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New Limits to Growth Revive Malthusian Fears --- Spread of Prosperity Brings Supply Woes; Slaking China's Thirst

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Now and then across the centuries, powerful voices have warned that human activity would overwhelm the earth's resources. The Cassandras always proved wrong. Each time, there were new resources to discover, new technologies to propel growth.

Today the old fears are back.

Although a **Malthusian** catastrophe is not at hand, the resource constraints foreseen by the Club of Rome are more evident today than at any time since the 1972 publication of the think tank's famous book, "The Limits of Growth." Steady increases in the prices for oil, wheat, copper and other commodities -- some of which have set record highs this month -- are signs of a lasting shift in demand as yet unmatched by rising supply.

As the world grows more populous -- the United Nations projects eight billion people by 2025, up from 6.6 billion today -- it also is growing more prosperous. The average person is consuming more food, water, metal and power. Growing numbers of China's 1.3 billion people and India's 1.1 billion are stepping up to the middle class, adopting the high-protein diets, gasoline-fueled transport and electric gadgets that developed nations enjoy.

The result is that demand for resources has soared. If supplies don't keep pace, prices are likely to climb further, economic growth in rich and poor nations alike could suffer, and some fear violent conflicts could ensue.

Some of the resources now in great demand have no substitutes. In the 18th century, England responded to dwindling timber supplies by shifting to abundant coal. But there can be no such replacement for arable land and fresh water.

The need to curb global warming limits the usefulness of some resources -- coal, for one, which emits greenhouse gases that most scientists say contribute to climate change. Soaring food consumption stresses the existing stock of arable land and fresh water.

"We're living in an era where the technologies that have empowered high living standards and 80-year life expectancies in the rich world are now for almost everybody," says economist Jeffrey Sachs, director of Columbia University's Earth Institute, which focuses on sustainable development with an emphasis on the world's poor. "What this means is that not only do we have a very large amount of economic activity right now, but we have pent-up potential for vast increases [in economic activity] as well." The world cannot sustain that level of growth, he contends, without new technologies.

Americans already are grappling with higher energy and food prices. Although crude prices have dropped in recent days, there's a growing consensus among policy makers and industry executives that this isn't just a temporary surge in prices. Some of these experts, but not all of them, foresee a long-term upward shift in prices for oil and other commodities.

Today's dire predictions could prove just as misguided as yesteryear's.

"Clearly we'll have more and more problems, as more and more [people] are going to be richer and richer, using more and more stuff," says Bjorn Lomborg, a Danish statistician who argues that the global-warming problem is overblown. "But smartness will outweigh the extra resource use."

Some constraints might disappear with greater global cooperation. Where some countries face scarcity, others have bountiful supplies of resources. New seed varieties and better irrigation techniques could open up arid regions to cultivation that today are only suitable as hardscrabble pasture; technological breakthroughs, like cheaper desalination or efficient ways to transmit electricity from unpopulated areas rich with sunlight or wind, could brighten the outlook.

In the past, economic forces spurred solutions. Scarcity of resource led to higher prices, and higher prices eventually led to conservation and innovation. Whale oil was a popular source of lighting in the 19th century. Prices soared in the middle of the century, and people sought other ways to fuel lamps. In 1846, Abraham Gesner began developing kerosene, a cleaner-burning alternative. By the end of the century, whale oil cost less than it did in 1831.

A similar pattern could unfold again. But economic forces alone may not be able to fix the problems this time around. Societies as different as the U.S. and China face stiff political resistance to boosting water prices to encourage efficient use, particularly from farmers. When resources such as water are shared across borders, establishing a pricing framework can be thorny. And in many developing nations, food-subsidy programs make it less likely that rising prices will spur change.

This troubles some economists who used to be skeptical of the premise of "The Limits to Growth." As a young economist 30 years ago, Joseph Stiglitz said flatly: "There is not a persuasive case to be made that we face a problem from the exhaustion of our resources in the short or medium run."

Today, the Nobel laureate is concerned that oil is underpriced relative to the cost of carbon emissions, and that key resources such as water are often provided free. "In the absence of market signals, there's no way the market will solve these problems," he says. "How do we make people who have gotten something for free start paying for it? That's really hard. If our patterns of living, our patterns of consumption are imitated, as others are striving to do, the world probably is not viable."

Dennis Meadows, one of the authors of "The Limits to Growth," says the book was too optimistic in one respect. The authors assumed that if humans stopped harming the environment, it would recover slowly. Today, he says, some climate-change models suggest that once tipping points are passed, environmental catastrophe may be inevitable even "if you quit damaging the environment."

One danger is that governments, rather than searching for global solutions to resource constraints, will concentrate on grabbing share.

China has been funding development in Africa, a move some U.S. officials see as a way for it to gain access to timber, oil and other resources. India, once a staunch supporter of the democracy movement in military-run Myanmar, has inked trade agreements with the natural-resource rich country. The U.S., European Union, Russia and China are all vying for the favor of natural-gas-abundant countries in politically unstable Central Asia.

