made in the plan. The land policy was designed to reduce the disparities in wealth and income, to eliminate exploitation, and to provide security for tenants and equality of status and opportunity for different sections of the population.⁷ Thus, the measures devised under this policy aimed at securing equity and social justice in the rural areas.

The First Plan's approach to agricultural development was based on three assumptions.⁸ First, it was assumed that farmers were exploited by the stronger elements in the society—landowners, moneylenders, and traders. Second, it was felt that the lower productivity in agriculture was due to the illiteracy and ignorance of the majority of the rural population. Third, it was recognized that agricultural production could be raised by increasing the use of inputs, especially water, although the role of technological change in raising productivity was not sufficiently realized. To overcome the institutional impediments, attention was focused on land reforms⁹ and promotion of cooperative credit and marketing. Following the recommendation of the GMF Enquiry Committee, the Community Development (CD) program was launched in October 1952.¹⁰ Increasing agricultural production was undoubtedly one of the objectives of the CD program, and for this reason the national extension service was organized as its principal component. The philosophy underlying the CD movement was that the villagers' attitudes toward the use of production-increasing technology needed to be changed and that they should be approached "not through a multiplicity of departmental officials, but through an agent (called the

⁶ The draft of the First Five-Year Plan was drawn up in July 1951, and made final in December 1952. The First Five-Year Plan began on April 1, 1951.

⁷ India, Planning Commission, *First Five-Year Plan—People's Edition* (Delhi: Publications Division, 1953), p. 88.

⁸ John W. Mellor, *Developing Rural India: Plan and Practice* (Ithaca, N.Y.: Cornell University Press, 1968), p. 34.

⁹ The land reforms during this period mainly took the form of abolition of *zamindari* and other intermediary rights and securing the rights of tenants to the lands they cultivated. The former could be implemented more easily, for the peasants formed the rural backbone of the nationalist movement whereas landlords tended to back the imperial power.

¹⁰ This program was extended to cover the entire country by the end of 1963-64. In April 1977 there were 5,028 community development blocks in the country.

village level worker) common at least to the principal departments engaged in rural work."¹¹ Essentially, however, in the agricultural sector, the First Plan was merely a continuation of the GMF schemes and the IPP.

Agriculture was not specifically included among the development objectives of the Second Five-Year Plan (1956-61).¹² Because the targets for foodgrain production had been achieved under the First Plan, agriculture probably was not considered to be of high priority. Agricultural programs under the Second Plan were envisaged merely as continuations of First Plan programs. However, what was not realized was that the production targets had been met by and large as a result of good weather and an increase in the area under foodgrains.

Regarding land policy, the twofold objectives of land reform were clarified as the removal of impediments to agricultural production that arose from the character of Indian agriculture and the creation of conditions for evolving a highly efficient and productive agrarian economy. It was expected that essential steps would be taken during the Second Plan so that over a period of about 10 years a substantial portion of agricultural lands would be cultivated on cooperative lines. The beginning of democratic decentralization through the setting up of Zilla Parishads (local government organizations) was made in the Second Plan following the recommendations of the Balwantray Mehta Study Team (1957).¹³ Thus, three agencies sought to promote agricultural development: the community development agency, the cooperatives, and the Zilla Parishad. In retrospect, none of them had a significant impact on agricultural production.

In financial outlay, the allocation for agriculture was raised from Rs 3,570 million in the First Plan to Rs 5,680 million in the Second Plan. In percentages, however, the

outlay was reduced from 15.1 percent of the total outlay (Rs 23,560 million) in the First Plan to 11.8 percent of the total outlay (Rs 48,000 million) in the Second Plan. The financial provisions for irrigation and electric power followed a similar pattern.

Basically, the development strategy of the Second Five-Year Plan gave primacy to large-scale heavy industry over agriculture. It was recognized that this would result in lower employment, but this was to be remedied by developing agriculture and cottage industries simultaneously. Efficiency was to be increased through programs such as community development and through better organization of labor.

Though the CD movement was established in the rural areas and created an awareness of new inputs such as seed and fertilizer, it failed to have any large impact on growth because the vast majority of the rural poor lacked resources for development and because there was no new technology to be disseminated. Whatever resources were available were preempted by the better-off farmers. Even the cooperative movement, which was unevenly developed among the different states, was dominated by the richer farmers who usually deprived the poorer farmers of the facilities offered by the cooperatives. The performance of panchayati raj institutions also was vitiated by political factionalism, which either warped or diluted developmental thrusts.¹⁴

Toward the end of the Second Five-Year Plan, it became clear that the generalized approach to agricultural development promoted through CD, the national extension agency, and agricultural production programs (which were more or less an expansion of the former GMF schemes) was not resulting in a rapid increase in foodgrain production. The Intensive Agricultural District Program (IADP) was initiated in 1961. (It was also known as the Package Program.) Experi-

¹¹ India, Planning Commission, *First Five-Year Plan*, p. 102.

¹² The principal objectives of the Second Five-Year Plan were a sizable increase in national income, rapid industrialization with particular emphasis on the development of basic and heavy industries, large expansion of employment opportunities, reduction in inequalities of income and wealth, and a more even distribution of economic power.

¹³ The system of *panchayat raj*, which extended local political control over large sections of the lower bureaucracy, was probably the most important institutional change facilitating the expansion of the political base of the Congress Party (Myron Weiner, "Political Evolution—Party Bureaucracy and Institutions," in *India: A Rising Middle Power*, ed. John W. Mellor, [Boulder, Col.: Westview Press, 1978], pp. 49-68).

¹⁴ India, Ministry of Agriculture and Irrigation, Department of Rural Development, *Report of the Committee on Panchayati Raj Institutions* (Delhi: Government of India Press, 1978), p. 7.

tation began in 7 districts in 1961 and 1962, and later extended to 16 districts, generally one project in each state.¹⁵ These pilot projects emphasized immediate and rapid increases in production in most favorable areas through the application of a package of inputs and associated improved practices. The principle of intensifying agriculture by applying a package of practices was extended in 1964 to the Intensive Agricultural Area Program (IAAP), which covered ultimately about 1,200 community development blocks in addition to the 300 blocks already covered by the IADP.¹⁶ (A development block is a geographical unit comprising about 100 villages.) Though there was some increase in production in the areas covered by the program, the rate of growth was not impressive. The lack of emphasis on an appropriate technological base or adequate research support for increased production efforts resulted in much disillusionment. Moreover, no attention was paid to the problems of water control and management.

The principal aim of the Third Five-Year Plan (1961-66) in agriculture was to achieve self-sufficiency in foodgrains and to increase agricultural production to meet the requirements of industry and export. The land policy of the Second Plan was reiterated. Price policy was designed primarily to ensure that movements of relative prices accorded with the priorities and targets of the Plan and to prevent any considerable rise in the prices of goods essential to the consumption of low-income groups.¹⁷

One of the severest droughts of the century occurred during the final year of the Third Plan, 1965/66, and the following year

saw only a slight improvement in weather. During the two years 1966 and 1967, the country had to import 19 million tons of cereals to maintain the food distribution system and to prevent widespread starvation. This period also exposed the vulnerability of Indian agriculture to adverse weather and the need to achieve food self-sufficiency as quickly as possible.

Two basic changes characterized agricultural development policy during the Third Plan. First, the policy shifted from changing the attitudes and motivations of farmers to changing the environment in which they worked. Second, variations in regional productivity were recognized and efforts were concentrated in areas that showed optimum potential for development and where the response was the greatest.

New Strategy for Agricultural Production

The period of the annual plans, 1966/67-1968/69,¹⁸ witnessed the formulation of a new strategy that was favored by three circumstances. First, the experience of the Package Program showed that farmers were receptive to the adoption of the new technology provided that the new methods were demonstrated and benefits properly explained. Second, new high-yielding exotic strains of wheat and paddy that responded well to irrigation and heavy doses of fertilizers were introduced and adopted in India after extensive field trials.¹⁹ Third, the government of India adopted the policy of assuring

¹⁵ The IADP was the result of a recommendation of the Agricultural Production Team sponsored by the Ford Foundation in the report on *India's Food Crisis and Steps to Meet It* (Delhi, India, Ministry of Food and Agriculture and Ministry of Community Development, 1959). The Ford Foundation not only sponsored but also financed some aspects of the program for several years. A standing committee, set up for the review and assessment of the program, brought out several evaluation reports of which the most important was India, Ministry of Food, Agriculture, and Community Development, "Modernizing Indian Agriculture," *Report on the Intensive Agricultural District Programme (1960-68)* (Delhi: Manager of Publications, 1969).

¹⁶ There were two major points of difference between the IADP and IAAP. The latter was crop oriented and it had less extension-staff support than the former.

¹⁷ India, Planning Commission, *Third Five-Year Plan* (Delhi: Manager of Publications, 1961), p. 119.

¹⁸ The failure of agricultural production in the years 1965-66 and 1966-67 upset so many assumptions made in the original draft of the Fourth Five-Year Plan (1966-67-1970-71) that it was decided to treat the plans for the years 1966/67-1968/69 as annual plans and postpone the Fourth Five-Year Plan until the five-year period 1969-70-1973/74. Such is the influence of agriculture on the Indian economy.

¹⁹ The high-yielding exotic strains were not photo-period sensitive and were early maturing. They were short-stemmed and stiff-strawed and hence were nonlodging under heavy doses of fertilizer; early maturation permitted more intensive cropping. The traditional varieties, on the other hand, were sensitive to photo-period and hence late maturing. With application of fertilizers, there was more vegetative growth than grain, and they also lodged.

remunerative prices²⁰ so that farmers' efforts to increase production might not be inhibited by the fear of undue depression in prices. The new strategy consisted of introducing HYVs of cereals, encouraging irrigation, increasing availability and use of scientific inputs, arranging access to credit, and assuring remunerative prices. But even under the new strategy there was no clear enunciation of a comprehensive agricultural policy.

Growth with Social Justice

The draft of the Fourth Five-Year Plan (1969-74) was published in March 1969. It contained a more explicit and elaborate presentation of issues connected with agricultural policy. Growth with stability had been explicitly stated as the objective of the Fourth Plan. It recognized that the pace of development in the agricultural sector set a limit to the growth of industry, exports, and the economy as a whole and constituted a major condition for achieving economic and social stability and improving the standards of living and nutrition for the masses. Together with programs for increasing agricultural production, the Plan provided for the building up of sizable buffer stocks to even out the supplies of foodgrains. Other measures were aimed at stabilizing foodgrain prices and prices in general. More specifically, the first objective was to provide the conditions necessary for a sustained increase in agricultural production of about 5 percent per year (compared to a growth of 3.2 percent per year actually achieved from 1949/50 to 1964/65). The second objective was to enable as large a section of the rural population as possible (including the small cultivator, the farmer in dry areas, and the agricultural laborer) to participate in devel-

opment and share the benefits, presaging the concept of growth with social justice that was formally announced along with the budget documents for the year 1970/71.²¹

The priority programs for agricultural development were grouped into two categories: those aimed at maximizing production and those aimed at remedying the imbalances. This seemed to create a dichotomy in the programs between growth and social justice. The equity programs included pilot experiments for setting up Small Farmers Development Agencies (SFDA), a Marginal Farmers and Agricultural Laborers Development Agency (MFAL), Command Area Development Projects (CADP), and Drought-Prone Area Programs (DPAP).

Because the formulation of the Fourth Plan followed the enunciation of the new strategy for agricultural production, the role of technology as a major input in agriculture was recognized. In irrigated areas commercialization of agricultural production of even small units was favored through intensive agriculture that would make them viable. In parts of the country under rainfed agriculture, the strategy was to increase the supplementary or ancillary activities of the small farmers and provide them fuller employment, thereby achieving social justice.

Detailed references were made in the plan to policies regarding prices, land reforms, mechanization, and credit and to their implications. Selective mechanization was advocated. This had the double advantage of adding to productivity through shifts to more labor-intensive activities and of avoiding large-scale displacement of labor. The credit policy in the plan aimed at institutionalization of agricultural credit in order to reduce direct borrowing from government (*taccavi*).

The SFDA/MFAL projects²² were designed to extend the benefits of economic develop-

²⁰ The Agricultural Prices Commission was set up in January 1965 to advise the government on price policy for agricultural commodities. The Food Corporation of India also was set up that month and entrusted with procurement and public distribution of foodgrains through its own agencies as well as those of the states.

²¹ A confidential study completed by the Home Ministry in December 1969 on the causes and nature of agrarian unrest from 1966 to 1969 predicted that relations between rich and poor in rural areas could explode unless preventive measures were taken in time. This led to the slogan *Garibi Hatao*, which was the basis of the special programs subsequently undertaken.

²² The proposal for setting up these agencies was made by the All-India Rural Credit Review Committee chaired by B. Venkatappiah. The main emphasis in these projects is on crop husbandry, which includes intensive agriculture, multiple cropping, introducing HYVs, horticulture, development of minor irrigation, soil conservation, and land shaping and development, with emphasis on dry farming practices and water-harvesting techniques in rainfed areas. The subsidiary activities of milk production, poultry and pig raising, and sheep production are funded separately and coordinated at the agency level.

ment to the weaker sections in the rural areas. Initially 46 SFDA and 42 MFAL projects were started during the Fourth Plan. Subsequently, following a recommendation by the National Commission on Agriculture (NCA),²³ the SFDA and MFAL projects were merged into a single SFDA program covering small and marginal farmers and agricultural laborers, and their number was increased to 168. The SFDA was a novel experiment, creating a new agency to which the central government could provide financial assistance directly without channeling it through the state governments. However, this agency had only coordinating functions and had to depend on the regular departmental agencies to implement the programs.

The DPAP extended over 74 districts (spread over 13 states) identified as drought prone.²⁴ These were also area programs, but covered parts of or entire districts.

Although the irrigation policy for optimum production was accepted at the national level, very little was known about water management and use. Consequently, the irrigation potential that had been created at great cost remained underutilized. It was realized that the gap between the creation of irrigation potential and its utilization was due to the failure to undertake several additional measures such as land leveling, construction of field channels, development of market roads, and other agricultural development activities before farmers could switch from dry cultivation to irrigated agriculture. This led to the formulation of the CADP under which a new organizational model, the CAD authority, was tried in an attempt to coordinate the various activities concerning irrigation, land development,

agriculture, and cooperative credit. By December 1979 the program covered 12.4 million hectares of ultimate irrigation potential in 50 irrigation projects spread out over 108 districts in 13 states. Thirty-eight CAD authorities were set up to administer these projects, but success was not uniform.

Other area development programs initiated during the Fourth Plan covered the desert, hill, and tribal areas. Dramatic increases in yield per hectare achieved by 1970/71, particularly in wheat and in irrigated area, served as the rationale behind these equity-oriented programs. It was thought that the green revolution would usher in the era of plenty²⁵ and that the government would soon have to attend to second and third generation problems of plenty.²⁶

Though most of the equity-oriented programs were initiated in the Fourth Plan, they took concrete shape only during the Fifth Plan (1974-79). Thus, eliminating poverty and attaining economic self-reliance were the major tasks set before the country during the Fifth Five-Year Plan, with growth for social justice the principal objective in the sphere of agricultural development. Emphasis was also placed on employment-oriented agriculture, with greater stress on dry farming and diversification of agriculture (including crop production, horticulture, animal husbandry, dairying, and fishery programs). Rural public works, Pilot Intensive Rural Employment Projects, and Integrated Rural Development Programs were initiated to ensure that employment problems received proper attention, along with agricultural growth.

The draft Medium-Term Plan for 1978-83 formulated in April 1978²⁷ envisaged

²³ India, Ministry of Agriculture, *Reorientation of Programmes of Small and Marginal Farmers and Agricultural Labourers Development Agencies* (Interim Report of the National Commission on Agriculture (Delhi: Government of India Press, 1973).

²⁴ Development and management of irrigation resources and soil and moisture conservation and afforestation, restructuring of cropping patterns and pasture development, and development of programs for small and marginal farmers were the main elements of the strategy of this program. Some of these projects were assisted by the World Bank.

²⁵ Foodgrain production in 1970-71 reached a record 108.4 million tons. Imports fell to 2 million tons in 1971 and, excluding quantities supplied to East Pakistan, there were net exports of 0.5 million tons of cereals in 1972. Foodgrain prices were stable during 1970 and 1971. Grain stocks were built up to 8.1 million tons at the end of 1971. Some regulatory controls were lifted, and there were signs that the food situation was easing. In retrospect, this easing was short-lived.

²⁶ The NCA, set up in August 1970, was expected to look into the problems of plenty created by the success of the green revolution.

²⁷ There was a change in the central government in February 1978. The new government decided to terminate the Fifth Five-Year Plan in 1977-78, and adopt the system of rolling plans from 1978 onwards. The draft Sixth Five-Year Plan, 1978-83, therefore represents a medium-term plan covering this period.

greater emphasis on agriculture through higher financial allocations and the acceleration of irrigation and fertilizer programs. This draft was revised in December 1979, and another draft Sixth Five-Year Plan, 1978-83, was published.²⁸ The programs and policies proposed for achieving growth for social justice and eliminating unemployment and underemployment within 10 years were essentially the same as those implemented during the Fifth Five-Year Plan. In addition, detailed guidelines were drawn up and communicated to the states on the 'Integrated Rural Development Program'²⁹ and block-level planning. Food-for-Work programs (since renamed National Rural Employment programs) were taken up on a large scale, and the scope of the Minimum Basic Needs programs was expanded. More emphasis was given to the development of small-scale and cottage industries through the establishment of District Industries Centers with built-in arrangements for monitoring the programs.

The draft Sixth Plan refers to seven specific measures for redistribution of income in favor of the poor: distribution of surplus land (over the permitted ceilings) to the landless cultivators; subsidies and preferred access for the small and marginal farmers to credit and farm inputs; debt relief and provision of consumption credit; operation of the public distribution system covering essential supplies; provision of basic needs; development of tribal areas and economic betterment of "scheduled" castes;³⁰ and organization of the poor to ensure effective implementation of these measures.³¹

This brief review of agricultural policy brings out significant landmarks in its evolu-

tion. Though achieving social justice has always been a policy goal under successive five-year plans, the strategy for agricultural production adopted at each stage took note of the most urgent needs for growth perceived at the time. In the 1940s when the food imports from Burma were cut off, areas were diverted from nonfood (commercial) crops to foodgrains under the GMF campaign. After Partition, when the country lost cotton- and jute-growing areas to Pakistan, this policy was reversed under the IPP. In the 1950s, agricultural programs were given topmost priority in the First Plan, but the Second Plan gave primacy to heavy industry. At the end of that decade, a food crisis threatened. In the 1960s the intensive agricultural programs were initiated to meet the food crisis. In the wake of the droughts of 1965 and 1966, the new strategy for agricultural production was devised. Both the IADP and IAAP aimed at rapid increases in foodgrain production in areas with high growth potential. Toward the end of the 1960s, the new strategy appeared to be succeeding in accelerating growth, but it was also threatening to widen interpersonal and interregional disparities. In the 1970s the government responded to this new threat by implementing such special programs as SFDA and DPAP. Though early in this decade food production stagnated, by the mid-1970s food self-sufficiency was achieved³² and the new technology was firmly established, though confined to a few crops and certain areas. The adverse effect of new technology on disparities and the limited success of the special programs led to a search for production policies that would promote growth with equity.

²⁸ India, Planning Commission, *Draft Sixth Five-Year Plan (Revised)*. Before the draft was made final, there was another change in the central government and a new Sixth Five-Year Plan was formulated, covering the period 1980-85. This study, however, deals with developments up to the middle of 1980.

²⁹ The objectives of the enlarged Integrated Rural Development Programme were growth in production, benefits to the identified target groups in the disadvantaged sections of the rural community, and full employment. By 1982-83 it was proposed to cover 2,000 out of 3,000 blocks already under special programs and an additional 1,500 blocks at a rate of 300 a year.

³⁰ "Scheduled" castes are economically backward classes.

³¹ India, Planning Commission, *Draft Sixth Five-Year Plan (Revised)*, p. 8.

³² In a country where the government undertakes the responsibility to supply foodgrains through a public distribution system at reasonable prices, the goal of self-sufficiency could mean that requirements for distribution should be met from within the country. Where there are no such arrangements, self-sufficiency could imply that market demand for foodgrains should equal marketed surpluses of the producers at reasonable prices. For planning production programs, the self-sufficiency objective requires that the production target should equal the estimated gross demand (at constant prices), including the requirements for human consumption and other uses. The self-sufficiency achieved in India refers to the first concept.

4

GROWTH IN PRODUCTION

The long-term trends in production show annual growth rates of about 2.7 percent for foodgrains as well as for all crops during the period 1949/50-1978/79.³³ A comparison of the growth rates between the periods 1949/50-1964/65 and 1967/68-1978/79 shows that, though the growth in productivity after the green revolution was higher, the annual rates of increase in both area and production still were lower than those before the introduction of the new technology (Table 1). Although the output of wheat grew 6 percent per year from 1967/68 to 1978/79, this growth was partly offset by lower increases in rice (2.6 percent) and slower or negative growth in other foodgrains because wheat is only 26.6 percent of foodgrain output.

The performance of Indian agriculture, particularly its rates of growth and the factors influencing them, has been studied by several researchers. Some of their conclusions are: that increases in area contributed more to the increase in production up to 1960/61 and increases in productivity contributed more thereafter; that wheat production grew more rapidly than that of other crops, and that this growth tapered off in the early 1970s; that production growth in eastern states was much lower than the national average; that production grew fastest in Gujarat and Punjab before 1964/65 and in Punjab and Haryana thereafter; and that about 75 percent of the variations in growth of crop output were explained by the growth of irrigation. Dharm Narain studied the growth rate of productivity by decomposing it and segregating the changes in the cropping

pattern and the spatial shifts of crops. He found that the pure yield effect was distinctly higher in the post-green revolution period. It increased from 0.54 percent per year between 1952/53 and 1960/61 to 1.33 percent between 1961/62 and 1972/73. He also found that non-price factors were responsible for much of the growth.³⁴ Regarding instability in foodgrain production, a recent IFPRI study by Shakuntla Mehra shows that during the periods 1949/50-1964/65 and 1967/68-1977/78, the standard deviation and coefficient of variation of production for all crop aggregates and for many of the individual crops examined increased and that fluctuations in yield were the dominant force behind the increased variability.³⁵

All-India growth in foodgrain production also varied between 1949/50 and 1973/79. Table 2 shows the relevant point-to-point growth rates. The production growth rates for the different states between 1960/61 and 1978/79 were also uneven. Punjab and Haryana led with average growth rates of 8.0 and 5.0 percent per year, while Orissa and Kerala had growth rates of less than 1.4 percent.³⁶

An analysis carried out jointly by Jawaharlal Nehru University and the Planning Commission at the district level showed that the annual rate of growth of crop production between the periods 1962-65 and 1971-74 exceeded 4.5 percent in 48 districts, was between 1.5 and 4.5 percent in 102 districts, and was less than 1.5 percent in 62 districts. In 70 districts the rate was negative. For various reasons yield was the

³³ Computation of growth rates in crop production where seasonal factors cause annual fluctuations is tricky. Depending on the length of the period covered, its beginning and end points, and the computation formula adopted, the rates of growth differ greatly, even after production data are adjusted for changes in coverage and methods of estimation. Point-to-point growth rates are simplest to compute provided care is taken to see that the two points are comparable from the point of view of weather and its effect on production.

³⁴ Dharm Narain, "Growth of Productivity in Indian Agriculture," *Indian Journal of Agricultural Economics* 32 (January-March 1977): 1-44.

³⁵ Shakuntla Mehra, *Instability in Indian Agriculture in the Context of the New Technology*; Research Report 25 (Washington, D.C.: International Food Policy Research Institute, 1981).

³⁶ See Y. K. Alagh and P. S. Sharma, "Growth of Crop Production: 1960/61 to 1978/79—Is It Decelerating?" *Indian Journal of Agricultural Economics* 35 (April-June 1980): 104-118.

Table 1—Compound rates of growth of agricultural production, area under crops, and yield, 1949/50–1978/79

| Item | 1949/50– 1964/65 | 1949/50– 1978/79 | 1967/68– 1978/79 |
|---------------|---------------------|---------------------|---------------------|
| | (percent/year) | | |
| Foodgrains | | | |
| Production | 2.98 | 2.66 | 2.77 |
| Area | 1.34 | 0.84 | 0.44 |
| Yield | 1.61 | 1.52 | 1.84 |
| Nonfoodgrains | | | |
| Production | 3.61 | 2.76 | 2.88 |
| Area | 2.52 | 1.42 | 1.19 |
| Yield | 1.06 | 0.93 | 1.25 |
| All crops | | | |
| Production | 3.19 | 2.68 | 2.81 |
| Area | 1.55 | 0.96 | 0.63 |
| Yield | 1.60 | 1.35 | 1.63 |

Source: Compiled from data in India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Indian Agriculture in Brief*, various editions (Delhi: Controller of Publications, various years).

