GLOBAL 2000 Revisited

What shall we do?

The Critical Issues of the 21st Century

Gerald O. Barney
with Jane Blewett and Kristen R. Barney

A publication of
MILLENNIUM INSTITUTE

GLOBAL 2000

Revisited

What shall we do?

GLOBAL 2000 *Revisited*

What shall we do?

Gerald O. Barney

with Jane Blewett and Kristen R. Barney

A report on the critical issues of the 21st century
prepared for the 1993 Parliament of World's Religions

by the

MILLENNIUM INSTITUTE

Published by the:

MILLENNIUM INSTITUTE
A nonprofit organization promoting long-term integrated global thinking

1611 North Kent Street, Suite 204
Arlington, Virginia 22209-2135, USA

Copies of this book and a 16-page summary of the book may be ordered from:

Public Interest Publications
P.O. Box 229
Arlington, Virginia 22210, USA

Phone: +1-(800) 537-9359 in the U.S., Canada, and Mexico or
+1-(703) 243-2252
Fax: +1-(703) 243-2489

In memory of Adupa.

Contents

Acknowledgments

This report has been at least twenty-five years in the making. It would not have been possible without the love, support, and encouragement provided by my wife Carol, by our children, Bill, Kris, and Steve, and my father, Richard, and my mother, Gladys, now deceased.

Also essential has been the intellectual and moral support of my extended family, the members of the Holy Trinity Forum. For fifteen years now, these twenty-five friends have met monthly for an evening of discussion of how their faith influences how they live.

My co-authors, Jane Blewett and Kristen R. Barney, have written key passages and made essential suggestions and criticisms throughout the writing process. Their ideas have given shape, structure, and content to the whole document.

The intellectual contributions of several people have been particularly important. Among them are: Fr. Thomas Berry, Professor Jay W. Forrester, Dr. Sallie McFague, Rabbi Herman Schaalman, Dr. S. Z. Abedin, the Reverend Daniel Wee, Bishop Harold Jansen, Dr. Larry Rasmussen, Dr. Alan M. Rulis, Dr. Martha J. Garrett, Mr. Leo Harris, and the Reverend Frank Lee.

Trustees of the MILLENNIUM INSTITUTE have also been very helpful in many ways: Mr. Peter H. Aykroyd, Dr. Katharine C. Esty, Dr. Daniel A. Gómez-Ibáñez, Mr. Ronald E. Léger, Dr. Colette Mahoney, Mr. Alan Pilkington, Dr. D. Jane Pratt, Dr. Carlos A. Quesada-Mateo, and Ms. Michaela L. Walsh.

Many others have contributed. The first are those who heard lectures on this material since 1980 and commented on the substance and presentation.

A very early draft of the book was presented at a conference sponsored by the Council for a Parliament of the World's Religions at De Paul University, Chicago, on October 13, 1990. The following persons presented helpful comments at that time: Dr. Diane Sherwood, Dr. Aminah B. McCloud, Mr. James Buchanan, Dr. Dennis McCann, and Reverend George F. Cairns.

A few months later, the Council for a Parliament of the World's Religions established a committee on critical issues consisting of Professor Ronald Engel, Dr. Daniel Gómez-Ibáñez, Mr. Jim Kenney, Dr. Lois Livezey, Fr. John Pawlikowski, Dr. David Ramage, and Rabbi Herman Schaalman. This committee reviewed the early drafts. Rabbi Schaalman, Dr. Engel, and Professor Livezey made especially helpful suggestions concerning

the questions for spiritual leaders that appear near the end of the report.

An oral version of the report was presented November 18, 1992 at the Harvard Seminar on Environmental Values, organized by Dr. Timothy C. Weiskel. Fifteen faculty members and guests from The Divinity School and other parts of Harvard University heard the presentation and many made suggestions for improvements.

The following persons reviewed drafts of the manuscript: Dr. David Peterson, Ms. Laura Peterson, Professor Gordon D. Kaufman, Dr. Daniel A. Gómez-Ibáñez, Mr. Patrick O'Brien, Dr. Glenn Kuswa, Ms. Martha Campbell, Professor Steven C. Rockefeller, Dr. Vivienne Simon, Dr. Robert Goodland, Dr. Herman Daly, Reverend William E. Gibson, Mr. Allan F. Matthews, Mr. Jim Kenney, Dr. Gordon Brown, Ms. Barbara Bernstein, Ms. Diane Brenneman, and Mr. Kip Cooper.

Several people have assisted in the preparation and design of the manuscript. Ms. Kristen R. Barney contributed greatly to the design of the figures and prepared most of them; she also designed the format for the report. Mr. Gary T. Gardner also contributed to the work on the figures and to the editing. Ms. Leigh Ann Evanson and Ms. Kirsti A. Lattu typed many of the drafts and helped format the final document. Thanks also to Shirley N. Nunh for proof reading and to Lou Niznik and Craig Gotschall for graphics and photography assistance.

We are especially grateful to an anonymous donor, Mr. Dan Aykroyd, Dr. Cynthia Harris, Mr. Leo Harris, Mr. John A. Harris IV, Los Trigos Fund, the Mitchell Energy & Development Corporation, the Rockefeller Brothers Fund, the Trinity Grants Program, and the Wallace Genetic Foundation, who have supported the work on this report.

Gerald O. Barney

Foreword

The book you are holding is an invitation to reflect deeply on the critical issues we face today: threats to the global environment; divisions within the human community, such as racism, interreligious hatred, sexual discrimination, and xenophobic nationalism; extremes of affluence and poverty; and the prevalence of violence, oppression, and exploitation of all kinds.

The book is also an attempt to make clear the relationships which each of these issues has with all the others. Such a portrait is difficult to paint and may be hard to see, because most of the time we perceive and think serially, one idea after another. But the real world in all its variety and interdependence is a complete and simultaneous whole.

What we do in one area affects all other areas. It is difficult to deal with one problem without inadvertently causing other problems. Most of us will be able to think of everyday examples of this, and many global examples are described in this book. When we are not aware of this interdependence we easily make mistakes. But when we know how things work together we may discover that one wise action brings benefits in many places.

It should also be apparent that the interrelationships extend not only throughout the physical realm, but also to the worlds of ideas, cultures, traditions, values, and beliefs. Values we often take for granted have important consequences for the way we treat each other and the way we treat the earth. A great danger in a materialistic and mechanistic view of the world's problems is that even when we see the problems, we often assume that the solutions are to be found only in the same material realm. Thus, for example, most proposals for cleaning up the environment focus on technical fixes. But the greatest help and the only lasting solutions to the violence we do to the world and to each other will come from wisdom—from rediscovering ways of seeing ourselves clearly. This includes seeing our close connections with one another while at the same time enjoying and cherishing our incredible diversity.

This book is rooted in the idea that our perceptions, values, and attitudes hold the key to what we must do to make this world a better place. It encourages us to look at the planet and our place in it as a whole system—even to "see with the heart" how we are interrelated with every aspect of creation. It asks the reader to reflect on the consequences of beliefs, however ordinary or ingrained. And it challenges us to begin the process of

answering the question, " What shall we do?" by examining ourselves and the communities we live in.

These are communities of shared culture and values, and for many persons these communities include the spiritual and religious communities of faith. Even for those who may not consider themselves "religious," religion matters because it is the basis for much of our ethical culture. Fundamental to a culture are the shared explanations of creation, the rules for living, the teachings of seers and gods, and the stories of how and why the world ends. No consideration of the critical issues is complete if it ignores questions of belief.

There have been many conferences, projects, and events highlighting the enormous difficulties facing us and our children all over the world. There is an urgent sense that we must take individual and collective action. Most of the response has been political, like the creation of the World Commission on Environment and Development, or the U.N. Conference on Environment and Development.

But the 1993 Parliament of the World's Religions will be different. It will demonstrate the religions' commitment to issues which usually are considered secular, and it will demonstrate their adherents' and their leaders' willingness to work together for peace and the health of the planet.

The purpose of the Parliament is to find practical ways we can live peacefully and sustainably, communicating and understanding, respecting one another's diversity, and protecting the common ground which nourishes all life. The time is right for this gathering. It coincides with a growing awareness of the limitations of our technological and political ingenuity. It responds to a growing confidence in the power of spiritual understanding and the desire for wisdom.

Global 2000 Revisited: What Shall We Do? is our way of inviting you to this work of reconciliation and peace. As you prepare for the 1993 Parliament of the World's Religions, please reflect on the questions raised by this book. What can you put into practice? Then come to the Parliament to share your wisdom and the wisdom of your faith, and to listen to the wisdom of others.

Daniel A. Gómez-Ibáñez
Executive Director
Council for a Parliament of the
World's Religions
Chicago, Illinois, United States
March 1993

A Letter to Our Spiritual Leaders

Dear Spiritual Leaders:

My colleagues and I at the MILLENNIUM INSTITUTE are delighted to join with the Council for a Parliament of the World's Religions in preparing for the 1993 Parliament of the World's Religions.

Our part has been to prepare this report on the critical issues of the 21st century. As you will see, many of the trends before us are troubling. We look forward to working with you and others to ensure that our future is very different from the one toward which we seem now to be rushing.

In preparing this report, we have, in a sense, revisited *The Global 2000 Report to the President*, the report I directed for the United States Government.[1] *Global 2000* is the first and only report by any national government on the economic, demographic, resource, and environmental future of all countries of the world. Published in 1980, it has sold 1.5 million copies in eight languages.

Global 2000 is now 13 years old, and although most of its trends are still disconcertingly accurate, it needs updating. This report assembles new data on most of the basic trends reported in the original *Global 2000*. This is why I gave it the title *Global 2000 Revisited*. It is not, however, a full update of *Global 2000*. Only the U.S. Government can do that job, and we hope that President Clinton will.

A major part of the MILLENNIUM INSTITUTE'S work is encouraging and assisting countries in the preparation of long-term strategic studies of their options for sustainable development and security. We call such studies "21st Century Studies." In one way or another over the last decade, we have helped research teams in a fifth of the countries of the world as they prepared a long-term outlook for their country.

We feel that it is important to include spiritual leaders in the process of preparing national 21st Century Studies, but only rarely does this happen. There are several reasons. Often national leaders doubt that spiritual leaders have a sufficient understanding of the contemporary analytical methods used by economists, ecologists, demographers, and geographers to participate effectively in a national strategic study. Sometimes two or more of the country's spiritual traditions are in violent conflict, and the political leaders doubt that spiritual leaders could converse constructively among themselves and with others

about future possibilities. In other cases, there are extreme tensions between the nation's political and spiritual leadership.

The Board and staff of the MILLENNIUM INSTITUTE believe that spiritual leaders have a vital contribution to make to a country's reflections on sustainable possibilities for the future. During the Parliament of the World's Religions, we hope to meet many of you and to discuss the possibility that you might like to participate together with political leaders in the exploration of alternative futures for your countries.

We at the MILLENNIUM INSTITUTE also believe that the entry into the 21st century and the new millennium needs to be understood as an anniversary of Earth, an anniversary in which all nations, cultures and faith traditions participate. The 1999-2001 period must be a time when five billion of us humans give up old, 20th century ways of thinking and living; change to a new time and a new purpose; and then start toward the humane and sustainable future that we can all share.

The MILLENNIUM INSTITUTE is nurturing a worldwide network of individuals and organizations that are planning to use the 1999-2001 period to encourage a major shift in human attitudes and institutional goals, a shift toward a sustainable future. We hope the spiritual leaders at the Parliament will join the planet-wide effort.

Beyond these institutional reasons for our participation in the Parliament, my colleagues and I feel an urgent need for a more substantive dialogue between "secular" issue experts and spiritual leaders of all faith traditions. There are many pressing issues that need thoughtful, holistic attention, integrating both the spiritual perspective and the secular or scientific perspective. Such integrated work is difficult because of limited trust and respect on both sides.

In the course of my work for the MILLENNIUM INSTITUTE, I have had many conversations with political leaders and with ecologists, economists, geographers, modelers, political scientists, and other leaders about the role of the spiritual traditions in the future of Earth. I have been disturbed by the attitudes that some professionals have expressed toward the spiritual traditions.

For example, an internationally famous, highly influential author on sustainable development told me bluntly, "Religion must die. It is the fundamental cause of virtually all social, economic, and ecological problems and much of the violence in the world."

In another example, an ecologist, who has devoted his life to the practical work of preserving specific endangered species, was equally vehement in his feelings that religion generally, and mine

(Christianity) in particular, was a menace to the future of Earth. After I explained the importance of my faith to me in the work I do, he was silent for a moment, and then said with total sincerity, "You have done some very important work, but just think of how much more you could have done if your parents had not exposed you to the pernicious influence of Christianity!"

