The Evolving Role of the World Bank

South Asia's Food Crisis
The Case of India

Uma Lele and Balu Bumb

The World Bank
Washington, DC
The World Bank Group

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The World Bank Group today includes five international organizations:

The International Bank for Reconstruction and Development (IBRD), the original institution in the group, opened its doors for business in 1946. Today, it is the largest source of market-based loans to developing countries and is a major catalyst of similar financing from other sources. It lends to governments or to public or private entities with government guarantees. It is funded mainly through borrowings on the international capital markets.

The International Finance Corporation (IFC) was established in 1956 to support private enterprise in the developing world through the provision and mobilization of loan and equity financing and through its advisory activities relating to, among other things, capital market development and privatization. IFC is also a major catalyst of both local and foreign private investment. Its lending and equity investment activities are based on the principle of taking market risk along with private investors. Under the terms of its Articles of Agreement, it cannot accept government guarantees.

The International Development Association (IDA) was created in 1960 to provide finance on concessional terms to low-income countries that lack creditworthiness for IBRD borrowing. IDA is primarily funded from grants it receives from donors in periodic replenishments.

The International Centre for Settlement of Investment Disputes (ICSID) was added to the World Bank family in 1966 to provide conciliation and arbitration services for disputes between foreign investors and host governments that arise directly out of an investment.

The Multilateral Investment Guarantee Agency (MIGA) was created in 1988 to provide noncommercial investment risk insurance and technical services that help promote investment flows. It also disseminates information on investment opportunities.

As is now common practice, the "World Bank" or simply the "Bank" are used interchangeably to mean both IBRD and IDA. The "World Bank Group" refers to IBRD, IDA, IFC, ICSID, and MIGA.
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Foreword

The world has changed dramatically over the last five decades and so has the World Bank. The Fiftieth Anniversary of the World Bank has provided us with an opportunity to reflect on and learn from the Bank’s experience and to apply the lessons to the Bank’s future agenda.

This series of essays is devoted to improving understanding of the evolving role of the World Bank. Each essay analyzes the Bank’s approach to the major development challenges its borrowing countries have faced, starting with the reconstruction and development needs of Europe and Japan in the 1940s and 1950s and ending with the transition of Central and Eastern Europe and the former Soviet Union. One essay examines the evolution of the Bank’s relations with the world’s capital markets as it mobilizes private savings for development. An overview paper provides a picture of the fifty-year period as a whole.

The story that emerges is one of an evolving and learning institution that has built on its successes and its mistakes. The Bank has responded with vigor and energy to the challenges confronting its borrowers. In this process, it has made a significant contribution to the impressive developmental gains recorded in these past fifty years. In responding to those challenges, the Bank itself has changed, learning from its experiences, deepening its understanding of the development process, and recasting its analytical and financial support to help its borrowers better.

The Bank will continue to nurture its tradition of self-evaluation and learning. These essays will, I hope, contribute to a better-informed debate on the Bank’s future role. They complement the recently issued paper, The World Bank Group—Learning from the Past, Embracing the Future, which sets out the future directions for the Bank Group.

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Vice President, Human Resources Development and Operations Policy, and Chairman of the Bank Group Committee on the 50th Anniversary
South Asia’s Food Crisis

The Case of India

Uma Lele and Balu Bumb

Thirty years ago, the world regarded India as an economic basket case. Today, India manages the world’s largest public grain stock and has even become a minor grain exporter. In 1993, the country’s exports increased 20 percent (and are expected to continue increasing rapidly), and the economy as a whole attracted $4.7 billion of foreign investment. These positive economic trends make India one of the largest emerging markets in the world.

Clearly India’s (and the rest of Asia’s) Green Revolution is a development success of major proportions—and one in which the World Bank has played a significant role. By increasing food production and creating millions of jobs, it allowed India to reduce dependence on food imports and lower the share of its population living in poverty from 50 percent in the 1970s to 30 percent by the end of the 1980s. It is also estimated that, by making land already under cultivation more productive, some 45 million hectares have been saved from the plow—land roughly equivalent to the land under India’s best remaining forests. This triple phenomenon of enhanced food security, poverty alleviation, and environmental sustainability has been repeated in much of South and South East Asia. Moreover, enhanced food security and the ability to maintain low urban food prices and wages, combined with global political and economic changes have allowed South Asian countries to follow the path of their East Asian neighbors towards economic liberalization.
India's repeated food and economic crises pushed two successive Prime Ministers, Mr. Lal Bahadur Shastri and Mrs. Indira Gandhi, to try new ideas and innovative ways to develop the country's agriculture. The advice of many assistance agencies, including private United States foundations, and some of the world's top experts on agriculture, reinforced the credibility of agricultural reform. The international character of the World Bank Mission's agricultural team (led by Sir John Crawford) increased its acceptability among the handful of strategically placed Indian policy makers such as Mr. C. Subramaniam, India's then Minister of Agriculture. His support was crucial at a time when Indo-United States relations had soured. With the blessings of both prime ministers, Mr. Subramaniam and several other Indians played a key role in selling the reforms internally to a wide array of skeptics. Their efforts laid the foundation for sustained growth in agricultural productivity in the irrigated parts of India and South Asia for well over three decades.