Note: The growth rates given in Table 1 are published by India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics. They are based on the index numbers of production, area, and yield of foodgrains, nonfoodgrains, and all crops also published by the directorate. In computing the group index of yield, the directorate adopts the formula:

$$\text{Index of Yield} = \left[\frac{\sum a_{ij} Y_{ij} p_{ij}}{\sum a_{ij} Y_{ij} p_{ij}} \right] \times 100.$$

where a_{ij} and a_{ij} represent areas under i th crop in the base year and j th year; Y_{ij} and Y_{ij} , yields per hectare in the base year and j th year; and p_{ij} , price per unit of the i th crop in the base period. Hence the growth rates of area and yield do not add up to the growth rate in production even after allowing for the interaction term.

major and predominant component of growth in most of the high-growth districts, whereas increases in area were usually far less important. In the medium-growth districts no clear-cut pattern emerged, though yield increases ceased to be the predominant factor of growth. In the districts with negative growth, decreases in both area and yield contributed to their decline.³⁷

Although the contribution of the new technology to the acceleration of wheat production is acknowledged by all researchers, there is a controversy over its impact on the production of foodgrains and overall agricultural production. Those who believe that the new strategy has failed point to the absence of acceleration of either production or productivity growth in the post-green revolution period.³⁸ Dantwala, on the other hand, concludes that HYV technology brought about significant improvement in the productivity of all cereal crops except jowar (sorghum), though its overall impact on foodgrain production was not significant, especially in per capita terms.³⁹

Effects of HYVs on Growth

To determine if the HYV program had any influence in accelerating growth rates, it is best to consider the period after the introduction of the new technology in three phases. The relevant data on area planted with HYVs, irrigated area sown with foodgrains, consumption of fertilizers, and the output of foodgrains are given in Table 3.

In the first phase, 1966/67–1970/71, the HYVs proved an instant success and the area under them expanded rapidly, as did

³⁷ G. S. Bhalla and Yogendra K. Alagh, "Spatial Pattern of Levels and Growth of Agricultural Output in India," Jawaharlal Nehru University, Delhi, 1978. (Mimeographed.)

³⁸ Ashoka Mitra, "Bumper Harvest has Created Dangerous Illusions," *The Statesman*, October 14 and 15, 1968; B. S. Minhas and T. N. Srinivasan, "Food Production Trends and Buffer Stock Policy," *The Statesman*, November 14 and 15, 1968; T. N. Srinivasan, "The Green Revolution or Wheat Revolution," in *Comparative Experience of Agricultural Development in Developing Countries of Asia and the Southeast Since World War II*, ed. M. L. Dantwala (Bombay: Indian Society of Agricultural Economics, 1972), p. 407; T. N. Srinivasan, "Trends in Agriculture in India, 1949/50 to 1977/78," *Economic and Political Weekly*, Special Number, August 1979, pp. 1283–1294; and Ashok Rudra, "Organization of Agriculture for Rural Development: The Indian Case," *Cambridge Journal of Economics* 2 (December 1978), 393–394.

³⁹ M. L. Dantwala, "Future of Institutional Reform and Technological Change in Indian Agricultural Development," *Economic and Political Weekly*, Special Number, August 1978, pp. 1299–1306.

Table 2—Annual rate of growth of foodgrain production, 1949/50–1978/79

| Period | Rate of Growth | Period | Rate of Growth |
|-----------------|----------------|-----------------|----------------|
| | (percent) | | (percent) |
| 1949/50–1960/61 | 2.8 | 1964/65–1970/71 | 3.3 |
| 1949/50–1964/65 | 2.6 | 1964/65–1975/76 | 2.8 |
| 1949/50–1970/71 | 2.8 | 1964/65–1978/79 | 2.8 |
| 1960/61–1964/65 | 2.1 | 1970/71–1975/76 | 2.2 |
| 1960/61–1970/71 | 2.8 | 1970/71–1978/79 | 2.4 |
| 1960/61–1975/76 | 2.6 | 1975/76–1978/79 | 2.8 |

Source: John W. Mellor, *The New Economics of Growth: A Strategy for India and the Developing World* (Ithaca, N.Y.: Cornell University Press, 1976) p. 39.

Note: Growth rates for periods after 1970/71 were calculated by the author using Mellor's methodology.

fertilizer use. In 1970/71 two thirds of the irrigated area and 35 percent of the total area planted with wheat was sown with HYVs. In contrast, only 38 percent of the irrigated area and 15 percent of the total area planted with rice were sown with HYVs. The irrigated area planted with foodgrains increased nearly 25 percent in six years, or 3.8 percent per year. The 3.3 percent rate of growth in foodgrain production between 1964/65 and 1970/71 was no doubt due to expansion of irrigation, fertilizers, and the introduction of HYVs. This was higher than the average rate between 1960/61 and 1970/71 or between 1949/50 and 1970/71.

In the second phase, 1972/73–1974/75, fertilizer use, irrigated area, and foodgrain production stagnated, though irrigation picked up in the last year of the period. It is still arguable whether this decline should be attributed to weather alone or to deterioration in seed quality, to the incidence of wheat rust, to tight fertilizer supplies, to complacency in the wake of the success of the HYVs, or to preoccupation with the implementation of the new target group and area development schemes designed to secure social justice.

In the last phase, 1975/76–1978/79, irrigation continued to increase. Fertilizer consumption picked up in 1976/77, and area sown with HYVs of rice rose in 1977/78. Foodgrain production in 1976/77 showed an increase of 3.5 percent per year over the comparable year, 1972/73, and in 1978/79 reached a record 131.37 million tons, 53.8 million tons of which was rice.

Thus, the new strategy for agricultural production based on HYVs did contribute to

the growth in production and productivity. However, as this growth was largely confined to wheat and irrigated area, its full effect was not reflected in the overall rate of growth of foodgrain production for the whole country.

Furthermore, about 44.2 percent of total foodgrain production in 1975/76 was produced on irrigated land that formed only 26.6 percent of the area. Although separate growth rates for irrigated and unirrigated production are not available, it is interesting to note that if rainfed production increased 1 percent per year, irrigated production had to go up 5.3 percent to achieve an overall rate of growth of 3 percent per year during a period of 10 years. If rainfed production did not rise, the rate of increase in irrigated production had to be even higher. This explains why the overall growth rates were a modest 2.6–2.8 percent.

Wheat did very well in northwestern India, but until recently rice performed poorly in eastern and parts of southern India. The reasons are not difficult to find. Wheat is grown in fertile, alluvial soils of the Indo-Gangetic plains, where the average size of holdings is larger than the national average; the holdings are consolidated; irrigation was well developed even before the new technology; and the winter rainfall is assured and supplemented by irrigation. The problems of pests and diseases are less severe and the marketing system is well developed. In contrast, rice is traditionally grown in hot, humid deltas of rivers in small, fragmented, scattered holdings. It is also raised in the monsoon season when problems of pests and diseases are severe and floods and

Table 3—Progress of foodgrain production programs, 1964/65–1978/79

| Year | Area Sown With High-Yielding Varieties | | | Total Fertilizer Consumption | Irrigated Area Sown With Foodgrains | Area Sown With Foodgrains | Production of Foodgrains | Production of Wheat | Production of Rice |
|----------------------|--|-------|-------|------------------------------|-------------------------------------|---------------------------|--------------------------|---------------------|--------------------|
| | Cereals | Wheat | Rice | | | | | | |
| | (million hectares) | | | (million tons) | (million hectares) | | (million tons) | | |
| 1964 65 | ... | ... | ... | 0.77 | 23.94 | 118.11 | 89.37 | 12.25 | 39.32 |
| 1966 67 | 1.89 | 0.54 | 0.88 | 1.10 | 25.79 | 115.30 | 74.23 | 11.39 | 30.44 |
| 1967 68 | 6.04 | 2.94 | 1.78 | 1.54 | 26.10 | 121.42 | 95.05 | 16.54 | 37.61 |
| 1968 69 | 9.20 | 4.80 | 2.60 | 1.76 | 28.05 | 120.43 | 94.01 | 18.65 | 39.76 |
| 1969 70 | 11.40 | 4.92 | 4.34 | 1.98 | 29.55 | 123.57 | 99.50 | 20.09 | 40.43 |
| 1970 71 | 15.38 | 6.48 | 5.59 | 2.26 | 30.12 | 124.32 | 108.42 | 23.83 | 42.23 |
| 1971 72 | 18.17 | 7.86 | 7.41 | 2.66 | 30.54 | 122.62 | 105.17 | 26.41 | 43.07 |
| 1972 73 | 22.09 | 10.00 | 8.11 | 2.77 | 30.74 | 119.28 | 97.03 | 24.74 | 39.25 |
| 1973 74 | 26.00 | 11.00 | 10.00 | 2.84 | 31.17 | 126.54 | 104.67 | 21.78 | 44.05 |
| 1974 75 | 27.30 | 11.20 | 11.20 | 2.58 | 33.26 | 121.08 | 99.83 | 24.10 | 39.58 |
| 1975 76 | 31.90 | 13.50 | 12.40 | 2.90 | 34.08 | 128.18 | 121.03 | 28.85 | 48.74 |
| 1976 77 | 33.60 | 14.50 | 13.30 | 3.43 | 34.24 | 124.36 | 111.17 | 29.01 | 41.92 |
| 1977 78 | 38.00 | 15.50 | 15.60 | 4.28 | 36.25 ^b | 127.52 | 126.41 | 31.75 | 52.67 |
| 1978 79 ^d | 41.10 | 16.10 | 16.90 | 5.12 | n.a. | 128.12 | 131.37 | 34.98 | 53.85 |

Source: India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Indian Agriculture in Brief*, various editions (Delhi: Controller of Publications, various years).

Note: Where n.a. appears, the figure was not available.

^d These are provisional figures.

^b This is an estimate.

waterlogging are frequent. The marketing system for rice is also less developed. Above all, the net returns from the HYVs of rice are lower than those from the improved local varieties that enjoy higher prices.

In retrospect, the early success and rapid spread of HYVs of wheat had beneficial effects on the overall economy. The sharp increase in wheat production that resulted in the procurement of large surpluses enabled the country to reduce wheat imports and attain self-sufficiency. Because rapid increases in rice production also occurred in north-western India, where rice is not normally eaten, increased supplies were available to the rice-deficit states. Though the high prices paid to the farmers for wheat resulted in large subsidies inherent in the distribution of grain at lower prices through fair price shops, food prices stabilized from 1976 to 1978, helping to control the rate of inflation.

Prospects

Whereas Vaidyanathan⁴⁰ and Bhalla⁴¹ would favor a cautious assessment of future prospects, Thamarajakshi and Rao strike an optimistic note and assert that "the agricultural scenario today has undergone a quantitative change and with the achievement of a decisive breakthrough in food production, the country has emerged from the scarcity trap."⁴² It is also evident that even in irrigated areas there is considerable scope for acceleration of yields as is shown by the following data on the average yields obtained by farmers in national demonstrations in 1975/76 and those attained at the national level for irrigated crops.⁴³ The latter are nearly half to one third of the former.

| Crop | National Demonstrations Number | All-India Irrigated Yields | |
|----------------------|--------------------------------|---------------------------------|--------|
| | | Mean Yields (kilograms/hectare) | Yields |
| Rice | 875 | 3,431 | 1,620 |
| Wheat | 875 | 3,814 | 1,724 |
| Maize | 189 | 3,238 | 1,694 |
| Jowar (sorghum) | 135 | 3,554 | 1,017 |
| Bajra (pearl millet) | 115 | 2,142 | 1,229 |

The draft Sixth Five-Year Plan, 1978-83 (revised), aims at a target of 3.2 percent annual growth in foodgrain production as compared to the more ambitious targets of 5.6 percent in the Third and Fourth Plans and 4.2 percent in the draft of the Fifth Plan. The actual achievements have been much lower. However, a recent study shows that foodgrain production in 1975-77 was 30.19 million tons higher than in 1960-62. This was consistent with the production potential (33.47 million tons) created during the 1970s as a result of additional irrigation, fertilizer use, increased area, and shifts in cropping patterns.⁴⁴ The major programs designed to promote increased foodgrain production in the draft Sixth Five-Year Plan aim at a target of 13.8 million hectares of additional irrigated area (of which 11 million hectares will be sown with foodgrains) and consumption of 7.85 million tons of fertilizer (NPK, of which 5.9 million tons will be applied to foodgrains). Even assuming no change in the area planted with foodgrains and no large shift in the cropping pattern, the additional production potential likely to be created during the

⁴⁰ A. Vaidyanathan, "Performance and Prospects of Crop Production in India," *Economic and Political Weekly*, Special Number, August 1977, pp. 1355-1368.

⁴¹ Sheila Bhalla, "Agricultural Growth: Role of Institutional and Infrastructural Factors," *Economic and Political Weekly*, November 5-12, 1977, pp. 1898-1905.

⁴² R. Thamarajakshi and G. V. K. Rao, "Some Aspects of Growth of Indian Agriculture," *Economic and Political Weekly*, Review of Agriculture, December 23-30, 1978, pp. A113-A118.

⁴³ India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Indian Agriculture in Brief*, 17th ed. (Delhi: Controller of Publications, 1980); and India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Estimates of Area and Production of Principal Crops, 1978-79* (Delhi: Controller of Publications, 1980). All-India yields were derived from the state data on irrigated area and yield per hectare of irrigated crops based on crop-cutting experiments. Also, results given for rice are in terms of rice, not paddy.

⁴⁴ See J. S. Sarma and Shyamal Roy, "Foodgrain Production and Consumption Behavior in India, 1960-77," in *Two Analyses of Indian Foodgrain Production and Consumption Data*, Research Report 12 (Washington, D.C.: International Food Policy Research Institute, 1979), Table 2.

1978-83 period works out to 32 million tons above the base level.⁴⁵ Thus, if the irrigation and fertilizer targets under the Sixth Plan are achieved, the growth rate in foodgrain output will certainly exceed 3.2 percent.

A recent study of the impact of irrigation on multiple cropping in India by Dharm Narain and Shyamal Roy also comes to the conclusion that the irrigation expansion

called for in the Sixth Plan might yield an annual increase of 1 percent in cropping intensity, and even if the growth rate of productivity does not improve but continues at its present rate, agricultural output could increase by 3.5 percent per year. If, in addition, an increase in productivity is also brought about, reaching the targeted 4 percent per year rate of growth will be possible.⁴⁶

⁴⁵ The response coefficients adopted in working out these estimates are modest compared to the potential if the inputs are efficiently used.

⁴⁶ Dharm Narain and Shyamal Roy, *Impact of Irrigation and Labor Availability on Multiple Cropping: A Case Study of India*, Research Report 20 (Washington, D.C.: International Food Policy Research Institute, 1980). The targeted rate of growth of 4 percent in agricultural production is based on the original draft of the Sixth Five-Year Plan, 1978-83.

5

IMPACT OF NEW TECHNOLOGY AND SPECIAL PROGRAMS ON INTERPERSONAL AND INTERREGIONAL DISPARITIES

The initial success stories of the green revolution led to considerable discussion about the effects of new technology on growth and equity. A number of people believed that although the yield-increasing technology would step up growth in agricultural production, it would also widen existing disparities in income. Their apprehensions arose from prevailing disparities in land ownership and operation. In addition, farmers of different sizes of farms have differential access to inputs and varying rates of adoption of the new technology. Finally, increased mechanization of large farms in the wake of new technology may affect employment.

It is clear that where land distribution remains skewed, the direct effect of a technology that raises output per unit of land—such as the one based on the adoption of HYV seeds—will be to widen disparities in the absolute levels of family earnings from these crops. What is more pertinent is not whether this form of technological change widens interpersonal disparities in the absolute incomes of different groups of farmers, but whether the resulting income growth is confined to only some groups of farmers or is widespread. Also, where the new technology is applicable to irrigated and assured-rainfall areas, there is no question that interregional disparities will widen. The relevant issue for the not-so-endowed areas is what kind of measures are necessary to improve the productivity and incomes of the people living in them.

Interpersonal Disparities

Between 1960/61 and 1970/71 the number

of rural households owning land increased from 64 to 71 million, while the average size of a holding decreased from 2.0 to 1.7 hectares.⁴⁷ Within different size groups, the number and area of marginal holdings (less than 1 hectare) increased significantly, whereas those of large holdings (10 hectares or more) declined. In 1970/71 nearly 42 million rural families owned less than 1.0 hectare each (see Table 4).

Available data on operational holdings⁴⁸ based on the agricultural censuses show that between 1970/71 and 1976/77 their number increased by 15 percent from 71.0 million to 81.5 million—a 2.5 percent increase per year. Here again the largest increase was in marginal holdings—from 36.2 million to 44.5 million (or 23 percent)—whereas the number of large holdings declined from 2.8 to 2.4 million. The average size of an operational holding declined from 2.3 to 2.0 hectares. Also, in 1976/77 the number of small holdings (between 1.0 and 2.0 hectares in size) was 14.7 million. These small and marginal holdings, numbering in all 59.2 million (or 72.7 percent of the total), accounted for 23.5 percent of the cultivated areas (see Table 5).

The other large segment of the rural population that is among the poorer groups is agricultural laborers, a majority of whom are landless. According to the Rural Labor Enquiry of 1974/75, the number of rural labor households increased from 18 to 25 million during the decade 1964/65-1974/75, while their share of total rural households rose from 25 to 30 percent. The number of agricultural labor households increased from 15 to 21 million, and the number of agricultural workers increased from 31 to 46 million.

⁴⁷ Data are based on India, Department of Statistics, National Sample Survey Organization, *Tables on Land Holdings—All-India*, National Sample Survey, 26th Round, No. 215 (Delhi: Controller of Publications, 1976).

⁴⁸ An operational holding is all land cultivated by a person irrespective of whether it is owned by him or taken on lease.

Table 4—Estimated number of rural households owning land and area in different size holdings, 1960/61 and 1970/71

| Size of Holdings | 1960/61 | | 1970/71 | |
|--------------------------------|----------------------|--------------------|----------------------|--------------------|
| | Number of Households | Area | Number of Households | Area |
| | (million) | (million hectares) | (million) | (million hectares) |
| Marginal (less than 1 hectare) | 35.07 | 9.77 | 41.51 | 11.67 |
| Small (1 to 2 hectares) | 10.98 | 15.96 | 12.14 | 17.56 |
| Semimedium (2 to 4 hectares) | 9.32 | 26.43 | 9.36 | 26.22 |
| Medium (4 to 10 hectares) | 6.57 | 40.19 | 6.14 | 36.78 |
| Large (10 hectares or more) | 2.06 | 36.34 | 1.66 | 27.41 |
| Total | 64.00 | 128.69 | 70.81 | 119.64 |

Sources: India, Cabinet Secretariat, *The National Sample Survey: Tables with Notes on Some Aspects of Landholdings in Rural Areas (State and All-India Estimates)*, 17th Round, No. 144 (Delhi: Manager of Publications, 1968); India, Department of Statistics, National Sample Survey Organization, *Tables on Land Holdings--All India*, National Sample Survey, 26th Round, No. 215 (Delhi: Controller of Publications, 1976).

These trends are largely the result of demographic pressures, implementation of land reform measures that involve fixation of ceilings on holdings (or anticipation thereof), and programs for the allotment of surplus lands to landless laborers. There is no evidence to show that the large increases in marginal holdings and agricultural labor households are the direct result of the adoption of new technology or the trend toward mechanization on any significant scale for India as a whole. On the other hand, the various research studies summarized by Parthasarathy show that new technology has had varying effects on tenancy. "In relatively labor scarce Punjab, a profitable technology led to eviction of tenants, expansion in the size of the owner

cultivated holding, growing landlessness and mechanization, and increased productivity without serious immediate tensions. Similar is the experience in the commercially advanced Gujarat State where the larger farmer is found to lease in from the small farmer." In densely populated West Bengal and Andhra Pradesh, the new technology pushed the owners toward cost-sharing with the tenant, though in Andhra Pradesh this was a transitional arrangement. As contract labor arrangements developed for peak operations, share tenancy gave place to non-mechanized, owner-cultivated larger farms. In semifeudal Orissa sharecropping with small tenants continued with added emphasis on advances for purchase of new inputs. "Undoubtedly, a superior technology has

Table 5—Distribution of operational holdings by size of holding 1970/71 and 1976/77

| Size of Holding | 1970/71 | | 1976/77 | |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|
| | Number of Holdings | Area | Number of Holdings | Area |
| | (million) | (million hectares) | (million) | (million hectares) |
| Marginal (less than 1 hectare) | 36.20 | 14.56 | 44.53 | 17.50 |
| Small (1 to 2 hectares) | 13.43 | 19.28 | 14.70 | 20.86 |
| Semimedium (2 to 4 hectares) | 10.68 | 30.00 | 11.64 | 32.36 |
| Medium (4 to 10 hectares) | 7.93 | 48.23 | 8.21 | 49.67 |
| Large (10 hectares or more) | 2.77 | 50.06 | 2.44 | 42.82 |
| Total | 71.01 | 162.13 | 81.52 | 163.14 |

Source: India, Ministry of Agriculture and Irrigation, "All-India Agricultural Census, 1976/77," 1980. (Mimeographed.)

been a driving force to induce institutions to adapt themselves to its requirements."⁴⁹

Three further observations are relevant. First, despite the decrease in the number and area of large holdings, both owned and operated, their skewed size distribution persists. Second, the size of a viable holding—that is, the area needed to meet the subsistence needs of an average household—has decreased with the adoption of yield-increasing technology. Third, with the increase in number and proportion of marginal holdings, a larger number of people now have a land base, either owned or leased, enabling them to meet part of their subsistence needs and also to become eligible for government-assisted programs.

The next issues are whether the small and marginal farmers are in a position to participate in the new technology, whether they have, in fact, participated in it, and in areas where they have not participated, what are the reasons? And what has been the impact of mechanization on equity?

With respect to irrigation, 70.5 percent of 12 million wholly irrigated holdings in 1970-71 were less than one hectare; another 15.5 percent were between one and two hectares. Small and marginal holdings accounted for 56.2 percent of partly irrigated holdings. Again, more than 31 percent of net irrigated area was in small and marginal holdings, and the percentage of unutilized land was the lowest. The input of human labor also is high on small farms, partly due to the adoption of more intensive cropping patterns and partly due to an increased use of labor per hectare for each crop.

The evidence regarding the relationship between the size of holding and fertilizer use is not clear cut. The National Sample Survey data on fertilizer use in agricultural holdings do not indicate much variation in the dosages of fertilizers applied in different size groups of holdings, nor any association between the size of holdings and the rate of application of urea or ammonium sulfate on irrigated rice and wheat.⁵⁰ However, the share of small and marginal farms in total

fertilizer use was about 32 percent. Data based on a study by the National Council of Applied Economic Research reveal that for the country as a whole and for most crops the proportion of gross cropped area fertilized per holding increased with farm size, but the intensity of fertilizer use per hectare of cropped area was greatest on small holdings.⁵¹

As for credit, many of the earlier field investigations showed that the absence of credit was one of the important constraints preventing small and marginal farmers from using the new technology and that the amount of low-cost institutional credit available to them was too small compared to their needs. This was the premise on which the SFDA programs were launched. Subsequent evidence, however, shows that by 1975-76 farmers owning less than two hectares used about one third of the total institutional credit from commercial banks, cooperative societies, and land development banks, although their share of the land was less than one fourth. In 1977-78 the proportion of small borrowers was about half of the total number of borrowers from cooperative credit societies and land development banks (excluding borrowers from commercial banks), whereas small holders accounted for three fourths of the total ownership holdings in the country.

The studies conducted by the Program Evaluation Organization of the Planning Commission did not show any bias by farm size in the adoption of HYVs of wheat in Punjab, although the small farmers were a little slower in adoption than the more progressive medium and large farmers. There is also evidence that, in general, the small farmers did participate in the HYV program. This was true where the technology spread rapidly as well as in other areas. However, for all five crops and in each of the years studied, a strong positive linear association was found between the proportion of farmers adopting HYV seeds and the size of the farm. An inverse relationship was found between the intensity of adoption and farm size, the small farmers devoting a larger proportion

⁴⁹ G. Parthasarathy, "Land Reform and the Changing Agrarian Structure," *Agricultural Development of India: Policy and Problems*, ed. C. H. Shah (Bombay: Orient Longman, Ltd., 1979), pp. 359-360.

⁵⁰ India, Department of Statistics, National Sample Survey Organization, "Fertilizer Use in Agricultural Holdings," Department of Statistics, 1977. (Mimeographed.)

⁵¹ National Council of Applied Economic Research, *Fertilizer Use on Selected Crops in India* (New Delhi: NCAR, 1974).

of their crop to HYVs than larger farmers.⁵² Schluter and Mellor's study also confirmed these conclusions.⁵³

There is also evidence to show that promotion of small-farmer-oriented agriculture does not inhibit growth. The farm management investigations in the 1950s and early 1960s clearly showed that farm productivity per hectare was inversely proportional to size using traditional technology, although there was some controversy regarding this conclusion.⁵⁴ The results for the period following the green revolution were mixed, perhaps because of unequal access of small farms to production resources.⁵⁵ Given the package of inputs, credit, and extension, there is no evidence to show that small farms were less productive than large farms, even under the new technology.⁵⁶

The effects of mechanization on employment were studied by several researchers in the 1970s.⁵⁷ Introduction of tractors and threshers, which facilitated higher cropping intensity in labor-scarce Punjab, did not adversely affect employment. Mechanization of irrigation through tubewells and pumpsets

actually increased employment, though it displaced bullock labor. On the other hand, introduction of harvest combines as a logical corollary to the introduction of tractors, threshers, and tubewells resulted in labor displacement. Thus, unrestricted mechanization does at some point begin to adversely affect employment and equity. Indian agricultural policy therefore advocates "selective mechanization." In general, however, the green revolution (regarded as a package consisting of HYVs and fertilizers) has made a substantial contribution to employment. Irrigation, particularly tubewells, has also contributed significantly to employment where partial tractorization was done. The additional labor required by the new technology has compensated for the displacement of labor through mechanization.