The attacks on religion generally and mine in particular are not limited to quiet conversations among friends. The editors of *Time* introduced their 1989 "Planet of the Year" issue with these thoughts:

> [In the Judeo-Christian tradition, the] earth was the creation of a monotheistic God, who, after shaping it ordered its inhabitants, in the words of Genesis: "Be fruitful and multiply, and replenish the earth and subdue it; and have dominion over the fish of the sea and over the fowl of the air and over every living thing that moveth upon the earth." The idea of dominion could be interpreted as an invitation to use nature as a convenience. Thus the spread of Christianity, which is generally considered to have paved the way for the development of technology, may at the same time have carried the seeds of the wanton exploitation of nature that often accompanied technical progress."[2]

This is a serious public charge against my faith. It troubles me that the charge was made. It troubles me that it might be true. It troubles me that my faith has made no thoughtful or significant response to the issue raised by *Time*.

Christianity is not alone in coming under criticism. In one forum or another, virtually every faith tradition is being criticized today for not having a thoughtful, informed, penetrating analysis of the issues facing Earth and Earth's human community in the 21st century.

We, the people of Earth, need the help and involvement of our spiritual leaders. It is from our respective faiths that we derive our sense of origins, of self, of purpose, of possibility. You are our source of inspiration for what we humans and Earth can become. Your dreams are our visions—and our destiny. We depend on you.

So we come to you both with our perplexed sense that something is terribly wrong on Earth and with our question: What shall we do?

Gerald O. Barney, Executive Director
MILLENNIUM INSTITUTE
Arlington, Virginia, United States
July 1993

Overview

If present beliefs and policies continue, the world in the 21st century will be more crowded, more polluted, less stable economically and ecologically, and more vulnerable to violent disruption than the world we live in now. Serious stresses involving inter-religious relations, the economy, population, resources, environment, and security loom ahead. Overall, Earth's people will be poorer in many ways than they are today.

For more than a billion of Earth's desperately poor humans, the outlook for food and other necessities of life will be no better. For many it will be worse. Life for billions will be more precarious in the 21st century than it is now—unless the faith traditions of the world lead the nations and peoples of Earth to act decisively to alter current beliefs and policies.

This, in essence, is the picture which emerges in *Global 2000 Revisited: What Shall We Do?* This picture is based on projections of probable changes in the world economy, population, resources, and environment. Although these projections are drawn from the most reliable sources available, they do not predict what will occur. Rather, they depict conditions that are likely to develop if there are no changes in beliefs, public policy, and practices. A keener awareness of the prospects for the 21st century, however, may induce significant changes in beliefs, policies, and practices.

Principal Findings

Rapid growth in the world's population cannot continue through the 21st century and will come to an end either by human decision and action or by an uncontrollable increase in deaths.

Over the past 70 years—roughly one lifetime in many countries—the human population grew from 1.8 billion to 5.3 billion. For every person alive 70 years ago, there are now three. Such rapid growth cannot continue for even another generation. Fertility must decline, or mortality will increase.

But for now the growth continues. Currently the world's population is growing faster than ever before. Each year, 90 million people are added to our numbers, the demographic equivalent of another Mexico. Just a lifetime ago, we were adding only 15 million people per year.

If drastic declines in human fertility (or very large increases in mortality) occur over the next five years, it would be possible to stabilize the human population at about 12 billion within a

century. Virtually all of the additional growth—more than 6 billion—would occur in the poorest, least industrialized countries of the world, often called the "South." The population in the South would grow to over 10 billion. The population in the industrialized countries of the "North" would remain at about its current size, a little over 1 billion.

For such a rapid drop in human fertility to occur, it will be necessary to change the religious, social, economic, and legal factors that shape couples' decisions on the number of children they have. Safe and effective contraceptive services must be available, but most importantly, religious teachings and social, economic, and legal circumstances must shift to encourage small families. Child labor, for example, must cease to provide an economic benefit to parents.

It will be difficult to provide 11 to 12 billion people with even such basic necessities as food. Of the 14 billion hectares of land on Earth, only 3.3 billion hectares are potentially arable. At current yields, 0.26 hectares per person are needed to feed the human population; thus at current yields, 3.1 billion hectares would be needed to feed 11 to 12 billion. Only 1.5 billion hectares are currently in production. Since in most cases the best lands are already in use for agriculture, and the remaining lands are already used for grazing or some other use, a doubling of the land in agricultural production would be expensive and disruptive.

Doubling the world's agricultural lands would also cause enormous environmental damage. The potentially arable land that is not now in use—especially land in the tropics—is habitat for a large number of species. Doubling the amount of land in agricultural production would lead to massive extinctions. Even with modest growth in the amount of land in production, a third of all the species that were alive a lifetime ago will become extinct—gone forever—within another decade or two. By 2015, *hundreds* of species are projected to disappear *daily*.

If we are to meet the food needs of up to 12 billion people by the end of the 21st century, it is essential that agricultural yields continue to be increased—and in ways that are sustainable. Although conventional technologies can probably double yields, there are increasing questions about the sustainability of conventional agricultural technologies. Furthermore, the promised benefits of yield increases through genetic engineering may be delayed and more modest than expected.

The so-called Green Revolution began about 1950. For the first time, yield-increasing technologies (plant breeding genetics, fertilizers, pesticides, and pumped irrigation) were applied extensively and systematically during the last half of this century,

increasing yields dramatically and preventing serious food shortages.

But the Green Revolution also changed agriculture radically, making it dependent both on environmentally destructive practices (especially the use of pesticides, fertilizers, and irrigation) and on fossil fuels. Energy used for corn production in the United States, for example, has increased by a factor of four since 1945. The future of human food supplies is now closely linked to the future of energy supplies.

Global energy supplies and prices are likely to become more unstable and erratic in the decades ahead. Even at present rates of consumption, most of the world's petroleum would be burned within the lifetime of a child born today. If consumption were to increase enough to fuel economic growth in the South, the petroleum supplies of the world would disappear even more quickly. The most pressing constraint on the use of petroleum, however, may not be supply of the resource, but disposal space for its principal combustion product—carbon dioxide.

The concentration of carbon dioxide in Earth's atmosphere is increasing around the world, largely because of the combustion of fossil fuels in the industrialized North. Within the lifetime of today's children, global concentrations of carbon dioxide are likely to reach twice pre-industrial concentrations. Such high concentrations are expected to cause planet-wide changes in temperature and weather patterns. Such changes would seriously disrupt agriculture throughout the world as early as the first half of the 21st century, and during the second half would lead to a sea level rise of 20 to 30 centimeters—enough to force the resettlement of hundreds of millions of people and the abandonment of some island nations.

The Choice Ahead

The critical issues described above are just a few of the challenges that lie ahead. Others that have not even been touched on include the implications of AIDS and tuberculosis; nuclear, chemical, and biological weapons; the global debt; migration; corruption; drug trade; and technological change, to name a few.

Given the magnitude of the issues we face, we must expect that within the lifetime of a child born today, the world will change radically in one of two directions. If we continue with present beliefs, institutions, and policies, the world will become highly polarized, with a billion people in the wealthy industrialized countries of the North attempting to enjoy life and leisure a few decades longer while 10 billion plus people in the South spiral downward into increasingly desperate poverty exacerbated by global environmental deterioration. Ultimately

the North spirals downward too, and the whole planet drifts off into a new dark age or worse.

But there is another option open to us, one in which everyone comes to recognize that a healthy Earth is an essential prerequisite for a healthy human population. Under this option, the world could become less polluted, less crowded, more stable ecologically, economically and politically if we humans would be willing to work together to: (a) create the religious, social, and economic conditions necessary to stop the growth of human population; (b) reduce the use of resources (sources) and disposal capacity (sinks) by the wealthiest; (c) ensure civil order, education, and health services for people everywhere; (d) preserve soils and species everywhere; (e) double agricultural yields while reducing both agricultural dependence on energy and agricultural damage to the environment; (f) convert from carbon dioxide-emitting energy sources to renewable, non-polluting energy sources that are affordable even to the poor; (g) cut sharply the emissions of other greenhouse gases; (h) stop immediately the emissions of the chemicals destroying the ozone layer; and (i) bring equity between nations and peoples of the North and South.

We do not have generations or even decades to choose between these two directions because of the momentum inherent in population growth, capital investments, technological choices, and environmental changes. In fact, the choice of direction for Earth is being made today.

The choice is difficult because: (a) there is some scientific and economic uncertainty about the severity of the difficulties ahead; (b) it is difficult to believe that such major, unprecedented change can be occurring; (c) it is generally thought to be easier to adapt to whatever comes than to make change in advance of necessity; (d) there is widespread lack of awareness of what is happening; and (e) the steps which must be taken are extremely difficult; and (f) we lack a set of common moral values on which to base collective action. Most difficult, however, is to accept that our concept of progress has failed.

Our concept of progress—our model of development—measures every nation by the norm of a so-called "developed" country. Under this concept of progress, each "rational" nation is to progress to the economic and military might of the "developed" countries of the industrialized North. Similarly, the goal of each "rational" person is to progress to the point of being able to live like the wealthiest. This concept of progress has failed. Twelve billion people cannot live like the wealthiest do now. All nations of the world cannot become as wasteful and environmentally

destructive as the industrialized North is now. For them to do so would increase the total economic activity of the world by a factor of five to ten, and Earth could not withstand such an assault.

What is our alternative? What other concept of progress—what other model of development—can we pursue? Currently there is no agreed upon answer to these questions. But if we people of Earth are to avoid a massive disaster within the lifetime of our children, our most critical and urgent task is to bring forth a transformed vision of progress, one of sustainable and replicable development.

We are discovering (or rediscovering) that our human economy is part of, and depends on, the "economy" of the whole ecosphere. So any model for a sustainable world must address both our habits of consumption and reproduction and our willingness to live peacefully with one another, with other creatures, and with Earth itself. Our definitions of progress and success must take into account the future well-being of the entire ecosphere, not just the human part of it. Such a changed understanding of progress and success will require a new understanding of humankind as a species, a new approach to the ethics of interspecies relations, and a new vision for the future of Earth.

Questions for Our Spiritual Leaders

The task before us is fundamentally spiritual in nature: to discover who we humans are, how we are to relate to each other and to the whole community of life, and what we are to do, individually and collectively, here on Earth. So we turn with our questions to you, our spiritual leaders.

What are the traditional teachings—and the range of other opinions—within your faith on how to meet the legitimate needs of the growing human community without destroying the ability of Earth to support the community of all life?

- What does your faith tradition teach about how the needs of the poor are to be met as human numbers continue to grow? What does your faith teach about the causes of poverty? What trends and prospects do you see for the poor?
- How are the needs and wants of humans to be weighed relative to the survival of other forms of life? What trends and prospects do you see for other forms of life?

What are the traditional teachings—and the range of other opinions—within your faith on the meaning of "progress" and how it is to be achieved?

- What does your faith tradition teach about the human destiny? Is the human destiny separable from that of Earth?
- What is your destiny, the destiny of the followers of your faith tradition? What does your tradition teach concerning the destiny of followers of other traditions?
- How are we to measure "progress?" Can there be progress for the human community without progress for the whole community of life?
- How is personal "success" related to "progress" for the whole?

What are the traditional teachings—and the range of other opinions—within your faith tradition concerning a proper relationship with those who differ in race or gender (conditions one cannot change), or culture, politics, or faith?

- Much hatred and violence is carried out in the name of religion. What teachings of your faith tradition have been used—correctly or not—in an attempt to justify such practices?
- Discrimination and even violence by men toward women is often justified in the name of religion. Which, if any, of the teachings of your faith have been used—correctly or incorrectly—in this way?
- How does your faith tradition characterize the teachings and followers of other faiths? Do some adherents of your tradition hold that the teachings and followers of other faiths are evil, dangerous, misguided? Is there any possibility that your faith tradition can derive wisdom, truth, or insight from the teachings of another faith?

What are the traditional teachings—and the range of other opinions—within your faith on the possibility of criticism, correction, reinterpretation, and even rejection of ancient traditional assumptions and "truth" in light of new understandings or revelations?

- Does your faith tradition envision new revelation, new understanding, new interpretation, new wisdom, and new truth concerning human activity affecting the future of Earth?