The character of World Bank assistance to India has changed over time as it has learned from its experience. However, many more lessons are still to be distilled and applied.

The Green Revolution in South Asia is one of the most important (yet misunderstood) development stories of technological change, international cooperation, and national perseverance. It has been controversial, for its contributions as well as its form. Clearly, much remains to be done to make sure that South Asia's 300 million poor do not have to go to bed hungry, lacking employment and income to buy the increased food supplied by the Green Revolution.

Certain policies and institutions introduced to propel the revolution have also caused other problems in their wake: excessive use of chemicals, the peaking in yields, increased salinization, silting of dams, waterlogging, interregional disparities, and mounting agricultural subsidies. Today water shortages threaten to become India's greatest environmental crisis. Interregional
specialization in cropping patterns also need to advance more rapidly. But with the population having doubled in three decades, both the environmental stress and poverty would have been much worse without the Green Revolution—particularly in India’s semiarid areas on which larger populations would have had to depend for food security and livelihood.

The heart of the Revolution was the introduction of miracle wheat and rice varieties, which dramatically changed India’s agricultural production function, and increased total factor productivity. But technological breakthroughs would have had little effect without policy reforms. New technologies required new policies, and India’s leaders responded to the challenge. The country’s evolving national agricultural strategy included a complex mix of price incentives; a goal-oriented national agricultural research system; support services responsive to farmers; a system of short-run imports and long-run production and distribution of fertilizer and seed; a public system of grain procurement, storage, and transport; and additional investment in irrigation. With millions of scattered small farm households with little money or access to physical or institutional infrastructure, public policy was crucial. Many agribusiness activities can now be handled easily by the private sector and by nongovernmental community organizations. In the early years of the Green Revolution, however, both these sectors were far weaker and food shortages were acute, placing the burden for change on government.

Why Focus on India

South Asia contains 22 percent of the world’s population and 47 percent of its poor. Within South Asia, India accounts for 74 percent of the population, earns 78 percent of its GNP, and produces 77 percent of its food grain.

As the world’s largest democracy (and one of the oldest among developing countries), India was viewed by the West as a counter to communist China. India took center stage in development planning in the 1950s and the 1960s, attracting
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some of the best known western economists. They not only backed India's import-substituting industrialization strategy, they also lent it intellectual credibility by developing state-of-the-art multisectoral models to explore planning options. India was only displaced as the model for development practice when East Asia achieved more rapid and more broad-based economic growth.

Throughout the 1950s and 1960s, India attracted a substantial amount of financial, commodity, and technical assistance from the United States and became the largest recipient of concessional IDA lending. After Robert McNamara became president of the World Bank in 1968 and poverty alleviation became its principal goal, agricultural lending quadrupled in his first term. As part of this commitment, India received 26 percent of worldwide IDA credits, 60 percent of IDA commitments (about $35 billion) to the South Asian Region, and 70 percent of total Bank commitments (about $60 billion) to the region through 1993.

Before the end of the 1970s, India commanded a dominant share in the Bank's lending for agriculture and rural development. Even so, in per capita terms, and as a proportion of India's own public sector investment, the World Bank share has been modest. IDA lending to India averaged about $2 per person annually in 1979–81, which was less than 2 percent of total investment expenditures.

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The World Bank and the United States (then India's premier donor) played a central role in helping to change agricultural policies and institutions in India, and subsequently throughout South Asia. For India, President Lyndon Johnson personally instituted and oversaw a "short-tether" requiring India to adhere to policy reforms devised by the World Bank. In the midst of India's worst post-independence food crisis in 1965-67, and following a decade of U.S. support to India, Johnson made food shipments available on a month-to-month basis. Indian policy makers found the experience humiliating, and the

Figure 1

Declining dependency on food imports in India
Cereal imports
Kilos per person

<table>
<thead>
<tr>
<th>Year</th>
<th>Cereal Imports</th>
</tr>
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<tbody>
<tr>
<td>1965</td>
<td>20</td>
</tr>
<tr>
<td>1970</td>
<td>15</td>
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<td>1975</td>
<td>10</td>
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water. (To maintain this supply, Bank agricultural assistance to both countries has focused on irrigation, for example, at Tarbela in Pakistan and Mahaweli in Sri Lanka). The Bank also played an active role in bringing about the 1960 Indus Waters Treaty between India and Pakistan, which expanded irrigation and increased food productivity in both countries, and averted regional conflict over water. Had there been an agreement between the two countries on joint development and management of waters, this could all have been achieved at much lower cost.
episode soured relations with the United States. Johnson later described India's Green Revolution as "one of the most difficult and lonely struggles" of his presidency. This testifies to the almost insurmountable difficulties that Indian policymakers and the World Bank faced in instituting new agricultural policies.

