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Apocalypse When? Population Growth and Food Supply in South Asia

Asia-Pacific Population & Policy summarizes research on population and reproductive health for policymakers and others concerned with the Asia-Pacific region.

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Ever since Thomas Malthus published his famous essay on the consequences of unchecked population growth nearly two centuries ago, pessimists have warned that escalating demand for food would soon overtake supplies, leading to global food shortages, widespread starvation, and political chaos. Nowhere have these warnings been more urgent than in the countries of South Asia—India, Bangladesh, Pakistan, Nepal, Afghanistan, and Sri Lanka.

Up to now, Malthus's apocalyptic vision—in which population growth outstrips food supply—has not materialized. In South Asia as a whole, the production of staple grains and other food has grown faster than the population. Stimulated by the technological advances of the Green Revolution, yields of rice, wheat, and corn have more than doubled in the past three decades. Food prices have gone down.

But will the positive trend continue? Over the next two decades, South Asia's population is projected to grow by 66 percent, reaching 1.9 billion by the year 2020 (Table 1). An increase of 482 million is projected for India alone. Demand for staple grains is expected nearly to double over the same period, based on population growth and higher consumption as incomes rise. Will farmers be able to increase food production rapidly enough to keep up? And the historic Malthusian dilemma now includes a new, equally pressing concern: Will increased food production bring

with it unacceptable damage to the environment?

The pessimists' view is of "a catastrophe in the making." They fear that agricultural production may be reaching some absolute limit or that the continued burden of population increase will strain an already precarious ecological balance to the breaking point. The optimists maintain that technological advances in agriculture, improved food distribution, and policies that protect natural resources are sufficient to solve the problems of global hunger and environmental sustainability. Both groups agree that slowing population growth is key. As Samuel Preston writes, "There is no question that population growth is one of the principal factors . . . putting pressure on agricultural systems in developing countries and on the environmental base that supports them."

Table 1 Population size, South Asia, 1990 and 2020

Country	Population (millions)	
	1990	2020
Afghanistan	16.6	41.6
Bangladesh	113.7	209.2
India	846.2	1,328.6
Nepal	19.6	37.3
Pakistan	118.1	240.9
Sri Lanka	17.2	23.8
Total	1,131.4	1,881.4

Source: Dyson 1993.

THE CURRENT SITUATION

Trends up to now provide evidence for either optimism or pessimism. One reason is that the situation varies widely—both among countries in the region and among regions within each country. Another is that the anticipated increase in population is unprecedented: just because farmers are keeping up with the demand for food today does not mean that they will be able to cope tomorrow.

However, some trends are clear. Population densities in the region are already among the highest in the world (Table 2). Only Nepal and Sri Lanka have any significant reserves of arable land not already under cultivation (Table 3), and these are shrinking rapidly. Urban sprawl has engulfed surrounding farm land, while population growth in rural areas has reduced average farm sizes, pushed cultivation

Table 2 Population density, selected countries, 1995 and 2000

Country	Population density (persons per km ² arable land)	
	1995	2000
Bangladesh	1,309.8	1,473.3
Nepal	924.3	1,038.5
Sri Lanka	964.2	1,021.6
Pakistan	628.0	720.2
India	496.8	543.6
Afghanistan	296.4	342.0
France	299.3	304.6
United States	117.4	122.9
Canada	57.2	61.0

Source: John A. Ross, W. Parker Mauldin, and Vincent C. Miller, (1993), *Family planning and population: A compendium of international statistics*, pp. 11–13, New York: The Population Council.

Table 3 Factors affecting food supply in South Asia, 1987–1990

Country	Total arable land (million ha)	Percentage total under cultivation	Percentage cultivated under irrigation	Average annual fertilizer use (kg/ha)
Afghanistan	8.2	99	33	8
Bangladesh	9.4	99	26	86
India	169.0	100	25	62
Nepal	3.8	68	34	23
Pakistan	23.1	90	78	85
Sri Lanka	2.7	70	29	107
Total	216.2	98	31	63

Source: Dyson 1993.

into marginal areas, and swelled the ranks of the landless. The number of landless households in India grew from an estimated 15 million in 1961 to 26 million in 1981: it is projected to reach 44 million by the year 2000.

Even while average farm sizes were shrinking, farmers with enough land and capital to modernize adopted Green Revolution technologies that boosted per hectare food output dramatically. Success was achieved primarily through the introduction of new, high-yielding strains of wheat and rice together with generous applications of fertilizers, chemical pesticides, and irrigation water.

Between 1960 and 1985, the agricultural use of pesticides in India increased from 2,000 to 72,000 tons per annum. During the 1980s alone, fertilizer application nearly doubled in the region as a whole. By the late 1980s, nearly one-third of South Asia's crop land was irrigated (Table 3).