HYV technology affected wages, aggregate income, and the disparities therein as predicted. In the areas where HYVs spread in a measurable way, cash wages generally rose, especially for seasonal workers. Real wages also improved significantly, not only in Punjab (including Haryana) and Kerala, but

⁵² Brian Lockwood, P. K. Mukherjee, and R. T. Shand, "The High-Yielding Varieties Program in India—Part I (Draft)," India, Planning Commission and the Australian National University, 1971.

⁵³ Michael Schluter and John W. Mellor, "New Seed Varieties and the Small Farm," *Economic and Political Weekly: Review of Agriculture*, March 25, 1972, pp. A31-A38.

⁵⁴ For the controversy see Amartya K. Sen, "An Aspect of Indian Agriculture," *The Economic Weekly*: Annual Number, February 1962, pp. 243-246; Amartya K. Sen, "Size of Holding and Productivity," *The Economic Weekly*: Annual Number, February 1964; Pranab K. Bardhan, "Size, Productivity, and Returns to Scale: An Economic Analysis of Farm-Level Data in Indian Agriculture," *Journal of Political Economy* 81 (November-December 1973): 1370-1386; A. M. Khusró, "Returns to Scale in Indian Agriculture," *Indian Journal of Agricultural Economics* 19 (July-December 1964): 51-80; Ashok Rudra, "Farm Size and Yield Per Acre," *Economic and Political Weekly*: Special Number, July 1968, pp. 1041-1044; Ashok Rudra, "More on Returns to Scale in Indian Agriculture," *Economic and Political Weekly: Review of Agriculture*, October 26, 1968, pp. A33-A34; N. Bhattacharya and G. Sami, "Farm Size and Productivity—A Fresh Look," *Economic and Political Weekly: Review of Agriculture*, June 24, 1972, pp. A63-A72; and C. H. Hanumantha Rao, "Alternative Explanations of the Inverse Relationship between Farm Size and Output Per Acre in India," *Indian Economic Review* (New Series) 1 (October 1977).

⁵⁵ See Surjit S. Sidhu, "Relative Efficiency in Wheat Production in the Indian Punjab," *American Economic Review* 64 (September 1974): 742-751; S. S. Jhól, "Farm Size, Economic Efficiency, and Social Justice: A Case of Punjab," *Agricultural Mechanization of Asia* 4 (Spring 1973), pp. 56-61; and C. H. Hanumantha Rao, *Technological Change and Distribution of Gains in Indian Agriculture* (Delhi: Macmillan Company of India, 1975), pp. 143-145; Surjit S. Bhalla, "Farm Size, Productivity and Technical Changes in Indian Agriculture," in R. Albert Berry and William R. Cline, *Agrarian Structure and Productivity in Developing Countries* (Baltimore, Md.: The Johns Hopkins University Press, 1979), pp. 141-193.

⁵⁶ Uma Lele, "Roles of Credit and Marketing," in *Agricultural Policy in Developing Countries*, ed. Nurul Islam (New York: Halstead Publications, 1974), pp. 413-431. Also see Fred Sanderson and Shyamal Roy, *Feudal Trends and Prospects in India* (Washington, D.C.: Brookings Institution, 1979), pp. 60-66.

⁵⁷ For a review of the effect of mechanization on employment and on income distribution, see H. Metrick, Shyamal Roy, and D. S. Thornton, "Agricultural Mechanization in South Asia," *Development Research Digest*, Autumn 1978, pp. 28-33; William R. Cline, "Policy Instruments for Rural Income Distribution," in *Income Distribution and Growth in the Less Developed Countries*, ed. Charles R. Frank, Jr. and Richard C. Webb (Washington, D.C.: Brookings Institution, 1977), pp. 281-336; Rao, *Technological Change*; and Hans Binswanger, *The Economics of Tractors in the Indian Subcontinent: An Analytical Review* (Hyderabad: International Crop Research Institute for the Semi-Arid Tropics, 1977).

also in Tamil Nadu, Uttar Pradesh, and Gujarat.⁵⁸ A definite link was also observed between fast growth and real wages as well as employment in several areas.⁵⁹

Because of easy access to inputs and credit, the growth of output was much faster on larger farms. Higher growth was achieved through the use of capital inputs and substitution of capital for labor. The sharp rise in income enabled farmers with larger holdings to invest in irrigation. Increased irrigation led to expansion of area sown in wheat in northern India, which in turn resulted in increased incomes. These farmers market relatively higher proportions of their output, whereas much of the output of farmers with small holdings is consumed by the household. Furthermore, because of their bargaining power and stockholding capacity, particularly in a situation of rising prices, larger farmers receive higher prices than smaller ones.⁶⁰ Small farmers are often forced to sell their produce to intermediaries within the village at lower prices. These factors have contributed to the widening of income disparities between small and large farmers.

How are the benefits from the new technology shared? Mellor and Lele have shown that in a typical transfer of 10 acres (nearly 4 hectares) from traditional varieties to HYVs, 67 percent of the increased gross income is added payment to the family land and capital; 10 percent is the share of labor; and the balance represents the additional cost of fertilizer, seed, and other expenses.⁶¹ In another study Rao shows that although the absolute share of hired labor in aggregate income has risen, its relative share in output

has declined. He concludes that although land-augmenting technological change by itself seems to reduce the relative share of land more than that of labor, the relative share of hired labor in the large-farm sector has declined more than that of land, owing to mechanization, indicating the widening income disparities between the large land-owner families and the landless laborers.⁶²

Special Programs

As noted earlier, because policymakers recognized that the new technology might bypass small and marginal farmers and result in widening disparities between people, programs such as SFDA and MFAL were initiated in the Fourth Plan. These special programs were designed to enlarge the productive asset base of small and marginal farmers and to enable them to adopt the new technology by providing credit and inputs. Existing employment and income-generating activities were to be made more remunerative, and new opportunities were to be added through such subsidiary activities as dairying; raising poultry, pigs, sheep, and goats; fishing, and so forth.

The evaluation studies carried out by the Division of Rural Surveys of the Reserve Bank of India,⁶³ the Program Evaluation Organization of the Planning Commission,⁶⁴ agro-economic research centers, and other research institutions show that, in general, the special programs have failed to achieve their goals. The reasons are many.

⁵⁸ A. V. Jose, "Trends in Real Wage Rates of Agricultural Laborers," *Economic and Political Weekly: Review of Agriculture*, March 30, 1974, pp. A25-A30.

⁵⁹ Gilbert Etienne, "Some Field Observations in Rural India's Development," Agricultural Administration Network Papers No. 2, Overseas Development Institute, London, 1980. Also see Kalpana Bardhan, "Rural Employment, Wages and Labor Markets in India: A Survey of Research—II," *Economic and Political Weekly*, July 2, 1977, pp. 1065-1074; and V. S. Vyas, "The Agricultural Labor Market—A Synoptic View," in *Agricultural Development of India: Policy and Problems*, ed. C. H. Shah (New Delhi: Orient Longman, Ltd., 1979).

⁶⁰ M. L. Dantwala, "Agricultural Policy in India Since Independence," *Indian Journal of Agricultural Economics* 31 (October-December 1976): 31.

⁶¹ John W. Mellor and Uma J. Lele, "Growth Linkages of the New Foodgrain Technologies," *Indian Journal of Agricultural Economics* 28 (January-March 1973): 35-56.

⁶² Rao, *Technological Change*.

⁶³ Reserve Bank of India, *Small Farmers Development Agencies (A Field Study) 1972-73* (Bombay: Reserve Bank of India, 1975); Reserve Bank of India, *Marginal Farmers and Agricultural Labourers Development Agencies (A Field Study) 1973* (Bombay: Reserve Bank of India, 1976).

⁶⁴ For a summary of the Planning Commission's evaluation report, see India, Planning Commission, "How and Why SFDA Fails to Deliver the Goods?" *Kurukshetra* 27 (June 1, 1979): 4-8.

In the initial years the process of identifying the beneficiaries was sometimes slow, partly because of the absence of land records. Imprecise definition of target groups, use of varying norms for identification, and lack of supervision resulted in the inclusion in the program of persons not intended to be covered as beneficiaries. When the criterion was based on size of holding, it was circumvented by including persons whose ownership holdings were within the prescribed limits but who had larger operational holdings, which gave them larger incomes. Similarly, there were those whose operational holdings were within limits but who had larger ownership holdings. The norms were fixed by size without specifying whether the land was irrigated or unirrigated. In some projects the tenants were altogether left out of SFDA because the majority of them had oral leases, and where tenancy arrangements were concealed, their names were omitted from land records. And if the tenants were identified and their rights recorded, this might meet with opposition from the landlords. Some farmers with land and income above the agreed limits managed to be included in the list of beneficiaries with the connivance of project authorities. The lists of beneficiaries were prepared from outdated land records, and lands owned or cultivated outside the resident village were not considered.

Even among the target groups the programs tended to increase the incomes of better-off farmers. As the initial objective of SFDA was to ensure the viability of potentially viable farmers, the larger of the small farmers benefited. Farmers with substantial nonfarm incomes were included in SFDA, whereas landless agricultural laborers were in many cases excluded from MFAL because the selection was confined to cultivating laborers only. However, some of these deficiencies were later removed by defining the beneficiaries more precisely and by laying down standard criteria and procedures for their identification.

There were other weaknesses in the implementation of the programs. Subsidies were provided to small and marginal farmers for purchase of inputs to reduce the cost of adopting input-intensive technology; funds

were also provided to cover risks and management costs of cooperative credit institutions to induce them to supply more credit, but experience shows that there is need for other kinds of intervention also.⁶⁵ In many of the project areas, the cooperative infrastructure continues to be weak, and thus identified beneficiaries cannot get credit. Several projects studied by the evaluation agencies did not have any specific program for supplying inputs. Cases of misuse of loans and subsidies were also detected in many of the projects in the absence of proper supervision. Where an adequate staff was not posted at the project or block level, the minor irrigation programs did not make much headway. In some of the areas the returns from irrigation schemes were low because of lack of extension support. The program for construction of small tubewells (through loans to farmers) was unrealistic as it benefited large farmers only.

The subsidiary activities programs need supplies of improved livestock and poultry, improved feeding and management practices, appropriate veterinary and disease prevention facilities, and arrangements for marketing, transport, and storage as a package. The evaluation studies showed instances where loans were given to individuals for purchase of dairy animals without making arrangements for marketing of milk. In others, supplies of improved livestock were inadequate. Where required veterinary services were not available, many animals perished or became unproductive. In such cases, where the essential elements of a package were missing, the programs became a liability to farmers.

Coverage is still inadequate. Even after the SFDA program is extended to 168 districts and the full complement of 70,000 small and marginal farmers envisaged in each project is fully covered, the program will benefit approximately 12 million families. This is only one fifth to one sixth of the target groups. The districts selected for SFDA are not necessarily those where the new technology has been introduced. Therefore, these programs will not benefit the small and marginal farmers in the latter districts. Even where the districts are the same, the crop production and subsidiary

⁶⁵ B. M. Desai, Introduction to *Intervention for Rural Development—Experiences of the Small Farmers' Development Agency*, ed. B. M. Desai (Ahmedabad: Indian Institute of Management, 1979).

activity programs are not integrated at the farmer's level. Furthermore, although various measures were expected to overcome institutional and infrastructural disabilities, in actual practice these difficulties are formidable and require action outside the jurisdiction of the agencies. For example, in the case of loans for purchase of milch animals, the additional income will accrue to the farmer only when adequate arrangements are made for marketing of milk. Thus, the experiment of superimposing additional equity-oriented programs, designed to enable small and marginal farmers to participate in the growth process, on programs to improve production has not succeeded in achieving the goals.

On the positive side, after a review of the performance of the SFDA, Raj Krishna stated that "whenever irrigation and dairy assistance is given with access to technical help and marketing, increases in incomes of the order of 75 to 300 percent have been achieved, and the beneficiaries have either crossed or risen close to the poverty line These results have validated the essential concept of the SFDA scheme that small households can be relieved of poverty if production assets are delivered to them and their new activities are linked with support systems. The main problems that then need to be attended to are problems of inadequate coverage, administrative apathy and laxity, and the failure to organize support activities."⁶⁶ These deficiencies need to be removed and the coverage of the programs enlarged.

Interregional Disparities

As is only natural in a country as large as India, there were wide interregional disparities even before the green revolution. They arose from inherent differences in resource endowments of land and water of different regions and the extent to which potential is utilized. The amounts of rainfall received are unequal in different areas. There are also differences in slope, composition, and

texture of soils. Superimposed on these differences are the varying levels of infrastructure development, which differ due to historical reasons, demographic pressures, and economic and social factors. Because new technology is so far largely confined to irrigated and assured-rainfall areas and because it requires good infrastructure development to facilitate input distribution and output marketing, these interregional disparities have been accentuated in the post-green revolution period.

Variations between the states in the percentage of cropped area irrigated, the proportion of potentially irrigable land already irrigated, the use of fertilizer per hectare, and the availability of credit per hectare are given in Table 6. Although in the aggregate 25.8 percent of gross cropped area is irrigated, the percentage of area irrigated varies from 9.8 in Madhya Pradesh to 80.8 percent in Punjab. Fortunately, there is still plenty of scope for increasing the irrigated area in some of the states where the existing percentage is low (Assam, Bihar, Kerala, Madhya Pradesh, and Orissa). The consumption of fertilizer per hectare also varies widely from less than 2.0 kilograms in Assam to 76.7 kilograms in Punjab with a national average of 26.2 kilograms per hectare. In Punjab, Haryana, Tamil Nadu, Uttar Pradesh, and Andhra Pradesh, both the proportion of irrigated area and fertilizer consumption per hectare are high. Though the percentage of irrigated area in Gujarat is low, fertilizer consumption is relatively high, perhaps because it is used for commercial crops. Moreover, a district study undertaken by Desai and Singh shows that in 1968/69 less than 15 percent of the districts accounted for 80 percent of total fertilizer use in the country, whereas more than 50 percent of the districts accounted for only 10 percent of the fertilizer consumed during the year.⁶⁷ Even in 1974/75 a little over one third of the total number of districts accounted for about 80 percent of total fertilizer consumption.⁶⁸ Distribution of agricultural credit from both cooperatives and commercial

⁶⁶ Raj Krishna, "Small Farmer Development" *Economic and Political Weekly*, May 26, 1979, pp. 913-918.

⁶⁷ Gunvant M. Desai and Gurdev Singh, "Growth of Fertilizer Use in Districts of India, Performance and Policy Implications," Indian Institute of Management, Ahmedabad, 1973. (Mimeographed.)

⁶⁸ Gunvant M. Desai, "Fertilizers in India's Agricultural Development" in *Agricultural Development of India—Policy and Problems*, ed. C. H. Shah (Bombay: Orient Longman, Ltd., 1979), p. 416.

Table 6—Irrigated area, fertilizer use, and institutional credit, by state

| State | Cropped Area Irrigated 1976/77 | Proportion of Irrigation Potential Created in Ultimate Potential 1977/78 | Fertilizer Use (NPK) 1977/78 | Institutional Credit 1977/78 ^c |
|-------------------|--------------------------------|--|------------------------------|---|
| | | (percent) | (kilograms/hectare) | (rupees/hectare) |
| Andhra Pradesh | 35.0 | 50.7 | 39.4 | 162 |
| Assam | 17.3 ^a | 13.0 | 1.9 | 6 |
| Bihar | 31.8 | 35.5 | 16.0 | 47 |
| Gujarat | 13.5 | 48.7 | 34.1 | 178 |
| Haryana | 51.1 | 63.4 | 38.9 | 234 |
| Himachal Pradesh | 16.7 | 17.0 | 10.8 | 38 |
| Jammu and Kashmir | 40.6 | 51.8 | 13.8 | 56 |
| Karnataka | 14.9 | 42.0 | 24.4 | 164 |
| Kerala | 12.7 | 35.6 | 25.9 | 343 |
| Madhya Pradesh | 9.8 | 26.0 | 7.8 | 52 |
| Maharashtra | 11.2 | 36.0 | 18.5 | 175 |
| Orissa | 19.2 | 31.3 | 9.0 | 75 |
| Punjab | 80.8 | 77.6 | 76.7 | 273 |
| Rajasthan | 17.6 | 60.9 | 7.1 | 60 |
| Tamil Nadu | 42.0 | 78.7 | 64.1 | 341 |
| Uttar Pradesh | 42.1 | 50.8 | 37.7 | 124 |
| West Bengal | 20.2 ^b | 44.5 | 22.4 | 110 |
| All India | 25.8 | 45.9 | 26.2 | 134 |

Sources: India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Indian Agriculture in Brief* 17th ed. (Delhi: Controller of Publications, 1980); and India, Planning Commission, *Draft Sixth Five-Year Plan (Revised), 1978-83* (Delhi: Controller of Publications, 1979); Reserve Bank of India, personal communication.

^a This figure relates to 1953-54.

^b This figure relates to 1967-68.

^c These figures are from a personal communication from the Reserve Bank of India.

banks is considerably skewed, with Kerala and Tamil Nadu leading in credit per hectare.

The differences in irrigation and fertilizer use are reflected in the crop yields in Table 7. In general, the highest average yields are three to five times larger than the lowest yields for different crops.

Interregional disparities can never be eliminated in the sense that the natural endowments of different areas can never be made equal. Even after full development of the irrigation potential, only 50 percent of gross cropped area can be irrigated by the year 2025. However, the existing disparities can be reduced if a technology suitable to dry areas can be evolved. In addition, some of the adverse effects of farming under rainfed conditions can be mitigated through adoption of soil and moisture conservation practices. The incomes of the people in the semiarid and arid areas can be improved by adopting silvipastoral systems suited to

these areas. In fact, it is for these reasons that the government started special area programs such as the Drought-Prone, Hill, and Tribal Area Programs. But these programs have not made any visible impact on the overall situation: the financial allocations made have been small relative to needs, progress in implementing the programs has been poor, and there is still no technology suitable for the dry areas.

At first view the CADP, which aims at making the most efficient use of water in the irrigation system, may appear to run counter to the equity policy because it results invariably in the widening of interregional disparities. However, even this program has some favorable effects on equity because fuller use of water leads to intensive and multiple cropping, thereby increasing the demand for labor and the employment opportunities on a continuing basis in the irrigated areas.

Table 7— Highest and lowest crop yields, 1976/77–1978/79 averages

| Crop | Highest | | Lowest | |
|---------------------|---------------------|------------|---------------------|----------------|
| | Average Yield | State | Average Yield | State |
| | (kilograms/hectare) | | (kilograms/hectare) | |
| Wheat | 2,562 | Punjab | 632 | Karnataka |
| Rice | 2,834 | Punjab | 759 | Madhya Pradesh |
| Maize | 2,869 | Karnataka | 758 | Uttar Pradesh |
| Sorghum | 954 | Tamil Nadu | 167 | Haryana |
| Gram | 873 | Haryana | 317 | Andhra Pradesh |
| Cotton | 349 | Punjab | 76 | Madhya Pradesh |
| Groundnuts | 932 | Gujarat | 574 | Madhya Pradesh |
| Sugarcane (cane) | 99,374 | Tamil Nadu | 29,782 | Madhya Pradesh |

Source: India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Estimates of Area and Production of Principal Crops, 1978/79* (Delhi: Controller of Publications, 1980).

6

AGRICULTURAL STRATEGY FOR GROWTH WITH EQUITY

The approach to meeting economic development objectives in developing countries has undergone several changes during the last three decades. In the early 1950s the focus was on rapid growth in gross national product or on increasing aggregate supply. It was assumed that the trickle-down mechanism would solve poverty and income distribution problems if only growth rates were fast enough. It was even thought that redistribution in favor of the poor would automatically reduce savings, weaken incentives, and impair the growth rates. Later studies showed that this was not necessarily so. By the 1970s it was generally acknowledged that rapid growth rates had been accompanied by increased marginal or personal income inequalities and possibly increased poverty in some countries. Recognition of the failure to eliminate or substantially reduce poverty and unemployment led to consideration of a strategy to redistribute the increments of growth to the poor. Even this gradualist and incrementalist approach was not only difficult to implement but also slow to alleviate poverty because of leakages and other factors. This led to the advocacy of a basic-needs strategy of development that implied a major redistribution of total income and productive assets—not just of incremental income. The debate is still on.⁶⁹

All three of these approaches have been tried in the agricultural sector of India at different times. The land reforms of the 1950s were designed to secure social justice within the agrarian system by eliminating exploitation and providing security to the tiller of the soil. Though the intermediary tenures were abolished and millions of

tenants were brought into direct relationship with the state,⁷⁰ the implementation of the legislation to fix ceilings on landholdings and to regulate the terms of tenancy was not equally effective. However, because the man/land ratio in India is so high, radical redistribution of land in the sense of giving to each rural household some piece of land is not politically feasible; nor can the problems of the rural poor be resolved by this approach, for reasons which will be discussed in Chapter 7. The strategy adopted in the 1960s for agricultural development that emphasized rapid growth was similar to the first approach. Though self-sufficiency in foodgrains was reached, the trickle-down effects were not visible enough at the national level, perhaps because the overall rate of growth in agriculture was moderate. Even in areas where agricultural growth was rapid, problems of unemployment and poverty were not appreciably resolved for various reasons.⁷¹ The second approach was also tried in the 1970s with limited success. This again leads to the questions of whether there is any inconsistency between growth and equity and whether an agricultural strategy can be evolved to achieve both simultaneously.

Conflicts Between Growth and Equity

In considering growth-equity conflicts, one must keep in mind two related dimensions of equity: first, substantial reduction in the

⁶⁹ See David Morawitz, *Twenty-Five Years of Economic Development, 1950 to 1975* (Baltimore, Md.: The Johns Hopkins University Press, 1977); Keith Griffin and Jeffrey James, "Problems of Transition to Egalitarian Development," *The Manchester School*, September 1979, pp. 248-269; Hollis Chenery et al., *Redistribution With Growth* (London: Oxford University Press, 1974), and International Labour Office, Director General, *Employment, Growth and Basic Needs: A One World Problem* (Geneva: I.L.O., 1976).

⁷⁰ By the early 1950s, intermediary (*zamindari*) tenures were abolished over 70 million hectares of land, which covered almost the entire area held under such tenures, and proprietary rights were restored to 20 million tenants.

⁷¹ Montek Ahluwalia reported that in the Punjab and Haryana regions that experienced dramatic growth in agricultural output per person there was no evidence of a reduction in the incidence of poverty. The possible reasons for this finding are discussed in his paper, "Rural Poverty and Agricultural Performance in India," *The Journal of Development Studies* 14 (April 1978): 298-323.

gap between the incomes of the rich and the poor and, second, improvement in the income of the poor so that they can attain a reasonable standard of living. The impact of growth based on technological change on each is different depending upon the size and pattern of the change and the nature of the technology. A rapid growth rate in agricultural production, if it can be sustained through adequate domestic demand and/or exports, will result in greater equity in the second sense because of its direct and indirect linkage effects on employment and incomes and on availability of cheaper food. The surpluses provide more capital for industrial development and for building up rural infrastructure. Where the growth rate is low or even moderate, these indirect benefits will be small. In either case, if the distribution of land is skewed, if the pattern of growth and the technology adopted favor large and medium farmers, and if technological changes are confined to irrigated and infrastructurally well-developed areas, the interpersonal and interregional disparities will widen. At the same time, because the new technology based on HYVs is scale-neutral, its adoption by small and marginal farmers will improve their incomes and consumption, though the absolute disparity between rich and poor may widen. Furthermore, adoption of labor-intensive technologies for animal husbandry and poultry raising would increase rural employment opportunities and contribute to greater equity.

There are some growth-oriented policies that affect equity adversely unless adequate precautions are taken. For example, providing irrigation facilities promotes growth but conflicts between growth and equity arise from the way they are distributed. The NCA has reported that "in some of the irrigation systems, a substantial part of the available water is preempted by large farmers with the result that the small farmers often go without water."⁷² This situation can be remedied through greater government control and

supervision of the distribution system. In the exploitation of groundwater, the larger farmers with their easier access to institutional finance and political pull preempt the water unless government or government-sponsored agencies undertake the construction and even the operation of small irrigation projects, such as tubewells, and make the water available to small farmers on a priority basis.⁷³

Nowhere is the conflict between growth and equity greater than with some kinds of mechanization, particularly in a labor-abundant economy. However, the mechanization of irrigation operations, through installation of pumpsets and tubewells and the use of electricity for irrigation, results in improved technical efficiency and increased employment. In labor-scarce and high-wage areas, tractor cultivation encourages more intensive cropping, does not reduce the overall requirement for human labor, and permits timely agricultural operations over a large area. As long as mechanization does not lead to the displacement of labor, it should be generally acceptable. It should therefore be ensured that such incentives as cheap credit, tariff exemption, overvalued exchange rates, and wage rates that are high relative to the opportunity cost of labor do not encourage replacement of labor by machinery, particularly in labor-surplus areas. Selective mechanization where required for output increase is in fact desirable. Improvements in the efficiency of agricultural implements that enable precision farming (for example, adoption of seed-fertilizer drills) and that reduce the tedium of labor do not necessarily conflict with equity.

