Alarming signs of environmental deterioration include global warming, extinction of species, waning forests and cropland, the collapse of ocean fisheries and decreasing fresh water supplies.

Yet, little attention is paid to the connection between these tragedies and their most fundamental cause: overuse of the planet’s resources due to the large and still rapidly increasing number of humans and our excessive consumption.

North America appeared to have limitless resources to the new European immigrants in centuries past (who ignored the needs and stewardship of their indigenous predecessors). More recently, tapping the energy of fossil fuels has allowed us to better master time and space. Harnessing highly productive plants such as potatoes and hybrid corn, along with other agricultural advances, have increased productivity to the extent that one farmer can produce food for more than 100 people, allowing the rest of us to focus on other activities.

Fortunately, most people no longer believe that the earth’s resources are limitless. But how does one determine when these limits are reached? One valid way of quantifying our use of resources is by calculating our ecological footprint (EF) [1]. This concept is based on the understanding that all human activities require space — to live on, to grow food on, for developing resources, and for disposal of waste. Some people have much larger footprints than others.

The amount of surface area on the earth is fixed and the planet’s entire surface is not equally useful. If one leaves a small proportion for the benefit of other animals and plants, there remain about 11 trillion hectares (28 trillion acres) of “bioproductive” land and water. Since there are 6.6 billion people on the planet, the allotment for each human is about 1.8 hectares (4.4 acres).

Ecological footprint can be calculated by using readily available figures for a country’s population, its gross production and utilization of key resources or by using the EF website (www.ecofoot.net), which provides information on the EF of individuals in many countries, as well as the means to calculate one’s own EF.

Using these calculations, we find that people are using an average of 2.2 hectares (5.5 acres) of the planet’s resources per person, a full 0.5 hectares (1.1 acres) more than our fair share. The overuse is much more marked in richer countries such as the United States, which has the largest EF. The worldwide overshoot of 30% helps to explain environmental deterioration.

The recent UN-sponsored Millennium Ecosystem Assessment examined the effects of ecosystem change on human health and well-being [2]. It found that humans have changed ecosystems more rapidly and extensively over the past 50 years than during any other period, primarily to meet increasing demands for food, fresh water, timber, fiber and fuel. Sixty percent of ecosystem services — the benefits people obtain from ecosystems — are being degraded or used unsustainably [2].

The more people there are and the more each consumes, the worse the deterioration. Ultimately, the condition of the planet may reach a level at which it will be unable to fully support the human population, causing deaths by starvation, disease and conflict [3].

Because our children and grandchildren will suffer, limiting human numbers and consumption have become moral issues, if not issues of life or death. Fortunately, many couples want to limit their childbearing far below their current fertility. What is missing is access to good family planning.

In recent years, the field of reproductive health has focused on the worthy goal of ensuring that family planning programs are voluntary, respond to the needs of individual women and men and address the HIV/AIDS epidemic. Less attention has been paid to the consequences of rapid population growth for the environment and economic development, stemming in part from the political dominance of a largely antiabortion and anti-environmental administration and Congress in the United States.

The substantial decline in world birth rates over the past 50 years is a family planning success story, but it has lulled our sense of urgency toward increasing annual population.

---

1 Ecological footprint is a measure of the load imposed by a given population on nature. It represents the “land” area necessary to sustain a current level of resource consumption and waste discharge by that population. It reveals how much of the globe’s surface area is needed to support any specific lifestyle indefinitely. Therefore, it is a steady-state measure, not an annual or other time frame measure.

0010-7824/$ – see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1016/j.contraception.2007.08.003
growth. In 1950, the world’s population was 2.6 billion; the lifetime average number of children per woman (total fertility rate, or TFR) was 5.3; and annual population growth was 48 million [4]. Since then, the TFR has decreased to 2.6, and death rates have declined. This is good news. Unfortunately, world population has increased to 6.6 billion, and about 78 million people are now added to the world each year [4].

Most of worldwide population growth will be caused by population momentum — resulting from large numbers of people entering their childbearing years — and by unintended or unwanted pregnancy [5]. Of 210 million pregnancies annually worldwide, 80 million (38%) are unplanned, and 46 million (22%) end in abortion [6].

