

Demography and Policy: A View from Outside the Discipline

PAUL R. EHRLICH

IT WAS THE economist Robert Malthus who penned the first well-known demographic formulation describing the present human predicament: “Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio.” In modern terms he can be viewed as pointing to the first term on the right side of the $I=PAT$ equation¹ and relating it to environmental factors and to potential levels of consumption—especially of food. He did not, however, imagine at the turn of the nineteenth century that much of the future “checking” of population would come through the use of technology to limit fertility. Malthus in the public mind is considered to be a founder of demography, although most demographers would more likely trace the early roots of their discipline to such pioneers as the Berber historian-scholar Ibn Khaldoun (1332–1406) or even Tertullian. Tertullian was well aware around 200 CE that humanity had “grown luxuriantly” and expressed the view that “we are burdensome to the world” (Holland 1993).

Curiously, the discipline has largely diverged from environmental concerns and the broad analyses of social structures associated with Malthus and Ibn Khaldoun. Instead today it focuses on measuring and modeling the dynamics of various populations, evaluating the reasons for changes in vital rates—especially the total fertility rate—and doing technical analyses of social issues associated with demographic variables: disease incidence, disability, divorce, race, age at first sexual activity, education, and so on. These analyses are valuable, but they only peripherally address the really big demographic issue: the role of population growth in damaging humanity’s life-support systems, and developing policies that will help to prevent the damage.

Demography and the human predicament

Some extremely important work on the present human predicament is being done by demographers and other social scientists. For example, they have made much progress in measuring human welfare, as in designing the Human Development Index of the United Nations Development Programme and the World Health Organization's Global Burden of Disease. But on the really big environmental issue, most demographers either are not asked or don't speak out. For example, a news article in the journal *Science* (Balter 2006) showed a near total lack of appreciation among demographers of the roles of population and consumption in the ruining of Earth's life-support systems. It stated that the population bomb "wasn't" and carried the message that the big concern about fertility rates is that they are too low. This attitude carried over to much congratulatory coverage in the media when what might be considered the world's most overpopulated nation (based on its high level of per capita consumption and huge population), the United States, passed 300 million people in 2006. There was essentially no public dissent from the demographic community.² No attention was paid to the views held by many distinguished scientists, eloquently expressed by the World Scientists' Warning to Humanity (Union of Concerned Scientists 1993):

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about.

One of their five recommendations was: "We must stabilize population."

Another report in 1993, this one issued by fifty-eight of the world's academies of science (including the National Academy of Sciences in the United States, the Royal Society in the United Kingdom, the Chinese Academy of Sciences, the Indian National Science Academy, the Brazilian Academy of Sciences, and the Third World Academy of Sciences), and including demographers among its framers, stated:

The magnitude of the threat to the ecosystem is linked to human population size and resource use per person. Resource use, waste production and environmental degradation are accelerated by population growth. They are further exacerbated by consumption habits.... As human numbers further increase, the potential for irreversible changes of far-reaching magnitude also increases.... With current technologies, present levels of consumption by the developed world are likely to lead to serious negative consequences for all countries.³

In generating and analyzing global and national population statistics, as exemplified by the Population Reference Bureau's extraordinarily useful annual Population Data Sheet and web site, demographers have done a vast service for all those interested in the human predicament. But the service they have done has, strangely, not vaulted demographers into leadership positions in addressing that predicament. Their contributions are largely unsung. An eminent biologist with a strong interest in population issues, the late Garrett Hardin, asked rhetorically in 1985 what "deep insights" professional demographers have contributed to understanding the population problem; he answered, "None" (Hardin 1988: 3). This is, I think, an unfair statement, especially considering the small size of the discipline, but it does represent a widespread and unhappy impression of the field among biologists.