Concentration of efforts in irrigated areas and promotion of HYV technology among large and medium farmers have the obvious advantage of providing relatively large surpluses of foodgrains, which could be sold to government procurement agents. On the other hand, when small and marginal farmers increase production, they consume most of

⁷² India, Ministry of Agriculture and Irrigation, *Report of the NCA vol. 2 Policy and Strategy*, p. 43. Also, a study of the economic benefits in the Kosi Command Area revealed that "the biggest size-group (of farmers) gets the maximum irrigation facility substantiating probably the power theory of distribution" (Pradban H. Prasad, "Economic Benefits in Kosi Command Area," A. N. Sinha Institute of Social Sciences, Patna, 1972 [mimeographed]).

⁷³ In one study it was found that in the Kosi region of Bihar, the number of tubewells (masonry and bamboo) increased from a mere 300 in 1965-66 to 23,000 in 1972-73, but more than half the investment in this expansion was made by farmers with holdings of eight hectares or more, the share of farmers holding less than two hectares was negligible (Edward J. Clay, "Equity and Productivity Effects of a Package of Technical Innovations and Changes in Social Institutions—Tubewells, Tractors and High Yielding Varieties," *Indian Journal of Agricultural Economics* 30 [October-December 1975]: 74-87).

the surplus themselves. Moreover, because large farmers employ more hired labor, the promotion of new technology among them would increase employment opportunities for the landless. But the adoption of such a strategy also would squeeze out the small and marginal farmers and increase the ranks of the landless, and hence should not be encouraged. Thus, whatever might have been the justification of the former policy in the IADP, IAAP, and HYV programs in the past, future agricultural production strategy should be small-farmer oriented.

Keeping in view these considerations, the outlines of an agricultural strategy involving growth policies that are consistent with equity in the sense of enabling the weaker sections of the population to have at least the employment and income needed to raise them above the poverty line are discussed here.

Proposed Strategy

The new technology based on HYVs is applicable primarily to irrigated and assured-rainfall areas.⁷⁴ Because productivity per hectare, income, and employment are different for irrigated and unirrigated areas from the point of view of growth, the strategy for agricultural production has to be considered separately for each. Rural society may be divided into five classes: large and medium farmers, small farmers, marginal farmers,⁷⁵ landless laborers, and rural artisans and other nonfarm workers. The rural poor mostly belong to the last four categories. The overall agricultural strategy for attaining growth with equity should be a composite of appropriate strategies for each of these classes.

The highest priority in the proposed strategy should be to develop irrigation wherever there is potential and to give it an equity orientation. That is, to reduce inter-regional disparities, high priority should be given to areas where irrigation development

is low and potential is high, and to areas that are backward. Schemes that benefit small farmers—for example, community tubewells or other wells—should also receive high priority. In surface irrigation, steps should be taken to safeguard the interests of small farmers in the water distribution systems. Drainage schemes are also important in high-rainfall areas, particularly in eastern India. Accomplishing these objectives requires action by state and central governments to determine the priorities for various schemes and at the block and field levels to ensure that priority benefits go to the weaker groups. Irrigation programs should not suffer for want of financial resources: budgetary sources could be supplemented by institutional finances from within the country and abroad, if necessary. Small and marginal farmers in irrigated areas should be enabled to adopt the new technology through the provision of preferred access to inputs, credit, and extension as a package. Thus they can derive the full benefits from the limited land resources they have.

The effectiveness and adequacy of this strategy for achieving growth with equity depends in part on answers to several questions. How are growth and increases in income and employment to be achieved in areas with no irrigation or assured water supply, namely, rainfed areas? Will marginal farmers who have less than one hectare of land under crop production be able to have enough income to maintain their families at least above the poverty level? How will the needs of annual additions to the labor force be accommodated and backlogs of under- and unemployment be cleared? Will the strategy work within the framework of the current agrarian structure and existing institutions?

Rainfed Areas

In rainfed areas, which cover three fourths of total cropped area, crop yields are by and

⁷⁴ For kharif rice, grown during the monsoon season, adequate drainage is also an important prerequisite. Also, some hybrids of bapa do well under rainfed conditions.

⁷⁵ "The lower limit of farm size of a given productivity which divides 'small farmers' from 'marginal farmers' is a holding size sufficient to provide at least subsistence income for the farm household" (C. L. G. Bell and J. H. Duloy, "Rural Target Groups," in Chenery et al., *Redistribution with Growth*). The limits will have to be different for irrigated and unirrigated holdings, the latter being roughly one-and-a-half times the former.

large low and the incidence of poverty high. Although the percentage of irrigated area to cropped area is expected to rise from the current 25 percent to 42 percent in 2000 and to 50 percent in 2025, when most of the potentially irrigable land has been irrigated, half of the cropped area still will be rainfed. Therefore, adequate attention must be paid to increasing productivity in rainfed areas, from both the growth and equity angles.

Rainfed agriculture can be divided into four broad groups according to rainfall: heavy, high medium, low medium, and low. Low-rainfall or dry areas can be further subdivided into arid and semiarid regions. The farming system, to be adopted in each of the areas, the problems, and the solutions have been extensively discussed by NCA.⁷⁶ It is significant to note that some of the low-rainfall areas are more suitable for livestock production than for crops. An appropriate strategy adopted in each of the areas to promote growth also helps equity, in the sense that attempts to improve productivity of the low-rainfall areas also improve the standards of living of the people inhabiting these areas through creation of more income and employment opportunities.⁷⁷

Low-rainfall areas have long suffered neglect, and further neglect will only widen the disparities between regions; equity considerations thus require that high priority be given to the development of these areas. Necessary steps would include priority for centrally coordinated research in dryland agriculture, propagation of known technology through extension, undertaking programs for soil and moisture conservation and land development, and measures for covering risk of crop failure. It must be realized, however, that unless appropriate technology is evolved, prospects for rapid growth in these areas are limited. Emphasis should therefore be on ameliorating conditions through the optimum use of available resources. The task is large both in the cultivated area to be covered and the number of families involved. Therefore, a 10-year program needs to be drawn up and implemented.

Development of Subsidiary Activities

Even after adopting HYVs and the associated inputs, marginal farmers and even some of the small farmers will not be able to earn enough net income from crop production alone to maintain a family of five above the poverty level.⁷⁸ However, the agricultural sector is not based solely on crop production. The roles of horticulture; raising of poultry, pigs, and sheep; fishing; and even farm forestry should not be ignored. Taking a more comprehensive view of agricultural development would help to solve the problems of marginal farms to a large extent. Whereas crop and horticulture production are tied to land as the main resource, some of the other subsectors of agriculture are less dependent on land, and fisheries depend only on water resources.

There is no scope for enlarging the production base of small and marginal farmers by giving them more land. This would be possible if their overall numbers could be reduced by drawing them into employment in manufacturing and other sectors, but opportunities are not likely to be adequate in the near future. In fact, the present trend is for more than a proportionate increase in the numbers of small and marginal farmers as a result of land reform legislation, particularly the allotment of surplus land to the landless. This being so, one method of supplementing their employment is to provide them with facilities for engaging in subsidiary activities, both in irrigated and rainfed areas.

Fortunately, about the same time that the new technology was extended to food-grain crops, technologies involving cross-breeding and upgrading of farm animals for milk production were also introduced in the country. It was demonstrated that milk yields could be substantially improved through scientific breeding, better feeding and management practices, and good veterinary care. Poultry, pig, and sheep production could be similarly improved. Moreover, these

⁷⁶ India, Ministry of Agriculture and Irrigation, *Report of the NCA*, vol. 6: *Crop Production, Sericulture and Apiculture*

⁷⁷ Two significant steps were taken toward the development of dry areas in starting the Drought-Prone Area Program and the Desert Development Program.

⁷⁸ This is true unless the areas are devoted to high value crops, such as vegetables, or horticulture crops with intensive irrigation and access to markets.

subsidiary occupations can be organized on a small scale and are labor intensive. The bulk of the rural peasantry is familiar with these enterprises. The success of these programs, however, depends upon the provision by the government of the infrastructure for supply of improved animals and feed, for marketing of produce, and for veterinary and health care through cooperatives and other special institutions.⁷⁹

These subsidiary occupation programs should have several features: arrangements for supply of genetically improved stock should be made by the government and facilities for artificial insemination provided at convenient locations; small and marginal farmers and the landless should be organized into functional cooperative societies, which should be linked to a processing plant or a consumer market at the district or other appropriate level; and the government should provide infrastructure facilities for preventive immunization, health care, and so forth.

Most of the activities connected with the production of milk, poultry, and pork can be performed by small and marginal farmers, landless laborers, and their families, at home. Although most of the increased production would be marketed, some would be consumed by the farmers and their families, thereby increasing their incomes and improving their nutrition. Thus, the development of milk production and other subsidiary activities has triple benefits: increased employment, higher income, and improved nutrition. Such programs are particularly suitable for rural households with surplus family labor.

Special livestock production programs for the benefit of the small and marginal farmers and of agricultural laborers were instituted in 1975-76, following the recommendations of the NCA. The schemes under the SFDA and MFAL supplemented these efforts. The major defect of these programs

is that at the farm level crop production and animal husbandry programs are not properly integrated; hence, even in areas where the programs have been successful, they have not had the fullest possible effect on the economic conditions of farmers.

Where the programs were organized as a package of activities, they were largely successful. The income elasticity of demand for livestock and poultry products and fish is larger than unity, and rapid increases in production can be made. Growth rates as high as 10 percent per year are feasible, and have been obtained in some areas, particularly for poultry products. Although some people doubt whether landless people can raise an improved cow or buffalo without any land,⁸⁰ the major proportion of milk now produced in the country comes from small producers having one or two milch animals.⁸¹ It is now being proposed that local breeds of cows with low yields of milk be replaced by high-yielding, crossbred, or otherwise improved animals. It is true that feed costs are higher for improved animals, but yields also are higher and with an assured market there are adequate returns to small and marginal farmers. Under village conditions, the landless milkman gets straw as a perquisite from the landlord and grazes his cattle on the village commons. Without these facilities, dairying cannot be a subsidiary activity for the landless, who might resort to raising pigs or poultry, where suitable. In irrigated areas small and marginal farmers could introduce fodder into the crop rotation to enhance total income through mixed farming. It is, however, important that all aspects of the subsidiary activities program be implemented as a package; failures frequently cited usually were a result of the measures not being implemented as a package. Furthermore, these programs must be integrated with crop production activities at the field level. At the same time

⁷⁹ See India, Ministry of Agriculture, *Milk Production Through Small and Marginal Farmers and Agricultural Labourers*. Interim Report of the National Commission on Agriculture (Delhi: Government of India Press, 1971); and India, Ministry of Agriculture, *Poultry, Sheep and Pig Production Through Small and Marginal Farmers and Agricultural Labourers for Supplementing Their Income*. Interim Report of the National Commission on Agriculture (Delhi: Government of India Press, 1973).

⁸⁰ C. H. Shah feels that, "For small farmers to run a dairy enterprise as complementary to farming is unsustainable. For marginal farmers, especially, emphasis is placed on creating additional employment and income, through a supplementary occupation like animal husbandry. It can be assumed that additional supply of cattle to small or marginal farmers on a large scale will do more harm than good." C. H. Shah, "Small Farmers: Policy and Problems," *Economic and Political Weekly*, October 21, 1978, pp. 1771-1775.

⁸¹ India, Ministry of Agriculture, *Milk Production*, p. 4.

that assistance is provided to the small or marginal farmer for subsidiary activities, his crop production activities also should be taken note of and adequate resources should be provided for increasing the total output from the limited land in his possession.

Rural Industry

Even with the promotion of subsidiary activities allied to crop production, the NCA showed that it would not be possible to provide full employment to all the unemployed and underemployed persons in the rural areas unless rural industry is promoted.⁸² Agricultural processing, marketing, and storage facilities, which are at present located in towns and cities, operate to the detriment of the rural sector. If these operations were to take place in rural or semiurban areas the unemployment problems would be alleviated. With the extension of rural electrification to more and more areas, this should be possible.

Even after taking into account the linkage effects of agricultural growth on rural employment in areas of intensive agriculture, there will be large areas outside these intensive areas where rural industries need to be developed. The nature of the industry and its location would have to be carefully selected. Orienting small industries to rural areas would, in the long run, prevent migration of rural labor to urban areas in search of employment opportunities that do not exist.

As agriculture is modernized, some rural industries develop while other traditional industries decay. For example, a number of agricultural machinery repair and maintenance workshops have been opened in Punjab, Haryana, and western Uttar Pradesh. Rural engineering industries have also received impetus, particularly in the Punjab. For the detailed planning of their development, the dynamics of rural industries must be carefully considered. Small-scale indus-

tries are more labor intensive and employ more direct labor per unit of capital. Hence, they are important to the equity-oriented growth strategy. The new industrial policy announced by the government is designed to promote small and cottage industries and to encourage the dispersal of industries away from large metropolitan areas. The District Industries Centers will also promote widely dispersed development of cottage and small-scale industries in rural areas and small towns.

Rural Works Programs

Rural public works programs, food-for-work programs, or employment guarantee schemes often are suggested as immediate solutions to the problem of rural unemployment. Experience with the implementation of such programs in India has been mixed. Although the potential benefits of well thought-out and properly implemented public works programs are not questioned, cases exist where they have failed to realize their objectives because of faulty planning and implementation. To be effective, these programs have to be decentralized and organized on a massive scale.⁸³ Such programs have a special role to play in drought-prone areas and in years of adverse weather. It is in these years that many of the marginal farmers and landless laborers have no employment, and even if food is available they have no purchasing power. Mere scarcity-relief works that do not create productive assets in the rural areas serve the limited purpose of staying off famine. On the other hand, well-formulated food-for-work programs and employment schemes using projects such as minor irrigation, soil conservation, land development, rural roads, and so forth help to increase employment opportunities on a continuing basis and contribute to equity.

⁸² The NCA estimated an increase of 111.3 million persons in the rural labor force between 1971 and 2001. The proposed expansion of the various agricultural programs would probably generate employment opportunities for about 52 million. The rest would have to find employment in the nonagricultural rural sector. See India, Ministry of Agriculture and Irrigation, *Report of the NCA, vol. 13: Rural Employment and Special Area Programs*, p. 30.

⁸³ John P. Lewis made a careful analysis of the problems encountered and suggested guidelines in "Designing the Public Works Mode of Anti-Poverty Policy," in *Income Distribution and Growth in the Less Developed Countries*, ed. Charles R. Frank, Jr. and Richard C. Webb (Washington, D.C.: The Brookings Institution, 1977).

Overall Strategy

In sum, the six elements in the proposed strategy for agricultural growth with equity are: to accelerate development of irrigation wherever potential exists, with priority given to small and marginal farmers and to areas with a low percentage of irrigation; to give small and marginal farmers preferred access

to adequate inputs, credit, and extension as a package in irrigated areas; to mount major efforts to evolve suitable technology and to improve crop yields in dry areas where irrigation is not feasible; to provide subsidiary occupations to the rural poor to supplement incomes from crops and wages; to promote cottage and small industries in rural areas; and to alleviate rural unemployment through well-planned, massive, and decentralized rural works and food-for-work programs.

7

INSTITUTIONAL REFORM

The success of the framework of the agricultural strategy outlined in Chapter 6 depends to a large extent on the agrarian structure and institutional development in the country. The necessary reforms are discussed in this chapter.

Agrarian Structure

Because the skewed nature of ownership and operational holdings is one of the major factors responsible for inequity and social injustice in rural areas, the question arises as to whether a drastic redistribution of land ownership is a prerequisite to the achievement of distributive justice. Redistribution of land can be approached from two angles even in the context of equity. Millions of persons are landless in the rural areas; there is a tremendous amount of land hunger. First, redistribution could mean giving a piece of land to each of the landless or taking steps to enable uneconomic holdings to become economically viable. The second approach implies prevention of concentration of economic power in the hands of a few rich farmers who hinder equitable allocation of resources in the rural areas.

According to Dantwala, "While land reform can help to eliminate some of the worst forms of exploitation, by itself it cannot solve the problem of poverty. . . . Application of the ceiling is a necessary and desirable reform, but a *drastic* lowering of the ceiling is not likely to be very rewarding either for agricultural development or significantly better agrarian relationships. . . . High priority in land reform in the present context should be given to. . . 'protective' legislation, prevention of land acquisition by persons

with big money, influence, or political power, and protection of tenants and sharecroppers against evictions. Land reform *per se* can do little for the small farmers."⁸⁴

Dandekar and Rath have also categorically expressed the view that "It is futile to try to resolve the problem of rural poverty in an overpopulated land by redistribution of land which is in short supply." They have shown through simple calculations that once it is agreed that landless households should receive priority in any redistribution of land and on that basis some land should be given to every rural household, no more than half an acre can be given to any one rural household in many states, even if low ceilings are placed.⁸⁵ The analysis by Minhas leads to similar conclusions.⁸⁶

Thus, under Indian conditions, drastic redistribution of land ownership cannot be a precondition for implementing programs of growth with distributive justice. It is, however, necessary to ensure that there is no undue concentration of land in a few hands and that the tiller of the soil can reap the benefits of his efforts. These objectives could be achieved through a strict enforcement of the ceilings on the amount of land that can be held and tenancy legislation already enacted on which there is general consensus in the country. The NCA also recommended an agrarian structure oriented to peasant proprietorship. Within this structure, cooperative activities could be promoted by forming functional groups or societies for effective implementation of area-based agricultural activities, such as plant protection, mechanical cultivation, soil conservation, and contour bunding.⁸⁷

On tenancy the NCA recommended that ultimately there should be no leasing of land under the "land-to-the-tiller" concept,

⁸⁴ Dantwala, Preface to *Agricultural Development*, pp. 26-29.

⁸⁵ V. M. Dandekar and Nilakantha Rath, *Poverty in India* (Bombay: Indian School of Political Economy, 1971).

⁸⁶ B. S. Minhas, "Rural Poverty, Land Distribution and Development Strategy: Policy," in *Poverty and Income Distribution*, ed. T. N. Srinivasan and P. K. Bardhan (Calcutta: Statistical Publishing Society, 1974).

⁸⁷ India, Ministry of Agriculture and Irrigation, *Report of the NCA* vol. 15: *Land Reforms*

but until socioeconomic development in the country radically changes the man/land ratio, tenancy will have to be permitted in a restricted form that permits marginal farmers to take land on lease, while discouraging large owners from leasing land from small owners. Furthermore, the NCA suggests that all tenants of landowners possessing more than marginal holdings should be vested with proprietary rights and declared owners. Although, in principle, this seems to be a good idea, in actual practice it leads to concealed tenancies that are difficult to regulate. In the larger interests of increased production and equitable distribution, open tenancies that can be regulated in terms that are fair to tenants should be preferred. Sharecropping tenancies with equal sharing of expenses and net returns have been suggested by some people. Vyas asserts, "An open and regulated tenancy can be made to serve the interests of the small farmer in a more effective way than ineffective abolition of tenancy."⁸⁸

One of the major causes of concealed tenancies is absentee landlordism. Absentee landowners are of two kinds, the rich landowning rentiers and the small and marginal holders who pursue other professions. Most of the former have already been abolished, and the remaining ones should also be phased out by refusing them permission to lease out their lands. Those in the latter category stand on a different footing. Leasing out may have to be permitted in their case until adequate state-assured social security measures are provided for them. Perhaps the lands belonging to the small and marginal absentee holders could be organized into viable farms under a corporate or cooperative system of management without transfer of ownership.

Another essential institutional reform that merits speedy implementation is consolidation of landholdings. For example, without irrigation, large areas in northern and northeastern India grow poor crops—or none at all—in the dry rabi (winter) season. Seasonal droughts also affect crops adversely

in the kharif (monsoon) season. In many of these areas, there is plenty of groundwater that could be utilized by installing mobile pumpsets on borewells. This can be done, however, only if the small holdings, which often comprise six or seven fragments of land, are consolidated into two or three parcels.⁸⁹ HYVs and other technology requiring assured irrigation could then be adopted by these farmers.

Institutional Development

The most essential prerequisite for the success of an agricultural strategy aimed at helping the small farmer is equipping the existing institutional agencies or setting up new institutions for the supply of inputs and credit and the provision of marketing and processing facilities in an integrated manner. The question is whether the usual agencies can provide these services as a package to the small farmers. It is sometimes suggested that there should be separate institutions for catering exclusively to the need for inputs of the small farmers. This, however, is not desirable because the small farmers, although large in number, cultivate a relatively small area; their input and credit requirements as well as their marketable surpluses are too small to form economically viable units. Thus, a common agency with jurisdiction over a small geographical area would promote personal contact between the clients and the servicing agency.

As a national policy, it would be advisable to have a multiagency approach to input supplies that would promote healthy competition between different agencies, but in each area an appropriate agency must be specifically earmarked to provide for the needs of the small farmers. The NCA recommended setting up farmers' service societies with a majority representation of small and marginal farmers on the executive committee and with a trained full-time manager to look after the day-to-day operations.⁹⁰ The small

⁸⁸ V. S. Vyas, 'Tenancy in a Dynamic Setting,' *Economic and Political Weekly—Review of Agriculture*, June 27, 1970, pp. A73-A80.

⁸⁹ In areas where lack of drainage, or waterlogging, is a major problem, a farmer will be interested in having his lands in two or three different parcels as a measure of insurance.

⁹⁰ India, Ministry of Agriculture, *Credit Services for Small and Marginal Farmers and Agricultural Labourers*, Interim Report of the National Commission on Agriculture (Delhi: Government of India Press, 1971).

and marginal farmers' access to inputs is severely restricted when supplies are scarce. This constraint can be overcome by making ample supplies available at convenient locations within their reach. Thus, to encourage a viable small-farm sector, a major restructuring of institutions for input-supply, marketing, and credit is urgent.

Moreover, to ensure that small farmers do receive remunerative prices, more purchase centers could be opened in the rural areas within the reach of the small farmers or their surpluses could be pooled and transported to purchase centers after processing and grading the product. Functional cooperatives linked to farmers' service societies would have to be organized, particularly to handle such perishable products as milk, poultry, meat, fruits, and vegetables.

Development of rural roads is essential for marketing inputs and outputs. This is particularly important for transporting perishable products. Similarly, extension of rural electrification would facilitate the processing and storage of these goods. Although adequate financial provisions have been made in the draft Sixth Five-Year Plan for these schemes under the Minimum Needs Program (Rs 8.0 billion for rural roads and Rs 2.4 billion for rural electrification), it is important that these facilities are created in the same areas where subsidiary activities programs are established as a priority.

Because small farmers can have the benefit of medium- and long-term credit from institutional agencies only if they have title to the land they operate, a good land records system is necessary. Existing land records must be brought up-to-date, specifying the names of tenants and the nature of the tenancy.

Agricultural Extension

The Indian farmer is perfectly capable and willing to adopt improved techniques given sufficient motivation, necessary resources, and introductory demonstration of new techniques. The kinds of extension services needed differ between the large

and small farmers, just as there are differences in extension techniques adopted in developed and developing countries. To be most effective, the farming techniques recommended for the small farmers should be less capital intensive, at least in the initial stages. The dissemination of the techniques must be done on a group basis, in view of the large number of farmers involved.

To overcome the deficiencies in the prevailing arrangements for extension through the Community Development Agency, a new Training and Visit System of extension is being tested in India.⁹¹ Under this system, the village-level worker (VLW) first receives two weeks of intensive training in specific agricultural practices and recommendations directly related to farm operations. Then he visits on a regular basis each of the relatively small groups of farmers in the locality every fortnight to train them in the new techniques. The system essentially encourages farmers to adopt the improved management practices involved in crop production, which are generally labor intensive. The system is, therefore, best suited to a small farmer who cultivates his own land and has surplus family labor that can be put to productive use. It remains to be seen to what extent sharecropping tenants and marginal farmers who seek employment outside the farm can adopt labor-intensive methods unless the gains in income exceed the nonfarm wage forgone. The Training and Visit System should be reoriented to meet their needs.

Agricultural Research

Though the Indian agricultural research system is organizationally sound, most of the past efforts have been oriented to rapid growth and directed to irrigated crops and areas. In the Fifth Plan research in dryland agriculture was allocated a sum of Rs 32.5 million out of a total of Rs 330.0 million for agricultural research schemes in the central sector. The allocations for oilseeds and other dry crops were also small. Though allocations for some of these programs have

⁹¹ This system was proposed by Daniel Benor, an Israeli expert sponsored by the World Bank. See Daniel Benor and James Q. Harrison, *Agricultural Extension: The Training and Visit System* (Washington, D.C.: International Bank for Reconstruction and Development, 1977).

been increased under the Sixth Plan, changes in priorities are urgently needed to give the research programs an equity orientation. There should be more emphasis, higher priority, and larger financial allocations to research for the improvement of yields in dry areas, from poor soils, and of the crops grown and consumed by the poor. The new varieties and associated cultivation practices should be tried over large compact areas composed of small farms to see the difficulties to be encountered by these farmers in adopting them and the adaptations needed to suit them. More emphasis should be given to research oriented toward stabilizing or reducing the variation in yields, developing varieties with built-in resistance to drought, pests, and diseases; and developing varieties that mature quickly under irrigated conditions, thus enabling small farmers to

enlarge their land base through multiple cropping and increased cropping intensity.