The Critical Issues

When the United Nations launched the first Development Decade in the 1960s, there was high hope that the nations of the world would move forward in joint efforts to create international systems and structures that would address the urgent needs of the emerging nations of Asia, Africa, and Latin America while assuming the continued growth of the market-oriented industrialized economies. Development would mean more and better for everyone. Progress would guarantee a flourishing economy and technological advancements for the entire world.

Now, four Development Decades later, there is little evidence that the numerous development plans and strategies embraced over the years have done anything to improve significantly the situation of the poor of the world or to enhance the prospects for the wider community of life on Earth. On the contrary, as we look around us today, the struggle for life seems all the more perilous.

Over the whole Earth, the human community and much of the entire community of life is now in serious danger. Problems abound: poverty and starvation, consumerism and population growth, debt burdens and trade imbalances, crime, AIDS, drugs, war and refugees. Most ominously, all of the biogeochemical systems essential for life on Earth, the habitats essential for the survival of diverse species, and even the atmosphere and the oceans are now disturbed and threatened on a planetary scale.

As we humans have begun to think globally, it has become clear that we do not have just a poverty problem, or a hunger problem, or a habitat problem, or an energy problem, or a trade problem, or a population problem, or an atmospheric problem, or a waste problem, or a resource problem. On a planetary scale, these problems are all interconnected. What we really have is a poverty-hunger-habitat-energy-trade-population-atmospheric-waste-resource problem. This mega problem is so new that we did not even have a name for it until 1970 when the late Dr. Aurelio Peccei described it and named it the "global problematique."

Although Earth is one biologically and environmentally, it is not one socially and economically. Differences between the circumstances of the people in the "North" and "South" complicate discussions of the global problematique.*

Approximately a fifth of the world's people live in the North—the rich, industrialized countries of Canada and the United States, Western Europe, Japan, Australia, and New Zealand. In the North, the per capita consumption of energy and other resources and the per capita generation of wastes (especially carbon dioxide and the various air pollutants that cause acid rain) are extremely high relative to those in the South.

About four-fifths of the world's population lives in the South—the emerging countries of Africa, Asia, and Latin America. In the South there is still rapid population growth, and the environmental impacts (especially deforestation, overgrazing, water pollution and toxic wastes) are largely due to poverty, inadequate education, and inadequately regulated industry.

A clear sense of our future—Earth's future—requires that we examine trends over an extended period. The following discussion will consider developments covering the period 1600 to 2200. While this six hundred year period is only a brief moment in the overall history of Earth, it spans the period during which human activity has had and will have the greatest impact on Earth and is sufficient to provide a context for a discussion of the critical issues of the 21st century. A few events and discoveries that have already occurred during this period are noted in Figure 1.

---

* The terms "developed countries" and "less developed countries" or "underdeveloped countries" are used in economic development literature more or less synonymously with the terms "North" and "South." However, implicit in the terms "developed" and "developing" is the assumption that "developed" countries look like countries such as Germany, Japan, and the United States, and that through "development" all of the world can and should be made to look like "developed" countries. Since the sustainability of the western development model is being questioned increasingly, words are needed which facilitate rethinking the goals of "development" for all nations, including the so-called "developed" countries. The terms "North" and "South," while themselves having many limitations, do not perpetuate an assumption that the western model is the obvious choice for the future.

In addition to the North and the South there is what might be called the new "East"—the countries and republics of Eastern Europe and the former Soviet Union. The Coordinator of the 21st Century Study for the Czech and Slovak Republics, Dr. Pavel Novácek, has remarked: "Are we in Eastern Europe part of the North? I don't think so. We would certainly enjoy the lifestyle of the North, but I think we are too late for that. Are we part of the South? I hope not. We are confused. Our society has collapsed, and we no longer have a coherent national identity or a clear sense of our future."[3]

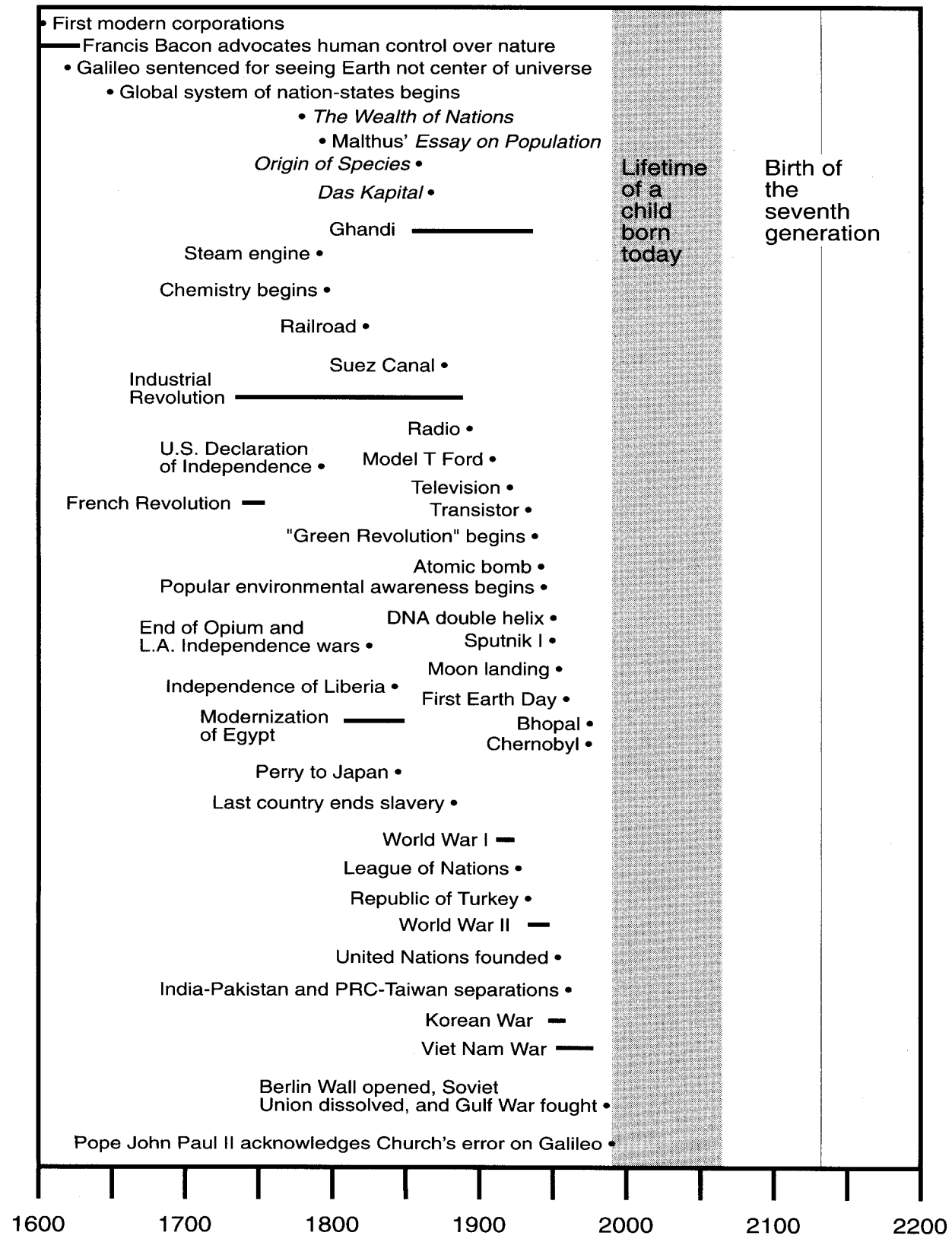


Figure 1: Philosophical ideas, historic events, and scientific discoveries during the period 1600 to present.

In thinking about the future it is also important to keep in mind how far into the future our major institutions think. Governments work on a time horizon related to the tenure of elected officials, which is typically less than a decade. Market economic decisions typically look ahead about a decade, depending on interest rates. Only the faith traditions of the world have an outlook of generations. Some faith traditions teach that all decisions should be made from the standpoint of their impact on the seventh generation into the future.

To help establish a generational perspective, the shaded columns in all figures in this book mark the seventy-year period that a child born today might live. The line at the right of Figure 1 marks the time of birth of the seventh future generation.

Our Numbers and Basic Needs

When thinking about the future and human needs in the future, it is necessary to consider the number of humans whose needs must be met. To make projections of human numbers in

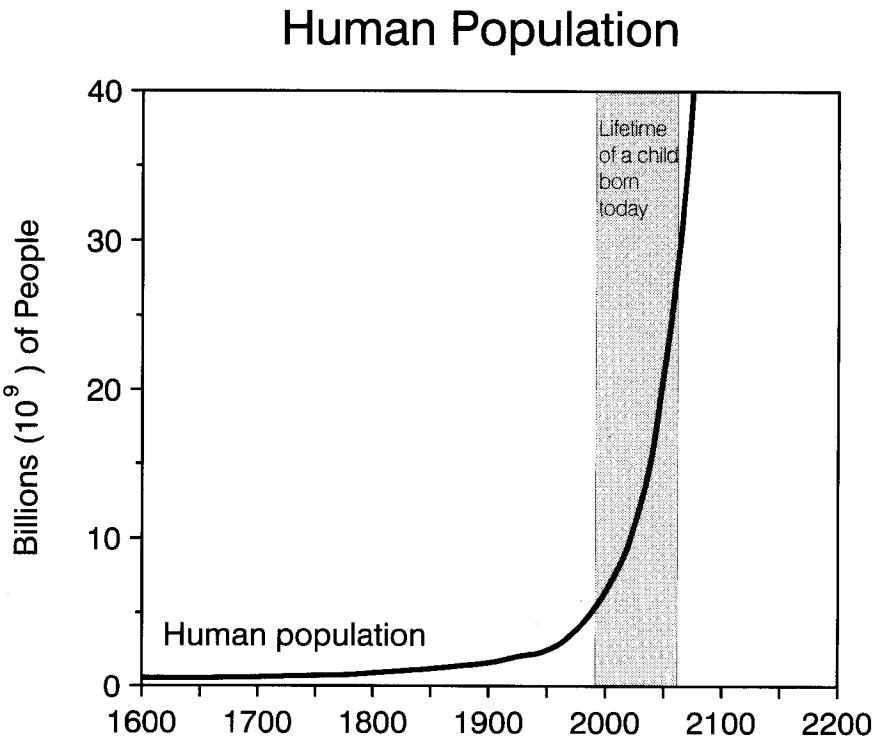


Figure 2: History and projection of the number of human beings whose needs must be met, assuming current fertility and mortality rates remain unchanged indefinitely into the future. Sources: United Nations. 1992. *Long-Range World Population Projections: Two Centuries of Population Growth, 1950-2150.* New York: United Nations. p. 28; and McEvedy, C. and Jones, R. 1978. *Atlas of World Population History,* Middlesex, England: Viking Penguin. pp. 342-51.

Table 1: Types of Land on Earth

Land Types	Area (millions of ha.)	Percent of Total
Highly productive	447	3
Somewhat productive	894	6
Slightly productive	1,937	13
Subtotal	**3,278**	**22**
Too cold	3,725	25
Too dry or steep	5,215	35
Too wet or poor	2,682	18
Subtotal	**11,622**	**78**
Total land area	**14,900**	**100**

Source: U.N. Food and Agriculture Organization. 1989. FAO Production Yearbook tapes. Rome: U.N. Food and Agriculture Organization.

the future, it is necessary to make assumptions about future trends in human fertility and mortality rates. The simplest such assumption—and one that is highly unlikely—is that human fertility and mortality rates in the future will remain just as they are now.

The past history of human numbers and the numbers that the United Nations projects would exist if today's fertility and mortality continued unchanged is illustrated in Figure 2. During the lifetime of adults today, human numbers approximately doubled from about 2.5 billion (1 billion = 1,000 million) to about 5 billion. The time that a child born today might live is illustrated by the gray vertical bar. Much more growth in human numbers can be expected within the lifetime of an infant born today.

A key aspect of caring for the children of the future is food. Since the bulk of our food—98 percent—comes from the land, caring for people for the future requires that we think carefully about land resources and their use.[4]

The total land area of Earth is about 15,000 million hectares (37,000 million acres), but only a relatively small part (about 22 percent) is potentially arable (see Table 1). Most of the land (78 percent) is too wet, too poor, too cold, too dry, or too steep for cultivation. The potentially arable land, which totals about 3.3 billion hectares (8.2 billion acres) is of mixed quality, ranging from highly productive to slightly productive.

Several important aspects of the human dependency on land are illustrated in Figure 3. The straight line across the figure

marks the estimated maximum potentially arable land. Approximately half of this total (1.4 billion hectares) is already used for crop production, and much of the remaining less-productive land is already grazed by livestock. Adding to the world's base of arable land or intensifying its use is costly, and additions have slowed dramatically over the last several decades. Consequently, land under continuous cultivation will probably never reach even 3.3 billion hectares.