With considerable diplomacy, the Bank helped to convince India's policymakers that agriculture was the country’s chief priority. To help them develop institutional and policy reforms, the Bank also provided concessional finance and foreign exchange partially to make up for the loss of U.S. aid after the 1960s.

For the next twenty years, Bank financing enabled India to expand irrigation and agricultural credit and supply fertilizers to millions of small farmers. Although its financial presence was still small, the Bank's influence on Indian policy was the greatest in the mid-1960s.

According to Mason and Asher, "...India has influenced the Bank as much as the Bank has influenced India." The Bank's experience in India helped it to clarify policies regarding balance-of-payments support for countries during a foreign exchange crisis, local and recurrent cost financing, the broad-based use of local contracting, and poverty alleviation. A vocal member of the Bretton Woods conference that fashioned the IBRD in 1945, India also played an important role in the creation of IDA in 1960, and in transforming the World Bank from its 1950s role as a financial institution to a development bank in the 1960s and 1970s.

From Food Insecurity to Growth

At the time of independence in 1947, India's per capita income was a mere $50 in nominal terms, and had been declining for almost fifty years. Average daily per capita grain consumption was only 400 grams, with the poor consuming a fraction of that. Recurring droughts and lagging growth in food-grain production forced India to depend on food imports. In drought years, such dependence created both food

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and foreign exchange crises. In the early years of scarcity, surplus commodity aid from the United States stabilized domestic food supplies, ensuring food security for the poor. These shipments saved India the much-needed foreign exchange to import intermediate capital goods for industrialization. Moreover, the sale of food aid provided domestic revenue to finance public expenditures, while keeping food prices, inflation, and real wages low. Over 40 percent of India’s net foreign resource transfers in the ten years from mid-1962 to mid-1972 came in food aid, causing concern that such aid had become a disincentive to domestic production.

Agriculture, which provided employment for almost 75 percent of India’s population, was a major source of raw materials for industry, and offered a large market for goods and services. Indian consumers, particularly the poor, spent over two-thirds of their budget on food. Given the large share of food consumption in the urban consumer budget, food prices determined the level of real wages, and thus indirectly, the pace of industrialization.

Yet despite the commanding position of agriculture, Indian planners did not see agricultural factor productivity as the obvious engine of broad-based economic growth, on which depended cheap food, employment, income, savings, investment, and markets for urban goods and services. Agriculture was seen as a holding ground for surplus labor while industry would be the primary source of employment and income generation.

But industrialization (based on a minuscule, capital-intensive, heavy industrial sector) was unable to generate sufficient jobs to achieve full employment. Planners considered institutional changes (such as land reform, cooperative farming, and community development) and infrastructure development (such as irrigation) to address the basic needs of India’s farm households. Raising the motivation of the largely illiterate Indian farm households was considered an important challenge.
Influenced by the Soviet state and China's cooperative farms, Indians saw the importance of institutional reforms and investment in irrigation. But the public sector continued to focus on—and monopolize—such "basic" industries as steel and power.

In line with development thinking of the time, donors such as the World Bank and USAID wholeheartedly supported the Indian priority on heavy industry and infrastructure development and underwrote India's economic strategy financially. Nevertheless, from the mid-1950s, the thrust of World Bank and U.S. advice on agriculture had begun to promote the importance of price incentives, technological change, investment in irrigation and fertilizers. The intellectual foundation for that view began to emerge with, among others, W. David Hopper's work on Senapur village in the state of Uttar Pradesh in the 1950s on the theme of the poor but rational farmer, which later formed the basis of T.W. Schultz's book, Transforming Traditional Agriculture.

Hopper's work emphasized the allocative efficiency of traditional farming and stressed the importance of technical change in increasing farm productivity. Influential people in India (such as A. P. Jain, then Minister of Food and Agriculture) also began to stress the role of price incentives in promoting growth in farm output, but such advice was slow to penetrate the ruling party, which favored institutional reforms. Foodgrain production fell by more than five million tons in 1957-58, contributing to India's first major balance of payments crisis. In 1958, India cut back on its investment program and agreed to give higher priority to agriculture.