Furthermore, technologies that are labor intensive and require a low cash input should have precedence over labor-saving technologies that require high input cost. Research on small tools and equipment for precision farming needs to be intensified. Because the emphasis in the proposed strategy is on the combination of crop production and subsidiary activities for small and marginal farmers, more emphasis should be placed on mixed farming research. Agricultural strategy oriented toward growth with equity calls for greater efforts in research on socioeconomic aspects of agriculture (both micro and macro) to diagnose and find solutions to the problems. Interdisciplinary research involving the physical and social sciences is thus imperative.

8

REORGANIZATION OF AGRICULTURAL PLANNING AND IMPLEMENTATION PROCEDURES

The six elements of the overall strategy proposed in Chapter 6 are not materially different from the policies and programs outlined in the draft Sixth Five-Year Plan. In fact, some of these programs have been in operation for several years. But, for various reasons, they have not visibly reduced income disparities nor ameliorated conditions of the weaker groups.

First, under the present method of formulating schemes and fixing targets at the national and state levels, there is no procedure for building them up from the lower levels nor are the operational details of the overall policies and programs fully worked out at the local level in several cases. Second, even when these details are worked out, the growth with equity objectives often are not reflected therein. For example, in irrigation and fertilizer distribution programs the small and marginal farmers do not get priority attention and so they are not able to receive full benefits. Without attention given to operational details, the institutional agencies are not fully geared to make productive assets available to large numbers of these farmers. Third, the programs are based on an individual crop, livestock, or sector approach, and until recently there was no attempt to integrate them at the farm level. Even the services provided under subsidiary activities programs often are not made available as a package. Only recently have some area programs been drawn up, but their aggregate coverage still is small. Finally, field implementation of several programs is poor. Most of the deficiencies are caused by inadequate planning and implementation procedures. The modifications needed in these procedures

to achieve growth with equity are discussed in this chapter.

Decentralized Planning

In India formulation of a plan starts at the national level with a view to balancing overall and sectoral investments with the available resources; then, adopting the top-to-bottom approach, planning is extended to lower levels.⁹² In the agricultural sector this exercise is done at two levels, national and state. The physical program and production targets are not built up from below, but are broken down from the national and state levels to district and lower levels.

The case for decentralized planning, particularly in the agricultural sector, is obvious. It would facilitate optimum use of resources at the local level and make the programs more realistic and feasible. Decentralized planning enables the various activities to be organized in a mutually supportive manner.⁹³ It also helps to ensure that economic opportunities are created for those groups that are bypassed in the top-to-bottom approach. Planning from below does not mean that someone should go to each and every household and tell families what to do.⁹⁴ What is suggested is that agricultural schemes or programs should be formulated at lower levels and then aggregated at the district and state levels. This procedure is, of course, possible only for those aspects that are amenable to local planning; for example, minor irrigation, input distribution,

⁹² The term "planning" has acquired a special meaning in India. It "attempts a middle way between a comprehensive national plan and indicative planning (in sectors where it has no effective authority)." Ursula Hicks, "Thirty Years of Planning: The Indian Experience," *The Malayan Economic Review* 24 (October 1979): 1-17.

⁹³ V. S. Vyas and George Mathai, "Farm and Non-farm Employment in Rural Areas," *Economic and Political Weekly*, Annual Number, February 1978, pp. 333-347.

⁹⁴ V. S. Vyas, "Planning for the Micro-Regions: Dharampur Approach," *Artha Vikas* 14 (July-December 1978): 1-2.

and credit supply. Operational procedures for implementing plans should also be devised at the local level, with the objective of social justice kept prominently in view.

If such detailed schemes for major irrigation and fertilizer programs are formulated at the local level in the areas that are likely to benefit from them under the Sixth Plan, it would be possible to ensure that irrigation, fertilizer, and HYVs are applied on the same farms, and that the small and marginal farmers in the area participate in the growth process. Under local planning, it should also be possible to see that the crop production and subsidiary activity programs are coordinated and that all the elements of these programs are taken up as a package.

It is true that it may not be possible to prepare such detailed schemes for all the blocks/areas in a district simultaneously, as this would require an extensive agricultural planning organization. Preparation of detailed schemes for the programs included in the Sixth Plan should be taken up block-by-block in a phased manner. For this work there should be an interdisciplinary agricultural planning team at the district level under the chief agricultural development officer as recommended by the NCA.⁹⁵

The block is generally the most convenient operational unit for formulating the initial schemes, whereas the district is the administrative unit where coordination between different schemes within agriculture and between different sectors is done. The state plans should be built up from the district plans. In some cases the relevant planning unit may be determined by natural conditions, such as a watershed or a homogeneous agroclimatic unit.

Land Use Planning

Another major improvement in agricultural planning that is needed to ensure rapid growth and regional equity is land use planning, the importance of which has been underscored by the draft Sixth Five-Year

Plan, 1978-83,⁹⁶ and by the NCA.⁹⁷ Scientific crop planning as a part of land use planning is imperative in the long run, not only to improve soil productivity, but also to achieve sustained rates of growth coupled with the needs of equity so that farmers in irrigated and rainfed areas can take up crop and livestock production suited to their areas and participate in the growth process. Cropping and livestock systems must take into account soil suitability, rainfall patterns, and water availability. Where rainfall is scanty, a silvipastoral approach is needed. Only through such an approach can balanced regional development be brought about and the living conditions of the poor inhabiting these areas be improved.

When India was deficient in several commodities across-the-board, crop planning was not important. However, as soon as surpluses develop in some regions and in some cereals and deficits exist in pulses, oilseeds, and other crops, the question arises of reallocating the land to different crops. For example, if the output of pulses and oilseeds is to be encouraged by diversion of area from cereals, the specific areas where their cultivation could be extended need to be determined as well as the crops that they would replace. Similarly, if the cultivation of fodder is to be extended, the areas where this is possible need to be demarcated. Thus, it is both necessary and desirable to indicatively reallocate land and other resources to different crops to achieve the desired land use and cropping patterns.

A major difficulty, hitherto, in the adoption of land use planning has been the lack of the requisite information on rainfall, temperature, soil characteristics, and cropping patterns at the local level. This information has now been compiled and published by the NCA. The agricultural universities could indicate, on the basis of field trials and experiments already conducted, desirable cropping patterns for each area that are agronomically feasible and remunerative to the farmer. These could then be disseminated through extension agencies wherever necessary. Such efforts should be supplemented by making

⁹⁵ India, Ministry of Agriculture and Irrigation, *Report of the NCA*, vol. 14, *Planning Statistics and Administration*, p. 193.

⁹⁶ India, Planning Commission, *Draft Sixth Five Year Plan (Revised)*, p. 263.

⁹⁷ India, Ministry of Agriculture and Irrigation, *Report of the NCA*, vol. 2: *Policy and Strategy*, and vol. 6: *Crop Production, Senculture, and Apiculture*.

sure that inputs (seeds and fertilizers) are supplied and processing and marketing facilities are available, and other suitable incentives are instituted. Before any cropping pattern is recommended, the expected price and anticipated net return from the crops should be examined. The aggregate supply should be checked with the aggregate demand, and any adjustments needed between them should be made through trade and price policies. These should be continuously reviewed. Land use planning in this sense is feasible, particularly after decentralized planning is adopted.

Successful but isolated cases where new crops have been introduced include cultivation of cotton in rice fallows, introduction of *baisakhi mung* (a short-duration variety of pulse) in northern India where summer irrigation is available, maize in Karnataka, wheat in West Bengal and Bihar, and soya-bean and sunflower in northern and central India. A case where an unsuitable crop was discouraged involved tobacco cultivation in heavy black soils in Andhra Pradesh.

To direct and coordinate the efforts for promoting land use and crop planning, a national land use commission should be set up and similar land use planning boards should be established in the states.

Implementation

Attention has been drawn several times in the preceding chapters to failures in the implementation of various programs and policies. Among the major reasons for significant gaps between planning and implementation are: inadequate investigation and preparation of operational details; lack of specific assignment of responsibility and accountability for results; inadequate motivation of personnel, incentives, and commitment to results; lack of adequate arrangements for monitoring and concurrent evaluation; and interference from political and vested interests. The proposed changes in the planning procedures are designed to remedy the first deficiency. To remove the

second lacuna, the field organizations of the state agricultural departments should be reorganized into agricultural development departments, headed by the Chief Agricultural Development Officer (CADO) at the district level and the Block Agricultural Development Officer (BADO) at the block level. The responsibility for achieving the targets should be fixed on these officers. To discharge their duties effectively, they should have not only the requisite powers but also the means to take appropriate measures.

It is recognized that agricultural development involves multidisciplinary efforts and hence participation by agencies belonging to different departments. This requires co-ordination of the activities of these agencies at various levels. Horizontal coordination often is not effective, particularly under the hierarchical administrative organization of India. The only language and authority that are understood are directives and vertical lines of command. Under these conditions, appropriate mechanisms have to be evolved to enable the CADO and the BADO to discharge their responsibilities for schemes involving several departments.

For example, the arrangements for a credit scheme could be as follows.⁹⁸ At the start of the season, after the details of the scheme are worked out and sanctions are issued, the officers concerned should meet under the chairmanship of the CADO or the BADO (as the case may be), draw up a plan for implementing the scheme, and agree on a time schedule. The actual implementation should be left to the departmental agencies. They should bring any difficulty that they might have in adhering to the schedule promptly to the attention of the BADO/CADO so that remedial action can be taken immediately. Often such difficulties are brought to light only at the end of the season when it is too late.

The next important step for ensuring effective implementation is to arrange for systematic monitoring and evaluation of the programs by setting up an organization under the CADO/BADO. A statutory obligation to submit the evaluation reports to the state legislatures and parliament would have a

⁹⁸ The expert group appointed by the Reserve Bank of India to review the agricultural credit schemes of commercial banks made several recommendations for improving implementation procedures. These include setting up a task force at the district level to facilitate implementation of location-specific and activity-oriented credit schemes.

salutary effect on the timeliness of the reports and their accuracy.⁹⁹ The evaluation report should particularly emphasize how well equity objectives are being realized and, if difficulties are experienced, what measures are proposed to overcome them.

An argument is often advanced that unless the rural power structure comprising rich landlords, traders, and moneylenders is broken, equity programs cannot be successful because this group will find ways and means of obstructing implementation, the lower-level implementation staff being either

in league with it or under its influence. By playing a watchdog role, genuine farmers' organizations with adequate representation of small and marginal farmers and landless laborers could ensure better implementation of these programs. However, the process of educating the rural poor and organizing them is an ongoing one; there is no quick solution to this basic problem. Meanwhile, the government should safeguard the interests of the weaker groups until they become better organized and capable of asserting their rights.

⁹⁹ The Panchayati Raj Institutions Committee also recommended submitting an administrative report on *panchayat raj* institutions to the legislature. Furthermore, they suggested establishing a legislative committee to be especially concerned with the physical and financial performance of *panchayat raj* bodies. A similar arrangement for equity programs would be desirable.

9

SOME CONCLUDING OBSERVATIONS

Although the problems of rural poverty and unemployment are complex, their solutions lie primarily in the adoption of a strategy for comprehensive development of the agricultural sector, covering not only crop production but also the associated subsidiary activities and rural industry specifically designed for achieving growth with equity. Conditions that favor such growth seem to exist in Indian agriculture. The seed-fertilizer technology is scale-neutral; scientific practices in animal husbandry and other subsectors can be adopted on a small scale; and the demand for dairy and meat products is high. There are vast opportunities for exploiting yield potentials and, faster growth rates are possible in these subsectors. Yet the programs oriented to target groups have not, by and large, succeeded because of defective planning procedures, ineffective implementation, and inadequate coverage. Wherever these programs have been implemented effectively, they have helped improve the economic conditions of the weaker sections.

Financial resources need not be a constraint. The major programs requiring large investments are irrigation and infrastructure development. Plan resources for development of irrigation could be supplemented by institutional finances from outside the plan. These could be augmented by international multilateral and bilateral resources, particularly to finance minor irrigation works with a short gestation period, benefiting small farmers. The lack of foreign exchange could constrain the importation of large

quantities of fertilizers, but this should be overcome by placing a higher priority on fertilizer and by resorting to international financing facilities.

India has an experienced administrative system, capable of handling rural development programs provided the deficiencies referred to in the last chapter are remedied. The country has a large reservoir of educated manpower and many educational institutions that could be tapped to train the scientific, technical, and administrative personnel needed to adopt decentralized planning and to implement the equity programs.

It must be noted that the country is not starting from scratch. Many of the development experiences in India have been subjected to intensive study both from within the country and without. Several of the policy decisions are based on careful analyses of various alternatives within the existing political framework. Most of the new equity programs have been evaluated and the directions that necessary improvements should take are known.

Because the problems are so vast, no visible improvement in conditions in the rural areas will appear overnight, but it should be possible to reduce poverty and unemployment during the next 10-15 years if the policies and strategies suggested here are implemented. The strategies are available. The political will and commitment to social justice at the top must percolate down to the village and block levels where most of the programs are implemented and where the poor people live.

BIBLIOGRAPHY

- Ahluwalia, Montek S. "Rural Poverty and Agricultural Performance in India." *The Journal of Development Studies* 14 (April 1978): 298-323.
- Alagh, Y. K. and Sharma, P. S. "Growth of Crop Production: 1960/61 to 1978/79—Is It Decelerating?" *Indian Journal of Agricultural Economics* 35 (April-June 1980): 104-118.
- Bardhan, Kalpana, "Rural Employment, Wages and Labor Markets in India: A Survey of Research—II." *Economic and Political Weekly*, July 2, 1977, pp. 1062-1074.
- Bardhan, Pranab K. "Size, Productivity, and Returns to Scale: An Economic Analysis of Farm-Level Data in Indian Agriculture." *Journal of Political Economy* 81 (November-December 1973): 1370-1386.
- Benor, Daniel and Harrison, James Q. *Agricultural Extension: The Training and Visit System*. Washington, D.C.: International Bank for Reconstruction and Development, 1977.
- Bhalla, G. S. and Alagh, Yogendra K. "Spatial Pattern of Levels and Growth of Agricultural Output in India." Jawaharlal Nehru University, Delhi, 1978. (Mimeographed.)
- Bhalla, Sheila. "Agricultural Growth: Role of Institutional and Infrastructural Factors." *Economic and Political Weekly*, November 5-12, 1977, pp. 1898-1905.
- Bhalla, Surjit S. "Farm Size, Productivity and Technical Changes in Indian Agriculture." In R. Albert Berry and William R. Cline, *Agrarian Structure and Productivity in Developing Countries*, pp. 141-193. Baltimore, Md.: The Johns Hopkins University Press, 1979.
- Bhattacharya, N. and Saini, G. "Farm Size and Productivity—A Fresh Look." *Economic and Political Weekly*, Review of Agriculture, June 24, 1972, pp. A63-A72.
- Binswanger, Hans P. *The Economics of Tractors in the Indian Sub-Continent: An Analytical Review*. Hyderabad: International Crop Research Institute for the Semi-Arid Tropics, 1977.
- Chenery, Hollis; Ahluwalia, Montek S.; Bell, C. L. G.; Duloy, J. H.; and Jolly, B. *Redistribution with Growth*. London: Oxford University Press, 1974.
- Clay, Edward J. "Equity and Productivity Effects of a Package of Technical Innovations and Changes in Social Institutions: Tubewells, Tractors and High Yielding Varieties." *Indian Journal of Agricultural Economics* 30 (October-December 1975): 74-87.
- Cline, William R. "Policy Instruments for Rural Income Distribution." In *Income Distribution and Growth in the Less-Developed Countries*, pp. 281-336. Edited by Charles R. Frank, Jr. and Richard C. Webb. Washington, D.C.: The Brookings Institution, 1977.
- Dandekar, V. M. and Rath, Nilakantha. *Poverty in India*. Bombay: Indian School of Political Economy, 1971.
- Dantwala, M. L. "Agricultural Policy in India Since Independence." *Indian Journal of Agricultural Economics* 31 (October-December 1976): 31.
- . Preface to *Comparative Experience of Agricultural Development in Developing Countries of Asia and the Southeast Since World War II*. Edited by M. L. Dantwala. Bombay: Indian Society of Agricultural Economics, 1972.
- . "Future of Institutional Reform and Technological Change in Indian Agricultural Development," *Economic and Political Weekly*, Special Number, August 1978, pp. 1299-1306.

- Desai, B. M. Introduction to *Intervention for Rural Development—Experiences of the Small Farmers' Development Agency*: Edited by B. M. Desai. Ahmedabad: Indian Institute of Management, 1979.
- Desai, Gunvant M. "Fertilizers in India's Agricultural Development." In *Agricultural Development of India, Policy and Problems*. Edited by C. H. Shah. Bombay: Orient Longman, Ltd., 1979.
- Desai, Gunvant M. and Singh, Gundev. "Growth of Fertilizer Use in Districts of India, Performance and Policy Implications." Indian Institute of Management, Ahmedabad, 1973. (Mimeographed.)
- Etienne, Gilbert. "Some Field Observations in Rural India's Development." *Agricultural Administration Network Papers No. 2*, Overseas Development Institute, London, 1980.
- Ford Foundation, Agricultural Production Team. *India's Food Crisis and Steps to Meet It*. Delhi: India, Ministry of Food and Agriculture and Ministry of Community Development, 1959.
- Griffin, Keith and James, Jeffrey. "Problems of Transition to Egalitarian Development." *The Manchester School*, September 1979, pp. 248-269.
- Hicks, Ursula. "Thirty Years of Planning: The Indian Experience." *The Malayan Economic Review* 24 (October 1979): 1-17.
- India, Cabinet Secretariat. *The National Sample Survey: Tables with Notes on Some Aspects of Landholdings in Rural Areas (State and All-India Estimates)*. 17th Round, No. 144. Delhi: Manager of Publications, 1968.
- India, Department of Agriculture. "Statement of Agriculture and Food Policy in India." Delhi, January 1946.
- India, Department of Statistics, National Sample Survey Organisation. "Fertilizer Use in Agricultural Holdings." Department of Statistics, 1977. (Mimeographed.)
- . *Tables on Land Holdings—All India*. National Sample Survey, 26th Round, No. 215. Delhi: Controller of Publications, 1976.
- India, Ministry of Agriculture. *Agricultural Price Policy: Interim Report of the National Commission on Agriculture*. Delhi: Government of India Press, 1975.
- . *Credit Services for Small and Marginal Farmers and Agricultural Labourers*. Interim Report of the National Commission on Agriculture. Delhi: Government of India Press, 1971.
- . *Milk Production Through Small and Marginal Farmers and Agricultural Labourers*. Interim Report of the National Commission on Agriculture. Delhi: Government of India Press, 1971.
- . *Poultry, Sheep and Pig Production Through Small and Marginal Farmers and Agricultural Labourers for Supplementing Their Income*. Interim Report of the National Commission on Agriculture. Delhi: Government of India Press, 1973.
- . *Reorientation of Programmes of Small and Marginal Farmers and Agricultural Labourers' Development Agencies*. Interim Report of the National Commission on Agriculture. Delhi: Government of India Press, 1973.
- India, Ministry of Agriculture and Irrigation, Department of Rural Development. "All-India Agricultural Census, 1976-77," 1980. (Mimeographed.)
- . *All-India Report on Agricultural Census 1970-71*. Delhi: Controller of Publications 1975.

- _____. *Report of the Committee on Panchayati Raj Institutions*. Delhi: Government of India Press, 1978.
- _____. *Report of the National Commission on Agriculture*, 15 vols. Delhi: Controller of Publications, 1976.
- India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics. *Estimates of Area and Production of Principal Crops, 1978/79*. Delhi: Controller of Publications, 1980.
- _____. *Indian Agriculture in Brief*, various editions. Delhi: Controller of Publications, various years.
- India, Ministry of Food, Agriculture, and Community Development. "Modernising Indian Agriculture." *Report on the Intensive Agricultural District Programme (1960-68)*. Delhi: Manager of Publications, 1969.
- India, Planning Commission. *First Five-Year Plan—People's Edition*. Delhi: Publications Division, 1953.
- _____. *Second Five-Year Plan*. Delhi: Manager of Publications, 1956.
- _____. *Third Five-Year Plan*. Delhi: Manager of Publications, 1961.
- _____. *Draft Fourth Five-Year Plan, 1969-74*. Delhi: Manager of Publications, 1969.
- _____. *Draft Fifth Five-Year Plan, 1974-79*. Delhi: Controller of Publications, 1974.
- _____. *Draft Sixth Five-Year Plan (Revised), 1978-83*. Delhi: Controller of Publications, 1979.
- _____. "How and Why SFDA Fails to Deliver the Goods?" *Kurukshetra* 27 (June 1, 1979): 4-8.
- _____. *Report of the Working Group on Block Level Planning*. Delhi: Government of India Press, 1978.
- International Labour Office, Director General. *Employment, Growth and Basic Needs: A One World Problem*. Geneva: ILO, 1976.
- Johl, S. S. "Farm Size, Economic Efficiency and Social Justice: A Case of Punjab." *Agricultural Mechanization in Asia* 4 (Spring 1973): 56-61.
- Jose, A. V. "Trends in Real Wage Rates of Agricultural Laborers." *Economic and Political Weekly*; Review of Agriculture, March 30, 1974, pp. A25-A37.
- Khusro, A. M. "Returns to Scale in Indian Agriculture." *Indian Journal of Agricultural Economics* 19 (July-December 1964): 51-80.
- Krishna, Raj. "Small Farmer Development." *Economic and Political Weekly*, May 26, 1979, pp. 913-918.
- Lele, Uma. "Roles of Credit and Marketing." In *Agricultural Policy in Developing Countries*, pp. 413-441. Edited by Nurul Islam. New York: Halstead Publications, 1974.
- Lewis, John P. "Designing the Public Works Mode of Anti-Poverty Policy." In *Income Distribution and Growth in the Less Developed Countries*. Edited by Charles R. Frank, Jr. and Richard C. Webb. Washington, D.C.: The Brookings Institution, 1977.
- Lockwood, Brian; Mukherjee, P. K.; and Shand, R. T. "The High-Yielding Varieties Program in India—Part I (Draft)." India, Planning Commission and the Australian National University, 1971.

- Mehra, Shakuntla. *Instability in Indian Agriculture in the Context of the New Technology*. Research Report 25. Washington, D.C.: International Food Policy Research Institute, 1981.
- Mellor, John W. *Developing Rural India: Plan and Practice*. Ithaca, N.Y.: Cornell University Press, 1968.
- . *The New Economics of Growth: A Strategy for India and the Developing World*. Ithaca, N.Y.: Cornell University Press, 1976.
- Mellor, John W. and Lele, Uma J. "Growth Linkages of the New Foodgrain Technologies." *Indian Journal of Agricultural Economics* 28 (January-March 1973): 35-56.
- Mettrick, H.; Roy, Shyamal; and Thornton, D. S. "Agricultural Mechanisation in South Asia." *Development Research Digest*, Autumn 1978, pp. 28-33.
- Minhas, B. S. "Rural Poverty, Land Distribution and Development Strategy: Policy." In *Poverty and Income Distribution*. Edited by T. N. Srinivasan and P. K. Bardhan. Calcutta: Statistical Publishing Society, 1974.
- Minhas, B.S. and Srinivasan, T. N. "Food Production Trends and Buffer Stock Policy." *The Statesman*, November 14 and 15, 1968.
- Mitra, Ashoka. "Bumper Harvest Has Created Dangerous Illusions." *The Statesman*, October 14 and 15, 1968.
- Morawitz, David. *Twenty-Five Years of Economic Development, 1950 to 1975*. Baltimore, Md.: The Johns Hopkins University Press, 1977.
- Narain, Dharm. "Growth of Productivity in Indian Agriculture." *Indian Journal of Agricultural Economics* 32 (January-March 1977): 1-44.
- Narain, Dharm and Roy, Shyamal. *Impact of Irrigation and Labor Availability on Multiple Cropping: A Case Study of India*. Research Report 20. Washington, D.C.: International Food Policy Research Institute, 1980.
- National Council of Applied Economic Research. *Fertilizer Use on Selected Crops in India*. New Delhi: NCAER, 1974.
- Parthasarathy, G. "Land Reform and the Changing Agrarian Structure." In *Agricultural Development of India: Policy and Problems*. Edited by C. H. Shah. Bombay: Orient Longman, Ltd., 1979.
- Prasad, Pradhan H. "Economic Benefits in Kosi Command Area." A. N. Sinha Institute of Social Sciences, Patna, 1972. (Mimeographed.)
- Rao, C. H. Hanumantha. "Alternative Explanations of the Inverse Relationship between Farm Size and Output Per Acre in India." *Indian Economic Review* (New Series) 1 (October 1977).
- . *Technological Change and Distribution of Gains in Indian Agriculture*. Delhi: Macmillan Company of India, 1975.
- Rao, V. K. R. V. *Growth with Justice in Asian Agriculture: An Exercise in Policy Formulation*. Geneva: United Nations Research Institute for Social Development, 1974.
- Reserve Bank of India. *Marginal Farmers and Agricultural Labourers Development Agencies (A Field Study) 1973*. Bombay: Reserve Bank of India, 1976.
- . *Report of the Expert Group on Agricultural Credit Schemes of Commercial Banks*. Bombay: Reserve Bank of India, 1978.