The population problem was first brought to the attention of many Americans shortly after World War II by the ecologist William Vogt (1948) and the conservationist Fairfield Osborne (1948). It was Norman Borlaug, an agronomist, who said in his 1970 Nobel Prize address:

The green revolution has won a temporary success in man's war against hunger and deprivation; it has given man a breathing space. If fully implemented, the revolution can provide sufficient food for sustenance during the next three decades. But the frightening power of human reproduction must also be curbed; otherwise the success of the green revolution will be ephemeral only. Most people still fail to comprehend the magnitude and menace of the "Population Monster."⁴

How right he was! The world's food supply today, nearly four decades later, is more precarious than ever, with minimal reserves, its future threatened by both climate change and a movement to grow crops for conversion to portable biofuels, falsely advertised as helping to slow climate change. Success to date in maintaining per capita food supplies—but not in greatly improving the lot of the poor half of humanity—has been due in part to the green revolution that Borlaug pioneered and in part to reductions in birth rates since 1970. But the green revolution has mostly run its course and begun to encounter the environmental consequences of intensive, industrial agriculture. And the success of the family planning movement also has lost its earlier momentum, the result of misguided and short-sighted policies, especially those of the United States government.

Most of the demographers who shared Borlaug's concern, such as Kingsley Davis and Nathan Keyfitz, have passed from the scene without making much public impact, not to be replaced. Others, such as John Bongaarts, continue to do excellent research (an early example is Bongaarts and Greenhalgh 1985) and have influenced population policies. And *Population and Environment*, *Population and Development Review*, and numerous publications

of the Population Reference Bureau frequently address environmental issues. But, like demographers in general, these publications have not attracted much attention from the media. Perhaps, as suggested to me by one reviewer, demographers believe they have too frequently predicted population-related disasters that (according to the popular press) have not materialized. This is a serious problem for both demographers and ecologists, since many if not most members of the press (like the rest of the “educated” public) are almost totally ignorant of subtle and complex technical issues such as how population growth exacerbates the threats to humanity posed by the decay of biodiversity, the probability of vast new pandemics, and rapid climate change.

As was the case with Malthus and Ibn Khaldoun, many important contributions to demography have come from scholars originally trained outside of that field. Two scholars who developed predictions of resource calamities associated with continued population growth in China were control systems engineers, Song Jian and Zhenghua Jiang; and one of the researchers (among many demographers) leading studies of the skewed sex ratios in China resulting from the one-child family policy in combination with parents’ continued preference for sons is my geneticist colleague Marc Feldman (Feldman et al. 2005). He has worked closely with the demographer Li Shuzhuo of Xi’an Jiaotong University in developing the “Care for Girls” program designed to ameliorate the problem. Analyses of key global issues such as the environmental impacts of household dynamics have been pioneered by the ecologist Jack Liu (Liu et al. 2003), and overall carrying capacity and closely related analyses of humans’ “ecological footprint” have also been the domain of ecologists and public policy experts (Wackernagel and Rees 1996; Daily et al. 1994; Daily and Ehrlich 1996). These are topics to which traditional demographers should have paid careful attention and made substantial contributions. Things still haven’t changed. A statement by the physicist Chris Rapley in July 2007 led to a headline in the *Guardian*—“Science chief: cut birthrate to save Earth” (McKie 2007). Again it was a natural scientist, rather than a demographer, warning about overpopulation.

I suspect if he were asked about the contributions of demographers today, Hardin’s view would be even more dismissive. The reason, in short, is that the discipline has continued to avoid dealing with the biggest policy issues in the area of population: How many people can Earth’s ecosystems support? How do the size of the global population, the planet’s carrying capacity under various assumptions, and the distribution of political power interact with those issues demographers study so well, such as the impact of women’s education on fertility, the role of local and regional population size on health, the demography of human migrations, and so on? This unwillingness to confront the big issues has worsened in the last decade. The August 2007 issue of *Africa Geographic*⁵ from Capetown devoted to climate change commented thus in an article titled “The Earth’s growing population: At least let’s talk about it”:

The size of the human population is inextricably interwoven with global warming, yet seldom will “population” be found on the agendas of global economic and sustainability forums. It is a taboo subject that offends political, social and religious correctness and so it is swept under the table, making a mockery of deliberations around notions of sustainable development. As James Lovelock [2001, p. 153] has commented: “We have grown in number to the point where our presence is perceptibly disabling the planet like a disease.”

Lovelock is not a demographer, but a physician, inventor, and long-time Fellow of Britain’s Royal Society who created the electron capture detector that led to the discovery that humanity was threatened with disaster through destruction of the stratospheric ozone layer.

A symptom of this aversion of politicians and the media to dealing with population issues (and thus with demographers) is the agenda of the United Nations Environment Programme. UNEP covers such vital areas as international trade in endangered species and in hazardous materials and at least helps keep these population-related issues alive. But it is symbolic of the avoidance of demographic issues that the UNEP web site does not include population as a thematic area. Turf wars and political correctness keep the United Nations from being an effective force in relating population size and growth to the most critical human problems, and the same forces keep demographers out of the limelight.