The World Bank coordinated donor efforts to meet the Indian crisis and created one of the first Bank-led Aid Consortia. It also established a resident mission in New Delhi. But problems with foodgrain production and the balance of payments turned out to be far from temporary. In the early 1960s, food production stagnated. Two successive droughts in 1965-66 and 1966-67, caused annual food imports to rise to 10 million.
and 11 million tons, respectively. The droughts also came at a time when the Third Five Year Plan’s ambitious targets of industrial expansion had increased import demand for intermediate goods while exports had stagnated—creating another balance of payments crisis. India lacked both the foreign exchange to import the food and the port and handling capacity to receive, store, and transport massive food aid shipments from the United States. 10

Changes in the global political and food situation and worsening bilateral relations with the United States and its neighbors combined to weaken India’s external position. United States food surpluses had also begun to decline. President Johnson was reluctant to go to Congress for more food aid for India. By his own admission, the lives of almost 50 million Indians were at risk. He held out against the urging of all his advisers and a “shrill (United States) press” to induce other nations to lend India a helping hand in the short run, to make India self-reliant in the long run. 11

India was also engaged in a dispute with the United States over investment in a public sector fertilizer plant by Bechtel Corporation. It was disappointed at not receiving sufficient military aid from the United States during wars with China (in 1962) and Pakistan (in 1965), and it opposed the Vietnam War. Donors were beginning to suffer from aid fatigue. By the mid-1960s, weaknesses in Indian development policy—and particularly the failure of the agricultural sector—generated a consensus among outsiders that India’s policies and programs in agriculture needed change. By 1965, Indian scientists were field testing many new varieties of wheat developed by Dr. Norman Borlaug in Mexico. In November 1965, Orville Freeman, U.S. Secretary of Agriculture under President Johnson, signed a secret agreement (the so called Treaty of Rome) with India’s Minister of Agriculture, C. Subramaniam, committing India to extensive agricultural sector reforms. That agreement was followed by the “Woods–Mehta”

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agreement in May 1966, between the World Bank President George Woods and the Indian Planning Minister, Asoka Mehta. The agreement was intended to create a well-focused program of incentives, technologies, and institutional reforms for transforming India's agriculture. The World Bank's controversial Bell Mission Report in 1965 also set out clearly India's macroeconomic and agricultural sector problems, but its recommended devaluation of the Indian rupee took the spotlight away from Sir John Crawford's important agricultural sector review.

The Crawford report observed that India's farmers were unlikely to adopt new technology unless there was public intervention through price supports and an effective public system of grain procurement, which would increase profitability by raising and stabilizing producer price levels.

Agricultural Prices Commission (APC) to ensure the systematic formulation of floor prices (based on cost of production and other considerations) on a regular basis. Crawford also supported a Food Corporation of India (FCI) to implement an effective price support program. The APC and FCI became the two major pillars of India's agricultural price policy over the next thirty years. More than thirty years later, 1991–92, the public sector procured 18.3 million tons of grain and made available 18.8 million tons for retail public distribution through 8,000 fair price shops. About 80 percent of that procurement came from only three states. This system of public procurement and distribution, however, is now in need of major reform.

The Crawford Report also recommended:

- Substantial increases in imports of fertilizers and their allocation to irrigated areas and to progressive farmers who had the capacity to take risks in the adoption of new technology.
• A timely supply of high-quality, improved seed.

• A liberal and timely supply of agricultural credit to facilitate the use of fertilizers and other inputs.

• Cost-effective and socially desirable use of fertilizer subsidies where prevailing prices discouraged the liberal use of fertilizers.

• Reliance on and expansion of the irrigation system.

Influenced by the Crawford Group, Bank lending to India increased in the 1970s, contributing significantly to maintaining the momentum of the Green Revolution. The Bank was less successful, however, in mobilizing the promised aid to meet India’s growing import needs. Net foreign resource transfers (20 percent of both gross domestic investment and central government expenditures in 1966–67) declined to a mere 1.7 and 1.9 percent in less than five years in 1970–71.13

The Rockefeller Foundation, meanwhile, had been working with Indian agricultural scientists to undertake experiments on high-yielding varieties of wheat (developed in Mexico at the International Center for the Improvement of Maize and Wheat) and rice (developed in Taiwan and at the International Rice Research Institute in the Philippines). Both had shown dramatic results. Where there was ample water and high doses of fertilizers, they yielded 6 to 8 tons as compared to 1 to 2 tons with traditional farm practices and few inputs. Yet in India, there was considerable resistance from scientists and administrators. The Rockefeller Foundation concluded that India’s agricultural research, extension, and seed production system needed radical revamping if it was to meet the practical needs of Indian farmers. It recommended administrative changes in the Indian Council of Agricultural Research (ICAR) including vesting leadership in scientists rather than administrators and tying salary and promotions to well-defined performance standards for farmer-oriented researchers. USAID, which supported policy changes, recommended a land
grant system of universities responsible for research, extension, and training in place of the departments of agriculture at the state level. Such reshaping was crucial to ensure the high returns to the pricing, fertilizer, and credit policy reforms recommended by the Crawford Group.

To implement reforms in the face of widespread opposition, Prime Minister Shastri, in a shrewd move, persuaded the strong and able C. Subramaniam to take on the agricultural portfolio. Opposition came from several quarters. India's scientists resisted the changes being sought in research. Leftist political parties opposed the importation and distribution of improved seed on grounds that it increased India's dependence on the West. The Ministry of Finance was reluctant to allocate foreign exchange and budgetary resources to import seed and fertilizer and pay for higher producer prices. State governments opposed the divestment of research and extension, to autonomous agricultural universities. On the grounds that it would increase regional income disparities, social scientists opposed the concentration of fertilizer and credit in states with the most water control. Some argued that land reform needed to precede the introduction of new technologies.