The results of this intensification have been substantial in some countries and somewhat disappointing in others. In India—which accounts for about three-quarters of the region's population—per capita cereal production has increased fairly steadily since 1950 (Figure 1). Tim

Dyson projects that this positive trend will continue. Pakistan enjoyed dramatic increases in cereal harvests in the late 1960s and early 1970s, but showed some decline in the 1980s. In Bangladesh and other countries of the region, the trend is less encouraging.

Although average daily calorie supplies per person have improved in South Asia since the early 1960s, overall levels remain strikingly low. The daily average of 2,214 calories per person is actually slightly below the level for Sub-Saharan Africa. The situation in Bangladesh, where the average is 2,037 calories, is especially worrying.

Precise environmental effects are difficult to quantify, but pressure on farm land is clearly contributing to loss of soil and water resources—the “raw materials” that farmers rely on for future harvests. Soil degradation is widespread: John Bongaarts warns that 20 percent of all vegetated land in Asia has deteriorated over the past 45 years. In considering intensified agricultural production, Vernon Ruttan adds global concerns such as acid rain, ozone depletion, and climate change to the more localized hazards of soil erosion, waterlogging, salinity, and fertilizer and pesticide residues.

LOOKING TO THE FUTURE

With virtually no new land available, future increases in South Asia's food supplies must come from intensified farming on land already under cultivation. Crop diversification may also become increasingly important: the present concentration on a small number of crops and varieties has increased farmers' vulnerability to pests, diseases, and the vagaries of climate. Further productivity gains from Green Revolution technologies are certainly feasible, but they may become more difficult and more expensive to achieve.

Although fertilizer use has increased exponentially, South Asian farmers still do not use nearly as much fertilizer as their counterparts in Europe, North America, and China. For farmers already fertilizing their crops at recommended levels, there is some evidence that additional fertilizer application may not lead to further large increases in productivity. The challenge now is to expand fertilizer use to less affluent farmers, to new areas within the region, and to a wider range of food crops.

In some areas, inappropriate or excessive use of broad-spectrum pesticides has led to resistance in important agricultural pests. Other problems include the emer-

gence of new pests from populations whose natural enemies have been unwittingly destroyed. There is little information on the extent of environmental contamination from pesticides in South Asia, but residual chemicals in soil and water can have effects right up the food chain, eventually compromising human health.

Irrigation systems in the region are running up against financial and management problems. The cost of expanding irrigation into less favorable areas may be prohibitive. In some of the areas already under irrigation, poor management is causing lower water tables, soil salinization, and waterlogging—all leading to reduced crop output.

Production issues aside, pessimists and optimists agree that hunger involves economics and politics as much as it does agriculture. Most of the world's hungry are suffering not from food shortages per se, but from poor food distribution and lack of purchasing power.

There is general agreement that the demand for food will increase rapidly over the next few decades, creating production shortfalls of varying degrees throughout the region. Most of the deficit will have to be met through food aid and commercial imports. Bangladesh, already heavily dependent on international food aid, stands little chance of attaining self-suf-

ficiency in food production. Prospects are more favorable for India.

What about the environment? Per Pinstrup-Andersen and Rajul Pandya-Lorch point out that agricultural intensification need not cause degradation. In fact, practices such as fertilizer application can play an important role in conserving the soil. The key is good management. It is the poorest farmers who are forced to sacrifice long-term sustainability for short-term survival: "The most serious environmental threat in low-income developing countries is poverty."

Widespread poverty and food shortages also make South Asia vulnerable to unpredictable catastrophes. Many scientists fear that global climate change may alter temperature and rainfall patterns, with uncertain consequences for agriculture. A particular concern is that global warming will increase droughts in areas already short of water. A more likely menace, according to Dyson, is that "violent sociopolitical upheavals could disrupt both agricultural production and food distribution" and possibly provoke famine and major migration flows. South Asia is not the only region in the world to face this risk, but its huge population and chronic food poverty make it particularly vulnerable.

