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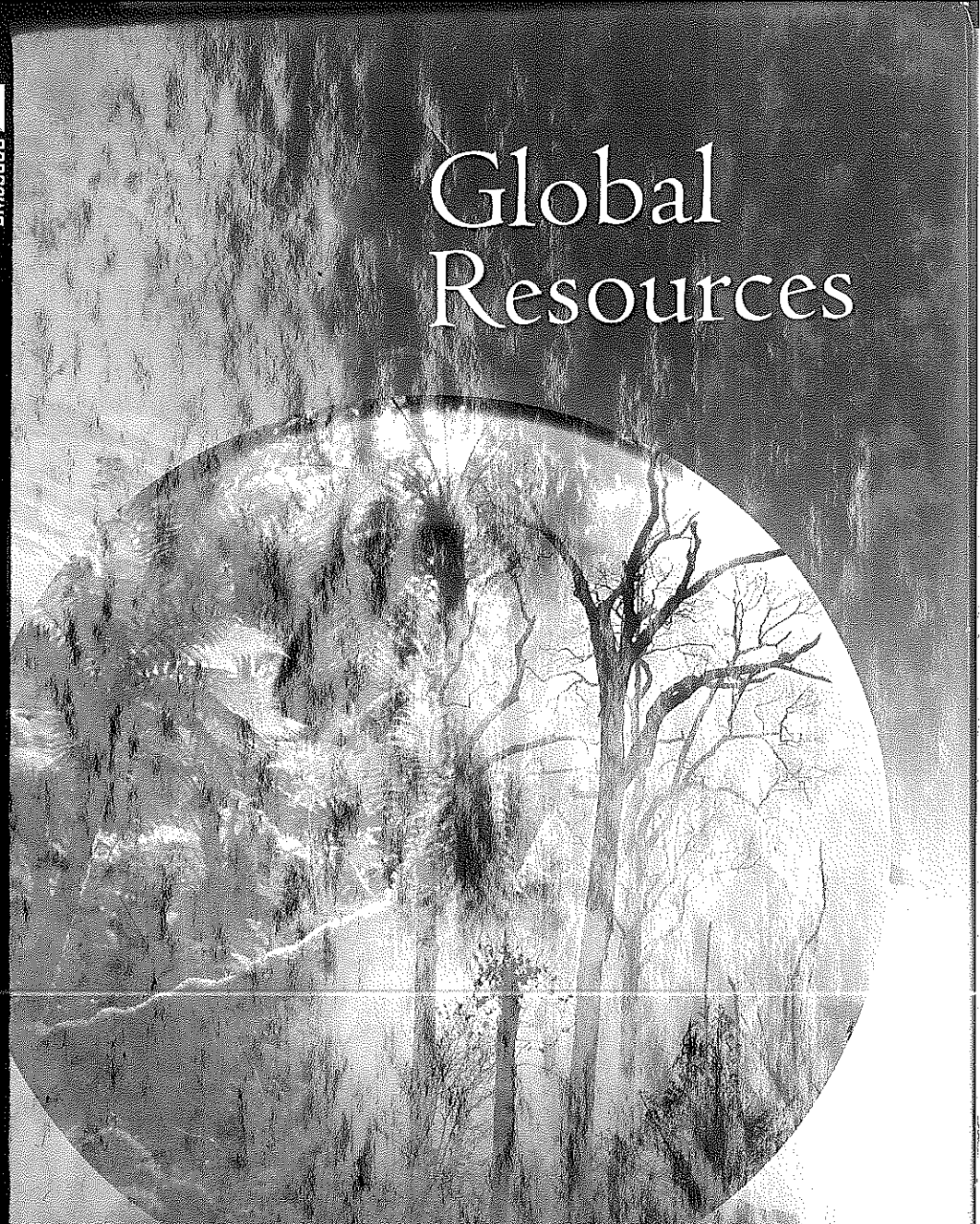

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Contents

VIEWPOINT 3

"Many Americans see terrorism as the principal threat to security but, for much of humanity, the effects of water shortages and rising temperatures on food availability are far more important issues."

Food Scarcity Is a Global Problem

Lester R. Brown

In this viewpoint, Lester R. Brown, a noted environmentalist, states that millions of people on the planet are suffering from food scarcity. Brown predicts that because of recent temperature peaks and resulting droughts, croplands across the globe will yield weaker harvests and fresh water supplies will shrink. Such trends will not only impact major agricultural nations but also those countries that rely heavily on imported grains and other foodstuffs. Brown is the president of the Earth Policy Institute, an organization based in Washington, DC, that promotes environmental sustainability.