Equally important, arable land is being lost through erosion, deforestation, expanding urban areas, depletion of irrigation water, salinization, waterlogging, and other factors. The effects of these factors on available arable land are illustrated schematically by the downward sloping curve.

The amount of land needed to feed the world population is shown by the curve rising toward the maximum available land. This curve is simply the curve of human population growth from Figure 2 multiplied by the average amount of land per capita required to feed people—0.26 hectares per person (0.64 acres per person).[5]

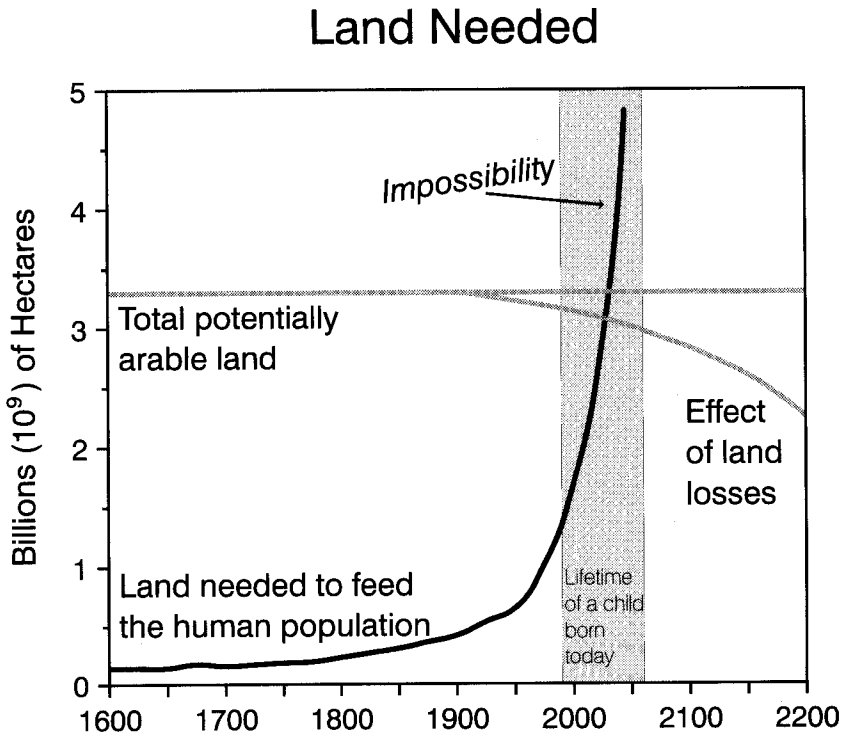


Figure 3: Agricultural land needed at current yields to feed the human population, historical and projected, and the total amount of potentially arable land. One ha. is equal to 2.47 acres. At current yields, 0.26 ha. (about 0.64 acres) is needed, on average, to feed a person.

In Figure 3 (and several other figures), the curve of land needed to feed the people crosses the curve of land available. Of course in reality it is impossible for this to happen: population cannot increase unless there is food to feed the people. The reason that the two curves cross in Figure 3 and some other figures is that the two curves are projected independently. In reality, as these two curves approach each other, there is a great increase of hunger, starvation, misery, and mass migration, and environmental destruction. Increases in deaths keep the curves from ever actually crossing.

Even now we see examples on our television screens of local areas where the need for land has approached the land available. Local food prices rise and, of course, the poor suffer first and most. The first to die are infants and the old. Before actual starvation (calorie deficiency) occurs, protein deficiency limits children's growth and mental development.[6] A child born today will live to see many people's need for land become much more desperate than today.

Three options are open to us in keeping these curves apart: stopping population growth, preserving arable land, and increasing agricultural yields. It is sometimes suggested that changing the diet of people living in the North is a fourth option, but it is not.

The Northern (especially American and Canadian) diet contains a high percentage of meat. Much of the meat is produced by feeding grain to animals. The meat produced in this way contains only about 10 percent of the calories contained in the grain fed to the animals. The idea is that if Northerners ate lower on the food chain (less meat and more grains and vegetables), there would be enough grain left over to feed the whole human population. A change of the Northern diet would indeed help by shifting the curve over about 15 years (see Figure 4) and would also, incidentally, improve the health of Northerners. However, a change of Northern diet cannot by itself solve the problem facing us all.

It should also be noted that if incomes in the South were to increase to the point that Southerners begin eating like Northerners (which seems to be the trend among affluent Southerners), there would be a large jump in the demand for agricultural produce (see Figure 4). Such a jump would accelerate the growth in the need for arable land.

For population to stop growing, the number of births and deaths must become equal. This can happen—and has happened historically—either with both births and deaths at a high level or with both births and deaths at a low level. If the deaths are to be kept low and people have long lives, the norm for a person must

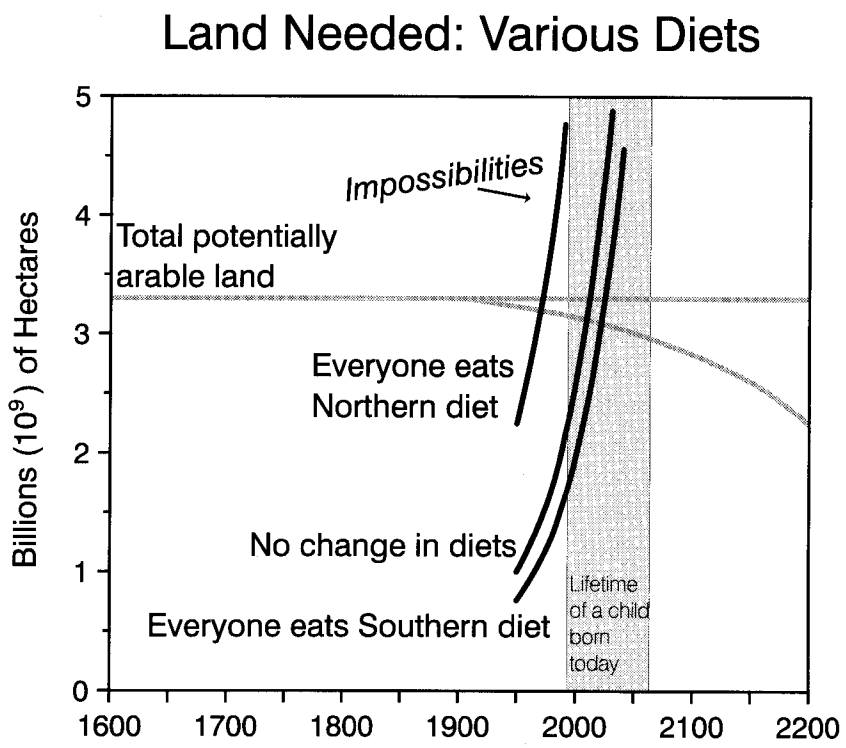


Figure 4: Land needed with current diets, and with hypothetical dietary shifts so that everyone eats either the current Southern diet or the current Northern diet.

become one child—two per couple. If this norm were met, the human population would ultimately stabilize after a delay of about forty years during which today's large numbers of youth pass through the fertile period of their lives.

The ultimate size of the stable population can be roughly estimated from what demographers call population profiles. Population profiles for the countries of the North and South are shown in Figures 5 and 6 for the year 2000. These profiles are, essentially, bar charts. The bars extend to the right and left of the center for females and males, respectively. Each bar represents the number of people in a five-year age cohort, for example, the number of males between the ages of 20 and 24.

The profile for the countries of the North is shaped approximately like a column. This shape is indicative of a stable, non-growing population. It means that the people in fertile years of their lives (about 15 to 45) are having, on average, about two children, just enough to create new bars at the bottom of the column that are the same width as their own bars. People are just reproducing themselves.

By contrast, the profile for the developing regions is shaped like a pyramid. The pyramidal shape is characteristic of a rapidly growing population. It means that people in the 15 to 45 year cohorts are creating new bars at the bottom that are much wider than their own. The more gradual the slope of the pyramid's sides, the more rapid the population growth.

As population growth slows and stops, the shape of the profile gradually shifts from a pyramid to a column. If somehow by the year 2000 replacement fertility (essentially two children per couple) could be achieved throughout the world and if mortality could be kept from increasing, the population pyramid for the countries of the South would ultimately become a column as wide as the base of the pyramid for the year 2000 (see Figure 7). The wide column implies that, barring a huge increase in deaths, the population of the South will grow ultimately to at least twice the

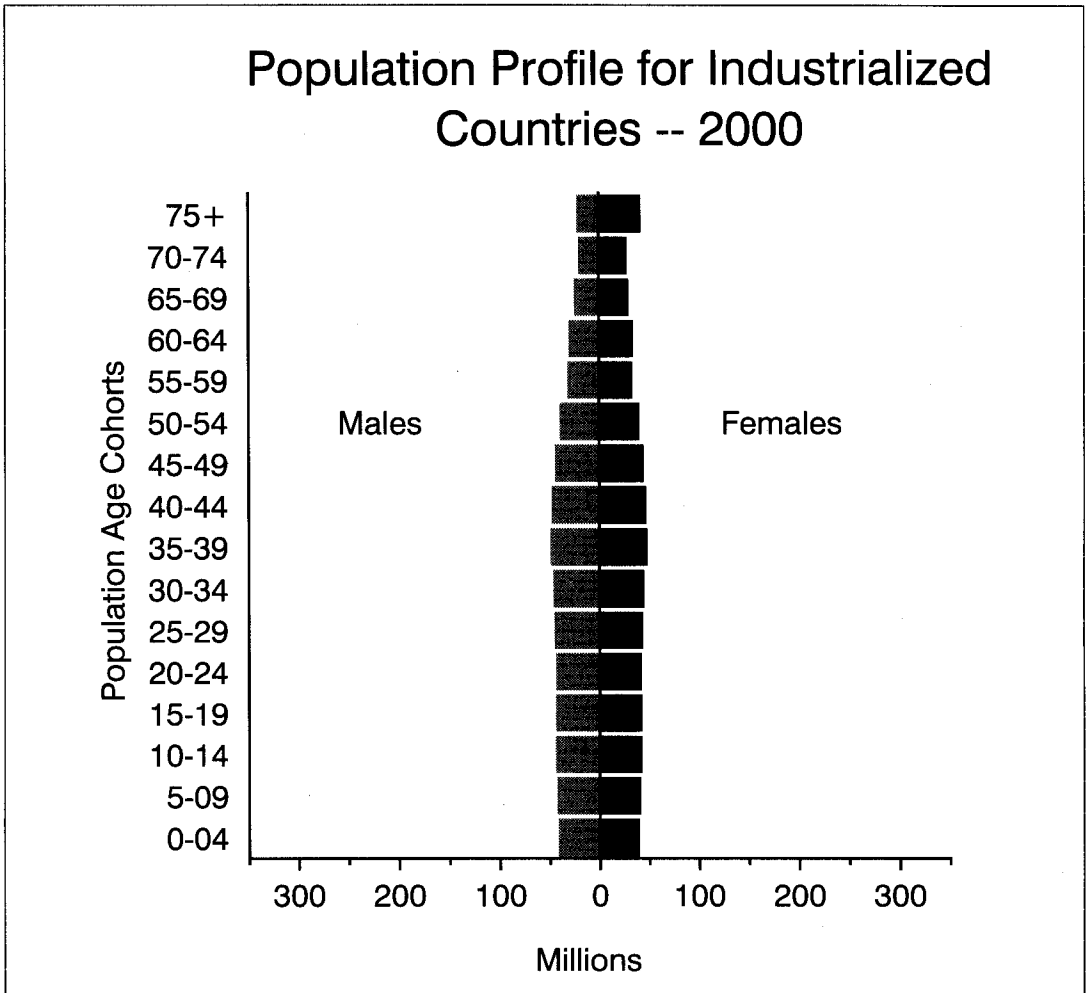


Figure 5: Population profile showing the age-sex distributions for the countries of the North, as projected by the World Bank for 2000. Source: Bulatao, R. A.; Bos, E.; Stephens, P. W.; and Vu, M. T. 1990. *World Population Projections, 1989-1990 Edition.* Baltimore: Johns Hopkins University Press (for the World Bank). pp. 6-8.

