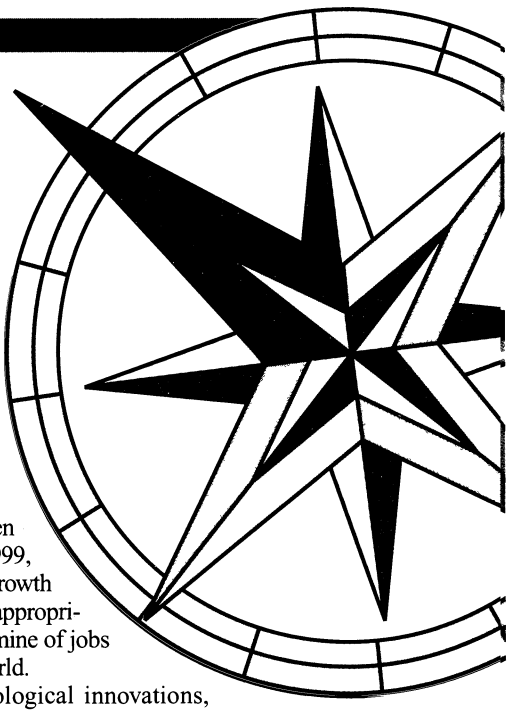

Science in Response to Basic Human Needs

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The 20th century has ended with an impressive array of accomplishments in science and technology. The past few decades in particular have witnessed the tremendous beneficial impact of innovations in biotechnology and in information and space technologies on human food and health security. The entire global population was only 940 million in 1798 when Thomas Malthus expressed his apprehension about humankind's ability to achieve a balance between food production and population. The number of humans reached 6 billion in 1999, and in 12 years another billion will be added to the global population if current growth rates continue in developing countries. Science-based technologies supported by appropriate public policies are responsible for food famines becoming rare. However, a famine of jobs and other opportunities to earn a livelihood continues to plague the poor of the world.

In spite of an impressive stockpile of scientific discoveries and technological innovations, poverty and social and gender inequity are increasing globally. According to the World Bank, 1.3 billion people lived on less than $1 per day and another 3 billion lived on less than $2 per day in 1993. Nearly 1.5 billion of the world population of 6 billion live in severe poverty at the dawn of the new millennium. Illiteracy, particularly among women, is still high in many developing countries. It is not only in opportunities for education that children of many developing countries remain handicapped, but even more alarmingly, in opportunities for the full expression of their innate genetic potential for physical and mental development. For example, 25 to 50% of the children born in South Asian countries are characterized by low birth weight, caused by maternal and fetal undernutrition and malnutrition. Low birth weight has serious consequences for the child's brain development as well as for the health of the child in later life.

"How can we now enlist technology as an ally...?"

New technologies supported by appropriate services and public policies have helped prove doomsday predictions wrong and have led to the Green Revolution in agricultural production becoming one of the most socially significant of the scientific developments of this century. Four thousand years of wheat cultivation resulted in Indian farmers producing 6 million metric tons of wheat in 1947. Production in 1999 was 72 million tons, making India the second largest producer of wheat in the world. The average yield of wheat per hectare increased from 900 kilograms in 1964 to 2300 kilograms now. At the 1964 yield level, nearly 72 million hectares would be needed to produce India's current quantity of wheat, in contrast to the 24 million hectares now used for this crop. Thus, the Green Revolution can also be termed forest-saving agriculture, because additional land for food production has tended to come from clearing forests in many developing countries.

There are uncommon opportunities now to harness the power of synergy between science and public policy to address contemporary development issues such as the growing divide between rich and poor, the feminization of poverty, the dearth of jobs, overpopulation, climate change, and the loss of forests and biodiversity. Fortunately, modern information technology can provide opportunities for reaching the unreached. Computer-aided and Internet-connected virtual colleges linking scientists and women and men living in poverty can be established at local, national, and global levels for launching a knowledge and skill revolution targeted toward poverty eradication. With the priority now being accorded to information technology in India and many other developing countries, it is feasible to provide access to computers in rural areas. Even where electricity is not available, solar power can be used, as is being done in villages in southern India.

After the Industrial Revolution in Europe, technology contributed to the growing prosperity gap between nations. How can we now enlist technology as an ally in the movement for social, gender, and economic equity in an era of expanding proprietary science? Obviously, public-good research supported by public funds must be stepped up. The simple test proposed by Mahatma Gandhi is the most meaningful yardstick for determining priorities in scientific research designed to help in meeting basic human needs: "Recall the face of the poorest and the weakest man whom you have seen, and ask yourself, if the steps you contemplate are going to be of any use to him. Will he gain anything by it? Will it restore to him control over his own life and destiny?"

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