Lester R. Brown, "Is the Food Scarcity Scare for Real?" *USA Today*, vol. 134, no. 2728, January 2006, pp. 20–21.

As you read, consider the following questions:

1. As Brown lists them, what are some of the telltale indicators that the global demand for food and water is outstripping supply and consequently damaging a sustainable environment?
2. What was the amount of grain harvest shortfall that Europe experienced after a season of high temperatures in 2003, according to Brown?
3. In Brown's view, what are the three principal steps needed to secure future food supplies?

[In late 2005], rising oil prices have focused the world's attention on the depletion of vital reserves, but the drying up of underground water resources from overpumping is a far more serious issue. Excessive pumping for irrigation to satisfy food needs today almost guarantees a decline in food production tomorrow. There are substitutes for oil; the same cannot be said for water.

The growth in population since 1950 exceeds that during the preceding 4,000,000 years. Perhaps more striking, the world economy has expanded sixfold since 1950. As the economy grows, its demands are outstripping the Earth, exceeding many of the planet's natural capacities to provide food, water, and the basic needs of daily living. Evidence of these excessive demands can be seen in collapsing fisheries, shrinking forests, expanding deserts, escalating CO_2 levels, eroding soils, elevated temperatures, disappearing species, falling water tables, melting glaciers, deteriorating grasslands, rising seas, and rivers that are running dry. Nearly all these environmental trends affect world food security.

Falling Water Tables and Rising Temperatures

Two of the newer trends—falling water tables and rising temperatures—are making it far more difficult for the world's

farmers to feed the 76,000,000 people added to our numbers each year. Humans drink nearly four quarts of water a day in one form or another, but the food we consume on a daily basis requires 2,000 quarts of water to produce. Agriculture is the most water-intensive sector of the economy: 70% of all water pumped from underground or diverted from rivers is used for irrigation; 20% is employed by industry; and 10% goes to residences.

Water tables currently are falling in countries that contain over half the world's people. The vast majority of the nearly 3,000,000,000 individuals to be added to world population by mid-century will come in nations where water tables already are falling and wells are going dry. Historically, it was the supply of land that constrained the growth in food production. Today, though, the shortage of water is the most formidable barrier.

Rising temperatures are the second big threat to future food security. During the last few years, crop ecologists focusing on the precise relationship between temperature and crop yields have found that each 1°C rise in temperature during the growing season reduces the yield of grain—wheat, rice, and corn—by 10%. Since 1970, the Earth's average temperature has risen nearly 0.7°C (1°F). The five warmest years during 124 seasons of record-keeping occurred in the last seven calendar turns [i.e; since 1999].

In 2002, record high temperatures and drought lowered grain harvests in India and the U.S. These reduced harvests helped pull world grain production some 90,000,000 tons below consumption, a shortfall of more than four percent.

In 2003, it was Europe that bore the brunt of rising temperatures. The record-breaking heat wave that claimed 35,000 lives in eight countries withered grain harvests in virtually every nation from France in the west through the Ukraine in

the east. The resulting reduction in Europe's grain production of some 30,000,000 tons was equal to half the U.S. wheat harvest.

Although climate change is discussed widely, we are not quick to grasp its full meaning for food security. Everyone knows that the Earth's temperature is rising, but commodity analysts often condition their projections on weather returning to "normal," failing to realize that, with climate conditions now in flux, there is no "normal" to return to.

The Intergovernmental Panel on Climate Change, a group of some 2,000 scientists, projects that the Earth's average temperature will rise during this century by 2–10°F. Young farmers face the prospect of higher temperatures than any generation of growers since agriculture began.