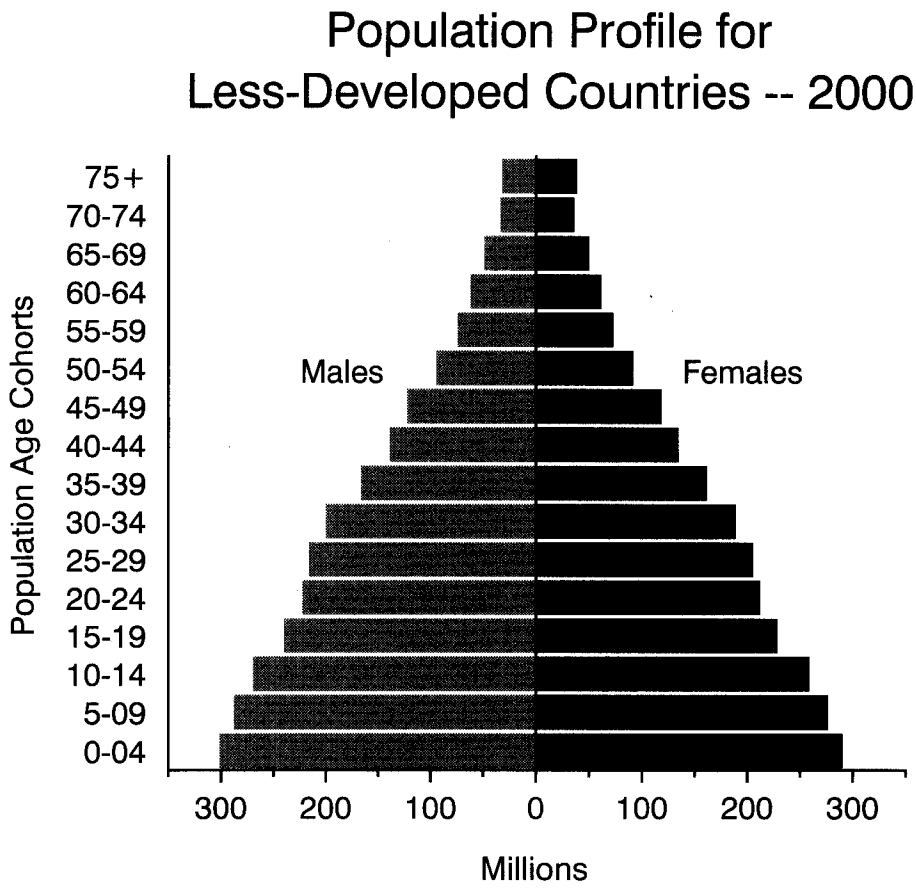


Figure 6: Population profile showing the age-sex distributions for the countries of the South as projected by the World Bank for 2000. Source Bulatao, R. A.; Bos, E.; Stephens, P. W.; and Vu, M. T. 1990. *World Population Projections, 1989-1990 Edition.* Baltimore: Johns Hopkins University Press (for the World Bank). pp. 6-8.

number projected for the year 2000. Since in 2000 there will be about 5 billion people living in the South, there might ultimately be 10 billion or more in these countries—assuming no increase in mortality rates. In addition there will continue to be a billion people or more living in the North, bringing the world total to at least 11 billion.

The analysis of the previous paragraph provides only a very rough estimate. Recent United Nations projections, prepared with much more elaborate methods, suggest that Earth's human population might level off at approximately 12 billion by about 2150.[7]

The magnitude of the change in demographic behavior implied by the U.N. projections can be seen by comparing the historical and projected annual increment to the human

population. The annual increment (births less deaths) is an indicator of the additional people for whom housing, jobs, schools, food, etc., are needed each year. As shown in Figure 8, the annual increment to the world population is now rising at a record rate. Approximately 90 million people are now added each year—roughly the equivalent of adding a Mexico every year. According to the U.N. projection, the annual increment will continue to rise to record heights for another few years, peak sharply at about 100 million people per year in 2000, and then fall by roughly three-fourths within the lifetime of today's infants.[8] Should this much-needed event actually come to pass, it would be a truly remarkable change in human reproductive habits, comparable only to the demographic change of the last two decades in China.[9]

Such rapid changes in fertility are extremely difficult to achieve. Currently, large families serve the economic and social interests of couples in most nations of the South. Large families

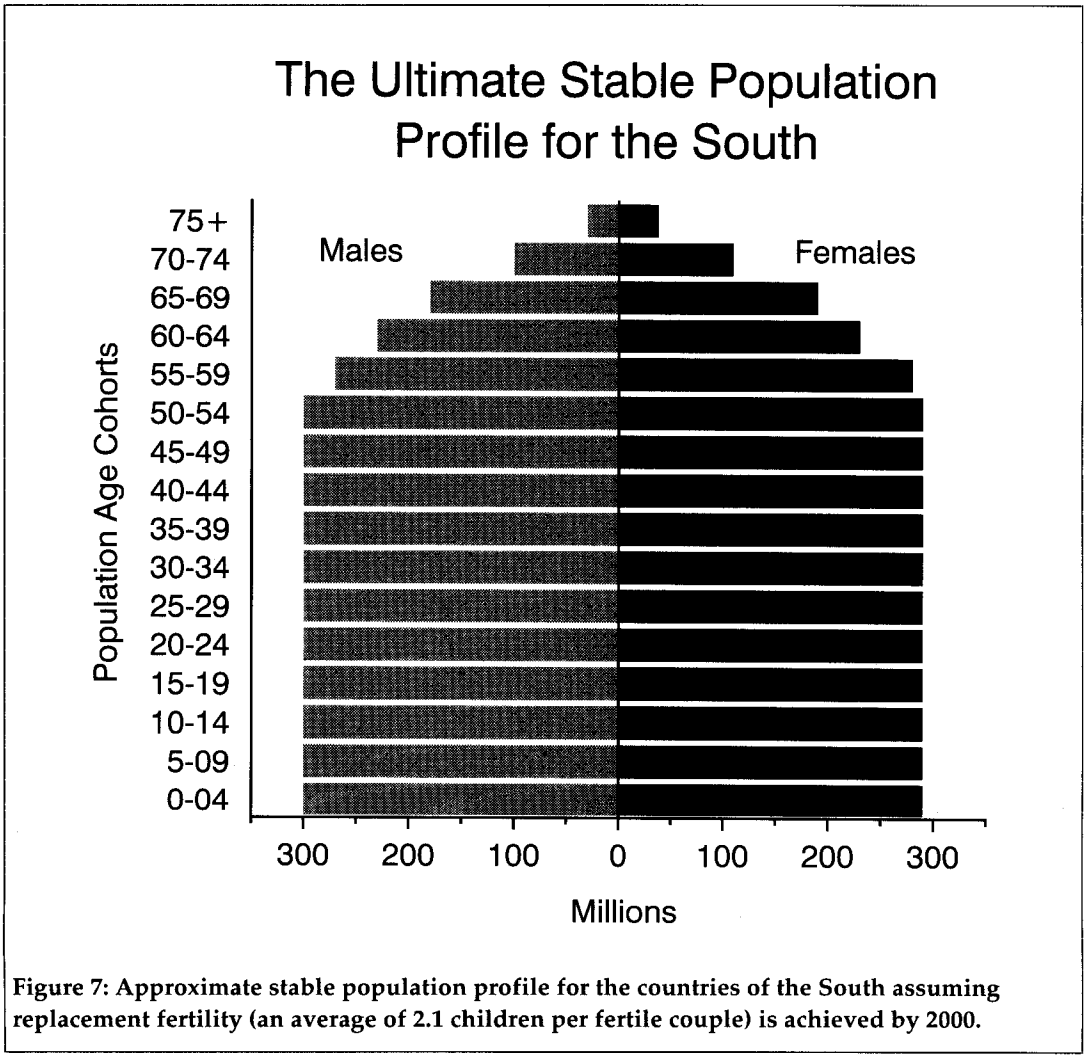


Figure 7: Approximate stable population profile for the countries of the South assuming replacement fertility (an average of 2.1 children per fertile couple) is achieved by 2000.

(especially when there are more boys than girls) are perceived as divine blessings and evidence of the virility of the father and the continued fertility of the mother. The children provide free labor, are a source of security in both community disputes and old age, and give status to women and especially to men. Moreover, under current government policies in many countries, children are a relatively low economic burden to the couple. Child labor laws, traditions, religious beliefs, financing of education and health services, the status and education of women, and the norms by which men judge each other's masculinity will all need to change radically if the number of children couples want is to drop to two. There will also need to be increases in the availability of family planning services.

Our Food and the Land

Even if human population is successfully limited to 12 billion, the problem of meeting human needs is not solved. At current yields, over 3 billion hectares of arable land would be required to

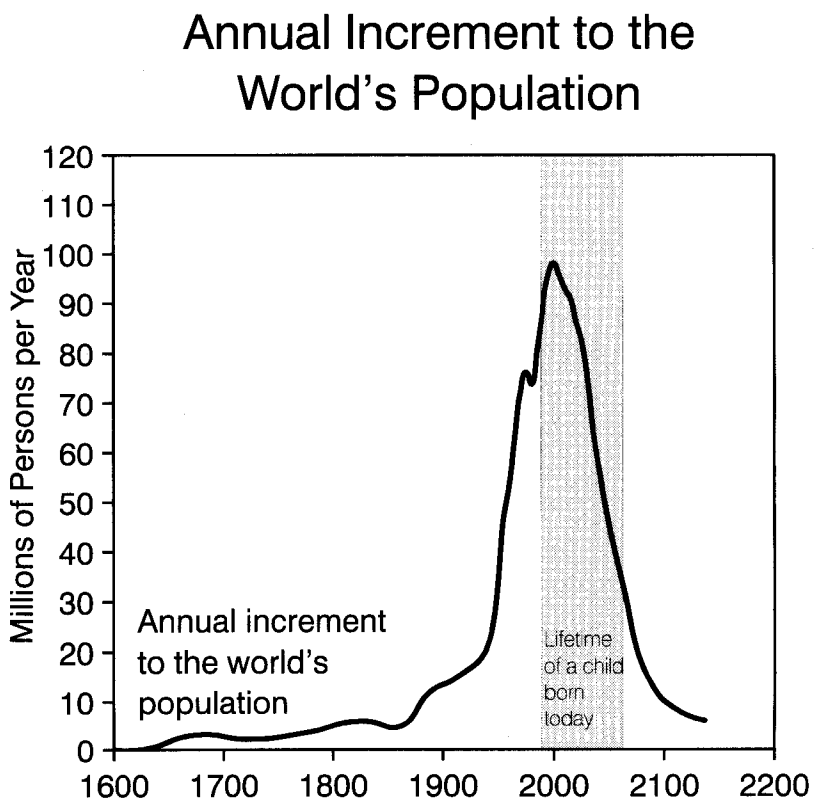


Figure 8: Annual increment to the world's population from 1600 to date and as projected by the United Nations. Sources: United Nations. 1990. *World Population Projections.* New York: United Nations. p. 21; United Nations. 1992. *Long-Range World Population Projections.* New York: United Nations. p. 14; and McEvedy, C.; and Jones, R. 1980. *Atlas of World Population History.* Middlesex, England: Viking Penguin. p. 342.

feed 12 billion people (see Figure 9), and while there are 3.3 billion hectares of potentially arable land available on Earth, the economic and ecological cost of bringing it all into production is prohibitive. An effort to bring 3 billion hectares under cultivation implies an enormous loss of habitat for many entire species and for the critically important wild varieties of human food species. As a consequence, we must also give attention to efforts both to preserve arable land and to increase yields.