More than 200 million women in developing countries would like to delay their next pregnancy — or stop bearing children altogether — but rely on traditional, less effective methods of contraception (64 million) or use no method because they lack access or face other barriers to using contraception (137 million) [7]. These barriers include cultural values that support high fertility, opposition to use of contraception by family members, and fears about health risks or side effects of contraception [8].

In contrast to almost all other developed countries, the United States — the world’s third largest country — is experiencing rapid population growth of nearly three million each year [9]. The United States is projected to grow from 303 million in 2007 to nearly 350 million in 2025 and to 420 million by 2050 [10]. An estimated 1.4 million of 4.1 million annual US births result from unintended pregnancy. The other 2.7 million are largely offset by the 2.4 million annual deaths [11]. Even with immigration contributing more than one million people annually, unintended pregnancy is the source of about half of annual population growth in the United States.

1. We must improve access to family planning and safe, legal abortion

According to Dr. Malcolm Potts: “All societies with unconstrained access to fertility regulation, including abortion, experience a rapid decline to replacement levels of fertility, and often lower” [12]. The development and introduction of modern contraceptives and the establishment of organized family planning programs have helped reduce the TFR of developing countries by half, from 6.0 in 1960 to 3.1 [13]. But a high unmet need for family planning and safe abortion services persists [6].

2. International challenges

Recent increases in assistance for HIV/AIDS are welcome. Unfortunately, donor funding dedicated to family planning activities decreased in absolute dollar amounts from $723 million in 1995 to $442 million in 2004, while funds for STI/HIV/AIDS increased 22-fold to $2.7 billion. Family planning assistance in 2004 reached only 9% of a 2005 $5 billion annual target [14–17].

3. US challenges

Unintended pregnancy remains a major problem in the United States, especially for low-income women. Comprehensive sexuality education — which could help prevent pregnancy and is favored by a majority of parents and educational experts — is being replaced by ineffective “abstinence unless married” programs.

Inflation-adjusted funding for Title X — the nation’s only distinct, federally funded family planning program — has declined by half since 1980 [18]. With 17 million women reliant on publicly funded family planning services, an annual expenditure of about $3.5 billion is needed [14,19]. But in 2001, public outlays were only $1.26 billion — about one third of the total required [19].

There is almost no governmental support for research on abortion technologies, and governmental support for research on contraception has decreased in the last decade. Even the pharmaceutical industry and private foundations have decreased or stopped funding in these fields.

4. An agenda for action

We need to:

- Fully fund and strengthen reproductive health programs, including programs that address the HIV/AIDS epidemic.
- Provide comprehensive information about human sexuality and affordable, high-quality family planning and safe abortion services for all, including young people and the unmarried.
- Invest in research on contraceptive and abortion technologies to overcome issues relating to effectiveness, safety, cost, acceptability and side effects that hamper use of current methods.

Better reproductive health care and decreased population pressures will not suffice to preserve the environment. There is also an urgent need for people — particularly in the United States — to reduce consumption of critical natural resources and decrease the resulting waste and pollution. We also need to change our concept of economic progress that is seemingly based upon ever-expanding consumption. Redefining Progress (www.redefiningprogress.org) and Brown [20] provide other economic models that de-emphasize production of material goods and place greater value on ecological services and preservation of natural resources.

The health and other welfare benefits of preventing unintended pregnancy are felt most keenly by individual women, men and their families. At the same time, increased access to family planning in all countries, combined with
measures to reduce consumption in wealthier nations, offer a powerful strategy for helping ensure environmental sustainability [14,21].

J. Joseph Speidel
Department of Obstetrics, Gynecology and Reproductive Sciences, Bixby Center for Reproductive Health Research & Policy, University of California, San Francisco, Box 0744, San Francisco, CA 94143-0744, USA
E-mail address: speidelj@obgyn.ucsf.edu

Richard A. Grossman
Department of Obstetrics and Gynecology
University of Colorado
Durango, CO 81302, USA
E-mail address: richard@population-matters.org

References