India's economic crisis and inadequate foreign aid pushed Prime Minister Shastri and later Mrs. Gandhi to go along with the recommendations of the World Bank and United States. But the prime movers behind the reforms, apart from Mr. C. Subramaniam was his Secretary of Agriculture, Mr. Sivaraman; and the Director General of ICAR (and later Secretary of Science and Technology), Dr. M. S. Swaminathan. Scores of Indian scientists and administrators played a key role in adapting and multiplying hybrid wheat and rice and developing the network of services to meet the complex needs of India's millions of farm households. In the midst of a foreign exchange crisis Mr. Subramaniam persuaded India's cabinet to import 18,000 tons of wheat seed from Mexico. Ten years later, India had raised producer
prices and instituted a large food procurement system, adapted and developed over 200 wheat and rice varieties, and greatly expanded the supply of irrigation water, agricultural credit and fertilizers to millions of small farmers.

Sustaining the Revolution

Although the Bank played only a small role in creating the physical and institutional infrastructure for launching the Green Revolution, Indians saw its assurance of assistance to agriculture in the mid-1960s as crucial to the launching of the new strategy. More significantly, the Bank became a long-term partner of the Government of India. Bank lending to India for agriculture and rural development in the McNamara years (1968–81) increased from $124 million in 1950–68 (6 percent of all lending to India) to $687 million (31 percent) in 1969–74. Agricultural lending increased even more sharply to about $4.2 billion (50 percent) in 1975–81. In addition, through nonproject lending in 1967–76, the Bank provided $311 million to support imports of fertilizer and other inputs. Although lending for agriculture continued to increase until the mid-1980s, agriculture’s share of total lending dropped to 33 percent in 1982–87 and has fallen sharply in both absolute and relative terms since.

This decline stems from the global shift toward increased efficiency, an emphasis on (macroeconomic) policy reforms, the role of markets and prices, and a reduced emphasis on public investments. Growing food surpluses in OECD countries, and declining world prices of cereals and fertilizers reduced returns on investment in irrigation and fertilizer production capacity. India’s agricultural subsidies, which had grown to equal total planned public investment in agriculture and its growing foodgrain stocks also became a cause for concern. Moreover, the expanding lending came at the expense of addressing fundamental problems in Indian agriculture. This led to growing criticism by Bank staff about the quality of the agricultural portfolio and externally by environmentalists about, for

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example, the adverse environmental impact of irrigation and chemical inputs. Such criticisms have contributed to a decline in the Bank’s global lending to agriculture, of which India was only a part.

India’s share in the Bank’s total agricultural lending to the South Asian region, which stood at 73 percent in 1975–81, declined to 56 percent in 1988–93. The number of projects financed by the Bank showed a similar trend. It had increased from nil in 1950–68 to twenty-four in 1969–74 and sixty-two in 1975–81. By 1981, agriculture and rural development and related lending accounted for 48 percent of the projects and programs financed by the Bank in India, but that dropped to 26 percent in 1988–93.

Irrigation, fertilizer, and credit projects dominated the Bank’s agriculture and rural development portfolio, accounting for over 67 percent of the total. Seed, research, and extension were other agricultural projects financed by the Bank to sustain the Green Revolution. Although these projects accounted for a small share, they were instrumental in alleviating seed shortages (for example, the Tarai Seed Project). They also spread new crop technologies among millions of small farmers through location specific adaptive research, training and visit extension. Likewise, area development projects played a small role, but financed technology and infrastructure components. Forestry and watershed management followed later.

IDA has played a critical role in sustaining the Green Revolution, financing eighty-six of the ninety-six operations by 1981 and 135 of the 159 operations by 1993. It has also provided over 90 percent of lending commitments in the 1968–81 period. Without IDA, the Bank would not have been able to promote food production in India. Like most other developing countries, India was hesitant to borrow for agriculture on IBRD terms because of the long gestation lags in achieving response in agriculture, its subsistence rather than export-oriented nature, and the difficulty in
capturing benefits of technology generation from a large number of dispersed farmers.

**Fertilizer Supply**

The Bank's support for fertilizer import and production was crucial during India's extreme fertilizer shortages in the late 1960s and the 1970s. Without increased fertilizer use, food production would not have increased to the level it did. Funds for the import of fertilizers, plant protection material, and agricultural machinery augmented input supplies in the short-run, while lending for the development and rehabilitation of fertilizer production built new capacity. By making free foreign exchange available and requiring international competitive bidding, World Bank projects ensured internally compatible and technically efficient plants. But increased fertilizer use in irrigated areas has now become a cause for concern as marginal returns to fertilizer use are peaking. Fertilizer subsidies have now become a major source of concern for the budget, and the fertilizer sector is in need of major restructuring for improved efficiency and growth.