The human future is closely linked to the future of soils, and alarmingly little is being done to monitor soil losses and deterioration. Only in the last decade and a half has it been possible to estimate the magnitude and productivity effects of soil loss even in the industrialized countries of the North. Even rudimentary data on soil loss is almost completely unavailable for most countries of the South.[10]

The arable area currently under cultivation in the world is about 1.4 billion hectares 9,[11] far less than the 3.3 billion hectares potentially arable. Land area under cultivation, however, is

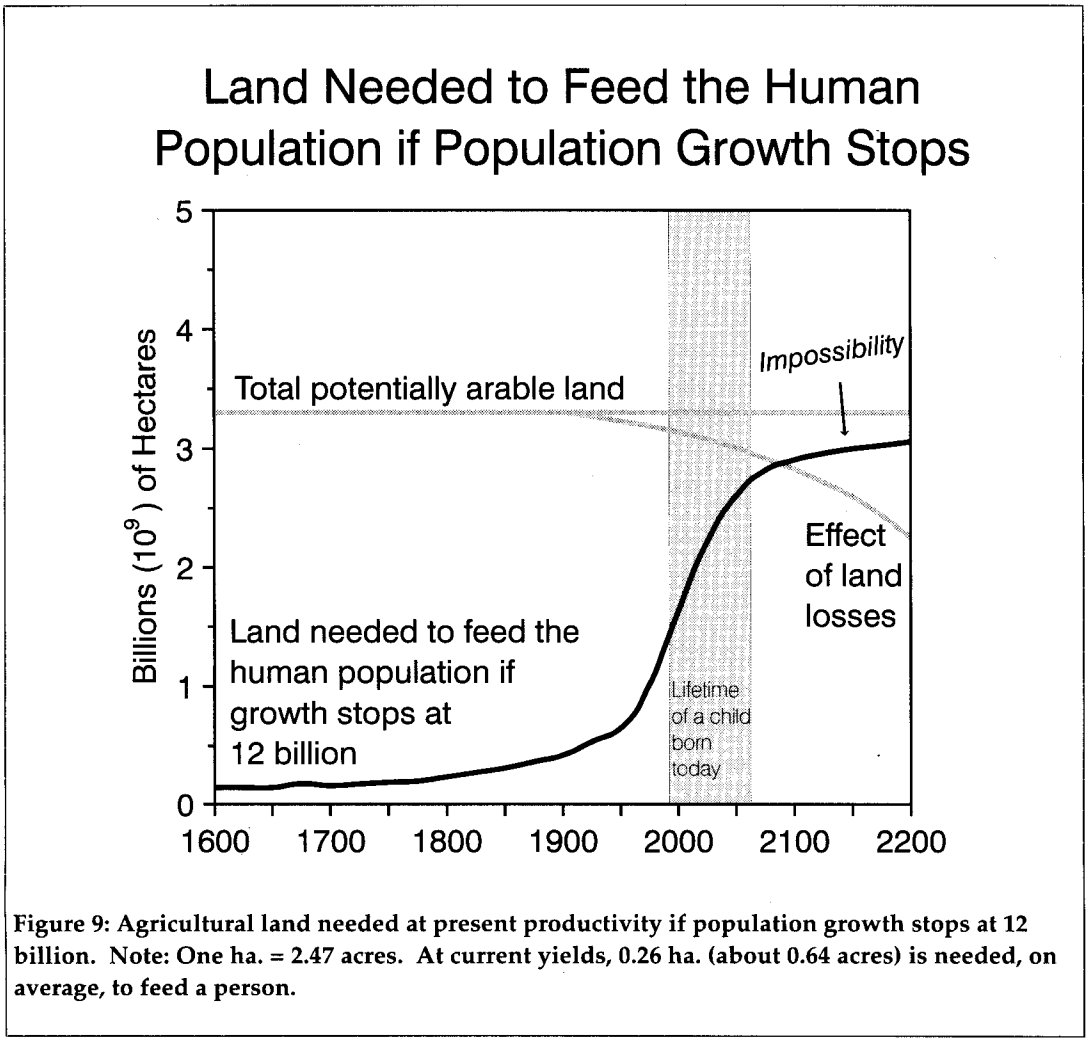


Figure 9: Agricultural land needed at present productivity if population growth stops at 12 billion. Note: One ha. = 2.47 acres. At current yields, 0.26 ha. (about 0.64 acres) is needed, on average, to feed a person.

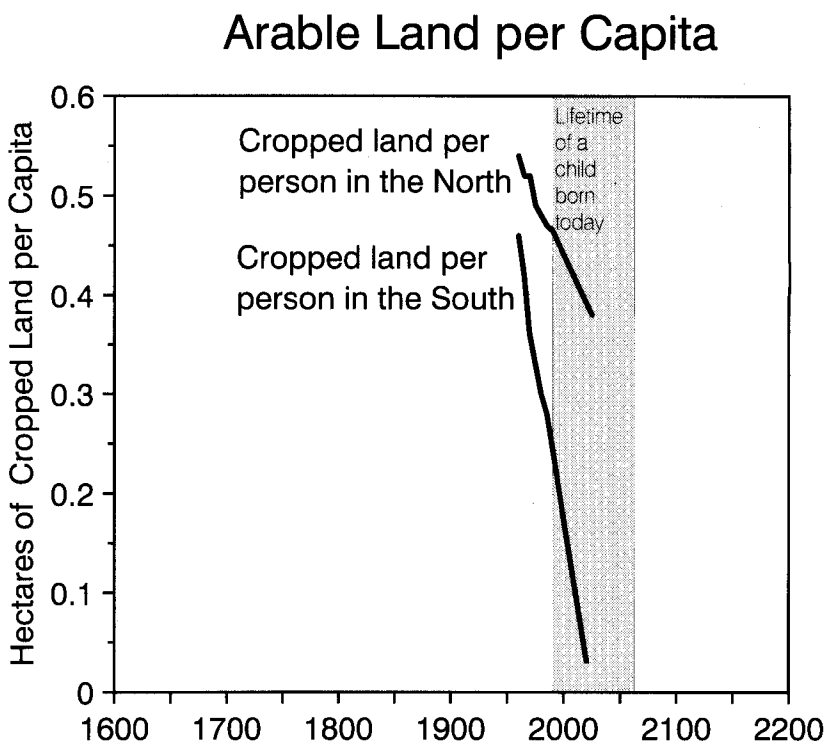


Figure 10: Cropped arable land per capita, actual and projected. The projections are linear extrapolations. Source of historical data: U.N. Food and Agriculture Organization. 1989. FAO Production Yearbook tapes. Rome: U.N. Food and Agriculture Organization.

increasing only slowly and the rate of increase is declining because the cost of bringing additional land into production is so high.[12] During the 1960s, land under cultivation increased 4.4 percent; in the 1970s, 3.3 percent; during 1980s, less than 2 percent. At the growth rate of the 1980s, arable area might reach about 2 billion hectares by 2200. Should soil losses continue at a mere tenth of one percent (0.1%) per year, land under cultivation would decline almost 20 percent to 1.2 billion hectares by 2200.

Additional perspective on the pressures on arable land comes from trends in per capita arable land (see Figure 10). At the global level, arable area per capita has declined steadily from roughly half a hectare per capita in the 1950s to less than a third of a hectare in the late 1980s. The countries of the North have experienced a decline from roughly 0.54 hectares in 1960 to 0.47 hectares in 1989. Despite the large increases in arable area in Brazil, Indonesia, and the Sudan, the countries of the South as a group have experienced a severe drop from 0.46 hectares to 0.26 hectares. If one takes into account land losses due to urbanization and other non-agricultural demands, and due to erosion,

desertification, waterlogging, and salinization, it is likely that future per capita levels of arable land will drop toward a tenth of a hectare.

Prior to this century almost all the increase in food production was obtained by bringing new land into production, but that is no longer possible. For human numbers to reach 12 billion will involve adding an additional 7 billion, enough to fill the habitable land of every continent to the density of China and India today. If soil losses and competing uses of land can be stopped completely within a century and intervening losses limited to no more than 15 percent of the total arable land, there might ultimately be about 2.8 billion hectares of potentially arable land, significantly less than the 3.1 billion hectares needed at present yields to feed 12 billion people (see Figure 11). Even with extraordinary efforts to protect and preserve arable land, there is not enough potentially arable land to feed the human population

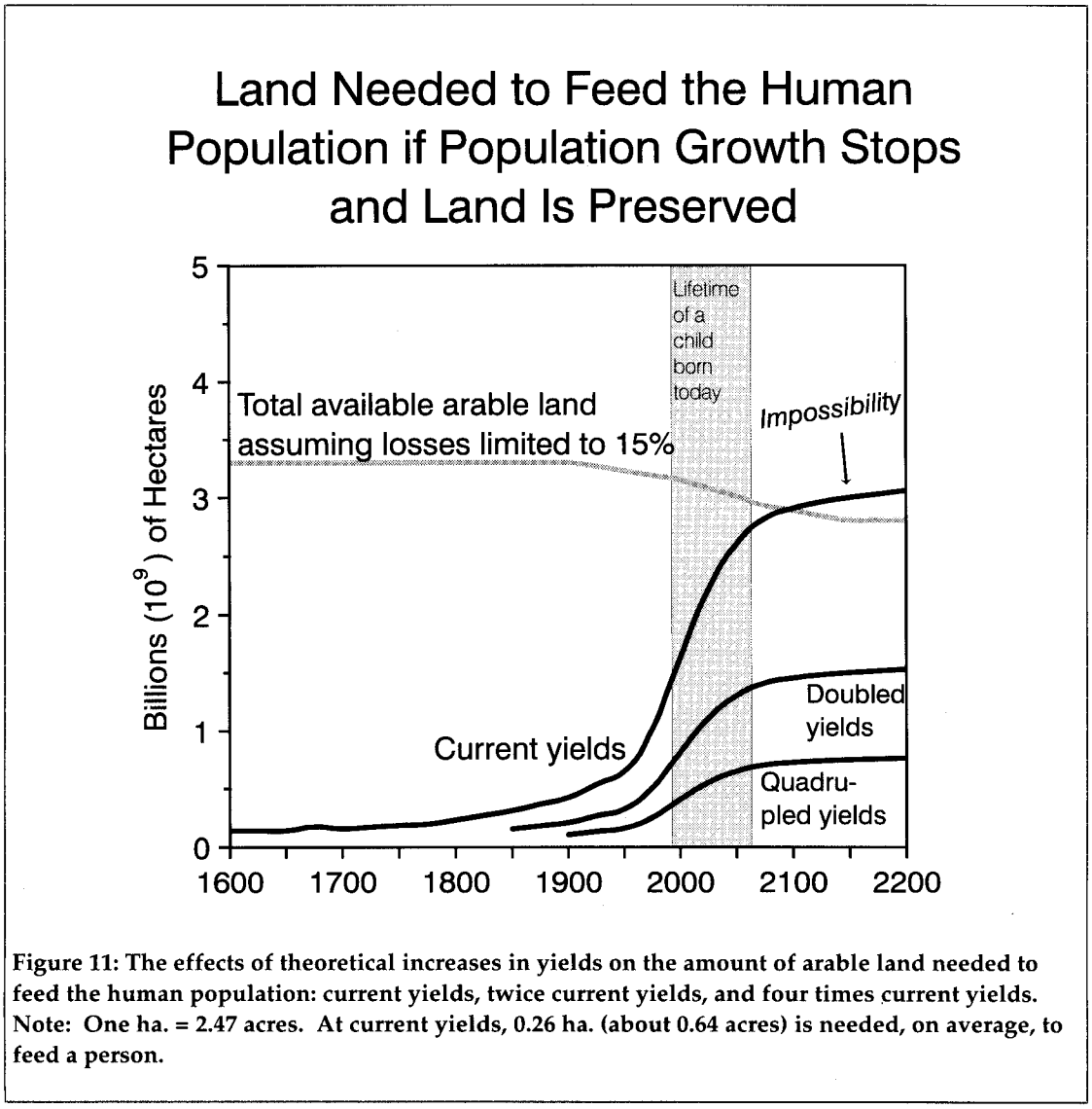


Figure 11: The effects of theoretical increases in yields on the amount of arable land needed to feed the human population: current yields, twice current yields, and four times current yields. Note: One ha. = 2.47 acres. At current yields, 0.26 ha. (about 0.64 acres) is needed, on average, to feed a person.

