
Appendix 6.2

The following material is Appendix 6.2 for Chapter 6 of: Fowler, C.W. 2009. Systemic Management: Sustainable Human Interactions with Ecosystems and the Biosphere. Oxford University Press

1 Overpopulation as contributing cause to environmental degradation

The following table contains a sample of statements (primarily from the ecological/ecosystem literature) regarding human overpopulation or population growth seen as one of the main factors in the causes of altered (usually evaluated as degraded) ecosystems.

Allen and Hoekstra (1992):

“The nonequilibrium nature of the modern world is something that emerges when we try to describe ecological systems in terms of the old parts of the biosphere that existed before the human population explosion.”

Andrewartha and Birch (1984):

“...cause for extinctions seems to be the destruction of habitat by burgeoning populations of *Homo sapiens*...”

Bateson (1972):

“...the more basic causes of the current rash of environmental troubles. The present testimony argues that these basic causes lie in the combined action of (a) technological advance; (b) population increase; and (c) conventional (but wrong) ideas about the nature of man and his relation to the environment.”

Brown and Maurer (1989):

“Within the last few centuries the exponentially growing population of *Homo sapiens* has changed in the rules of resource allocation. Human beings currently use 20 to 40% of the solar energy that is captured in organic material by land plants... Never before in the history of the earth has a single species been so widely distributed

and monopolized such a large fraction of the energetic resources. An ever-diminishing remainder of these limited resources is now being divided among the millions of other species. The consequences are predictable: contraction of geographic ranges, reduction of population sizes, and increasing probability of extinction for most wild species; expansion of ranges and increased populations of the few species that benefit from human activities; and loss of biological diversity at all scales from local to global.”

L. Brown (1971):

“...I conclude that we have already, at some time in the past, exceeded our optimum population level in the United States.”

Catton (1980):

“Famine in the modern world must be read as one of several symptoms reflecting a deeper malady in the human condition—namely, diachronic competition, a relationship whereby contemporary well-being is achieved at the expense of our descendants.” “We are already living in an overloaded world. Our future will be a product of that fact; that fact is a product of our past.” “Barring human extinction, there will never come an end to man’s need for enlightened self-restraint—the conservation ethic, as Leopold understood it.”

Christensen *et al.* (1996):

“We must also address such daunting issues as human population growth, poverty, and human perceptions regarding the use of energy and natural resources.”

Cox (1993):

“...conservation ecology has emerged because of a basic need: the human population stands on the verge of causing the massive extinction of species throughout the biosphere.”

Diamond (1989):

“As regards the future, consideration of the main mechanisms of human-caused extinctions (over hunting,

effects of introduced species, habitat destruction, and secondary ripple effects) indicates that the rate of extinction is accelerating. The basic reason is that there are now more humans than ever before, armed with more potent destructive technology and encroaching on the world's most species-rich habitats: the continental tropical rain forests."

Ehrlich (1980):

"Three key assertions can be made about this growing human impact on the biosphere. First, unless these trends can be reversed, the most ingenious tactics on the part of the conservation movement will, at best, slightly delay an unhappy end to the biotic armageddon now underway.... a non trivial consequence of the failure to reverse these trends will be the disappearance of civilization as we know it." "Continued human population growth and conservation are fundamentally incompatible." "It goes almost without saying that the conservation movement must join even more whole heartedly in the population control movement."

Ehrlich (1985):

"The human population must gradually be reduced to a size that can be sustained in the long-term with every body living a decent life.... the only way to go."

Eldredge (1991):

"But there is equally no doubt that our threat is the greatest one, at least over the short term: we seem to be able to affect more environmental change per unit of time than any other factor ever proposed as a cause for serious bouts of extinction, with the sole exception of the most catastrophic of bolide impact scenarios." "It has been said thousands of times that it is our own unbridled growth—growth and utilization and exploitation of resources, leading to the most important aspects of all, growth of our own populations—that poses the greatest threat to the global ecosystem, and thus, ironically, to our own survival. High population numbers generally help insulate against extinction, but that is for species that have remained integrated into a variety of different local ecosystems."

Freedman (1989):

"...the size of the human population remains a root cause of the degradation of our environment."

Jenkins (1985):

"...human species is lurching and stumbling toward a biological catastrophe of the first order."

Koshland (1992):

"...the environment is threatened by a population growth that is proceeding largely unchecked."

Lollar (1991):

In 1960 the AAAS board supported a statement on overpopulation signed by Nobel laureates and others for submission to the United Nations calling for international action: The "...AAAS is concerned that continued rapid growth of the human population contributes directly to human suffering throughout the planet, impedes sustainable economic development, increases international tensions, and exacerbates environmental degradation and endangers the survival of the human and many other species;..."

Mangel *et al.* (1996):

"Maintenance of healthy populations of wild living resources in perpetuity is inconsistent with unlimited growth of human consumption of and demand for those resources." "It is almost certain that the only practicable way to reduce human per capita resource demand is to stabilize and then decrease the human population."