**Seed Production**

Despite large initial imports, shortages of the new high yielding varieties of seed for wheat, rice, and maize became widespread in the late 1960s. This called for supervision and quality control at various stages of breeding, production of foundation seed, and commercial production of seed for a market which had not yet been developed. High quality seed supply needed public investments in plant and equipment for screening and drying. In addition to the 1969 loan, the Bank supported seed production through an IBRD loan of $25 million in 1976 and an IDA credit of $16 million in 1978. India's seed production increased from 420 tons in 1966 to 28,000 tons in 1973 and over 200,000 tons by 1981. Now a combination of rapid liberalization of seed production and distribution, combined with stringent public regulation of quality control, will greatly accelerate diversification of Indian agriculture.
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Credit

Bank lending to rural credit projects in 1970–74 amounted to more than $325 million, directed mainly at developing groundwater resources in the private sector. While lending to public sector tubewells was less successful, the Bank has estimated that private sector tubewell irrigation had economic rates of return of well over 30 percent, and have impacted over 2 million hectares with at least that many households. The Bank’s contribution to the development of a viable rural financial infrastructure through support of the Agricultural Refinance and Development Corporation, however, has been undermined by poor loan recovery, subsidized interest rates, and political interference in management. The future of Bank involvement in agriculture credit remains uncertain.

Irrigation

The Bank provided about $1.6 billion to projects with the potential to irrigate 5 million hectares. Its early support focused on the completion of ongoing large scale surface irrigation projects and, later, improvements in distribution systems. This was followed by investments in rehabilitation and modernization of the existing irrigation systems, construction of medium and minor irrigation schemes, and introduction of new technology for public tubewells.

India’s irrigation systems are among the largest in the world. They present complex technological, institutional, and environmental challenges in design and management, with particular difficulties in efficient water allocation across states, watersheds, households, seasons, and crops. These problems are due partly to intense competition among states for acquiring control of the scarce water resource. To establish political support for acquiring water rights, the states have tended to design irrigation systems stretching access among as many farmers as possible. The resulting overinvestment in physical infrastructure and underinvestment in design of institutional arrangements to deal with the complex technical, equity, and
efficiency issues has contributed to a suboptimal performance of both Indian schemes and the Bank-financed projects.

India has yet to develop a national long-term strategy for water management. Due to the politically sensitive nature of water allocation issues among states, the Bank has been kept out of the loop. This has forced it to focus on individual schemes rather than the development of river basins. The Bank introduced many innovations in its water management strategies, such as canal lining, the command area development programs, underground piped distribution, sprinkler irrigation and others. Some of these technological innovations were introduced to solve institutional problems, and others to improve the performance of the main irrigation systems. Although these innovations proved useful in some areas, their uniform applicability across regions, agro-ecosystems and cropping patterns have resulted in increased costs without significant improvement in performance.

In reality, irrigation problems tend to be highly diverse, complex and inextricably related to climatic and sociocultural conditions. Their solution requires active cooperation among competing states and location-specific approaches with the active participation of the local communities in the design and implementation of water management systems. The challenges still facing the Bank and the Indian government in the area of water management include institutional reforms of interstate allocation of water resources and local organizational arrangements to deal with water distribution among farmers, the problem of rent-seeking among irrigation officials, and the need for a further reform of rate structures for both greater efficiency in distribution and better cost recovery.

Research and Extension

Although Bank involvement in agricultural research has been modest, the Bank has considered its training and visit projects to be very successful.
Less than ten years after the introduction of the new agricultural strategy in India in 1966–67, the area under high yielding varieties had expanded from less than 2 million hectares to over 30 million hectares. It reached over 60 million hectares in 1990.

These promote a message-oriented approach through a highly structured training of extension workers and their systematic interaction with farmers. The principles crucial to its success include: a time-bound program of farmer visits and training by extension workers, permitting close supervision and merit-based promotions; concentrated efforts to achieve a clear and visible impact by working on the most important crops within the most promising agro-ecosystems; regular visits and field trials with selected farmers who offer the best prospects for a rapid spread of innovations; and linkages with a vigorous farmer-responsive research program. Whether a uniform approach to extension across diverse production conditions is desirable may need to be examined.

Assessing the Revolution

By the year 2000, the combined domestic production and imports of the South Asian region will have to feed 1.4 billion people and by 2025, two billion people. If domestic production cannot meet these requirements, the region will need adequate foreign exchange to import food. The shrinking global capacity to deliver enough food and fertilizers could well affect world prices. Future increases in production, moreover, must be brought about with less incremental use of modern inputs, such as water, fertilizers and pesticides. The poor must command enough income to have access to food and other essentials for a healthy life. These are daunting challenges.