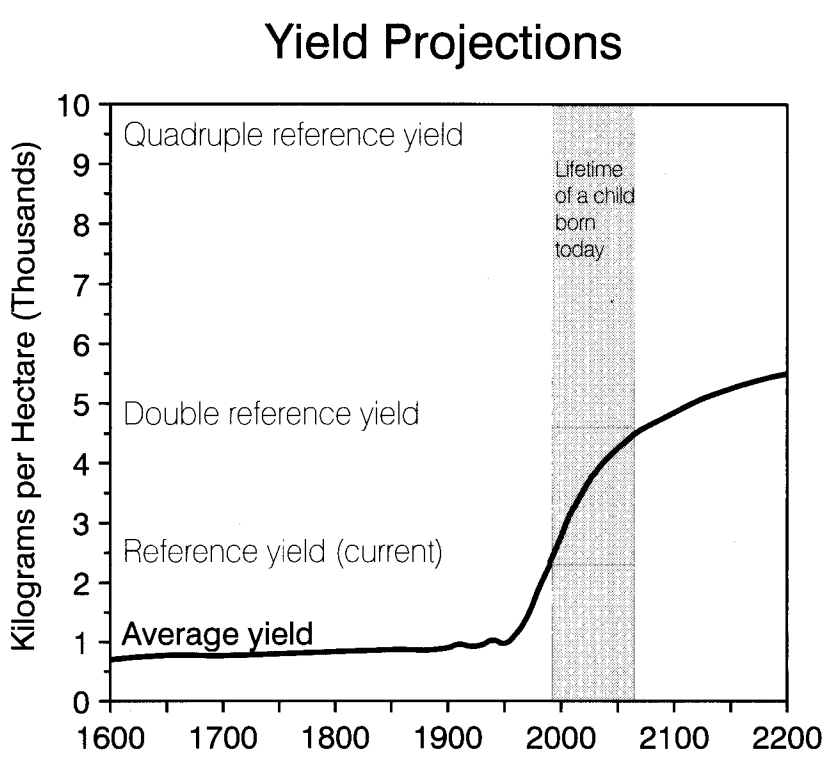


Figure 12: World agricultural yields from 1600 to present and projections. Sources: For the history: Food and Agriculture Organization, *Production Yearbooks*; and U.S. Department of Agriculture, *Agricultural Statistics*. For the projection: Ruttan, V. W. 1990. "Constraints on Sustainable Growth in Agricultural Production: Into the 21st Century." In: Agriculture and Rural Development Department and Training Division, World Bank, eds. 1991. *Eleventh Agricultural Symposium: Agricultural Issues in the Nineties*. Washington: The World Bank; and Ruttan, V. W. December 1992. Personal communication.

projected for the late 21st century at current agricultural yields. By the first decade of the next century, almost all of the increases in food production must come from increased output per hectare —from higher yields—rather than from increases in arable area under cultivation.[13]

Our Agricultural Yields

The theoretical effects of increasing yields are shown in Figure 11. At current yields about 1.5 billion hectares are needed to feed the human population. If yields were somehow to be doubled, only half as much land (0.75 billion hectares) would be needed, so doubling yields moves each point on the curve down by half.

Similarly, somehow quadrupling yields would move the curve down by three quarters. Note that the effect of the

theoretical doubling and quadrupling does not change the shape of the curve but shifts it over and lowers the plateau level. A major human goal must be to find ways to increase yields enough to bring the plateau level below the curve of land available.

The history of yield increases is plotted in Figure 12. Yields increased relatively slowly until modern methods of genetics and plant breeding ushered in the period of the so-called "Green Revolution." The Green Revolution was an enormously significant event in human history.[14] Without it, human needs for land would already have exceeded the land available. As a result of the Green Revolution, yields have increased at about 2.1 percent per year. Furthermore, wheat prices in constant U.S. dollars have declined since the middle of the last century and rice prices have declined since the middle of this century.

Then let man look at his Food, (and how Allah provides it): For that Allah pours forth water in abundance, and Allah splits the earth in fragments, and produces therein grain, and Grapes and the fresh vegetation, and Olives and dates, and enclosed Gardens, dense with lofty trees, and fruits and Fodder — a provision for you and your cattle.

The Holy Qur'an
80:24-32

While these trends in yields and prices are apparently reassuring, a deeper look raises many concerns about the long-term viability of the trends in input-intensive agriculture.

Mainstream agricultural methods create serious resource and environmental problems: surface and underground water pollution due to run-off of chemicals and animal waste, erosion and compaction of soils, energy dependence (see Figure 13), depletion of underground water deposits, and worker and community health problems. These weaknesses in mainstream agriculture, and alternatives to them are described in two major, path-breaking reports, *Agroecology*[15] and *Alternative Agriculture.*[16]

While these reports provide a critically important service in critiquing mainstream, input-intensive agriculture, they do not provide a sense of agricultural yields to be expected globally in the future. The only recent comprehensive analysis of this extremely important matter seems to have been done by Professor Vernon W. Ruttan, Regents Professor, Department of Agricultural and Applied Economics at the University of Minnesota. The following paragraphs summarize his principal findings:

- For the next quarter century, the primary source of growth in crop production will be applying conventional plant and animal breeding more widely, that is, more intensive and efficient use of water, chemical fertilizers, pest control chemicals, and more effective animal nutrition throughout the world. Although we now have strains of grain that produce 8 to 10 thousand kilograms per hectare under favorable conditions, most of the world's farmers will not achieve such yield gains on their farms without much greater technical knowledge and close working relationships with skilled agricultural researchers.

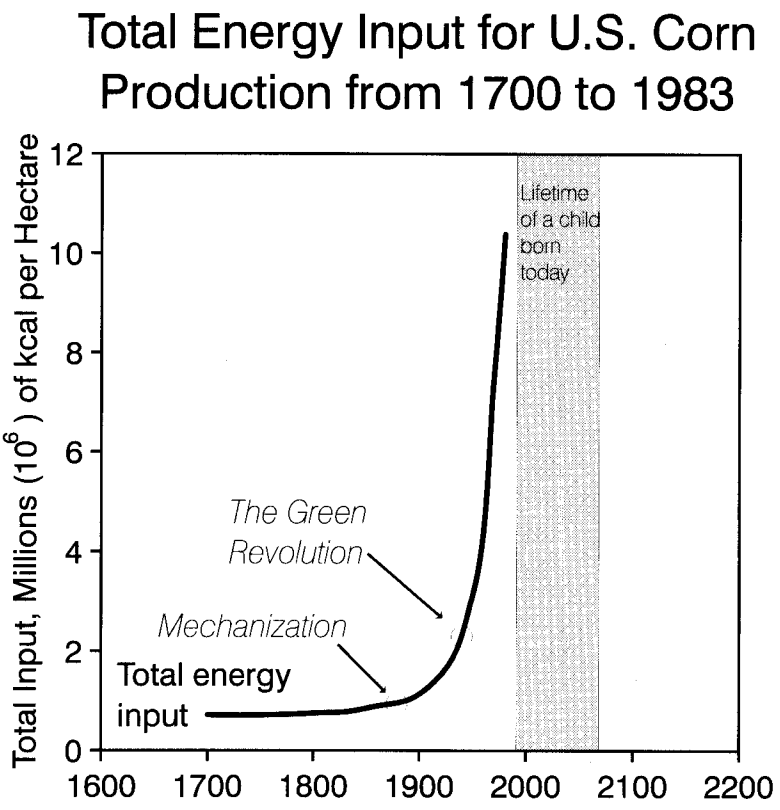


Figure 13: Total energy input to U.S. corn production from 1700 to 1983. Source: Pimentel, D. and Wen, D. Technological Changes in Energy Use in U.S. Agricultural Production. In: Carrol, C. R.; Vandermeer, J. H.; and Rosset, P. M. 1990. *Agroecology*. New York: McGraw-Hill Publishing Company. p. 152.

- By the second decade of the next century, advances through conventional techniques (Mendalian genetics) will be inadequate to sustain the needed yield increases. The incremental response to fertilizer, pesticides, and other inputs is declining. Maximum yield trials in rice have been stuck at 8 to 12 thousand kilograms per hectare for the past fifteen years. Maximum maize (corn) yields are not increasing exponentially but only linearly at about 2 bushels per year. Conventional methods are generally increasing only the ratio of grain to roots, stalk and leaves rather than increasing total production of the plant, and since the plant must have *some* roots, stalk and leaves, there are obvious limits to this trend. Conventional animal breeding has produced animals that use a higher proportion of their feed to produce meat and less for

general maintenance of the animal, another trend that cannot continue indefinitely.

- Advances in non-conventional methods—microbiology and biochemistry—have possibilities for increasing yields later in the next century, but their successful utilization will require major changes in agriculture. Since non-conventional methods are useful only with specific varieties in relatively small geographic areas, research will be needed that is variety and location specific. The research approach will need to shift from "little science" to "big science." Even a small country in the South will need 250 to 300 agricultural scientists if it is to benefit from non-conventional methods. An increasing portion of the products and services will be proprietary or patented and not generally available to countries in the South.
- While one can have reasonable confidence that conventional technologies will continue to increase yields for the next decade or so, conventional technologies are producing a variety of ecological problems and are achieving less incremental gains per unit of research and inputs. In the absence of major changes in agricultural research, it seems likely that the promised gains from biotechnology will continue to recede well into the 21st century.[17]

Our Genetic Resource

All methods of increasing food production are essentially "tinkering" with Earth's ecosystem, and "[t]o save every cog and wheel," wrote the great American naturalist Aldo Leopold, "is the first precaution of intelligent tinkering."[18] We are not saving every cog and wheel. We are throwing away the parts of the ecosystem left and right, as illustrated in Figure 14. By early in the 21st century, species will be vanishing forever at a rate of hundreds per day.

A species that becomes extinct, that disappears forever, can easily be seen as a "nonproblem," since it just vanishes and we hear no more about it. But the rapidly increasing losses of species is a very serious problem. Species are valuable for many reasons.

First and foremost, the *community* of all life is like a sky full of stars, and it is the whole sky full of stars, not human technology, that allows life on Earth to continue. We humans have been making our star to shine brighter and brighter, not even noticing that the other lights in the sky are being eclipsed. Each time we crowd out another species, it is an aesthetic and spiritual loss for all of us. Children born today will have no opportunity to see a

third of the species that were here during the lives of their parents and grandparents.

There are pragmatic reasons for concern, too. Both conventional and biotechnical methods of increasing yields require diversity in the germplasm for major crops, but the diversity of available germplasm is declining daily. The wild races and strains of crop plants on which plant breeders depend will largely be lost over the next few decades as more and more marginal land is brought into cultivation.[19]

Dr. Peter H. Raven, Director of the Missouri Botanical Garden and a world-renowned expert on the diversity of Earth's species, summarizes the practical concerns as follows:

> In fact, the loss of biological diversity is important to us for many reasons. Only about 150 kinds of food plants are used extensively; only about 5,000 have ever been used. Three species of plants—rice, wheat and corn—supply more than half of all human energy requirements. However, there may be tens of thousands of additional kinds of plants that could

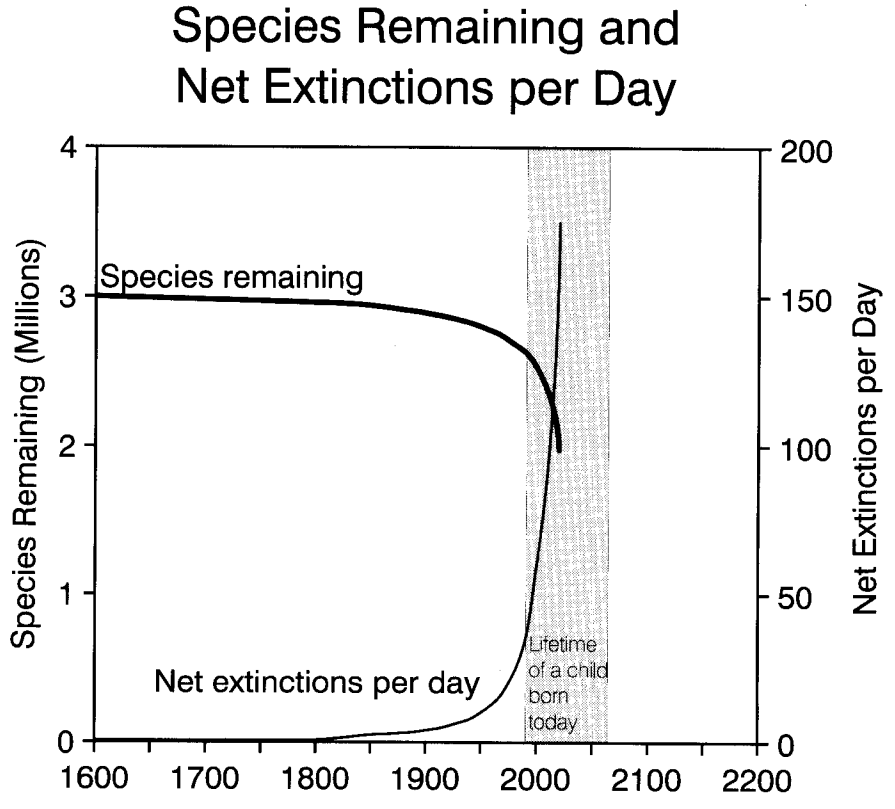


Figure 14: Species remaining and net extinctions (extinction less speciation) per day, 1600-2020. Source: Raven, P. H. 1987. "We're Killing Our World: The Global Ecosystem in Crisis." Occasional Paper. Chicago: MacArthur Foundation. Raven, P. H. 1993. Personal communication.