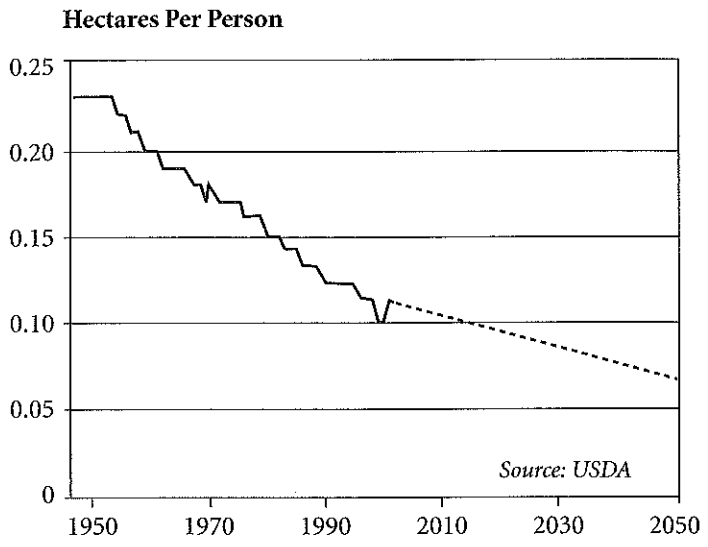
Higher temperatures in mountainous regions alter the precipitation mix, increasing rainfall and reducing snow accumulation. The result is more flooding during the rainy season and less snowmelt to feed rivers during the dry season. In Asia, for instance, this shift is affecting the flow of the major rivers that originate in the vast Himalayan-Tibetan region, including the Indus, Ganges, Mekong, Yangtze, and Yellow.

Decreased Harvest

The world has been sluggish in responding to these new threats. In four of the last five years [i.e., since 2001], the world grain harvest has fallen short of consumption. As a result, world grain stocks are at their lowest level in 30 years. Another large world grain shortfall [in 2006] could drop stocks to the lowest level on record and send world food prices into uncharted territory.

Among the trio of grains that dominate world food production—wheat, rice, and corn—the supply of rice is likely to tighten first simply because it is the most water-dependent of the three. Finding enough water to expand rice production is

World Grainland Per Person, 1950–2004, With Projection to 2050



TAKEN FROM: Lester R. Brown, *Outgrowing the Earth.* New York: Norton, 2004.

not easy in a world with spreading water scarcity. If rice supplies shrink and prices rise, the higher costs are likely to affect wheat as well.

Perhaps the biggest agricultural reversal in recent times has been the precipitous decline in China's grain production by 50,000,000 tons between 1998 and 2004. Since 1998, China has covered this decline by drawing down its once-massive stocks, causing it to turn to the world market. Its purchase of 8,000,000 tons of wheat to import in 2004 could signal the beginning of a shift from a world food economy dominated by surpluses to one ruled by scarcity.

Overnight, China has become the world's largest wheat importer. Yet it will almost certainly import even more in the future, as well as vast quantities of rice and corn. It is this potential need to import up to 50,000,000 tons of grain annually

within the next few years and the associated emergence of a politics of food scarcity that is likely to put this issue on the front pages of newspapers.

At the other end of the spectrum is Brazil, the only country with the potential to expand world cropland area markedly. However, what will the environmental consequences be of continuing to clear and plow Brazil's vast interior? Will the soils sustain cultivation over the longer term? How many plant and animal species will be sacrificed to expand its exports of soybeans?

An Opportunity for Corrective Policies

World food security is a far more complex issue today than it was a generation ago. In earlier times, if world grain supplies tightened, the U.S. simply returned some of its idled cropland to production, quickly expanding the harvest and reestablishing price stability. That commodity set-aside program was phased out in 1995, depriving the world of this ready reserve of cropland that could be brought into production quickly.

Today, food security—once the exclusive province of agricultural ministers—is far more involved. It is perhaps a commentary on the tenor of our times that decisions made in ministries of energy can have a greater effect on future food security than those reached in ministries of agriculture. Policies formulated by ministers of water resources also directly can affect food production and prices. Moreover, with irrigation water availability per person shrinking for the world as a whole, ministries of health and family planning also may have a greater affect on future food security.

The three principal steps needed to secure future food supplies are worldwide efforts to raise water productivity, cut carbon emissions, and stabilize population. If the global community does not act quickly to raise water productivity, falling tables soon could translate into rising food prices. Given the

effect of higher temperatures on crop yields, the urgency of cutting carbon emissions sharply cannot easily be overstated.

The good news is that we have the technologies to do this. For example, if, over the next decade, the U.S. was to shift its entire automobile fleet to gas-electric hybrid engines with efficiencies comparable to today's Toyota Prius, the country easily could slice gasoline use in half.

On the supply side, the potential for cutting coal use and carbon emissions by developing wind resources to generate electricity has enormous potential. In Europe, which is leading the world into the wind era, and where coal mines are closing, some 40,000,000 residents receive electricity from wind farms. By 2020, half of Europe's 400,000,000 people are projected to get their residential electricity from wind.