Less than ten years after the introduction of the new agricultural strategy in India in 1966–67, the area under high yielding varieties had expanded from less than 2 million hectares to over 30 million hectares. It reached over 60 million hectares in 1990. Over the same period, fertilizer consumption rose from 1.1 million to over 12.5 million tons. Per hectare, use increased ten-fold, from 7 to 70 kilograms. From crop year 1965–66 to 1988–89, irrigated area expanded from 30 million hectares to 45 million hectares increasing by 50 percent the area double-cropped, which now accounts
for 27 percent of the sown area. Most importantly, by 1989–90, average Indian yields had increased by more than 100 percent over the drought year yields of 1965–66 and 1966–67 and by 85 percent over the predrought record yields of 1964–65. Yield growth, of course, has been far greater in the areas covered by the Green Revolution. Output Gains

The combined impact of these developments was that food-grain production increased by 2.7 percent a year in 1966–90, compared with 2.3 percent in 1950–66. This was a small increase in overall growth. However, the qualitative difference was immense. Much of the increase in production

Figure 2

Increases in agricultural production are mainly due to improvements in yields

INDEX 1949 =100

Cultivated area

Yield

INDEX 1949 =100
prior to the Green Revolution came from area expansion. Most came from increased yields and multiple cropping on irrigated land. Indeed, area under cultivation declined in the early 1990s without a decline in growth of production (see Figure 2).

The growth in food production has enabled India to manage disastrous droughts without food aid—even in fiscal 1979, when foodgrain production plunged by 22 million tons.21 The country's ability to stabilize food supplies and prices for years has helped areas most vulnerable to food deficits, especially in regions such as Bihar and Eastern Uttar Pradesh.

**Regional Inequities and Employment Growth**

Nevertheless, adoption of high-yielding varieties has been concentrated in the irrigated areas, especially Punjab, Haryana and Uttar Pradesh. Because the new technologies were neutral as between large and small farms, small farmers gained substantially. Employment, both direct and indirect, surged with the spread of new technologies.21 Recent evidence, however, suggests that the elasticity of employment with respect to output has declined, and that relatively little additional employment is being generated. This seems to be the result of the Revolution's success in agriculture and of multiplier effects in other sectors of the economy, which have caused considerable tightening of labor markets leading to increased real wages. Certainly, the percentage of population below the official poverty line is far lower in the Green Revolution states—for example in Punjab (7.2 percent) and Haryana (11.6 percent)—than in Bihar (40.8 percent) and Orissa (44.7 percent). Thus, the substitution of capital for labor
South Asia's Food Crisis

in these areas seems to be mainly a response to labor shortages and higher wages. By the 1980s, the Green Revolution had begun to spread to eastern Uttar Pradesh, Bihar, and Orissa, which have abundant ground water and fertile lands but poor infrastructure and institutions. In these states there is little evidence of substitution of capital for labor. Indeed, had there been better-functioning institutions (that is secure land tenure, efficient labor, capital and product markets, effective state and local governments) and better physical infrastructure (roads and irrigation systems), the Green Revolution would have spread much more rapidly. Given the high risks and costs involved in adopting new technology, it is not surprising that the Revolution came first to better-organized states and richer farms. But India’s half-hearted land reform effort has only tended to make tenants more insecure. Institutional reforms are overdue.

Many feel that benefits to the poor, particularly in terms of increased food consumption, have not been commensurate with the growth in food production and that the reduction in poverty has been slow at best. Yet where 50 percent of Indians were once poor, poverty today is under 30 percent overall, and 33 percent in the rural areas. India’s large public food distribution system has also helped to keep urban food prices and real wages low. The low food prices in turn have helped maintain political stability.

Another concern is the growth of subsidies, which now rival planned public expenditures on agriculture in India. Fertilizer subsidies alone amounted to one percent of GDP; a major fiscal, environmental, and poverty concern. To the extent that public sector resources are allocated to subsidies, (which benefit the few), they compete with resources that could be invested in poorer regions. Improvement in infrastructure helps spread new technologies faster and thereby creates more employment and generates food. Moreover, reduction of subsidies on irrigation water, fertilizers and electricity—which now together amount to

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While the agricultural strategies proposed by various groups for India contributed to the Green Revolution's success, the implementation of these strategies owes much to the fruitful partnership between India and the World Bank and bilateral donors.

That environmental and poverty concerns do not always intersect is illustrated by the controversial Sardar Sarovar Dam Project. One of the largest projects of its kind in the world, it is intended to produce 1200 megawatts of electric power, domestic water for 40 million people, irrigation for 1.8 million hectares of land, and 3.8 million tons of additional grain, enough to feed 18 million people. Its costs are environmental degradation and the displacement of some 100,000 families in a country that still contains over 200 million poor and whose population is projected to increase by over 500 million persons between 1990 and 2025. Yet public debate over irrigation remains sadly uninformed, and a systematic analysis is called for to counter the incomplete measures now proposed and implemented.

The success of India's Green Revolution makes a strong argument for finding rational, scientifically sound solutions to the emotion-charged problems of poverty, food security and the environment.