Competition for resources can get ugly. A record drought in the Southeast intensified a dispute between Alabama, Georgia and Florida over water from a federal reservoir outside Atlanta. A long-running fight over rights to the Cauvery River between the Indian states of Karnataka and Tamil Nadu led to 25 deaths in 1991.

Economists Edward Miguel of the University of California at Berkeley and Shanker Satyanath and Ernest Sergenti of New York University have found that declines in rainfall are associated with civil conflict in sub-Saharan Africa. Sierra Leone, for example, which saw a sharp drop in rainfall in 1990, plunged into civil war in 1991.

The rise of China and India already has changed the world economy in lasting ways, from the flows of global capital to the location of manufacturing. But they remain poor societies with growing appetites.

Nagpur in central India once was known as one of the greenest metropolises in the country. Over the past decade, Nagpur, now one of at least 40 Indian cities with more than a million people, has grown to roughly 2.5 million from 1.7 million. Local roads have turned into a mess of honking cars, motorbikes and wandering livestock under a thick soup of foul air.

"Sometimes if I see something I like, I just buy it," says Sapan Gajbe, 32 years old, a dentist shopping for an air conditioner at Nagpur's Big Bazaar mall. A month earlier, he bought his first car, a \$9,000 Maruti Zen compact.

In 2005, China had 15 passenger cars for every 1,000 people, close to the 13 cars per 1,000 that Japan had in 1963. Today, Japan has 447 passenger cars per 1,000 residents, 57 million in all. If China ever reaches that point, it would have 572 million cars -- 70 million shy of the number of cars in the entire world today.

China consumes 7.9 million barrels of oil a day. The U.S., with less than one quarter as many people, consumes 20.7 million barrels. "Demand will be going up, but it will be constrained by supply," ConocoPhillips Chief Executive Officer James Mulva has told analysts. "I don't think we are going to see the supply going over 100 million barrels a day, and the reason is: Where is all that going to come from?"

Says Harvard economist Jeffrey Frankel: "The idea that we might have to move on to other sources of energy -- you don't have to buy into the Club of Rome agenda for that." The world can adjust to dwindling oil production by becoming more energy efficient and by moving to nuclear, wind and solar power, he says, although such transitions can be slow and costly.

There are no substitutes for water, no easy alternatives to simple conservation. Despite advances, desalination remains costly and energy intensive. Throughout the world, water is often priced too low. Farmers, the biggest users, pay less than others, if they pay at all.

In California, the subsidized rates for farmers have become a contentious political issue. Chinese farmers receive water at next to no cost, accounting for 65% of all water used in the country.

In Pondhe, an Indian village of about 1,000 on a barren plateau east of Mumbai, water wasn't a problem until the 1970s, when farmers began using diesel-powered pumps to transport water farther and faster. Local wells used to overflow during the monsoon season, recalls Vasantrao Wagle, who has farmed in the area for four decades. Today, they top off about 10 feet below the surface, and drop even lower during the dry season. "Even when it rains a lot, we aren't getting enough water," he says.

Parched northern China has been drawing down groundwater supplies. In Beijing, water tables have dropped hundreds of feet. In nearby Hebei province, once large Baiyangdian Lake has shrunk, and survives mainly because the government has diverted water into it from the Yellow River.

Climate change is likely to intensify water woes. Shifting weather patterns will be felt "most strongly through changes in the distribution of water around the world and its seasonal and annual variability," according to the British government report on global warming led by Nicholas Stern. Water shortages could be severe in parts Africa, the Middle East, southern Europe and Latin America, the report said.

China's farmers need water because China needs food. Production of rice, wheat and corn topped out at 441.4 million tons in 1998 and hasn't hit that level since. Sea water has leaked into depleted aquifers in the north, threatening to turn land barren. Illegal seizures of farmland by developers are widespread. The government last year declared that it would not permit arable land to drop below 120 million hectares (296 million acres), and said it would beef up enforcement of land-use rules.

The farmland squeeze is forcing difficult choices. After disastrous floods in 1998, China started paying some farmers to abandon marginal farmland and plant trees. That "grain-to-green" program was intended to reverse the deforestation and erosion that exacerbated the floods. Last August, the government stopped expanding the program, citing the need for farmland and the cost.

A growing taste for meat and other higher-protein food in the developing world is boosting demand and prices for feed grains. "There are literally hundreds of millions of people...who are making the shift to protein, and competition for food world-wide is a new reality," says William Doyle, chief executive officer of fertilizer-maker Potash Corp. of Saskatchewan.

It takes nearly 10 pounds of grain to produce one pound of pork -- the staple meat in China -- and more than double that to produce a pound of beef, according to Vaclav Smil, a University of Manitoba geographer who studies food, energy and environment trends. The number of calories in the Chinese diet from meat and other animal products has more than doubled since 1990, according to the U.N. Food and Agriculture Organization. But China still lags Taiwan when it comes to per-capita pork consumption. Matching Taiwan would increase China's annual pork consumption by 11 billion pounds -- as much pork as Americans eat in six or seven months.