These are but two of the hundreds of steps that can be taken to cut carbon emissions and stabilize climate. Ironically, given the role of automobiles in raising the atmospheric carbon dioxide levels that drive climate change, the fuel efficiency of the vehicle we drive to the supermarket may affect the price of the foodstuffs inside that very same store.

Many Americans see terrorism as the principal threat to security but, for much of humanity, the effects of water shortages and rising temperatures on food availability are far more important issues. For the 3,000,000,000 people who live on two dollars a day or less and who spend up to 70% of their income on food, even a modest rise in prices quickly can become life-threatening. For them, it is the next meal that is the overriding concern.

VIEWPOINT 4

"Over the past 35 years, the world's food production has expanded faster than its population."

Food Distribution, Not Scarcity, Is a Global Problem

Roger Thurow and Jay Solomon

Roger Thurow and Jay Solomon contend in this viewpoint that the world produces enough food to feed all people, but the distribution mechanisms are not in place to ensure that food can be delivered to those who are hungry. Using India as an example, the authors describe how one part of the solution to this problem is to raise standards of living in developing nations. India is investing in road building and local economies to get food to the nation's rural poor and to give them the power to purchase it. Thurow and Solomon suggest that this type of response has helped some Indians overcome persistent hunger but would have to be greatly expanded and earn the cooperation of governments to make a dent in the problem of global hunger. Currently based in Europe, Roger Thurow is a senior writer for the Wall Street Journal. *Jay Solomon is a staff writer for the same newspaper.*

As you read, consider the following questions:

1. According to the United Nations, how many calories per day could the world's farmers provide to each person on the planet in 2002?
2. As Thurow and Solomon report, why did India's large grain stocks never reach its 214 million hungry citizens?
3. Why did India choose to export much of its grain in 2001 instead of retaining it for future use?

THIRUKANCHIPET, India—In the 1960s, this country set out to prevent famine by boosting agricultural production. The push was so successful that wheat and rice stockpiles approached 60 million tons. By 2001, India had its own grain export business. But Murugesan Manangatti, a 29-year-old illiterate peasant, was still hungry. He had no land to grow crops and no steady income to buy food.

Last summer, an agricultural research foundation gave Mr. Manangatti some unusual advice: Drive a taxi. With the foundation's help, he and 15 members of this rural village received a loan to buy a three-wheeled, battery-powered vehicle. The taxi business earns up to $25 a day and Mr. Manangatti takes home a monthly salary of about $55. For the first time, he says, his family is regularly able to eat three nutritious meals a day.

The Thirukanchipet taxi is a fresh approach to solving a jarring paradox. The world is producing more food than ever before as countries such as India, China and Brazil emerge as forces in global agriculture. But at the same time, the number of the world's hungry is on the rise—including in India—after falling for decades. Despite its overflowing granaries, India has more hungry people than any other country, as many as 214 million according to United Nations estimates, or one-fifth of its population.

More Money, More Food

The paradox is propelling a shift in strategy among the world's hunger fighters. International agencies that once encouraged countries to solve starvation crises by growing more food are now tackling the more fundamental problem of rural poverty as well. The old development mantra—produce more food, feed more people—is giving way to a new call: Create more jobs, provide income to buy food.

"Increasing production is great, but we have to think about the whole chain," says M.S. Swaminathan, the 78-year-old scientist who helped engineer India's agriculture boom and whose foundation set up Mr. Manangatti's taxi. India has been able to conquer its famine of food, he says. Now it is suffering from a "famine of jobs and livelihoods."

The stark contrast between food production and rural poverty is helping to transform Indian politics. India's ruling Bharatiya Janata Party [BJP] had overseen a boom in the country's technology sector but was defeated in May [2004] elections largely by the votes of a rural population that felt left behind. The BJP's "India Shining" campaign, which highlighted the country's economic advances, was trumped by the victorious Congress party, which ran on a platform of aiding farmers.

There is plenty of supply on hand to meet global demand. Over the past 35 years, the world's food production has expanded faster than its population. In 2002, according to the United Nations World Food Program [WFP], farmers produced enough food to provide every person with 2,800 calories a day. That's equivalent to the general daily requirement of teen boys and active men, according to the U.S. government's dietary guidelines. The WFP's feeding programs aim to provide 2,100 calories a day to their recipients.