All of this traces in part to a lack of vision and public outreach in the discipline (shared across much of the social sciences) and to a misperception, rooted perhaps in the usually narrow training of social scientists, that recent declines in birth rates have been adequate to avoid disaster, and in part to a wave of irresponsible political correctness among funders in the foundation community. As a result, as *Africa Geographic* noted, the environmental repercussions of population size have largely dropped off the radar screen to be replaced with a narrow focus on issues of reproductive rights and maternal and child health (Kantner and Kantner 2006). Both of the latter are critical areas for concern. But demographers must keep in mind, and in the public eye, that if the much more fundamental problems of the damage being inflicted upon humanity’s life-support systems are not solved, those issues will become secondary. Population is the key factor in the $I=PAT$ equation because its growth is the one driver of environmental deterioration that requires the greatest time and care to curb humanely.

One sad consequence of these failures is that humanity, if it is fortunate to avoid great increases in mortality rates, is facing an addition to the planet in the next several decades of more people than were alive when I was born in 1932. And those additional billions of people will have a disproportionate impact on the systems that support human societies. People are clever: they farm the richest soils first, mine the most concentrated ores, pump the shallowest aquifers and oil pools, exhaust the most convenient pollution sinks,

and settle as close as possible to other valued resources. As the available resources become increasingly depleted or despoiled, each person added to the planet on average contributes more to environmental deterioration than the previous person (Ehrlich and Ehrlich 2005).

Demography needs more prominence

Another sad consequence is that an extremely important discipline is virtually unknown to the general public; in that respect, demography is more like statistical mechanics than like ecology or economics. Worse yet, demography lacks the representation it should have in academia. My guess is that a main reason for its neglect has been the failure of many demographers to collaborate with researchers in more widely publicized disciplines. While environmental economics promises to save old-fashioned economics from near total irrelevance (Ehrlich 2008), for practical purposes there is as yet no parallel environmental demography.

But there is hope. Demographers and epidemiologists are working together on issues like patterns of malaria risk (Castro et al. 2006), and anthropologists, ecologists, and demographers are collaborating to elucidate the critical ways in which population size, environment, and culture interact—in many respects, the most critical of all issues (Kirch et al. 2007).

What can demographers do to increase their prestige and their policy impact? In all disciplines, researchers (myself included) get pleasure from what one of my colleagues described as “doing more and more sophisticated investigations of more and more trivial problems.” And researchers deserve some pleasure because the pay is hardly handsome, and the results of such research at least ordinarily add something to our understanding of how the world works. But some of our time should be devoted to tackling the big issues, even when the tools available are not what they ought to be. Both demographers and ecologists must avoid the syndrome of the drunk searching for his keys under the lamp post, even though he lost them in the dark alley, “because the light is better.”

What sorts of policy issues might demographers be examining? Here’s a far from exhaustive series of suggestions:

- 1) The “problems” created by an aging population. Demographers should have been in the lead in pointing out publicly that the benefits of the inevitable aging, indicating an ending of population growth, far outweigh the costs, and that most of the political commentary on the subject has been, in technical terms, “spherically senseless”: ridiculous from all viewpoints (Ehrlich and Ehrlich 2006). Demographers such as my colleague Shripad Tuljapurkar have analyzed the issues surrounding population aging and are perfectly positioned both to lessen the fear of aging population structures and to initiate planning for adjusting to them (Tuljapurkar 2002, 2005). De-

mographers also are the ideal group to analyze how to deal with the equally inevitable gradual (I hope) population shrinkage.

But demographers usually are not consulted by the media, and, when they are, they are all too often represented by individuals who are ignorant of the environmental situation. A typical example is an article in the *Wall Street Journal* by demographer Nicholas Eberstadt on China's one-child family being a "mistake"—with no mention of that country's resource-environment situation, which presented the Chinese government with little choice. His statement was embellished with the usual alarmist statements on the aging of the population and a dramatically erroneous (but politically correct) statement about how people are the "wealth of modern societies" (Eberstadt 2007). While human beings can be regarded as productive assets (embodying "human capital," in economists' lingo), it is a mistake to view every increase in human numbers as expanding real wealth, the capacity for well-being. Given the reality of scarce natural resources, increases in population often reduce per capita wealth and can even reduce a nation's total wealth. If wealth were simply proportional to human numbers, China and India would each be three to four times as wealthy as the United States and much wealthier than all the nations of Europe combined, Africa would be richer than North America or Europe, and Yemen would be three times as prosperous as Israel.