- _____. *Small Farmers Development Agencies (A Field Study) 1972-73*. Bombay: Reserve Bank of India, 1975.
- Rudra, Ashok. "Farm Size and Yield Per Acre." *Economic and Political Weekly*, Special Number, July 1968, pp. 1041-1044.
- _____. "More on Returns to Scale in Indian Agriculture." *Economic and Political Weekly*, Review of Agriculture, October 26, 1968, pp. A33-A38.
- _____. "Organisation of Agriculture for Rural Development: The Indian Case." *Cambridge Journal of Economics* 2 (December 1978): 381-406.
- Sanderson, Fred and Roy, Shyamal. *Food Trends and Prospects in India*. Washington, D.C.: Brookings Institution, 1979.
- Sarma, J. S. "Agricultural Policy in India: Presidential Address at the 33rd All-India Agricultural Economics Conference." *Indian Journal of Agricultural Economics* 29 (January-March 1974): 1-15.
- Sarma, J. S. and Roy, Shyamal. "Foodgrain Production and Consumption Behavior in India, 1960-77." In *Two Analyses of Indian Foodgrain Production and Consumption Data*. Research Report 12. Washington, D.C.: International Food Policy Research Institute, 1979.
- Schluter, Michael and Mellor, John W. "New Seed Varieties and the Small Farm." *Economic and Political Weekly*, Review of Agriculture, March 25, 1972, pp. A31-A38.
- Sen, Amartya K. "An Aspect of Indian Agriculture." *The Economic Weekly*, Annual Number, February 1962, pp. 243-246.
- _____. "Size of Holding and Productivity." *The Economic Weekly*, Annual Number, February 1964.
- Shah, C. H. "Small Farmers: Policy and Problems." *Economic and Political Weekly*, October 21, 1978, pp. 1771-1775.
- Sidhu, Surjit S. "Relative Efficiency in Wheat Production in the Indian Punjab." *American Economic Review* 64 (September 1974): 742-751.
- Srinivasan, T. N. "The Green Revolution or Wheat Revolution." In *Comparative Experience of Agricultural Development in Developing Countries of Asia and the Southeast Since World War II*. Edited by M. L. Dantwala. Bombay: Indian Society of Agricultural Economics, 1972.
- _____. "Trends in Agriculture in India, 1949/50 to 1977/78." *Economic and Political Weekly*, Special Number, August 1979, pp. 1283-1294.
- Thamarajakshi, R. and Rao, G. V. K. "Some Aspects of Growth of Indian Agriculture." *Economic and Political Weekly*, Review of Agriculture, December 23-30, 1978, pp. A113-A118.
- Vaidyanathan, A. "Performance and Prospects of Crop Production in India." *Economic and Political Weekly*, Special Number, August 1977, pp. 1355-1368.
- Vyas, V. S. "The Agricultural Labor Market—A Synoptic View." In *Agricultural Development of India: Policy and Problems*. Edited by C. H. Shah. New Delhi: Orient Longman, Ltd., 1979.
- _____. "Tenancy in a Dynamic Setting." *Economic and Political Weekly*, Review of Agriculture, June 27, 1970, pp. A73-A80.

———. "Planning for the Micro-Regions: Dharampur Approach." *Artha Vikas* 14 (July-December 1978): 1-12.

Vyas, V. S. and Mathai, George. "Farm and Non-farm Employment in Rural Areas." *Economic and Political Weekly*, Annual Number, February 1978, pp. 333-347.

Weiner, Myron. "Political Evolution—Party Bureaucracy and Institutions." In *India: A Rising Middle Power*. Edited by John W. Mellor. Boulder, Col.: Westview Press, 1978.

INDIAN AGRICULTURE FROM THE PERSPECTIVE OF WESTERN EUROPE

Ester Boserup*

India's population density and area of arable land per inhabitant are similar to Western Europe's (Table 1). The much smaller Indian agricultural output per head is primarily due to the extremely low level of output per hectare in India. H. H. H. mi, Ruttan, and Binswanger have computed comparable statistics for agricultural output of land and labor in many countries, including India and the most important Western European countries. The main results of this comparison are shown in Table 2. Output per hectare in India in 1970 was only 20-30 percent that of continental Western Europe (represented by Denmark, France, and Germany) and was on the same low level as that of these countries a century ago. The much lower level of output per hectare in India is not a result of much poorer natural conditions for agriculture in India than in Western Europe. Much land in Western Europe was poor before it was improved by agricultural investment and other inputs. India is much more dependent upon irrigation than Western Europe, but if irrigation is provided, conditions in India are vastly better for multiple cropping than in Western Europe with its cold winters.

Although output of land was as low in Western Europe a century ago as in India today, output of agricultural labor was much higher. Agricultural equipment in Western Europe was much better than that of nearly all agricultural regions in India today. Output per male worker in agriculture was four or five times larger than in India today, and one worker cultivated a much larger area. The huge increase in agricultural output between 1880 and 1930 in continental Western Europe was obtained mainly by raising output of land. There was little change in the area cultivated per worker. This type of development, with focus on output per hectare rather than a change in man/land ratio, continued to be characteristic of Western European agriculture, particularly in Denmark from 1930 to 1960. Only after 1960 did rapid tractorization and other mechanization result in a rapid increase of the area cultivated per worker, accompanied by rapid transfer of agricultural labor to nonagricultural occupations.

In contrast to India, multiplication of output in Western Europe was obtained by means other than investment in irrigation. It is worth looking at changes in Western

Table 1—Area per inhabitant in India and Western Europe around 1970

| Country | Total Area | Arable Land | Permanent Pastures | Forests and Other Land |
|------------------------------|------------|-------------|--------------------|------------------------|
| | (hectares) | | | |
| India | 0.61 | 0.31 | 0.03 | 0.27 |
| Denmark | 0.85 | 0.54 | 0.06 | 0.25 |
| France | 1.08 | 0.38 | 0.27 | 0.43 |
| Germany, Federal Republic of | 0.39 | 0.13 | 0.09 | 0.17 |
| United Kingdom | 0.43 | 0.13 | 0.21 | 0.09 |

Source: FAO statistics.

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Table 2—Agricultural output of land and labor in India and Western Europe

| Country | Output Per Hectare | | | | Area Per Male Worker | | | | Output Per Male Worker | | | |
|------------------------------|--------------------|------|------|------|----------------------|------|------|------|------------------------|------|------|------|
| | 1880 | 1930 | 1960 | 1970 | 1880 | 1930 | 1960 | 1970 | 1880 | 1930 | 1960 | 1970 |
| | (wheat units) | | | | (hectares) | | | | (wheat units) | | | |
| India | ... | ... | ... | 1.2 | ... | ... | ... | 2 | ... | ... | ... | 2 |
| Denmark | 1.2 | 3.0 | 4.7 | 5.3 | 9 | 8 | 15 | 18 | 11 | 24 | 48 | 94 |
| France | 1.1 | 1.5 | 2.5 | 3.7 | 7 | 9 | 13 | 16 | 7 | 13 | 33 | 60 |
| Germany, Federal Republic of | 1.3 | 2.5 | 4.0 | 5.4 | 6 | 6 | 9 | 12 | 8 | 16 | 35 | 65 |
| United Kingdom | 1.1 | 1.2 | 1.9 | 2.6 | 15 | 17 | 23 | 34 | 16 | 20 | 45 | 88 |

Sources: Y. Hayami and Vernon W. Ruttan, *Agricultural Development: An International Perspective* (Baltimore, Md.: The Johns Hopkins University Press, 1971); and Hans P. Binswanger and Vernon W. Ruttan, *Induced Innovation, Technology, Institutions and Development* (Baltimore, Md.: The Johns Hopkins University Press, 1978).

European agriculture to see what scope there may be for using similar policies to speed up the increase of per hectare output in India and raise the living standards of the rural poor.

Most of the multiplication of output per hectare in Europe was obtained by a huge increase in fertilizer input and the spread of animal husbandry based upon production of labor-intensive fodder crops.

Compared to Europe, fertilizer application in India is extremely small (Table 3). Around 1970 fertilizer use per hectare in Western Europe was 20-30 times larger than in India, which explains a large part of the differences in per hectare output between these two regions. Sarma mentions that around 1970, 15 percent of the districts in India used 80 percent of all the fertilizer used in the country. This implies that these favored districts used some 70 kilos per hectare or

between one fifth and one third of the Western European level, whereas the rest of India used some 3 kilos per hectare, which amounts to saying that it used almost no fertilizer at all.

The districts in India in which large quantities of fertilizer are applied are those best supplied with roads and other rural infrastructure. Distribution of large amounts of fertilizer is possible only in regions with a dense road network. In the absence of such a network it is either impossible or uneconomic to raise crop yields by using large quantities of fertilizer. Table 3 shows that the Indian road network is very poor for a country with a high population density. Around 1970 the density of the Indian road network was one fifth that of Western Europe. Moreover, in contrast to Europe, most of the roads of India were unsurfaced. Thus, a precondition for intensive fertilizer use in

Table 3—Use of fertilizer and road networks in India and Western Europe around 1970

| Country | Fertilizer Use | Road Network | Percent of Roads Surfaced |
|------------------------------|-------------------------|-------------------------------|---------------------------|
| | (kilograms per hectare) | (meters per square kilometer) | |
| India | 13 | 290 | 35 |
| Denmark | 223 | 1,490 | 92 |
| France | 241 | 1,430 | ... |
| Germany, Federal Republic of | 460 | 1,670 | 72 |
| United Kingdom | 258 | 1,450 | 100 |

Sources: UN Research Institute for Social Development, *Data Bank of Development Indicators*, vol. 1 (Geneva: UNRISD, 1976); International Road Federation, *World Road Statistics* (Washington, D.C.: IRF, 1973).

the poor rural areas of India is very large investments in rural roads and other rural infrastructure. It is unfortunate, therefore, that road investment is not included among the components of "growth with equity" recommended by Sarma.¹

Although "rural public works programs" are mentioned as the last of the six components, they are not recommended as badly needed productive investments, indispensable for agricultural improvement. They are viewed as ways to "alleviate the immediate problem of rural unemployment, particularly in drought years and in chronically drought-affected areas." This tendency to treat investment in rural infrastructure (and even that in rural industries) as social works and ways of creating employment rather than as productive investments of high priority is an inheritance from the colonial past of India when the British administration used rural works to provide incomes for famine-stricken peasants and workers. When rural investments are viewed as social works, neither the types of works nor their location and timing are likely to be suitable for agricultural expansion. This may explain Sarma's comment that "experience with the implementation of such programs in India has been mixed."

In addition to abundant use of fertilizer, labor-intensive animal husbandry (including poultry-raising) made a large contribution to the increase of per hectare output in Western European agriculture. If India succeeds in accelerating the growth of per capita income, demand for milk and milk products, poultry, and other meat will increase rapidly. Sarma mentions increased animal husbandry as especially important for providing better incomes for rural people with little or no land of their own. However, he sees promotion of animal husbandry by special government support schemes primarily as a means of raising rural employment opportunities and contributing to greater equity. The role of these activities is repeatedly described as "subsidiary."

This is very different from the role played in animal husbandry in Western Europe from 1880 to 1960. Animal husbandry was not a subsidiary activity by which small peasants and workers supplemented their

incomes from the sale of cereals. Small-scale agricultural producers in Europe specialized in production of animal products that provided their main income. Only larger farms derived the bulk of their incomes from the sale of cereals. Producers with little land, whether owned or rented, used all or most of it for production of fodder crops, which they fed to their animals, or they specialized in other labor-intensive crops such as vegetables, fruit, or vines. In many regions small holders expanded their production of animal husbandry by buying fodder from larger farms or from importers.

In other words, in much of Western Europe small producers applied a development model different from that of the larger producers. Small producers were not less efficient and therefore in need of special government support programs. Small and large holdings were not competitive but were complementary. They relied on sales of different products and often purchased inputs from each other, not only labor but also materials.

Small producers could earn a sufficient family income, not only because of their specialization in products particularly suited for small-scale production but also because they made much more extensive use of cheap family labor of both sexes and nearly all ages than did larger producers. Wives and children of small producers not only worked extensively in the family holding, but they also earned supplementary incomes by seasonal wage labor in the larger holdings. Nevertheless, they remained poor compared to larger producers. When comparing European and Indian incomes, it should not be overlooked that minimum subsistence levels are much higher in Europe than in India because of the colder climate. Better housing, clothing, and food are needed for survival.

Because of the specialization of Western European small holdings in activities with high output per hectare, redistribution of land did not become a crucial problem in this period. There was little change in the size of holdings, except in the period after World War II when many owners and tenants of small holdings shifted to full-time or part-time employment in nonagricultural activities in rural and urban areas. In some

¹ A reference to the need for development of rural roads now appears in Chapter 7.

regions, prohibition against amalgamation of holdings and effective control of land sales contributed to security of tenure for both small and large producers.

Sarma regrets that in India "the only language and authority that are understood are directives and vertical lines of command," while horizontal coordination is ineffective. This is another inheritance from the colonial period when a small number of British administrators tried to control and govern the huge population and area of India. In their homelands, quite different policies were used by the Europeans, both in administration and in agriculture. Private and local initiative rather than government directives and control were responsible for the intensification of small-scale farming. Service cooperatives often played a very important role, but they were voluntary associations ruled by the general assembly of members, which decided on activities and recruited and paid the manager and other staff. These cooperatives were specialized; for instance, cooperative dairies, cooperative slaughterhouses, cooperative centers for collection and sale of eggs, cooperative associations for purchase of fertilizer and other inputs, cooperative credit associations in which the members were collectively responsible for the debts of the association, and cooperatives for purchase of consumer goods.

In some cooperatives, voting rights were in proportion to sales and purchases, and the larger farmers dominated. In other cases, each member family had one vote and small holders dominated. Sometimes small and large producers had different cooperatives. The important feature is that the members rather than government officials were responsible for their cooperatives and took the initiative in establishing them. If small producers believed the cooperative neglected them, they could break out and establish their own.

This situation changed considerably after 1960, when urban activities increased very rapidly in Western Europe and a large share of the small producers and agricultural workers shifted to nonagricultural work. Since 1960 large-scale "poultry and pork factories" using industrial techniques have replaced small-scale production. Small holdings have either been absorbed by larger ones or have become subsidiary activities for families whose main income is from outside agriculture. Moreover, the agricultural policy of the Western European Common Market countries has changed radically. This organization has attempted to raise agricultural incomes by means of a large number of bureaucratic directives and special support measures. An enormous bureaucracy has grown up. Large-scale misdirection of resources has resulted in accumulation of large surpluses and in a growing need for government subsidization. As in India, bureaucratic control of agriculture has mainly benefited the large farmers, who have the largest surpluses. Thus, in Western European countries the experience with bureaucratic control of agriculture has resulted in less equity and less economic efficiency than in the previous period when government intervention was less prescriptive and bureaucratic.

In the period of efficient small-scale farming in Europe, the large-scale poultry factories had not yet been invented. Today such "factory production" of animal products is often introduced in developing countries and is often subsidized by direct and indirect measures. In a country like India with a rapidly increasing rural population, a shortage of land, and limited possibilities for non-agricultural employment, the European experience suggests that placing ceilings on the size of enterprises engaged in such activities as poultry production might be as important—or even more important—than placing ceilings on land holdings.

SOME ISSUES IN INDIAN AGRICULTURE VIEWED FROM THE JAPANESE EXPERIENCE

S. Hirashima*

Sarma's study concerns three major areas of development in Indian agriculture: growth, equity, and the role of the state. This review covers Japanese experience in these areas, primarily during the prewar period.

Growth Experience

The growth rate of 2.7 percent for the Indian agricultural sector during the post-Independence period (1949/50-1978/79) is substantially higher than that achieved by prewar Japanese agriculture. As the table below shows, the highest Japanese growth rate during the prewar period was 1.78 percent in gross produce and 1.80 percent in value added during 1877-1919.¹

| | Gross Produce | Value Added |
|-----------|------------------|----------------|
| | (percent) | |
| 1877-1919 | 1.78 | 1.80 |
| 1919-1938 | 0.77 | 0.46 |
| 1877-1938 | 1.46 | 1.39 |
| 1919-1960 | 1.16 | 0.51 |
| 1877-1960 | 1.48 | 1.17 |

Much of the apparent success of Japanese agriculture is due primarily to substantially lower population growth and higher rice yields. Growth rates of population were below 1 percent for the first 30 years after the Meiji Restoration (1868) and never exceeded 1.5 percent during the prewar period.²

Japanese rice yields in the late 19th century were roughly comparable to the pre-"green-revolution" standards of south and southeast Asia, while prewar Japanese yields were similar to those achieved after the green revolution by many countries of Asia.³

It has been argued that the agricultural development of Japan was achieved with less demand for domestic and foreign capital.⁴ It is also recognized that the agricultural sector has had high labor absorption and mobilized rural savings for industrial development.⁵

It is highly questionable, however, whether the Japanese experience can be considered a model of "cheap-capital" development. From 1883 up to the turn of the century, rice yields increased about 50 percent without much public funding of agriculture. The growth in yield was based on the diffusion of local technologies that had been developed more or less independently by farmers in each feudal clan territory through landlords,

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¹ K. Ohkawa, "Phases of Agricultural Development and Economic Growth," in S. Kawano and Y. Kato, eds., *Japanese Agriculture and Economic Growth* (Tokyo: University of Tokyo Press, 1969), p. 6. (In Japanese.)

² M. Umemura, "Agriculture and Labour Supply in the Meiji Era," in S. Kawano and Y. Kato, eds., *Japanese Agriculture and Economic Growth* (Tokyo: University of Tokyo Press, 1969), p. 146. (In Japanese.)

³ S. Yamada, "Statistical Examination on Labour Absorption in Japanese Agriculture," International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, Bangkok, 1981 (mimeographed); Shigeru Ishikawa, *Essays on Technology, Employment and Institutions in Economic Development* (Tokyo: Kinokuniya, 1980), p. 37.

⁴ Bruce F. Johnston, "Agriculture and Economic Development in Japan: Its Relevance to the Developing Nations," in S. Kawano and Y. Kato, eds., *Japanese Agriculture and Economic Growth* (Tokyo: University of Tokyo Press, 1969). (In Japanese.) For similar arguments, see Bruce F. Johnston, "Agricultural Productivity and Economic Development in Japan," *Journal of Political Economy*, December 1951; Bruce F. Johnston and John W. Mellor, "The Role of Agriculture in Economic Development," *American Economic Review* 51 (September 1961): 566-593; and Arthur Lewis, *The Theory of Economic Growth* (Winchester, Mass.: Allen and Unwin, Inc., 1955), p. 136.

⁵ K. N. Raj, Preface to *Labour Absorption in Asian Agriculture, an Issue Paper*, by Shigeru Ishikawa (Bangkok: International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, 1978).

veteran farmers, and the government. The infrastructural development during the pre-Meiji period facilitated this process.⁶

Areas of State Intervention

Direct intervention of the state in agricultural production and agrarian affairs started in the 1920s, but the Meiji government had prepared for it late in the 19th century. The revenue reform in 1873, which drastically revised the land record of the Tokugawa period,⁷ revealed the nation's actual resource endowment to the government and made state intervention possible. The reform also established private ownership of land and set the land tax at the rate equivalent to the feudal rent (3 percent of land price, later reduced to 2.5 percent).⁸ Although the proportion of land tax in total revenue income of the state dropped from 16.7 percent in 1878 to 5.6 percent in 1897, these rates were higher than those of India.⁹

The second step taken by the Meiji government was the River (Control and Maintenance) Act of 1896, which established control of the state over river water. Rivers were classified into three grades according to their size, and responsibility for their control and maintenance was specified. In practice, first- and second-grade rivers came under the jurisdiction of the state and third-

grade rivers under local governments.

The third step was the Land Consolidation Act of 1899, which established modern land improvement works in Japan. Previously, the Meiji government had indirectly supported land improvement works initiated by many progressive farmers. Revisions to this act in 1905 and 1909 made improvements in irrigation and drainage prerequisite for land consolidation and improvement works in general. These changes were stimulated by experimental improvements in irrigation, drainage, and farm roads initiated by the influential landlords in 1902 in Saitama Prefecture. Although the improved area was only 387 hectares, the improvements enabled farmers to reduce labor input 40 percent, which was utilized for the second crop.¹⁰

Direct intervention of the government in agricultural production and agrarian relations in the 1920s was in response to the nationwide rice riots in 1918 and tenancy disputes in the 1920s.¹¹ The government intervened in four areas: land, water, price, and organization.

The tenancy dispute ultimately drove the government toward the encouragement and promotion of owner-farmers who were conceived to have "deep affection on land and were sober in ideology." In 1926 the Regulations on the Establishment and Maintenance of Owner-Farmer Act was enacted. At that time, about 45 percent of land was under tenant cultivation. The landlords

⁶ It is estimated that more than 70 percent of the irrigation works that irrigate more than 20 hectares were constructed before the Meiji period. See S. Sawada, *Nihon Nogyo no Gijutsu Shinpo* [Technological Progress of Japanese Agriculture], 1973, p. 4. It is also interesting to note that, during the Tokugawa period, irrigation technology was authorized by the Shogunate and was applied all over the country, while other technologies, particularly the ones such as seeds and cultural husbandry that could be developed within clan territories, were not open to each other. Since many irrigation works cut across different clan territories, it was physically impossible to conceal irrigation technology within each clan. This is the reason why land productivity could increase with the exchange of ideas hidden in each clan in the early Meiji period.

⁷ Many feudal clans developed cultivated land secretly in order to strengthen their power. Together with the adoption of standard measurement, the amount of land recorded increased substantially.

⁸ The burden of rent in rice terms was 1.83 million tons in 1836, whereas it was 1.77 million tons (3 percent less) in 1873. See T. Hayashi, *Formation of the Revenue State in Japan* (Tokyo: University of Tokyo Press, 1965), p. 170. (In Japanese.)

⁹ T. Hayashi, *Formation of the Revenue State*, p. 180.

¹⁰ In addition to the yield increase of rice (2.4 tons per hectare to 3.0 tons) and labor absorption, the Ministry of Agriculture in 1907 counted five by-products accrued to this land improvement works. These are: active commercial activities resulting from improvements in transportation, marked reduction of the absentee rate of school children, improvements in public health, improvements in landlord-tenant relationships owing to the improvements in the working conditions of tenants; and an increase in asset values (almost 50 percent). For details, see N. Imamura et al., eds., *Tochi Karyo Hyakunen Shi* [A Century of Land Improvement in Japan] (Tokyo: Heibon-sha), pp. 72-79.

¹¹ Tenancy disputes numbered 85 in 1917, 408 in 1921, and 2,751 in 1926 and involved 151,000 tenants. N. Imamura et al., eds., *Tochi Karyo Hyakunen Shi*, p. 126.

already were losing interest in farming because of low rice prices, labor shortages,¹² and tenancy disputes. The government's support of owner-farmer farming was maintained up to the time of land reform in 1946.

Severe price fluctuations were the major cause of the rice riots. In order to cope with the situation, the Rice Law was enacted in 1921. The government's intervention was confined initially to market operations but gradually increased. With enactment of the Rice Control Law in 1933 and the Food Management Law in 1942, rice prices came under government control and have remained so since.

Development of irrigation and drainage became the most important component of land improvement work after 1907. Irrigation investment during the feudal period was made primarily for expansion of area sown with rice. The Meiji government justified state intervention in land improvement works in the 1920s on the grounds of stabilizing landlord-tenant relationships by improving the working conditions of tenant farmers and suppressing price levels by enhancing the productive capacity of "technically marginal land."¹³ Under the Regulation on Irrigation and Drainage Improvement Works Act of 1923, land improvement projects undertaken by the prefectural governments covering more than 500 hectares began to get subsidies from the central government up to 50 percent of their costs. The marginal capital-output ratio jumped from 1.36 in 1900-20 to 5.00 during 1920-40.¹⁴ This trend is well illustrated in Figure 1, which shows the ratio of improved land starting to increase sharply around 1920 while the growth of land under cultivation remained stagnant.

The Industrial Cooperatives Central Monetary Fund Act of 1920 encouraged the formation of industrial cooperative societies in the next two decades. These preceded the present farmers' cooperative societies. Under the Act, the credit support of the government to cooperatives was institution-

alized. The Federation of Purchase Cooperative Societies started in 1920, and in 1931 the Federation of Selling Cooperative Societies was formed under the strong leadership of the government. These efforts were strongly supported by village community leaders who had experience in allocating scarce resources, notably irrigation water.

In summary, there was little direct government involvement in agricultural production and agrarian affairs, particularly investment, up to the turn of the century. Productivity growth was achieved by the diffusion of improved, labor-intensive cultural husbandry developed in western Japan. This included horse plowing, improved seeds (by pure-line selection), purchased manure (for example, fish meals and soyabean lees), line sowing, improved weeding, and saltwater treatment of seeds.