But inadequate infrastructure, local corruption and rural poverty have prevented the chronically hungry—those who don't eat enough to fulfill basic standards—from gaining ac-

cess to this bountiful harvest. After falling for decades, the estimated number of undernourished in the developing world increased by 18 million to 798 million between 1997 and 2001, according to the latest data from the U.N.'s Food and Agriculture Organization.

Failures in the Chain of Distribution

In a typical year, the World Food Program distributes food to about 90 million people, many of whom are threatened with starvation in disaster situations such as drought. Most of the remaining 700 million live on isolated, stingy land, and have neither the money to buy food nor the ability to grow it. They're beyond the reach of international feeding programs and also fall through national safety nets.

It's virtually impossible to simply hand out food surpluses to the hungry because of the cost and complexity of distribution. It would also turn recipients into permanent wards of the world. "I believe in [Mohandis K.] Gandhi's strategy: Don't turn people into beggars," says Mr. Swaminathan.

Looking for solutions, countries are turning their attention to permanent development projects such as road building that can foster economic activity for the rural poor and connect them to markets for their produce.

A [2004] summit meeting of the Group of Eight industrialized nations embraced a plan to "end the cycle of famine" in the Horn of Africa. One plan for Ethiopia involves creating work programs that would allow the five million people there dependent on aid to buy their own food. Earlier [in 2004], the Chinese government said it would cut farming taxes and boost investment in rural areas. And at a [2004] meeting of the African Union, leaders committed to allocating at least 10% of their budgets to agriculture and rural development.

The WFP, in one strategy shift, is emphasizing schools with a classroom-based feeding program that so far reaches 15 million. It's designed to encourage children, who constitute

about 300 million of the world's hungry, to attend school and at the same time combat malnutrition. "An ill-educated, unhealthy population can't take advantage of an open economy," says John Powell, a WFP deputy executive director.

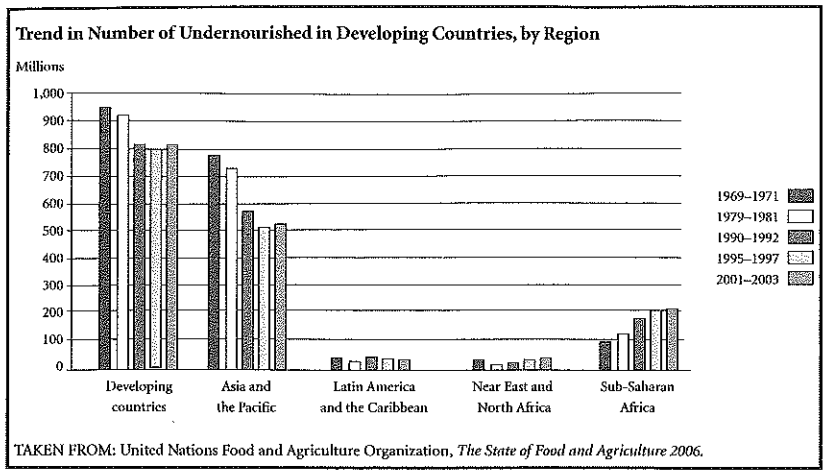
Good Grain Harvests

India's agricultural program of the 1960s, dubbed the Green Revolution, was launched after the country suffered through a series of famines. Under the guidance of local and international agronomists and scientists, Indian farmers were introduced to hardy, fast-growing wheat strains and better uses of fertilizer and irrigation. As a result, crop yields multiplied, and in recent years India's wheat production topped 70 million tons, surpassing that of the U.S. The Indian government estimates that wheat output may pass 100 million tons in the coming decade.

In the country's northern grain belt, wheat grows almost everywhere there is a level field, between houses and schools, and brick factories and gas stations. During the harvest season, the roads are clogged with tractors such as the small Massey Ferguson model driven by 19-year-old farmer Gopal Kumar. He recently pulled a wagon piled with five tons of wheat as he made his way to the mill in Mathura, a 30-minute drive from the Taj Mahal.

The Kumars have been farming wheat for three generations and now work 36 acres. "This is a pretty good year," said Mr. Kumar. He maneuvered his tractor and wagon past Mathura's McDonald's and delivered his wheat to Rajender Bansal's mill. Mr. Bansal opened his mill about 10 years ago with capacity to process 2,000 tons of wheat a month. He has since expanded to 3,000 tons.