The World Bank's Contribution

The World Bank does not work alone. All its operations in India were devised and carried out by Indians and often supported by other donors. For example, in irrigation, India had a large internal capacity for development before the Bank arrived. The Bank helped to expand its supply and introduced engineering innovations. Agricultural research and the spread of new high yielding varieties of cereals were the result of long term collaborative efforts among the Bank, U.S. official bilateral aid, private foundation assistance, and the Indian international scientific community. Initially, the Bank helped spread the new technologies more rapidly by fostering seed and fertilizer production and increasing small farmers' access to inputs and extension. Only recently has it become involved in supporting research. While the agricultural strategies proposed by various
groups for India contributed to the Green Revolution's success, the implementation of these strategies owes much to the fruitful partnership between India and the World Bank and bilateral donors.10

For its part, India helped the World Bank increase its understanding of the fundamental interactions of agriculture, poverty alleviation, and environmental development efforts. In particular, the Bank saw how a substantial presence on the ground made it more responsive to India's actual needs.

Lessons and Challenges

The World Bank–India partnership, in sustaining the Green Revolution, offers several lessons for designing and developing programs and policies to combat hunger in other parts of the world, especially Africa.

- For agriculture to move forward, productive technology and sound and stable national policy are equally indispensable. Promoting one at the cost of the other will yield few results, particularly in rainfed areas. Moreover, India's experience shows that even with spectacular technologies for irrigated agriculture, price incentives are essential to generate and sustain rapid technological change. Although, if sustained, price supports become a crutch to inefficient farmers, they are crucial in the early stages of development. Notwithstanding the many weaknesses of the seed-fertilizer technology, it has had a tremendous positive effect. Policymakers must not throw the baby of the Green Revolution out with the bath water, and instead must address the complex second-generation problems.

- Sequencing and phasing are important. It may be necessary to make the difficult political choices to concentrate physical, financial, and human resources on areas with the highest agricultural potential. In India, such concentration provided policy makers with much needed breathing space to address complex second-generation challenges of semiarid areas and environmental problems in irrigated areas.
With pressures to reduce bilateral aid generally, and the limited resources at the disposal of such international agencies as the Consultative Group on International Agricultural Research (CGIAR), the Bank becomes even more important as coordinator of partnerships and mobilizer of international information, funding, and advice.

often tends to be between areas of assured high rainfall and good soils and less well endowed areas with insufficient physical and administrative infrastructure. Donors in Africa have generally sought to address the problems of the poorest of the poor households in resource poor areas. It is now time to consider the complex preconditions needed to achieve and sustain technological changes that can address the continent’s growing agricultural and food crisis.

- The human, physical and institutional infrastructure needed to disseminate proven technologies is crucial. To ensure high rates of return on past investments in human and institutional capacity, the Bank in India helped expand existing physical infrastructure. Today it must help countries generate human capital through education and training and develop effective organizational structures that can simultaneously address the productivity and environmental sustainability conundrum.

- With pressures to reduce bilateral aid generally, and the limited resources at the disposal of such international agencies as the Consultative Group on International Agricultural Research (CGIAR), the Bank becomes even more important as coordinator of partnerships and mobilizer of international information, funding, and advice. As a facilitator, the Bank can help to promote institutional reform at the national, state, and local levels to promote technology transfer vital to the future of the world's developing countries.
Notes

1. This paper uses the Bank's traditional definition of South Asia as including Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka.

2. Lending for agriculture and rural development is defined to include both lending for agriculture and rural development (as defined in the World Bank's annual reports) and lending for related projects such as fertilizers, rural electrification, and others.


4. Pakistan's agricultural output was growing at an annual rate of over 6 percent in the late 1960s. See *IDA in Retrospect, 1982* for details.


12. As a result of the recommendations made by the Agricultural Prices Committee chaired by L.K. Jha, the APC and FCI were permanently established in mid-1964. The World Bank's claim in *IDA in Retrospect* that these institutions were established as a result of Bell Mission recommendations is incorrect. However, the Bank's insistence of incentive prices since the mid-1950s must have had some influence on their creation.


14. See Subramaniam's statement in *IDA in Retrospect*.

15. Since the Bank's lending for ARD accelerated after the launching of the Green Revolution in India and McNamara's arrival at the Bank, we have divided the lending period into three periods, namely the pre-McNamara years (1950-1968), the McNamara years (1969-1981), and the post-McNamara years (1982-1993). The latter two periods have each been further divided into two sub-periods of almost equal duration to show trends throughout the periods.
21. This decline is almost identical to the sum of declines in foodgrain production in 1957–58 (5.5 million tons) and 1965–66 (17 million tons) both of which triggered major food and foreign exchange crises.
22. Based on Bank lending for 7 million hectares of additional irrigated area, realization of 80 percent of irrigation potential, and incremental yield of 2 tons to 2.5 tons per hectare, the Bank may be estimated to have contributed 11 to 14 million tons of additional annual food/grain production.
23. Mellor, ibid.
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