In my view, knowledgeable demographers should promote their expertise more aggressively. There is probably no hope of getting anything intelligent into the *Wall Street Journal's* editorial pages. But when the *New York Times* makes a short-sighted statement on the topic of population aging, as it did recently about Ireland with its high rate of immigration from developing countries—"The country will remain young for decades, say the experts, and escape the 'graying' fate of the rest of Europe" (Quinn 2007)—things should be different. In such circumstances demographers should be first to take the opportunity to write letters and op-eds to help educate journalists and the public to the fact that the "graying" has helped reduce the menace of Borlaug's "Population Monster." They should point out that in countries where the A (per capita affluence) of PAT is high (with the notable exception of the United States), population decline is the prospect. That is the best news of all, since those countries have the high per capita consumption that puts much of the burden on our life-support systems.

2) Demographers should inject themselves much more readily into discussions about carrying capacity issues and increase public awareness of the fact that Earth's ability to support human life is, by definition, limited, and that in the view of many experts it has already been exceeded. Demographers are in an especially good position to collaborate with economists and ecologists in bringing issues of population structure into the discussion, including critical ones about the costs and benefits to society of changes in relative co-

hort sizes—for example, the potential influence of the expansion of “terrorist age-classes” in the Middle East (Ehrlich and Liu 2006).

3) With their extensive expertise in why people choose to have children, tracing in part to numerous “knowledge-attitudes-practices” (KAP) surveys, demographers should be designing policies not just for bringing human population growth to a halt as rapidly as possible through humane and economically sensible means, but also planning for population reductions. Collaborating with ecologists and economists, they could take the lead in this critical but nearly totally neglected area—one that is loaded with ethical questions and will be absolutely central if humanity is to avoid an ecocatastrophe.

4) Demographers need to work with environmental scientists and economists in comparing demographic with other approaches to environmental problems. For instance, how much might future greenhouse gas emissions be reduced by investing a given sum in educating women in India as opposed to using the same funds to promote solar technologies? How much reduction in the United States population would be required, under a variety of technological, consumption, and climatic scenarios, to restore sustainability to the Ogallala aquifer in the Great Plains?

5) The United States today presents the bizarre picture of a country that debates immigration policy without having a population policy. That is roughly like trying to design an airplane that can load a certain number of people per minute without deciding what its passenger capacity should be. Demographers should be making greater public efforts to bring the United States into line with the rest of the modern world by exploring population policies as well as migration policies—in close coordination with work on the country’s environmental footprint and carrying capacity.

Looking to the future

One thing seems certain. Graduate training in demography needs to be reinforced with more coverage of environmental biology. The decline in the stature of demography relative to the importance of its area of expertise could never have occurred if all demographers understood the seriousness of the loss of biodiversity (Ehrlich and Pringle 2008), the depreciation of natural capital, the probable impacts of climate change on supplies of food and water, the worsening of the epidemiological environment, and related topics. The many difficult ethical issues embedded in the “population problem” cannot be addressed with reasonable and ethical policies until careful cost–benefit analyses have been carried out with emphasis on the distribution of both costs and benefits.

Much refurbished training in demography could follow the example of ecological economics. The dismal science, often bogged down in pointless exercises in applied mathematics, is being rejuvenated by increasing num-

bers of economists now dealing with crucial environmental issues (Dasgupta 2001; Arrow et al. 2004; Ehrlich and Goulder 2007), and smart ecologists are increasingly requiring their graduate students to be steeped in economics (demography has long been part of their basic training). Ecological economists have lively professional societies such as the Society for Ecological Economics and the European Association of Environmental and Resource Economists, which are beginning to examine many of the truly critical problems facing society. Above all, training of demographers should adopt a new standard of scientific responsibility, as ecologists are gradually doing. When I was trained, I was told that I hadn't finished my research until I had communicated my results (in peer-reviewed papers) to other scientists. The new standard adds: "and told the general public about the importance of your results." We need to develop an ecological demography movement that deals with the enormous importance of human numbers to the human future.