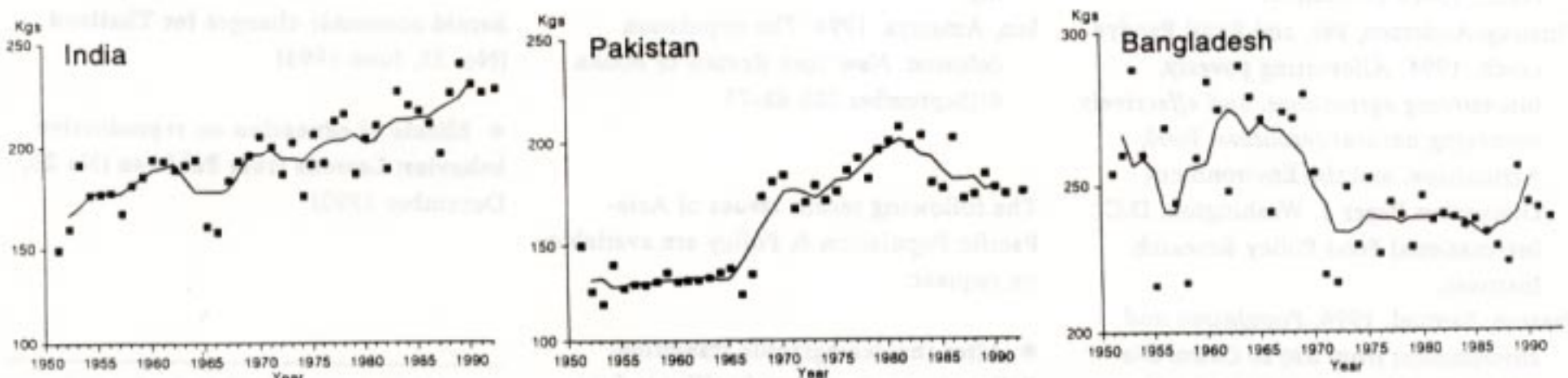


Figure 1 Per capita cereal production in India, Pakistan, and Bangladesh, 1951-92 (annual production ■, five-year moving average —)

POLICY IMPLICATIONS

Providing growing populations with food will require research, extension, infrastructure, pricing, and trade policies to boost harvests and ensure that food supplies reach those who need them—while also limiting environmental damage. To achieve these goals, expanding food production to support the growing population must be moved much higher on the political agenda.

Increasing food production requires:

- Policies to support further research in environmentally sensitive, yield-enhancing technologies such as integrated pest management, sustainable farming systems, and new crops or varieties that resist pests or tolerate adverse growing conditions.

- Policies to supply a wider spectrum of farmers—including women farmers—with improved seed, fertilizer, pest-control technologies, and well-managed irrigation systems.
- Policies to build rural institutions and infrastructure such as transportation systems, market outlets, credit facilities, and farmer training programs.
- Policies to remove market distortions such as inappropriate subsidies for irrigation water and other agricultural inputs, inadequate tenure arrangements, and price setting that disadvantages farmers.

Increasing food consumption requires policies to: (1) improve storage and distribution systems; (2) bolster the purchasing power of the rural and urban poor; and (3) at the international level, provide more

food aid in the coming years. The greatest volume of food aid will be destined for Bangladesh.

To avoid the apocalypse, the other side of the equation is population stability. Even with better agricultural policies in South Asia, it will clearly be difficult to increase food production quickly enough to keep up with projected population growth. In India it may be possible; in Bangladesh it will not.

It is technically feasible to feed a much larger population. It is probably possible to do this without irreversible damage to the environment. But the odds would certainly be improved if the population were growing more slowly. A look at the potential for increasing food production in South Asia only underlines the importance of efforts to slow down population growth.

This issue is based primarily on the following publications:

- Bongaarts, John. 1994. Can the growing human population feed itself? *Scientific American* March: 36–42.
- Dyson, Tim. 1993. *Population and food in South Asia: Recent trends and prospects*. Paper prepared for the XVII Annual Conference of the Indian Association for the Study of Population, Annamalai University, Tamil Nadu, 16–19 December.
- Pinstrup-Andersen, Per, and Rajul Pandya-Lorch. 1994. *Alleviating poverty, intensifying agriculture, and effectively managing natural resources*. Food, Agriculture, and the Environment Discussion Paper 1. Washington, D.C.: International Food Policy Research Institute.
- Preston, Samuel. 1994. *Population and environment from Rio to Cairo*. Distinguished lecture presented at the International Conference on Population

and Development. Liège, Belgium: International Union for the Scientific Study of Population.

- Ruttan, Vernon W. 1994. *Population growth, environmental change, and technical innovation: Implications for sustainable growth in agricultural production*. In Dennis Ahburg, Allen Kelley, and Karen Oppenheim Mason, eds. *The impacts of rapid population growth on economic development*. Heidelberg: Springer Verlag, forthcoming.
- Sen, Amartya. 1994. The population delusion. *New York Review of Books*. 41(September 22): 62–71.

The following recent issues of Asia-Pacific Population & Policy are available on request:

- **After the demographic transition: Policy responses to low fertility in four Asian countries** (No. 30, September 1994)

- **Does low fertility call for new policies in some Asian countries?** (No. 29, June 1994)

- **Culture influences demographic behavior: Evidence from India** (No. 28, March 1994)

- **Changes in fertility patterns can improve child survival in Southeast Asia** (No. 27, December 1993)

- **Shifts in household demographics herald economic changes for Thailand** (No. 25, June 1993)

- **Effects of education on reproductive behavior: Lessons from Pakistan** (No. 23, December 1992)

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