The Meiji Noho (method of cultural husbandry) required well-drained paddy fields; irrigation and drainage works had to be undertaken in eastern and southern Japan before the new technology could be adopted. Much of the work was done in the period up to 1920. Direct public investment in large-scale irrigation and drainage works was required at the lower reaches of the first- and second-grade rivers. With these improvements, rice yields increased and labor was shifted from rice cultivation and other agricultural activities.¹⁵

Equity Aspects of Japanese Agriculture

Sarma's discussion of growth with equity in Indian agriculture concerns primarily the alleviation of those below the poverty line, rather than the reduction in income and asset differentials among rural residents. Little data are available on rural poverty in prewar Japan. Estimates indicate that the

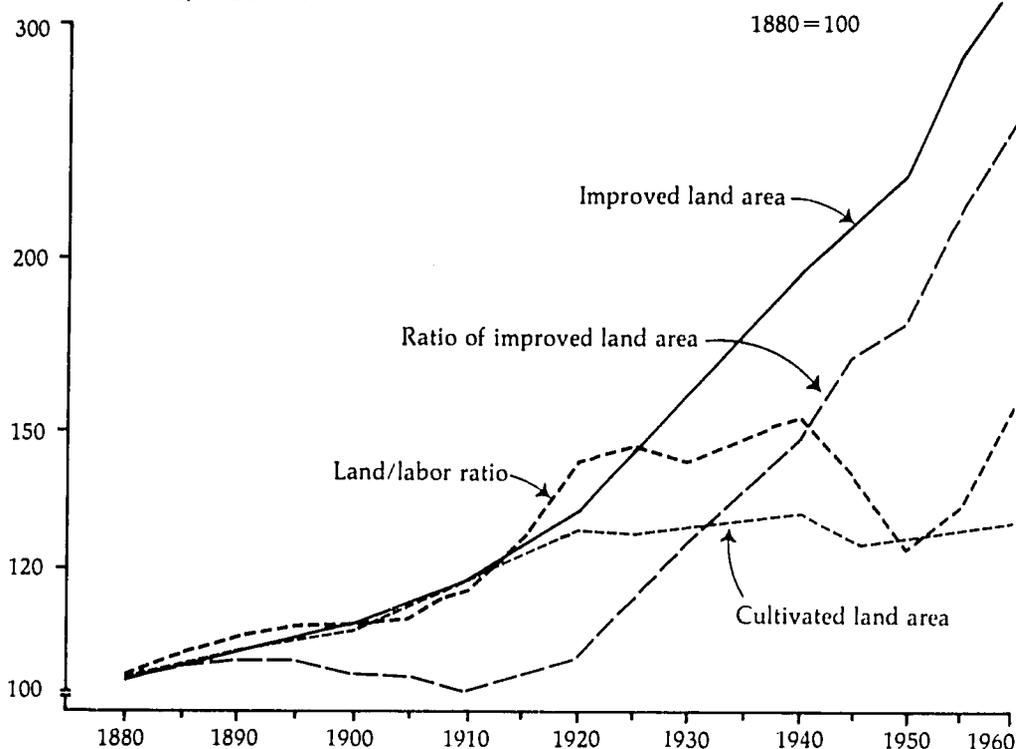
¹² See T. Nakamura, *The Japanese Economy—Its Growth and Structure* (Tokyo: University of Tokyo Press, 1980), p. 24. (In Japanese.)

¹³ Technically marginal land here implies the land that can generate rent equivalent to or more than the differential rent of the first type or even the first and the second types combining other, nonmarginal land with the capital investment.

¹⁴ Nakamura, *The Japanese Economy*, p. 24.

¹⁵ Yamada, "Statistical Examination," p. 49; Ishikawa, *Essays on Technology*, p. 37.

Figure 1—Trends in irrigation improvement, cultivated land area, and land/labor ratio, 1880–1960



Source: M. Kikuchi and Y. Hayami, "Agricultural Growth Against a Land Resource Constraint: A Comparative History of Japan, Taiwan, Korea, and the Philippines," *The Journal of Economic History* 38 (December 1978): 839–864.

average calorie intake per capita per day in Japan during 1883–87 was equivalent to that of India in 1954–56.¹⁶ No breakdown is available.

Despite the declining agricultural labor force, the number of farm households in Japan remained more or less constant during the prewar period (Table 1). This is obviously due to the primogeniture system instituted legally in 1898. With land under cultivation and the number of farm households generally stable, land per household has changed little.¹⁷ The number of gainfully employed

workers per household has also changed little.

By the end of the 1920s, 45 percent of agricultural land was under tenant cultivation;¹⁸ but pure tenants made up only 21 percent of farm households in 1883/84 and 28 percent in 1902 (Table 2). Because of the high proportion of part owners, it is not clear what effect the government's policy of encouraging owner-farmers has had. However, it is clear that further growth of tenancy was blocked.

Table 3 indicates that the economic

¹⁶ Per capita per day calorie intake in 1874–77 was 1,668. It reached 2,033 in 1888–92 and 2,320 calories in 1923–27. The percentage of animal protein was estimated to be 0.1 in 1874–77, 0.3 in 1888–92, and 1.1 in 1923–27. In 1954–56, per capita per day calorie intake in India was 1,795. Y. Hayami and S. Yamada, "Agricultural Productivity at the Beginning of Industrialization," in S. Kawano and Y. Kato, eds., *Japanese Agriculture and Economic Growth* (Tokyo: University of Tokyo Press, 1969), p. 81.

¹⁷ Scattered evidence suggests that the majority of farm households cultivated less than 1.5 hectares in the 17th century. Another document shows that more than 80 percent of farm households in two villages in the Kinki area cultivated less than 1 hectare in the 18th century.

¹⁸ See Yoshio Audo, ed., *Kindai Nihon Keizaishi Yoran* [An Outline of Modern Japanese Economic History] (Tokyo: University of Tokyo Press, 1975), p. 16.

Table 1—Cultivated land per farm household, 1875-1977

| Year | Gainfully Employed Agricultural Workers | Farm Households | Cultivated Land | Cultivated Land Per Gainfully Employed Agricultural Worker | Cultivated Land Per Farm Household | Gainfully Employed Agricultural Workers Per Farm Household |
|------|---|-----------------|------------------|--|------------------------------------|--|
| | (1,000) | | (1,000 hectares) | | | |
| 1875 | 14,686 | 5,517 | 4,556 | 0.306 | 0.826 | 2.7 |
| 1880 | 14,655 | 5,500 | 4,664 | 0.318 | 0.848 | 2.7 |
| 1890 | 14,279 | 5,448 | 4,836 | 0.339 | 0.888 | 2.6 |
| 1900 | 14,211 | 5,502 | 5,112 | 0.360 | 0.929 | 2.6 |
| 1910 | 14,020 | 5,518 | 5,488 | 0.391 | 0.995 | 2.5 |
| 1920 | 13,939 | 5,564 | 5,903 | 0.423 | 1.061 | 2.5 |
| 1930 | 13,944 | 5,613 | 5,863 | 0.420 | 1.045 | 2.5 |
| 1940 | 13,549 | 5,484 | 6,023 | 0.445 | 1.098 | 2.5 |
| 1950 | 15,990 | 6,156 | ... | ... | ... | 2.6 |
| 1960 | 13,390 | 5,966 | 6,071 | 0.453 | 1.018 | 2.2 |
| 1977 | 12,643 | 4,835 | 5,536 | 0.438 | 1.145 | 2.6 |

Source: M. Umemura et al., "Estimates of Long-Term Economic Statistics of Japan Since 1868 (Agriculture and Forestry)," *Toyo Keizai Shinpo Sha* (Tokyo, 1966); and Nagano Prefecture, *Agricultural Statistics of Nagano Prefecture—Annual Report, 1967-77*.

condition of tenant farmers before the war was not as good as that of owner-farmers. This survey revealed that the disposable income of tenant households was from 70 to 75 percent that of owner-farmers, which included income from nonagricultural sources. More important, total labor input (including labor spent on nonagricultural activities) was about the same on both types of farms. A substantial part of the income

difference could be explained by the returns to land and to labor of tenant farmers in subsidiary activities. Nevertheless, the relative difference probably was smaller than in other agrarian societies.

If Japanese agriculture appears to be relatively egalitarian, it is because it is characterized by a relatively wide distribution of operational holdings, similar levels of land productivity and of labor input among

Table 2—Classification of farm households by type of tenure, 1883-1970

| Year | Owner-Farmers | Part Owners | Tenant Farmers | Owner-Farmers | Part Owners | Tenant Farmers |
|---------|--------------------|-------------|----------------|---------------|-------------|----------------|
| | (1,000 households) | | | (percent) | | |
| 1883/84 | 2,119 | 2,377 | 1,189 | 37.3 | 41.8 | 20.9 |
| 1888 | 1,478 | 2,000 | 954 | 33.3 | 45.1 | 21.5 |
| 1899 | ... | ... | ... | 35.4 | 38.4 | 26.2 |
| 1902 | ... | ... | ... | 33.9 | 38.0 | 28.1 |
| 1910 | 1,835 | 2,154 | 1,509 | 33.4 | 39.2 | 27.4 |
| 1920 | 1,742 | 2,265 | 1,566 | 31.3 | 40.6 | 28.1 |
| 1930 | 1,743 | 2,371 | 1,486 | 31.1 | 42.3 | 26.5 |
| 1940 | 1,705 | 2,308 | 1,467 | 31.1 | 42.1 | 26.8 |
| 1950 | 3,822 | 2,001 | 512 | 61.9 | 32.4 | 5.1 |
| 1960 | 4,552 | 1,309 | 178 | 75.2 | 21.6 | 2.9 |
| 1970 | 4,241 | 1,002 | 85 | 79.4 | 18.8 | 1.6 |

Source: Yoshio Audo, ed. *Kindai Nihon Keizaishi Yoran* [An Outline of Modern Japanese Economic History] (Tokyo: University of Tokyo Press, 1975), p. 16.

Note: Because of the difference in statistical coverage, the figures on farm households of this table are different from those of Table 1. 1883/84 data exclude six prefectures and 1888 data exclude eight prefectures.

Table 3—Per capita disposable income and the total labor input of farm households, 1934-36

| Type of Household/ Year | Disposable Income | Total Labor |
|----------------------------|----------------------|-------------|
| | (yen) | (hours) |
| Owner-Farmer | | |
| 1934 | 126.1 | 1,191 |
| 1935 | 143.6 | 1,138 |
| 1936 | 154.8 | 1,139 |
| Tenant Farmer | | |
| 1934 | 92.8 | 1,143 |
| 1935 | 99.6 | 1,134 |
| 1936 | 117.0 | 1,179 |
| Index | | |
| 1934 | 73.5 | 96.0 |
| 1935 | 69.4 | 99.6 |
| 1936 | 75.6 | 103.5 |

Sources: S. Kawano, "Economic Significance of the Land Reform," in S. Kawano and Y. Kato, eds., *Japanese Agriculture and Economic Growth* (Tokyo: University of Tokyo Press, 1969), p. 296. (In Japanese.) The data are from Japan, Ministry of Agriculture and Forestry, *Farm Economic Survey* (Tokyo: Ministry of Agriculture and Forestry, 1952).

Notes: Average holdings are 1.23-1.31 hectares. The indexes are the income or labor of tenant farmers over the income or labor of owner-farmers.

tenure groups, relatively small differences in productivity among regions, and land reform.¹⁹

Before land reform was introduced in late 1946, about 70 percent of farm households cultivated less than one hectare of land.²⁰ By 1950 the proportion had risen about three percentage points. This was accompanied by small declines in the pro-

portion of farms with two hectares or more. These farms comprised only 5.5 percent of farm households after the reform.

Table 4 shows only small differences in land productivity and labor input between owner-farmers and tenant farmers in similar size categories. Total income of owner and tenant farmers in the same size groups also was similar.²¹ On the other hand, farms in the different size groups show significant differences in labor input but little variation in land productivity.²² These findings suggest that land ownership is a crucial factor in income difference and that maximization of land productivity has been the most important concern for all farmers, regardless of tenure and size.

Available data show substantial differences by size groups in labor input in both rice cultivation and total agricultural activities. Nevertheless, it is highly questionable whether there have been significant differences among either tenure or scale groups in land-augmenting technology. The gap in rice yields between the lowest five prefectures and the highest five has been reduced steadily from 80 percent in the early Meiji period to 28 percent in the early postwar period.²³ The major factor was the government's land-improvement policy, designed to minimize regional variation in productive capacity. In addition, a variety of land-augmenting technologies were invented and diffused at the community and village levels, first by farmers and landlords and later by government agencies, particularly after the 1920s. The creation and diffusion of these technologies involved government experimental stations at the prefectural level, regular agricultural schools below the college level, farmers' cooperative societies, and individual farmers.²⁴ Coherence in the village community was the important base for this

¹⁹ A. R. Khan and E. Lee, "The Expansion of Productive Employment in Agriculture: The Relevance of the East Asian Experience for Developing Asian Countries," Occasional Paper, International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, May 1981, p. 3.

²⁰ S. Kawano, "Economic Significance of the Land Reform," in S. Kawano and Y. Kato, eds., *Japanese Agriculture and Economic Growth* (Tokyo: University of Tokyo Press, 1969), p. 290 (in Japanese); and Yamada, "Statistical Examination," p. 21.

²¹ Yamada, "Statistical Examination," p. 24; Kawano, "Economic Significance," p. 296.

²² International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, *Labour Absorption in Agriculture—The East Asian Experience*, (Bangkok: ILO/ARTEP, 1980), p. 119; Yamada, "Statistical Examination," p. 39.

²³ Imamura et al., eds., *Tochi Kairyō Hyakunen Shi*, p. 71.

²⁴ At first, the principals of the agricultural schools often were the directors of the local experimental stations. Many graduates of the agricultural schools became local leaders and officials of the Ministry of Agriculture at different levels, thus facilitating communication at different levels.

Table 4—Imperial Farmers Association data on labor input and yield per hectare in rice production by type of tenure, five-year averages, 1923-47

| Years | Owner-Farmers | | | | Tenant Farmers | | | |
|---------|---------------|-------------------|-------------------------|--------------------|----------------|-------------------|-------------------------|--------------------|
| | Sample Size | Rice Planted Area | Labor Input Per Hectare | Rice Yield | Sample Size | Rice Planted Area | Labor Input Per Hectare | Rice Yield |
| | | (hectares) | (days per hectare) | (tons per hectare) | | (hectares) | (days per hectare) | (tons per hectare) |
| 1923-27 | 126 | 1.38 | 210 | 3.82 | 33 | 1.24 | 217 | 3.76 |
| 1928-32 | 462 | ... | 202 | 3.96 | ... | ... | ... | ... |
| 1933-37 | 704 | 1.32 | 208 | 3.64 | ... | ... | ... | ... |
| 1938-42 | 434 | 1.30 | 208 | 3.65 | 374 | 1.24 | 199 | 3.65 |
| 1943-47 | 392 | 1.23 | 215 | 3.52 | 326 | 1.24 | 202 | 3.20 |

Source: S. Yamada, "Statistical Examination on Labour Absorption in Japanese Agriculture," International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, Bangkok, 1981, p. 36. (Mimeographed.)

interaction.²⁵ Figure 2 indirectly suggests little difference among size or tenure groups in weeding, manuring, irrigation, and nursery preparation in the prewar period.

According to Sarma, current arguments have not been favorable to land reform. Two reasons have been advanced. First, distribution of existing land to small and marginal farmers and landless agricultural laborers would simply create farms that are not economically viable. Neither growth nor equity would be expected with this approach. Second, in order to achieve equitable distribution, a portion of land now owned and cultivated "efficiently" by the small and medium farmers would have to be taken away. This would not be politically and socially feasible.²⁶

There are four critical differences on this issue between Japan and India. First, land reform in Japan was introduced and implemented under the control of the Allied Forces. Second, Japanese agriculture has never had a sizable proportion of agricultural labor households. Third, differences in productivity among regions and among farmers had narrowed by the time of the reform. Fourth, the Japanese land reform was essentially a title transfer.

Three effects of the Japanese land reform should be noted here. First, it did not alter the scale of operation or the distribution among size groups (Table 5). It was primarily a transfer of land title or of rental income from landlords to tenants rather than an egalitarian reform. Second, the decline of productivity shown in Figure 1 was due to the reduced input supply rather than to the reform. Finally, the Japanese land reform did not affect about 80 percent of the farm households that did not have agriculturally viable units. As Table 5 shows, farmers who cultivated more than 1.5 hectares could meet household expenditures or costs necessary for labor reproduction with income from agriculture. But of those who cultivated less than 0.5 hectares, only 43 percent of household expenditures were met from agriculture. These units have become viable production units of society only by participating in nonagricultural activities.

Conclusions

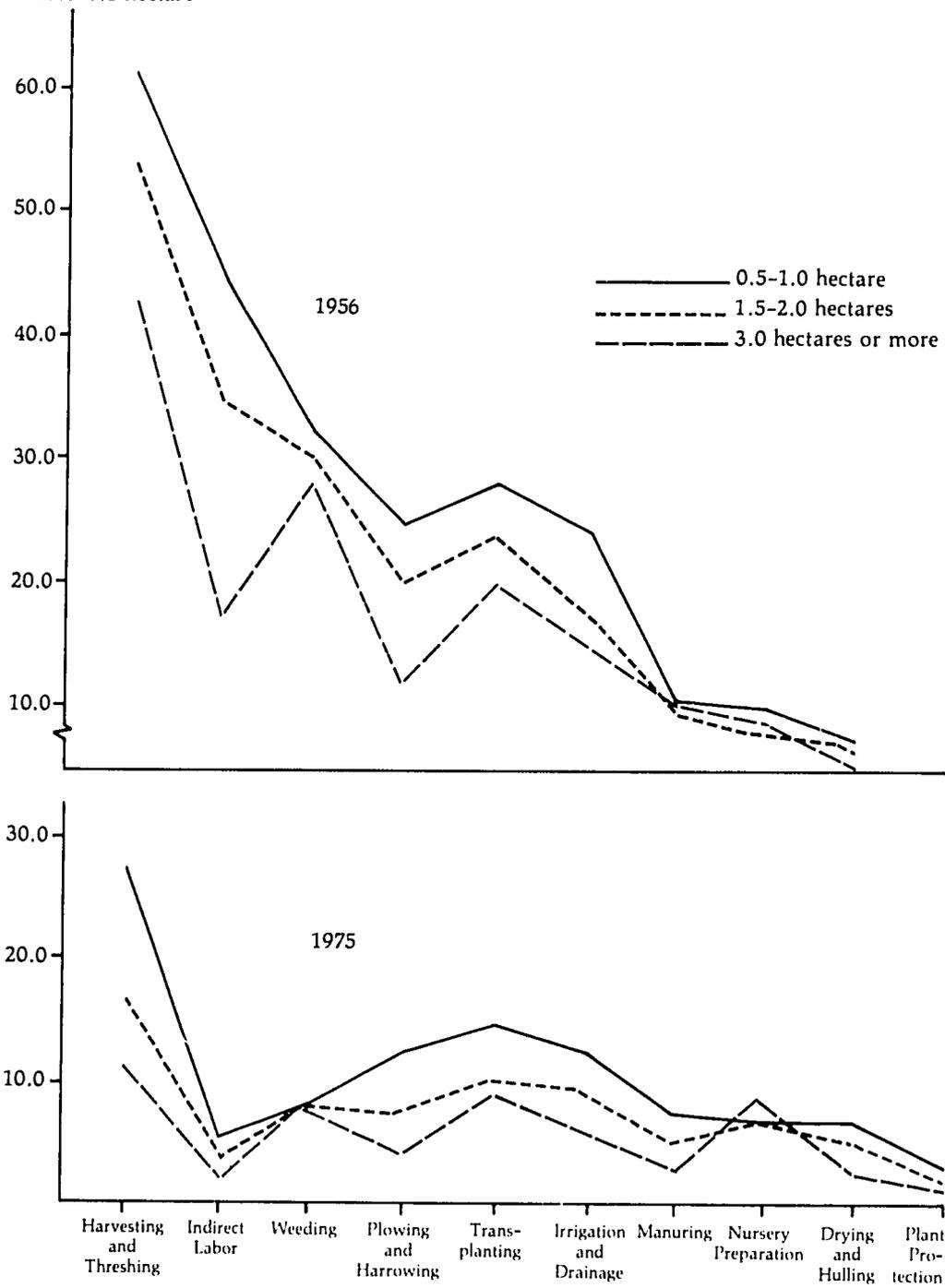
Japan has had only limited experience with the problems facing India: a huge,

²⁵ Concerning the factors attributed to the coherence of the Japanese village community, see S. Hirashima, "Institutional and Macro Aspects of Labour Absorption in Japanese Agriculture," in International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, *Labour Absorption in Agriculture—The East Asian Experience* (Bangkok: ILO/ARTEP, 1980), pp. 121-127, 138-139.

²⁶ See I. G. Patel, "Policy Framework for Indian Agriculture," *Mainstream*, December 12, 1980; and Yushiro Hayami, "Agrarian Problems of India: An East and Southeast Asian Perspective," *Economic and Political Weekly*, April 18, 1981, pp. 707-712.

Figure 2—Labor inputs in rice cultivation, 1956 and 1975

Hours/0.1 hectare



Source: S. Hirashima, "Institutional and Macro Aspects of Labour Absorption in Japanese Agriculture," *Labour Absorption in Agriculture—The East Asian Experience* (Bangkok: International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, 1980), p.15.

Table 5—Structure and trend of the farm economy, 1950-75

| Size of Farm/ Year | Farm Household Income ^a | Household Expenditure | Agricultural Income/Farm Household Income | Agricultural Income/ Household Expenditure |
|------------------------|--|--------------------------|--|---|
| (percent) | | | | |
| Less than 0.5 hectares | | | | |
| 1950 | 138.5 | 130.5 | 40.5 | 43.0 |
| 1955 | 261.1 | 241.2 | 35.1 | 38.0 |
| 1960 | 372.2 | 338.4 | 21.4 | 23.6 |
| 1965 | 684.4 | 606.4 | 17.8 | 20.1 |
| 1970 | 1,362.8 | 1,182.5 | 9.3 | 10.7 |
| 1975 | 3,194.1 | 2,559.6 | 8.7 | 10.8 |
| 0.5 – 1.0 hectare | | | | |
| 1950 | 170.7 | 153.5 | 66.9 | 74.3 |
| 1955 | 303.8 | 275.5 | 66.9 | 73.7 |
| 1960 | 368.8 | 348.2 | 52.0 | 55.1 |
| 1965 | 707.9 | 624.3 | 43.3 | 49.1 |
| 1970 | 1,328.8 | 1,182.4 | 29.0 | 32.5 |
| 1975 | 3,315.9 | 2,631.1 | 27.4 | 34.5 |
| 1.0 – 1.5 hectares | | | | |
| 1950 | 220.4 | 186.0 | 78.5 | 93.0 |
| 1955 | 392.8 | 339.1 | 80.9 | 93.7 |
| 1960 | 436.4 | 390.4 | 72.0 | 80.4 |
| 1965 | 795.0 | 675.3 | 64.9 | 76.4 |
| 1970 | 1,409.8 | 1,251.5 | 51.6 | 58.2 |
| 1975 | 3,483.1 | 2,651.5 | 46.9 | 61.6 |
| 1.5 – 2.0 hectares | | | | |
| 1950 | 275.2 | 219.0 | 85.6 | 107.1 |
| 1955 | 478.9 | 391.0 | 86.6 | 106.0 |
| 1960 | 526.6 | 449.2 | 79.4 | 93.1 |
| 1965 | 906.8 | 728.2 | 75.7 | 94.3 |
| 1970 | 1,448.8 | 1,296.5 | 65.8 | 73.5 |
| 1975 | 3,629.5 | 2,709.2 | 60.6 | 81.2 |
| 2.0 hectares or more | | | | |
| 1950 | 341.7 | 256.6 | 89.0 | 118.5 |
| 1955 | 609.9 | 480.0 | 90.3 | 114.7 |
| 1960 | 695.5 | 555.6 | 87.3 | 109.3 |
| 1965 | 1,115.2 | 834.4 | 83.2 | 111.3 |
| 1970 | 1,665.5 | 1,416.8 | 77.4 | 91.0 |
| 1975 | 4,261.3 | 2,994.8 | 75.0 | 106.7 |

Source: T. Nakamura, *The Japanese Economy—Its Growth and Structure* (Tokyo: University of Tokyo Press, 1980), pp. 333-334. (In Japanese.)

^a Farm household income is the sum of agricultural income and nonagricultural income.

rapidly growing population and large numbers of landless agricultural laborers. A strategy that would satisfy both growth and equity would have to be comprehensive. Japanese experience indicates that Indian planners should avoid being trapped by the notion that the marginal capital-output ratio should remain low at any stage of development. On the contrary, Japanese experience clearly demonstrates that a higher level of

productivity was accompanied by higher ratios.

As Sarma emphasizes, Indian problems are more on the equity side. It would be extremely difficult to deal with widening disparities, given the pattern of asset distribution, differential growth rates between asset value and the income generated on it, and the characteristics of technology.²⁷ Under such conditions, the market tends to

²⁷ For the differential growth between asset value and income generated on it, see S. Hirashima, *The Structure of Disparity in Developing Agriculture* (Tokyo: Institute of Developing Economies, 1980).

be imperfect and powerless to alter the situation.

Whatever success can be attributed to land reform in Japan is due mainly to its highly practical nature. One implication applicable to India is that land titles can be transferred from landlords to the cultivating tenants without affecting social productivity.²⁸ There is no economic reason for India to reject land reform of this kind.