To go even further, demography has a central intellectual position in the social and environmental sciences. After all, societal change often shows up first in demographic indicators, and almost all of cultural evolution, including how societies interact with their environments, has a demographic component. Demographers might follow the traditions of Ibn Khaldoun and Malthus and play a leading role in the badly needed restructuring of the social sciences to make them more effective at helping to solve serious human problems.

It is likely that in the next few years foundations will once again realize the critical importance of population issues, and a great deal of money might then become available to deal with them. The situation may be not unlike that of the early 1970s, when the big foundations discovered the environment. What was striking to me then was the dearth of first-rate ecologists ready and willing to undertake the needed research. Indeed it has taken the discipline nearly four decades to partly remedy that situation.

Universities have been even slower to change. Social scientists, in particular, still live in an antiquated and chaotic disciplinary structure (Wallerstein et al. 1996). Stanford conducts some of the best interdisciplinary environmental research in the world, yet the university regularly graduates a majority of students (and pays a majority of faculty members) who have only the slightest clue about how the world works. They cannot provide a coherent summary of what factors are critical in the demographic situation, define the total fertility rate, or explain why we're facing climate change, what an ecosystem service is, how genetic evolution works, what social learning is, what marking up a bill means, why discount rates vary, or what Rawls's "veil of ignorance" is. But this cannot go on forever, and I think (or hope) that universities will soon revise their structures and curriculums. They must recognize what has become known as the human predicament: the weight of human numbers coupled with humanity's unprecedented technological capacity that now threatens to overwhelm Earth's ability to sustain a global civilization (Ehrlich

and Ehrlich 2008). And they must train graduates to deal with this predicament both as professionals and as citizens.

So it would behoove more academic demographers to start providing students with good interdisciplinary skills, prepared to take advantage of funds and positions when they open up. It would also behoove them to train their students to speak out on important issues. To give one last example, midcareer demographic scholars with an interest in and aptitude for public service and education should be encouraged to apply to the Aldo Leopold Leadership Program, designed to train scientists to deal with Congress, the media, business leaders, and the general public, to hone the skills required to have a maximum impact on policy.⁶ The time is surely ripe for demography to move into the front rank of disciplines striving to produce a sustainable society.

Notes

I thank Gretchen Daily, Anne Ehrlich, Marcus Feldman, Lawrence Goulder, Shripad Tuljapurkar, and Wren Wirth for helpful comments on the manuscript. Three anonymous reviewers were kind enough to give in-depth comments, and many of their suggestions have been incorporated. The work was supported by a grant from the Mertz Gilmore Foundation.

1 Environmental impact (I) is the product of population (P); affluence (A), measured as GNP per person; and technology efficiency (T), expressed as impact per unit of GNP.

2 See, however, the editorial introduction to the Archives item in *Population and Development Review* 32(4): 771–772 (December 2006).

3 The full text of this Report appeared in *Population and Development Review* 20(1): 233–238. The quotations are from page 235.

4 http://nobelprize.org/nobel_prizes/peace/laureates/1970/borlaug-lecture.html.

5 Vol 15, no. 7.

6 <http://leopoldleadership.org/content/>

References

- Arrow, K. et al. 2004. "Are we consuming too much?," *Journal of Economic Perspectives* 18: 147–172.
- Balter, M. 2006. "The baby deficit," *Science* 312: 1894–1897.
- Bongaarts, J. and S. Greenhalgh. 1985. "An alternative to the one-child policy in China," *Population and Development Review* 11: 585–617.
- Castro, M. C., R. L. Monte-Mór, D. O. Sawyer, and B. H. Singer. 2006. "Malaria risk on the Amazon frontier," *Proceedings of the National Academy of Sciences* 103: 2452–2457.
- Daily, G. C. and P. R. Ehrlich. 1996. "Socioeconomic equity, sustainability, and Earth's carrying capacity," *Ecological Applications* 6: 991–1001.
- Daily G. C., A. H. Ehrlich, and P. R. Ehrlich. 1994. "Optimum human population size," *Population and Environment* 15: 469–475.
- Dasgupta P. 2001. *Human Well-being and the Natural Environment*. Oxford, UK: Oxford University Press.
- Eberstadt, N. 2007. "China's one-child mistake," *Wall Street Journal*, 17 September: A17.
- Ehrlich, P. R. 2008. "Key issues for attention from ecological economists," *Environment and Development Economics* 13: 1–20.