The 1972 warnings by the Club of Rome -- a nongovernmental think tank now based in Hamburg that brings together academics, business executives, civil servants and politicians to grapple with a wide range of global issues -- struck a chord because they came as oil prices were rising sharply. Oil production in the continental U.S. had peaked, sparking fears that energy demand had outstripped supply. Over time, America became more energy efficient, overseas oil production rose and prices fell.

The dynamic today appears different. So far, the oil industry has failed to find major new sources of crude. Absent major finds, prices are likely to keep rising, unless consumers cut back. Taxes are one way to curb their appetites. In Western Europe and Japan, for example, where gas taxes are higher than in the U.S., per capita consumption is much lower.

New technology could help ease the resource crunch. Advances in agriculture, desalination and the clean production of electricity, among other things, would help.

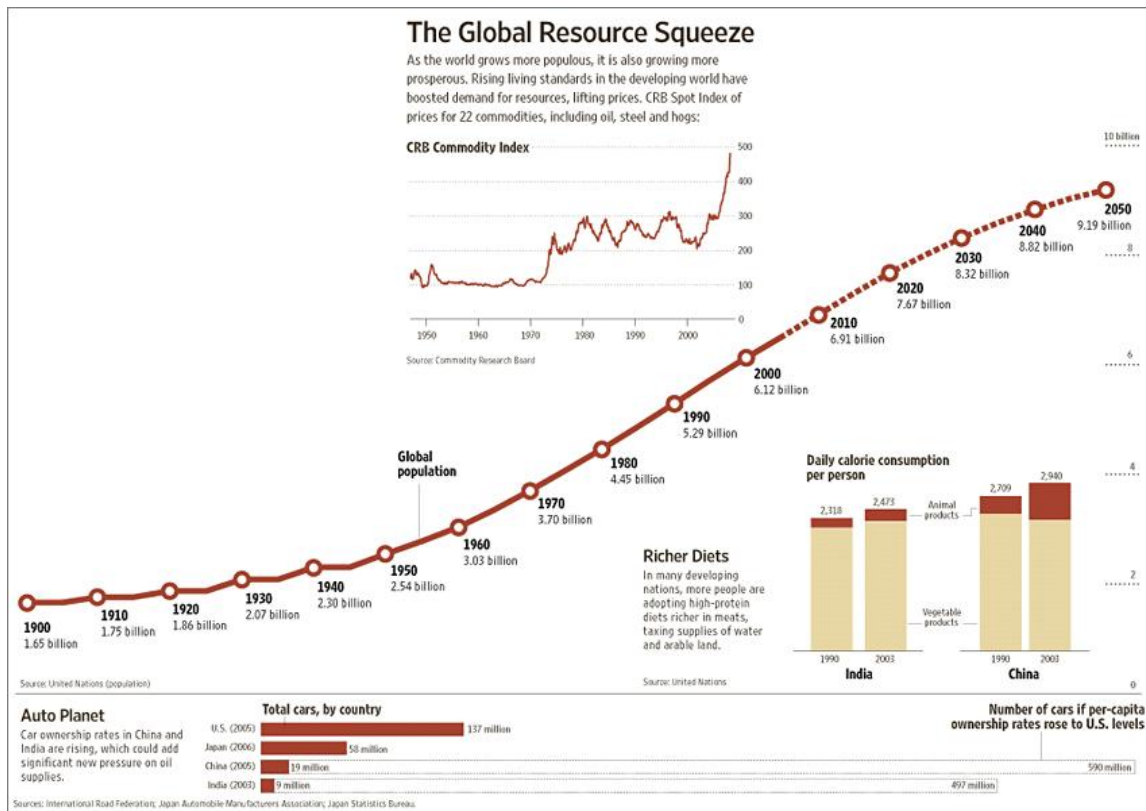
But Mr. Stiglitz, the economist, contends that consumers eventually will have to change their behavior even more than they did after the 1970s oil shock. He says the world's traditional definitions and measures of economic progress -- based on producing and consuming ever more -- may have to be rethought.

In years past, the U.S., Europe and Japan have proven adept at adjusting to resource constraints. But history is littered with examples of societies believed to have suffered **Malthusian** crises: the Mayans of Central America, the Anasazi of the U.S. Southwest, and the people of Easter Island.

Those societies, of course, lacked modern science and technology. Still, their inability to overcome resource challenges demonstrates the perils of blithely believing things will work out, says economist James Brander at the University of British Columbia, who has studied Easter Island.

"We need to look seriously at the numbers and say: Look, given what we're consuming now, given what we know about economic incentives, given what we know about price signals, what is actually plausible?" says Mr. Brander.

Indeed, the true lesson of Thomas Malthus, an English economist who died in 1834, isn't that the world is doomed, but that preservation of human life requires analysis and then tough action. Given the history of England, with its plagues and famines, Malthus had good cause to wonder if society was "condemned to a perpetual oscillation between happiness and misery." That he was able to analyze that "perpetual oscillation" set him and his time apart from England's past. And that capacity to understand and respond meant that the world was less **Malthusian** thereafter.



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