May (1990):

"Human activities are destroying natural habitats, and the associated biota, at rates that are probably without precedent in the history of life on Earth." "The scale and scope of human activity are now so large that they rival the natural processes that created and maintained the biosphere as a place where life can flourish." "The clock ticks faster and faster as human numbers continue to grow, and each year 1–2% of the tropical forests are destroyed."

Odum (1972):

"Controlled management of the human population together with the resources and the life support system on which it depends as a single, integrated unit now becomes the greatest, and certainly the most difficult, challenge ever faced by human society."

Paddock (1971):

"Based on the limitations of our agriculture, too many people now live in the United States. Our optimum population size is, therefore, less than our current 205 million people."

Pimentel and Dodds (1999):

"Environmental quality and Earth's capacity to support people will only diminish given current trends in both per capita resource use and human population growth."

Pimentel, Stachow *et al.* (1992):

"However, with the escalation of human numbers, the movement of humans into wild areas, and industrialization, a decline in species diversity... is associated with the destruction of ecosystems." "These trends are accelerated by the ever burgeoning rates of human population growth: a quarter-million humans added each day to the world's population of 5.3 billion..." "...In developed countries the use of natural resources may be 100- to 600-fold more per capita than in developing countries." "...Humans have destroyed approximately 44% of the world's tropical forests..." "The deterioration of current agriculture land, combined with the increasing population, results in approximately 15 million ha of new agriculture land being needed each year to satisfy human food needs."

Pimm (1991):

"The expected catastrophic extinction of species (already well underway in many places) will alter the planet's biological diversity so profoundly that, at known rates of speciation, it will take millions of years to recover it." "...I predict that there will be at least 10 billion [humans], dying from many causes each of which is orders of magnitude more important than the genetic causes the human genome sequencing will uncover. If we do not understand ecological processes better than at present, these 10 billion humans will be destroying our planet more rapidly than we are now."

Pimm and Gilpin (1989):

"The human species needs desperately to find a new way to navigate its ship of technology and population. One problem is that we are drowning too many other species in our wake."

Risser *et al.* (1991):

"Disturbing examples of environmental problems around the world lead to the unescapable conclusion that human activities have begun to threaten the ability of Earth to support even current human life-styles.... A few years ago, statements that Earth's ability to sustain human populations as threatened might have been dismissed as unsubstantiated assertions from pessimistic, emotion-driven environmentalists. Now, however, that conclusion comes from the broader scientific community." "If Earth's ability to support both humans and natural functions of the biosphere is in jeopardy, then there is no higher priority for the attention of society."

Rosenzweig (1974):

"Overpopulation and ecological insanity are not likely to produce the total extinction of man. Instead, the result will be treatable calamity: massive increase in famine and disease coupled with destruction of our way of life and its replacement by a sparse, bleak, marginal existence in which disease and deprivation will culminate in a permanently higher death rate—especially among infants and children. Surely most people will agree that is worth avoiding." "We do not predict overpopulation; **we are observing it.**"

Singer (1971):

"We have by far exceeded an optimum level of population."

Southwick (1985):

"...by 2000 the world's human population may be within only a few generations of reaching of the entire planet's carrying capacity."

Soulé and Wilcox (1980b):

"A green mantle of earth is now being ravaged and pilaged in a frenzy of exploitation by a mushrooming mass of humans and bulldozers."

Talbot, L.M. (2008):

"...the exponential growth of human numbers has brought a corresponding exponential rise in environmental impacts which, in turn have been amplified by increasing technology."

Tudge (1989):

"Our population cannot continue to expand at its present rate for much longer, and the examples of many other species suggest that expansion can end in catastrophic collapse." "Survival beyond the next century in a tolerable state seems most unlikely unless all religions and economies begin to take account of the facts of biology. This, if it occurred, would be a step in cultural evolution that would compare in import with the birth of agriculture." "Human numbers are, of course, staggering. There is an ecological law—a simple extrapolation of bedrock physics which says that large, predatory animals are rare. We break that law..."

Whitmore (1980):

"Man's dependence on other organisms and especially upon plants is such that unless this attack on

them is moderated, man's own continued existence is threatened."

Whittaker (1975):

"The Malthusian problem has not...been escaped, but delayed, changed in implication, and probably intensified...the effects of overgrowth are now being felt by world society,..."

Woodwell (1990a):

"The earth's complement of living systems is being reduced now more rapidly than at any time previously by the spread of human influences. The changes are global; no part of the earth is unaffected, no natural or human-dominated community immune."

Woodwell (1990b):

"The cause of the disruption is a single species, *Homo sapiens*, which has escaped the normal limitations that keep the numbers of individuals of each species in check and has swarmed over the earth as no species has ever done previously. *Homo* has also succeeded in developing the capacity to turn other species and countless things into resources that favor the further expansion of the populations of *Homo*. The effect is a series of drastic changes in the biosphere that threaten all life."

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