- Ehrlich, P. R. and A. H. Ehrlich. 2005. *One with Nineveh: Politics, Consumption, and the Human Future* (with new afterword). Washington, DC: Island Press.
- . 2006. "Enough already," *New Scientist* 191: 46–50.
- . 2008. *The Dominant Animal: Human Evolution and the Environment*. Washington, DC: Island Press, in press.
- Ehrlich, P. R. and L. H. Goulder. 2007. "Is current consumption excessive? A general framework and some indications for the U.S.," *Conservation Biology* 21: 1145–1154.
- Ehrlich, P. R. and J. Liu. 2006. "Socioeconomic and demographic roots of terrorism," in J. J. F. Forest (ed.), *The Making of a Terrorist: Recruitment, Training, and Root Causes*, vol. 3. Westport, CT: Praeger Security International, pp. 160–171.
- Ehrlich, P. R. and R. M. Pringle. 2008. "Where does biodiversity go from here? A grim business-as-usual forecast and a hopeful portfolio of partial solutions," *Proceedings of the National Academy of Sciences* (in press).
- Feldman, M. W., S. Li, N. Li, S. Tuljapurkar, and X. Jin. 2005. "Son preference, marriage, and intergenerational transfer in rural China," in S. Bowles, H. Gintis, and M. Osborne Groves (eds.), *Unequal Chances: Family Background and Economic Success*. Princeton, NJ: Princeton University Press, pp. 232–255.
- Hardin, Garrett. 1988. "Cassandra's role in the population wrangle," in Paul R. Ehrlich and John P. Holdren (eds.), *The Cassandra Conference: Resources and the Human Predicament*. College Station, TX: Texas A & M University Press.
- Holland, Bart K. 1993. "A view of population growth circa AD 200," *Population and Development Review* 19: 328–329.
- Kantner, J. F. and A. Kantner. 2006. *The Struggle for International Consensus on Population and Development*. New York: Palgrave Macmillan.
- Kirch, P. V. et al. 2007. "Human ecodynamics in the Hawaiian ecosystem, from 1200 to 200 yr BP," in T. A. Kohler and S. E. van der Leeuw (eds.), *Model-Based Archaeology of Socionatural Systems*. Santa Fe, NM: SAR Press.
- Liu, J., G. Daily, P. R. Ehrlich, and G. Luck. 2003. "Effects of household dynamics on resource consumption and biodiversity," *Nature* 421: 530–533.
- Lovelock, J. 2001. *Gaia: The Practical Science of Planetary Medicine*. New York: Oxford University Press.
- McKie, R. 2007. "Science chief: Cut birthrate to save Earth," *Guardian Unlimited*, 22 July.
- Quinn, Eamon. 2007. "Ireland learns to adopt to a population growth spurt," *New York Times*, 19 August.
- Osborne, F. 1948. *Our Plundered Planet*. Boston, MA: Little, Brown.
- Tuljapurkar, S. 2002. "Demographic forces in South Asia through 2050: Population, economy, health," in M. R. Chambers (ed.), *South Asia in 2020: Future Strategic Balances and Alliances*. Carlisle Barracks, PA: US Army War College, pp. 105–124.
- . 2005. "Structural and policy consequences of mortality and fertility decline," in Shripad Tuljapurkar, Ian Pool, and Vipan Prachuabmoh (eds.), *Population, Resources and Development: Riding the Age Waves*. Volume 1, *International Studies of Population*. Dordrecht, Netherlands: Springer Verlag, pp. 139–154.
- Union of Concerned Scientists. 1993. *World Scientists' Warning to Humanity*. Cambridge, MA: Union of Concerned Scientists. The text of this Declaration also appears in full in *Population and Development Review* 18(4): 782–784.
- Vogt, W. 1948. *Road to Survival*. New York: William Sloan.
- Wackernagel, M. and W. Rees. 1996. *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island, BC: New Society Publishers.
- Wallerstein I., C. Juma, E. F. Keller, J. Kocka, and D. Lecourt. 1996. *Open the Social Sciences: Report of the Gulbenkian Commission on the Restructuring of the Social Sciences*. Stanford, CA: Stanford University Press.