It seems that a substantial portion of

landless agricultural laborers in India will have to seek employment opportunities outside the crop sector. However, little is known about the functioning of the rural labor market or about the potential labor-absorptive capacity of the commercial sector.²⁹ Moreover, it is not certain whether a small capital-output ratio at one point in time means that high labor-absorptive capacity can be maintained over time. Japanese experience does not provide an adequate basis for solving these problems.

Bibliography

- Audo, Yoshio, ed. *Kindai Nihon Keizaishi Yoran* [An Outline of Modern Japanese Economic History]. Tokyo: University of Tokyo Press, 1975.
- Hayashi, T. *Formation of the Revenue State in Japan*. Tokyo: University of Tokyo Press, 1965. (In Japanese.)
- Hayami, Yushiro. "Agrarian Problems of India: An East and Southeast Asian Perspective." *Economic and Political Weekly*. April 18, 1981, pp. 707-712.
- Hirashima, S. *The Structure of Disparity in Developing Agriculture*. Tokyo: Institute of Developing Economies, 1980.
- Imamura, N. et al., eds. *Tochi Kairyō Hyakunen Shi* [A Century of Land Improvement in Japan]. Tokyo: Heibon-sha.
- International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion. *Labour Absorption in Agriculture—The East Asian Experience*. Bangkok: ILO/ARTEP, 1980.
- Ishikawa, Shigeru. *Essays on Technology, Employment and Institutions in Economic Development*. Tokyo: Kinokuniya, 1980.
- Japan, Ministry of Agriculture and Forestry. *Farm Economic Survey*. Tokyo: Ministry of Agriculture and Forestry, 1952.
- Johnston, Bruce F. "Agricultural Productivity and Economic Development in Japan." *Journal of Political Economy*, December 1951.
- Johnston, Bruce F. and Mellor, John W. "The Role of Agriculture in Economic Development." *American Economic Review* 51 (September 1961), 566-593.
- Kawano, S. and Kato, Y., eds. *Japanese Agriculture and Economic Growth*. Tokyo: University of Tokyo Press, 1969. (In Japanese.)

²⁸ It would be affected, in a short run, to the extent that the credit and input supply relations between landlords and tenants are intense.

²⁹ Patel is skeptical about labor-absorptive capacity of the tiny and rural industries and expects the commercial sector to play the role. Patel, "Policy Framework," p. 21.

- Khan, A. R. and Lee, E. "The Expansion of Productive Employment in Agriculture: The Relevance of the East Asian Experience for Developing Asian Countries." Occasional Paper, International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, May 1981.
- Kikuchi, M. and Hayami, Y. "Agricultural Growth Against a Land Resource Constraint: A Comparative History of Japan, Taiwan, Korea, and the Philippines." *The Journal of Economic History* 38 (December 1978): 839-864.
- Lewis, Arthur. *The Theory of Economic Growth*. Winchester, Mass.: Allen and Unwin, Inc., 1955.
- Nagano Prefecture. *Agricultural Statistics of Nagano Prefecture—Annual Report, 1967-77*.
- Nakamura, T. *The Japanese Economy—Its Growth and Structure*. Tokyo: University of Tokyo Press, 1980. (In Japanese.)
- Patel, I. G. "Policy Framework for Indian Agriculture." *Mainstream*, December 12, 1980.
- Raj, K. N. Preface to *Labour Absorption in Asian Agriculture: an Issue Paper*, by Shigeru Ishikawa. Bangkok: International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, 1978.
- Sawada, S. *Nihon Nogyo no Gijutsu Shinpo* [Technological Progress of Japanese Agriculture], 1973.
- Umemura, M. "Estimates of Long-Term Economic Statistics of Japan Since 1868 (Agriculture and Forestry)." *Toyo Keizai Shinpo Sha*. Tokyo, 1966.
- Yamada, S. "Statistical Examination on Labour Absorption in Japanese Agriculture." International Labour Organisation, Asian Employment Programme, Asian Regional Team for Employment Promotion, Bangkok, 1981. (Mimeographed.)

AGRICULTURAL POLICIES FOR GROWTH AND EQUITY: THE PERSPECTIVE OF THE AMERICAN EXPERIENCE

Olaf F. Larson*

Sarma's review of agricultural policy in India focuses on the period since independence was gained in 1947. A comparable review for the United States must encompass a longer period.

Direct government intervention in agriculture through so-called "action" programs is usually dated as starting in 1929, when the newly created Federal Farm Board sought to stabilize market prices for wheat, cotton, butter, wool, and California grapes by loans channeled through farmer marketing cooperatives, purchase and storage of the commodities, and other means.¹ In 1933 the early months of President Franklin D. Roosevelt's administration were marked by the first of a succession of a much wider-ranging set of agricultural action programs. Although bearing on agricultural growth and equity issues, these programs—in concert with the other New Deal programs—were a response to the severe economic depression of the early 1930s. They were viewed as temporary programs to meet economic and social problems of crisis proportions.

Long before the depression-born interventionist action programs, however, policies had been evolving that related to the equity concerns of farm people and to agricultural productivity. These policies include the Homestead Act of 1862 and prior and succeeding acts pertaining to the distribution of lands in the public domain; the Morrill Act of 1862, which was the first step in establishing at least one agricultural college in each state; the Hatch Act of 1887, which created a nationwide system of state agricultural ex-

periment stations with continued funding for research on agricultural problems; the Smith-Lever Act of 1914, which provided continued federal funding to each state for a cooperative extension program to diffuse useful and practical information on subjects related to agriculture and home economics and to encourage the application of this knowledge; the Smith-Hughes Act of 1916, which put training in agriculture in the secondary schools on a federal aid basis throughout the nation; the Federal Farm Loan Act of 1916, which marked the beginning of a federal farm credit system by establishing regional land banks to provide loans for farmland purchase; the Capper-Volstead Act of 1922, which encouraged farmers' marketing cooperatives by clarifying their legal right to exist without being in violation of federal antitrust laws; and the Cooperative Marketing Act of 1926, which fostered farmers' cooperatives for marketing and purchasing by creating a unit in the U.S. Department of Agriculture to serve them.²

This paper reviews, on a highly selective basis, national policies and programs that have been directed at a solution of equity issues for American farmers. However, equity-oriented policies cannot be considered independently of policies related to agricultural productivity.

Agricultural Growth and Equality for Farmers

The agricultural situation helps define

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¹ Murray R. Benedict, *Can We Solve the Farm Problem? An Analysis of Federal Aid to Agriculture* (New York: The Twentieth Century Fund, 1955), pp. 84-123.

² A comprehensive account of agricultural policies and programs in the United States up until about 1950 may be found in Murray R. Benedict, *Farm Policies of the United States, 1799-1950: A Study of Their Origins and Development* (New York: The Twentieth Century Fund, 1953). An excellent review and analysis of the federal agricultural action programs from 1929 until about 1953 is given in Benedict, *Can We Solve the Farm Problem?* The federal price and income support programs for specific commodities to the mid-1950s are examined in detail in Murray R. Benedict and Oscar C. Stine, *The Agricultural Commodity Programs: Two Decades of Experience* (New York: The Twentieth Century Fund, 1956). An excellent and more recent reference is Willard W. Cochrane and Mary E. Ryan, *American Farm Policy, 1948-1973* (Minneapolis, Minn.: University of Minnesota, 1976).

the growth and equity issues out of which national agricultural policies emerge through political processes and administrative decisions. We observe some general similarities in the agricultural situation in the United States and India. For example, the cropland area of something under 400 million acres in the United States during the past 30 years approximates the acreage in crops in India. Wider regional variations in rainfall, soil, and water resources are found in both countries. Both Indian and American farmers are subject to the risks of drought, excess rains, pests, and other natural hazards.

More striking are the sharp contrasts. Almost three fourths of India's labor force continues to be in agriculture. Sarma's data indicate some 81.5 million operational units in 1976/77, and 21 million hired agricultural labor households with 46 million workers in 1974/75. In the United States the labor force in agriculture, which decreased to 21 percent of the nation's workers by 1930, now accounts for less than 5 percent.

The number of farms in the United States at the peak in 1935 was less than 7 million. The population living on American farms held at between 30 and 32 million persons from 1910 through 1941, although they were a decreasing proportion of the total population.³ But by 1980 the number of farm residents (current farm definition) had shrunk to barely 6 million, less than 3 percent of the nation's people.⁴

Farms in the United States are conspicuously larger than those in India. The average size when farm numbers were at their peak,

in 1935, was about 155 acres. Since then the average has increased greatly, reaching 416 acres in 1974,⁵ in contrast to the average of about 5 acres in India's operational holdings in 1976/77.

One of the most fundamental of the differences in the two situations is India's history of being a food-deficit nation and the United States's record of being a food-surplus nation. Agricultural policy in the United States has included direct government intervention to increase food production for only two brief periods, first during World War I when a number of emergency measures were adopted to encourage farmers to produce more to help "win the war" and again, with a much broader set of strategies, during World War II when the patriotic message to farmers was: "Food will win the war and write the peace."⁶

Agricultural output since the 1860s has increasingly been for the commercial market and now is almost completely so. It has grown at such a rate that for the past 60 years the overriding issue for agricultural policy-makers in the United States has been not growth but how to cope with the excess productive capacity of American farms,⁷ the capacity to produce price- and income-reducing surpluses above market requirements.

Reasons for the great and continued agricultural growth include: land in farms continued to increase until 1950, with 150 million acres added in the first three decades of this century;⁸ irrigated acreage has been rising, especially since 1939;⁹ the substitution

³ Vera J. Banks and Calvin L. Beale, *Farm Population Estimates, 1910-70*. Statistical Bulletin 523 (Washington, D.C.: U.S. Department of Agriculture, Rural Development Service, 1973), pp. 14-16.

⁴ U.S. Bureau of the Census and U.S. Department of Agriculture, Economic Research Service, *Farm Population of the United States, 1980*. Current Population Reports, Farm Population Series P-27, No. 54 (Washington, D.C.: USDA, 1981), p. 1.

⁵ William Lin, George Coffman, and J. B. Penn, *U.S. Farm Numbers, Sizes, and Related Structural Dimensions: Projections to Year 2000*. Technical Bulletin 1625 (Washington, D.C.: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, 1980), p. 4.

⁶ Benedict, *Farm Policies of the United States*, pp. 156-168, 402-459.

⁷ The stake of nonfarm consumers in an adequate supply of food at stable prices has increasingly been recognized in agricultural legislation. The 1955 amended Hatch Act pertaining to support for the state agricultural experiment stations specified their object and duty to be, in part, to conduct investigations which had for their purpose . . . "the maximum contribution by agriculture to the welfare of the consumer . . ." The farm price and income bill of 1973 was called the Agriculture and Consumer Protection Act of 1973, "an act to extend and amend the Agricultural Act of 1970 for the purpose of assuring consumers of plentiful supplies of food and fiber at reasonable prices."

⁸ J. B. Penn, "The Changing Farm Sector and Future Public Policy: An Economic Perspective," in *Agricultural-Food Policy Review: Perspectives for the 1980s*. AFPR-4 (Washington, D.C.: U.S. Department of Agriculture, Economics and Statistics Service, 1981), p. 74.

⁹ Austin S. Fox and Kenneth C. Clayton, "Agriculture's Production Potential," in *Agricultural-Food Policy Review: Perspectives for the 1980s*. AFPR-4 (Washington, D.C.: U.S. Department of Agriculture, Economics and Statistics Service, 1981), p. 34.

of tractors for horsepower, which increased rapidly by the time of World War II, released millions of acres to produce crops for the market; farmers adopted high-yielding crop varieties, improved livestock and poultry, improved control of plant and animal diseases and weeds, and other technology developed through research; and use of commercial fertilizer increased fivefold since 1950. The results are summarized in the index of aggregate farm output: 43 in 1910 (with 1967 equal to 100), 51 in 1920 under the incentives of World War I, 52 in 1930, 60 in 1940, 74 in 1950, 91 in 1960, 101 in 1970, and 129 in 1979.¹⁰ What has happened on individual farms is reflected in the similar index of crop production per acre in crops, for example, 56 in 1910, 61 in 1920, 53 in 1930, but 130 in 1979.

The equity issue that has dominated agricultural policymaking for the past 60 years in the United States has been the farmer's quest for economic justice in relation to the other sectors of American society. This has been a direct consequence of agricultural surpluses or fear of surpluses because of excess productive capacity. This quest is epitomized by the slogan "equality for agriculture," which emerged during the early 1920s. First priority has been on equity for farmers as a whole. A number of indicators of how well farmers and agriculture are doing in this quest are used: per capita farm as compared with nonfarm income, labor income per hour for farmers as compared with wages and salaries of nonfarmers, and returns to capital invested in farming as compared with returns to various forms of nonfarm investment.

But it was a parity price concept that was incorporated into the Agricultural Adjustment Act of 1933 and which has been incorporated in some version in succeeding farm price and income support legislation up to the present time.¹¹ The objective of the 1933 Act was to establish and maintain, through

various means, such balance between the production and consumption of agricultural commodities as would provide agricultural commodities with the same purchasing power for goods bought by farmers as prevailed in the 1909-14 period. Behind this was the intent to raise the income of farmers.

Government intervention to achieve parity prices—to improve farm incomes—included strategies and programs far too numerous and complex to cover here.¹² But the attempts to reduce production by such devices as acreage controls, marketing quotas, and diversion and retirement of farmland were important. In 1972, for instance, 62 million acres of land were idled in response to agricultural program incentives.¹³ Prices were supported by nonrecourse loans and by government purchases of commodities. Cash payments—transfers from the federal treasury—were made to farmers for reducing acreage or production, for shifting from soil-depleting to soil-conserving crops, for soil conservation measures, and as compensatory payments when prices to producers fell below some specified level. The features common to most of the production-reducing, price-increasing programs were that specific programs were related to particular and important farm commodities rather than to the individual farm as a whole or to the farm operator family, and the programs benefited most the commercial farmers already most advantaged in terms of land and capital resources, although adopted under the guise of the goal of equality (parity) for agriculture as a whole. These programs were of little benefit to the low-production farmer and to the hired farm laborer.

In addition to the efforts in support of the quest for economic equality for agriculture, there have been federal programs designed to equalize the facilities available to farm and other rural people with those in urban areas. Here one would include, among others, the rural free delivery service started

¹⁰ U.S. Department of Agriculture, Economics and Statistics Service, *Economic Indicators of the Farm Sector. Production and Efficiency Statistics, 1979* (Washington, D.C.: USDA, 1981), pp. 20-21.

¹¹ The Soil Conservation and Domestic Allotment Act of 1936 substituted a parity income concept for parity price, but price parity was easier to administer and to measure. So from 1938 on, more emphasis was given to parity prices than to parity incomes (Benedict, *Can We Solve the Farm Problem?* pp. 537-538).

¹² See such sources as Benedict, *Farm Policies of the United States*; Benedict, *Can We Solve the Farm Problem?*; Benedict and Stine, *The Agricultural Commodity Programs*; and Cochrane and Ryan, *American Farm Policy*.

¹³ Penn, *The Changing Farm Sector*, p. 35.

in 1896, the parcel post, the improvement of farm-to-market roads, the rural electrification program started in 1936, improved and expanded telephone service for rural areas starting in 1949, and emphasis on hospital and medical facilities for rural areas. An example of the latter are the grants made through the Hill-Burton Hospital Survey and Construction Act of 1946. Similarly, farm operators and hired farm laborers have been covered, after a time lag, by the Old Age and Survivor's insurance coverage (Social Security) available to most working Americans.

Equity-Oriented Policies and Programs Within Agriculture

The excess productive capacity of American agriculture has meant that during the past half-century the programs to gain economic equity for farmers in relation to nonfarmers have overshadowed the programs directed at increasing equity within agriculture. Nevertheless, during this period and earlier, equity issues within agriculture have received attention. We will review three of the issues—land ownership and family farms, low-income farmers, and the differential impact of farm price and income support programs—and note others.

Land Ownership and Family Farms

A long-standing element of the American belief system has been that ownership by the family of the land they farm supports democratic institutions, is good for agriculture, and fosters strong rural communities. As recently as the Food and Agriculture Act of 1977, the U.S. Congress specifically reaffirmed the historical policy of the United States to foster and encourage the family farm system of agriculture in this country. Title I of that Act instructed the Secretary of Agriculture to report annually on trends in family and nonfamily farm operations.

Despite the legislative references and

the profusion of rhetoric in support of the family farm, there has not been a widely accepted precise definition that has guided policymakers consistently over time. The criteria have, in fact, shifted from time to time.¹⁴ Today's technology, for example, permits a family to operate a much larger acreage with little or no hired labor than was possible in the past. Regardless of the lack of precision in the concept, the family farm model contrasts with the plantation system, with the corporate-owned and manager-operated farms on which all labor is hired, and with the owner-operated farms dependent on hired labor to do the greater part of the work. In the past, tenant-operated farms have been considered contrary to the family farm model.

Regardless of confusion with respect to the precise meaning of the family farm concept, the policy of helping families acquire ownership of relatively small units has a long history. The Homestead Act of 1862 and succeeding acts for disposing of public lands provided for family-size units, 160 acres in the first instance. During the 1860s and 1870s measures were adopted for a time that were intended to help former slaves acquire small land holdings. When the Reclamation Act of 1902 authorized the development by the federal government of large-scale irrigation projects in the western states, the number of acres for which the subsidized federal water could be provided was limited to 160 per owner. The percentage of tenant-operated farms steadily increased from 1880 when the first data were collected until, by 1930, about 40 percent of all farms were cultivated by tenants. Recommendations by the President's Committee on Farm Tenancy led to the Bankhead-Jones Tenant Purchase legislation of 1937. This initiated a program of long-term, low-interest loans to help carefully selected tenants become farm owners. This program has continued, with modifications, to the present and is intended for those who cannot get mortgage credit from conventional lenders.¹⁵ Small-scale programs, soon discontinued, were also initiated during the 1930s to resettle families on more productive land, to establish co-

¹⁴ David Brewster, "Historical Notes on Agricultural Structure," in *Structure Issues of American Agriculture*, Agricultural Economic Report 438 (Washington, D.C.: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, 1979), pp. 74-79.

¹⁵ U.S. Department of Agriculture, Farmers Home Administration, *A Brief History of the Farmers Home Administration* (Washington, D.C.: USDA, 1981), p. 1.

operative farms, and to assist in long-term leasing arrangements for groups of tenants.

Low-Income and Low-Production Farmers

Large numbers of low-income farm families were no stranger to rural America for many decades but went uncounted in the absence of farm and farm-family income data. Further, it was assumed that for many, hired labor and farm tenant status, with their typically associated low incomes, were expected steps on the ladder to farm ownership. But the depression of the 1930s brought recognition that there was a low-income farmer problem of great magnitude. It became recognized that many low-income farm families were in need of special assistance if they were to be self-supporting and if they were to remain on their farms.

In response to this need, a policy was adopted of having a special program for farm families who were unable to get credit from conventional sources. To replace civil works and direct relief programs for all people on farms, a rural rehabilitation program was initiated in 1934 within the Federal Emergency Relief Administration. This continued from 1935 until 1936, under the Resettlement Administration and, from 1937 to 1946, under the Farm Security Administration. The rural rehabilitation program was then the major program effort directed at low-income farmers. It included low-interest loans for purposes other than land purchase, farm and home management supervisory services, debt adjustment, grants if necessary, encouragement of cooperative associations, and other tools to assist families to the point where they no longer needed credit or could obtain credit from conventional sources.

In 1946 the rural rehabilitation program was ended and the Farm Security Administration was succeeded by the Farmers Home Administration and activities to assist low-income farmers were curtailed. The FmHA has continued to the present, with many modifications in programs, as the credit agency of last resort for farmers.

Through September 30, 1980, the Farmers Home Administration and its predecessors

reported more than two million operating loans amounting to over \$10 billion, with 87,000 current borrowers.¹⁶ It reported some 355,000 farm ownership loans amounting to \$8 billion, with 118,000 borrowers current y active. But the drastic transformation from an agency solely to assist poverty-stricken families in distress is indicated by recent loan ceilings: \$100,000 for insured and \$200,000 for guaranteed farm operating loans; \$200,000 for insured and \$300,000 for guaranteed farm ownership loans. Partly as a result of this trend, Congress moved recently to require that a certain proportion of the loans at reduced interest be reserved for "limited resource" farmers, having especially in mind young farmers and minority farmers.

Limits on the Price and Income Support Programs

The policies and programs to raise farm prices and incomes have created equity problems within agriculture. In general, the amount of direct cash transfer payments received has been related to the amount of acreage or volume of production of a commodity. Small-scale farmers were further penalized if they had to divert from production the same proportion of their crop acreage required of producers overall. Means taken to reduce such inequities have included minimum payments, maximum payments, and waiving diversion requirements for small acreages.

A special problem in the early experience of the agricultural adjustment program was insuring that sharecroppers and tenants in the plantation areas received their share of the cash benefit payments. By shifting a cropper or tenant to hired laborer, a landlord could retain the entire amount of payments.

Concluding Remarks

Lack of space precludes mentioning the full array of equity issues within agriculture or noting the policy measures undertaken. Among these are the housing and other efforts with respect to hired farm labor, the

¹⁶ U.S. Department of Agriculture, Farmers Home Administration, *A History of the Farmers Home Administration*.

relevance of research and extension efforts for low-production and limited-resource farmers, efforts directed at especially disadvantaged areas, and efforts to assure blacks and other minorities equal access to federal agricultural and rural development programs.

The price and income support programs have had some unintended consequences with respect to equity within agriculture. Programs designed to help low-income farmers have tended to drift away from their originally intended clientele. The adverse consequences of the price and income support programs have been accentuated by tax and other policies external to agriculture. Policymaking has been hampered by lack of precision in concepts; for example, family farm, small farm, and low-income farm.

The net result of past policies and programs—in combination with other forces such as technological developments and tax policy—is that American agriculture has continued to produce food and fiber in great abundance. Only about 1 farm in 10 is tenant operated. At the same time, the number of farm operators has been reduced to 2,300,000 (in 1980) and the concentration of agricultural resources and production clearly has increased in recent decades.¹⁷

Important agricultural policy issues remain. These are denoted by such terms as the structure of agriculture,¹⁸ family farm, small farm, and part-time farmer. In unanticipated consequences of policies and programs, in the persistence of issues, and in conflicting policies one sees in the U.S. experience some similarities with that of India.

Bibliography

- Banks, Vera J. and Beale, Calvin L. *Farm Population Estimates, 1910-70*. Statistical Bulletin 523. Washington, D.C.: U.S. Department of Agriculture, Rural Development Service, 1973.
- Benedict, Murray R. *Can We Solve the Farm Problem? An Analysis of Federal Aid to Agriculture*. New York: The Twentieth Century Fund, 1955.
- . *Farm Policies of the United States, 1790-1950: A Study of Their Origins and Development*. New York: The Twentieth Century Fund, 1953.
- Benedict, Murray R. and Stine, Oscar C. *The Agricultural Commodity Programs: Two Decades of Experience*. New York: The Twentieth Century Fund, 1956.
- Brewster, David. "Historical Notes on Agricultural Structure." In *Structure Issues of American Agriculture*, Agricultural Economic Report 438. Washington, D.C.: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, 1979.
- Cochrane, Willard W. and Ryan, Mary E. *American Farm Policy, 1948-1973*. Minneapolis, Minn.: University of Minnesota, 1976.
- Experiment Station Committee on Organization and Policy. *Research and the Family Farm*. Ithaca, N.Y.: Cornell University Press, 1981.
- Fox, Austin S. and Clayton, Kenneth C. "Agriculture's Production Potential." In *Agricultural-Food Policy Review: Perspectives for the 1980s*, AFPR-4. Washington, D.C.: U.S. Department of Agriculture, Economics and Statistics Service, 1981.
- Lin, William; Coffman, George; and Penn, J. B. *U.S. Farm Numbers, Sizes, and Related Structural Dimensions: Projections to Year 2000*. Technical Bulletin 1625. Washington, D.C.: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, 1980.

¹⁷ Experimental Station Committee on Organization and Policy, *Research and the Family Farm* (Ithaca, N.Y.: Cornell University Press, 1981), pp. 1-3.

¹⁸ U.S. Department of Agriculture, *A Time to Choose: Summary Report on the Structure of Agriculture* (Washington, D.C.: USDA, 1981).

- Penn, J. B. "The Changing Farm Sector and Future Public Policy: An Economic Perspective." In *Agricultural-Food Policy Review: Perspectives for the 1980s*, Washington, D.C.: U.S. Department of Agriculture, Economics and Statistics Service, 1981.
- U.S. Bureau of the Census and U.S. Department of Agriculture, Economic Research Service, *Farm Population of the United States: 1980*, Current Population Reports, Farm Population Series P-27, No. 54, Washington, D.C.: USDA, 1981.
- U.S. Department of Agriculture. *A Time to Choose: Summary Report on the Structure of Agriculture*. Washington, D.C.: USDA, 1981.
- U.S. Department of Agriculture, Economics and Statistics Service. *Economic Indicators of the Farm Sector: Production and Efficiency Statistics 1979*. Washington, D.C.: USDA, 1981.
- U.S. Department of Agriculture, Farmers Home Administration. *A Brief History of the Farmers Home Administration*. Washington, D.C.: USDA, 1981.

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