

Many more mouths to feed

Last year the world's population not only hit 5 billion but went on to top 5.1 billion, according to the Washington, D.C.-based Population Reference Bureau. The trends that led to this increase, recently charted by the bureau's Carl Haub and Mary Kent, indicate that global population is in fact growing faster than had been projected.

Haub notes that the most respected population-growth estimates are a series of three five-year projections (high, medium and low) published by the United Nations (UN). Conservative population analysts tend to assume the medium-growth curve is the most reasonable projection. However, Haub says, the UN's medium-growth projection for 1985 to 1990 would have world population growing 1.6 percent per year. In reality, he points out, "it's still up above 1.7 percent." While that may not sound like much, Haub says it translates to a difference of more than 5 million more mouths to feed each year.

A recent increase in China's birth rate contributes to this trend. While China's total fertility rate (average number of children per woman) had dipped as low as 2.1, an upturn has occurred since 1986, fed in part, the bureau contends, by improved economic conditions and an easing of China's stringent population-control program. China's fertility rate is now estimated at 2.4 to 2.5. This increase, if continued, could contribute an extra 36 million children to its population by the year 2000. Haub says China has responded by asking its population-control agencies to sign up every potential candidate to a one-child promise. However, he adds, considerable skepticism exists as to whether officials can enforce the new policy.

India, with the world's second-largest population, also skews the UN projections. The medium-growth curve for India projected its total fertility rate at 3.7. In fact, Haub says, the rate is 4.3. Moreover, UN projections show India's fertility rate falling over the next five-year period to just 3.3—an unreasonable expectation, Haub suggests, considering the current rate.

Finally, the new Haub and Kent analysis indicates that more than one-third of the people in less developed countries are under age 15—compared with 20 percent in more developed nations. In less developed countries outside China, 40 percent of the residents are under 15; in some parts of Africa, nearly half are under 15.

This age factor points to how slowly population growth is likely to level off. Even as nations achieve a total fertility rate of 2—the "no-growth" or "replacement only" rate—the population will still increase for a generation or so, until all existing young women have their two children. Considering the abundance of young people in many nations, their populations likely will grow substantially for many years.

R&D growth slows to 11-year low

U.S. federal spending on research and development is expected to total \$132 billion this year, 7 percent more than in 1987. After this figure is adjusted for an anticipated 4 percent inflation, however, it will represent the lowest rate of growth in R&D spending since 1977, according to a recent analysis by the National Science Foundation.

Roughly 68 percent of R&D spending will go for development—projects that include much engineering and the design of prototypes or processes. This continues a gradual trend, begun in 1982, toward development and away from research. The shift "is primarily a result of major increases in federal spending on defense R&D activities," the analysts explain. Today, according to the study, defense programs account for an estimated 72 percent of federal R&D spending, and the Department of Defense alone for "fully 90 percent of the estimated growth in federal R&D support between 1980 and 1988." In the future, the

defense department is expected to continue this shift toward development—an area that already accounts for 92 percent of that agency's R&D spending.

Pressing researchers for R&D priorities

Addressing the National Academy of Sciences at its annual meeting on April 26, Academy President Frank Press proposed what few leaders of science have ever willingly offered: criteria for setting federal research funding priorities. He described them as "politically realistic and responsive to congressional requests for advice."

U.S. scientists are submitting record numbers of research proposals to federal funding agencies. Though generally "superb in quality," Press said, they are also "unprecedented in overall cost. And . . . come at a time of record budget deficits." Moreover, while choices must be made between them, Press said "our political leadership has no way of gauging the amount of resources necessary to maintain the strength of American science and technology."

While scientists do have the ability to set priorities for R&D funding, he maintains that "sniping and carping among scientists" over what to fund threatens to undermine the credibility of those who could offer constructive advice. So he recommends the scientific community—and especially the Academy—"be willing, for the first time, to propose [budget] priorities across scientific fields," organized into the following three broad categories:

- programs that have the highest priority and should be funded now, even when money is tight. Examples he gave were programs responding to national crises, such as AIDS; work on "extraordinary scientific breakthroughs," such as high-temperature superconductivity; and grants to preserve the human-resource base through training and the funding of individuals and small groups.
- large projects with important national or scientific goals that should be authorized now, even if full funding for these won't be available immediately. Cited examples included the Superconducting Super Collider and human-genome project.
- political "prerogatives" that support decisions made by the administration and Congress, including the Defense Department's national security initiatives, the space station and programs to enhance the competitiveness of U.S. R&D.

NSF lets reviewed review reviewers

The National Science Foundation (NSF) has completed the first major poll of its research-grant applicants, soliciting their views of how well the grant-proposal review process works. The agency contacted all 1985 grant applicants. Nearly half of the two-thirds who responded were satisfied, and another 14 percent had no opinion—even though two-thirds of the respondents had been rejected for funding.

What was really surprising, says James M. McCullough, NSF's director of program evaluation, was that most dissatisfaction was not over alleged cronyism, politics or bias. Instead, complainants usually charged that their reviews had been cursory, were conflicting, were conducted by persons who did not understand the subject well enough, or did not appear to reflect NSF's final funding decision.

But perhaps the biggest message for NSF, McCullough says, is the need for more feedback and encouragement to those who are turned down for funding—especially women and first-time grant applicants. He says the survey indicates these groups "are inclined to take one unhappy response and not come back." Similarly, with only 1 in 3 submitted proposals winning NSF support, he says, the message to applicants has got to be that "persistence pays off."