As India's grain production grew, so did its surpluses. By 2001, the national stockpile of rice and wheat was approaching 60 million tons, according to the government. The country had also become one of the world's leading producers of



TAKEN FROM: United Nations Food and Agriculture Organization, *The State of Food and Agriculture 2006.*

fruits, vegetables and milk. India set up a distribution network to supply surplus grain at reduced prices to 180 million families.

Mismanaged Distribution

But with inefficiency and local mismanagement plaguing distribution, it couldn't move the grain fast enough through the system. Some even spoiled in warehouses. A 2002 government survey concluded that 48% of children under five years old are malnourished. That's an improvement from three decades ago and even today, given rapid population growth, the proportion of chronically hungry Indians continues to fall. But in a sign that there are limits to the Green Revolution, the absolute number of hungry people in India began to rise again in the late 1990s, according to the U.N.

With the cost of storing surpluses spiraling, the government opened the door to grain exports in 2001. India sold more than 10 million tons of grain to overseas customers that year, mostly in Asia and the Middle East.

Traders from traditional wheat and rice exporters were critical of the Indian trade. How could the country export grain while so many in the country are hungry? D. P. Singh,

chairman of the All India Grain Exporters Association, says the grain surplus has been big enough to allow for both exporting and distribution to the rural poor. "If [the grain] didn't reach the hungry people, it's too bad, but it has nothing to do with availability," he says.

Persistent Hunger

At the same time, India made a donation of one million tons of wheat to a World Food Program project in Afghanistan. A few European members of the WFP's executive board questioned the propriety of India's action. Himachal Som, India's representative to the U.N.'s food agencies in Rome, made an impassioned speech to his critics arguing that the donation didn't affect the country's ability to feed its poor, a more intractable problem than simply growing greater amounts of food.

The results of [the May 2004] election in India are concentrating attention on the paradox of hunger. In the two states where the former BJP-led government fared especially badly—Andhra Pradesh and Tamil Nadu—the gap between India's high-tech centers and surrounding farming areas had become the most pronounced. Hyderabad, the capital of Andhra Pradesh, grew prosperous as the state's government courted U.S. companies such as Microsoft Corp. and General Electric Co., and the World Bank praised the state for its economic progress.

But about 100 miles outside the city's glittering office towers, farmers in the town of Kalimela say they've benefited little. A three-year drought hit farm production. Many blamed the state government for failing to invest more in irrigation systems and roads. In addition, farmers were hit hard when the state increased electricity rates.

"The government hasn't helped us. No roads. No water. Right from the beginning," says Jarappa Sonia, 35, a sugarcane and wheat farmer from Kalimela. Mr. Sonia joined a govern-

ment work program building roads in a district four hours from his home. "I prefer to be a farmer," he says.

The opposition Congress party promised free power for Andhra Pradesh's farmers. Within hours of taking office, the state's new chief minister, Y. S. Rajasekhar Reddy, honored that pledge.

It's too early to know how fully the Congress-led government will implement its ideas. The Congress party and its allies have agreed to support minimum-wage public-works programs such as a guaranteed 100 days of employment for rural households. They have also promised to improve farmers' access to credit and restructure outstanding debts.

Increasing Income to End Hunger

Providing rural folk with an income to buy food is a theory the Swaminathan foundation has extended to 9,600 people in 800 self-help groups in five states across the country.

In the small southern village of Thirukanchipet, the best the rural unemployed can hope for is seasonal work in rice paddies for $1 or $2 a day. Earlier this year, with the help of the Swaminathan foundation, 28 men and women formed a dairy group to improve their credit worthiness and received a micro-credit loan of about $10,000 from a local bank.

The group bought 20 cows and 19 calves, and built a milking shed. The cows produce more than 40 gallons a day, which is sold to a local dairy cooperative for 80 cents a gallon. Much of the daily income of about $30 is set aside to repay the loan. The rest is distributed among the members who for the first time are able to afford the higher-quality rice and wheat sold in the private stores instead of that in government ration shops.

"It tastes better," says M. Kanagaraj, a tall, thin man of 34. He is one of four workers who milk and manage the cows and makes about $40 a month. "We eat two meals a day now," he

says. They are waiting for the calves to mature, so they can double the milk production and their income.

"Then," says Mr. Kanagaraj, "we will eat three meals a day."