> provide human food if their properties were fully explored and brought into cultivation. Many of these plants come to us from the tropics.
>
> Further, there are numerous uses for tropical plants other than for food. Oral contraceptives for many years were produced from Mexican yams; muscle relaxants used in surgery come from an Amazonian vine traditionally used to poison darts; the cure for Hodgkin's disease comes from the rosy periwinkle, a native of Madagascar; and the gene pool of corn has recently been enriched by the discovery, in a small area of the mountains of Mexico, of a wild, perennial relative. Among the undiscovered or poorly known plants are doubtless many possible sources of medicines, oils, waxes, fibers and other useful commodities for our modern industrial society.
>
> Furthermore, as genetic engineering expands the possibilities for the transfer of genes from one kind of organism to another —indeed, as our scientific techniques become even more sophisticated—we could come to depend even more heavily on biological diversity than we do now.[20]

One particularly dangerous false and popular notion current today is that with a collection of seeds from endangered species, biologists can restore the ecosystems containing these species, should we ever need them. Scientists cannot recreate lost species, and even if they had all the species, biologists would have no idea, even with billions of dollars and thousands of scientists, how to recreate, for example, a tropical rainforest.[21]

Our Energy

The uncertainties about the future of agriculture involve not only future yield increases, but also the fundamental change that modern high-yield methods have brought to agriculture. Agriculture once was a means of capturing solar energy in the form of edible food calories. This is no longer true. Under high-tech, high-yield agriculture, solar energy has essentially become a catalyst for transmuting fossil fuels into food. Food grains produced with modern, high-yield methods now contains between four and ten calories of fossil fuel for every calorie of solar energy. These fossil fuel inputs are for pesticides, fertilizers, tractor fuel, truck fuel, irrigation energy, crop drying, and for other uses (see Table 2). Meat produced by feeding grains to animals contains only about ten percent of the calories contained in the feed grains.

Modern agriculture's dependence on fossil fuels ties the world's food supplies tightly to the world's energy supplies, especially petroleum and natural gas. Already the cost of energy

intensive agricultural inputs (fertilizers, etc.) cost farmers 10 to 15 percent of the value of the crop produced.[22]

If agricultural yields are to increase by 100-200 percent, much fossil fuel energy must flow into agriculture. Should energy costs increase, farmers' costs will increase throughout the world, and they will be forced to increase their prices or go out of business. Many people who have become accustomed to eating food grown with energy-intensive, high-yield methods may not be able to afford such food in the future.

While increased yields are important, the ability to grow more food on experimental plots is not enough. A solution to the hunger problem (and the farm problem) requires sustainable methods to grow more food that farmers can sell profitably at prices so low that the neediest can afford to buy it. Since the future of farmers' costs and the future of the world's food supplies and costs are now directly linked to the future of the world's fossil fuels, we must turn to the matter of the future of energy for the world.

Table 2: The Energy Input for Various Items Used in U.S. Corn Production

Item	Energy Input (1000 kcal/ha.)	Percent of Total
Machinery	1,018	9.66
Draft animals	0	0.00
Fuel		
Gasoline	400	3.80
Diesel	855	8.11
Manure	0	0.00
Fertilizers		
Nitrogen	3,192	30.29
Phosphorous	473	4.49
Potassium	240	2.28
Lime	134	1.27
Seeds	520	4.93
Insecticides	200	1.90
Herbicides	400	3.80
Irrigation	2,250	21.35
Drying	660	6.26
Electricity	100	0.95
Transport	89	0.84
Total	10,537	100.00

Source: Pimentel, D. and Wen, D. Technological Changes in Energy Use in U.S. Agricultural Production. In: Carrol, C. R.; Vandermeer, J. H.; and Rosset, P. M. 1990. *Agroecology.* New York: McGraw-Hill Publishing Company. p. 152. Data are for 1983, the latest reported.

There are several sources of commercial energy in use in the human economy today. They include coal, natural gas, petroleum, nuclear fuels (uranium and plutonium), and renewable energy supplies such as fuel wood, water, wind, and solar energy. Electricity is not a source of commercial energy but rather an energy form derived from one of the sources listed above.

For the modern industrial economy, petroleum (oil) has been particularly important because it can be refined into useful fluid fuels (especially gasoline, fuel oil, and kerosene) that have a high energy content per unit of weight and are relatively safe to store, transport, and utilize. In fact, the whole industrial economy of the world is designed primarily around oil-based commercial energy. The future of oil is therefore very important both to development prospects generally and for food production in particular.

[D]oubling of consumption at constant time intervals can bring disaster with shocking suddenness. Even when a nonrenewable resource has been only half used, it is still only one interval away from the end.

E. O. Wilson

Much is known about the future availability of oil. Petroleum geologists have determined by four independent methods that the total amount of oil in Earth when we first started using it in 1900 was about 2,000 billion barrels.[23] This total includes all of the oil known in 1900, all that has been discovered to date, and reliable, stable estimates of all of the additional oil that will be discovered in the future.* In other words, 2,000 billion barrels is all we ever had or will have.

The outer boundary of Figure 15A represents this initial resource in "Earth's fuel tank." The width of the various compartments in the fuel tank indicate the initial resource—known and yet-to-be-discovered—in North America, South America, the republics of the former Soviet Union, Africa, Europe, Asia-Oceania, and the Middle East.

Since 1900, oil has been steadily drawn from Earth's fuel tank, and this production has lowered the overall level in the tank and altered the relative level in the regional compartments. If current rates of production were to continue unchanged until 2010, the relative levels in the regional compartments would be as shown in Figure 15B. (If the rates of production were to increase to assist in the economic development of the countries of the South, the levels would be still lower.) The shaded area in Figure 15B

* Oil shale, tar sands, and coal liquefaction might contribute to the fluid fuel resource supply. However, oil shale and tar sands are not competitive at current petroleum prices, and may never be because production of oil from oil shale and tar sands is itself highly energy intensive, and every time petroleum prices rise, the break-even price for production from oil shale and tar sands increases, too. Oil shale, tar sands, and coal liquefaction all produce much more carbon dioxide than does petroleum.

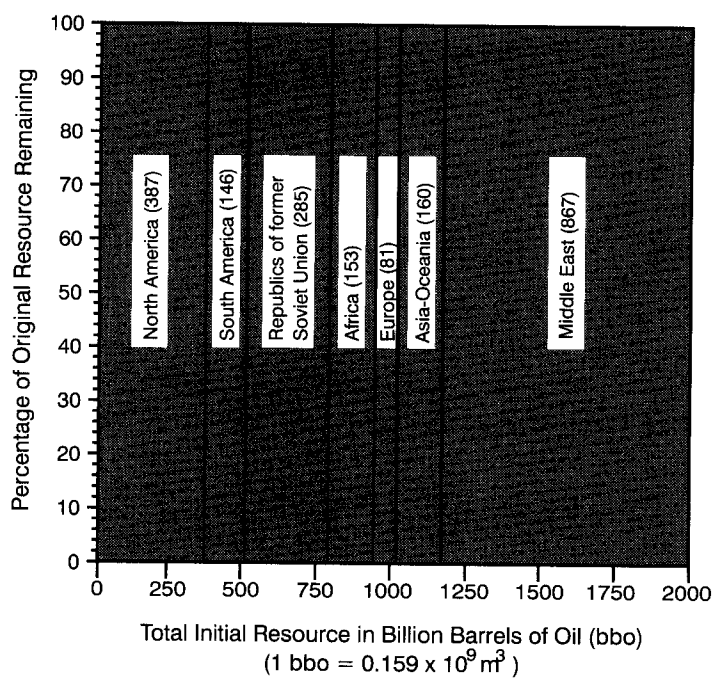


Figure 15A: Distribution of Earth's original (1900) total petroleum resource.

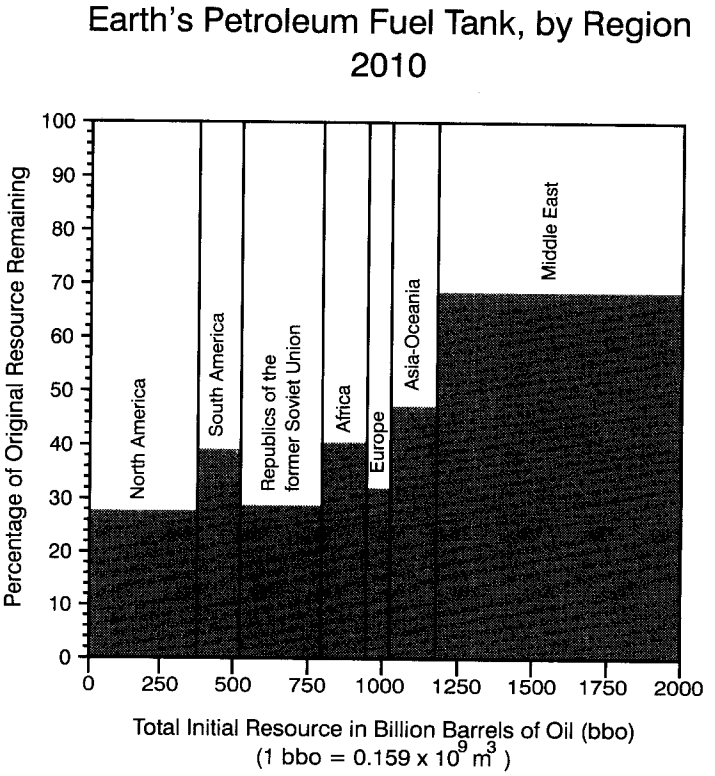


Figure 15B: Distribution of Earth's petroleum resources remaining by 2010, assuming no increase in current rates of utilization. Source: Masters, C. D.; Root, D. H.; and Attanasi, E. D. 1991. "Resource Constraints in Petroleum Production Potential." *Science.* vol. 253. 12 July 1991. pp. 146-152.

represents oil remaining; the white area represents the now-empty part of Earth's fuel tank. The regional distribution of oil shown in Figure 15B has significant implications for the world energy market. By 2010, approximately half of the oil remaining will be in a single compartment, the one in the Middle East. As long as several producing regions control more than half of the total resource, the international market can be expected to respond effectively to occasional disruptions in production. By 2010, however, any dislocations in the Middle East must be expected to have global consequences that will be beyond the control of other producing regions.[24]

How long will the fuel in Earth's oil tank last? It is possible to give a reasonably precise answer to this question based on what we know about petroleum and its use. Petroleum production began at zero in 1900 (when petroleum was first produced commercially), and increased at about 7 percent per year through 1973 (see Figure 16). Although sudden price increases in 1973 and 1979 broke the exponential trend in petroleum production, some increase in production is still expected over the next few decades.[25]

Ultimately, however, petroleum production must peak and return to zero when all of Earth's total supply of 2000 billion barrels has been used. By about 2025 a rapid decline in petroleum use must begin. Within the lifetime of a child born today, virtually all of Earth's petroleum will be burned, and Earth's fuel tank will have gone from full to empty.

By leveling off oil use at the current rate (about 21 billion barrels per year), it would be possible to delay the fall-off in the availability of oil for perhaps ten or fifteen years, but there will never be large increases in the availability of petroleum to fuel development in the countries of the South. This fact has major implications for the development prospects for both the South and the North.

The industrial style development characteristic of the North is fundamentally a process of replacing human labor—man, woman, and child power—with other forms of power derived from commercial energy sources. The energy is needed not only for daily ongoing activities such as powering factories, household conveniences, transportation systems, and energy processing, but also in the construction and maintenance of buildings, roads, equipment, and other economic infrastructure and capital that is now so characteristic of the "developed" countries of the North.

To build industrialized economies modeled on the North, the countries of the South would require enormous quantities of a particular type of energy—fluid fuels. Northern economies are

designed to operate on fluid fuels, especially gasoline, because such fuels contain much usable energy for their weight. One gallon of gasoline provides the equivalent of two and a half weeks of human labor.[26] Where could this fluid-fuel energy come from? Not from petroleum, as pointed out above.

The U.S. Department of Energy has investigated probable future prices of petroleum assuming competition from all other sources of energy (see Figure 17).[27] Until the 1973 oil embargo, the average global energy price (in 1982 dollars per barrel equivalent) was approximately $10 and declining slowly. In 1973 the price of oil doubled. Then in 1979, prices doubled again to about $40 per barrel as a result of decisions by the members of the Organization of Petroleum Exporting Countries (OPEC). Since 1979, energy prices have declined as a result of four factors: energy conservation, a slowing of the global economy during the early 1980s, increased petroleum production in the United States and in the North Sea, and the desire of OPEC members for high annual incomes. The outlook now is for prices to increase again toward the end of the century.

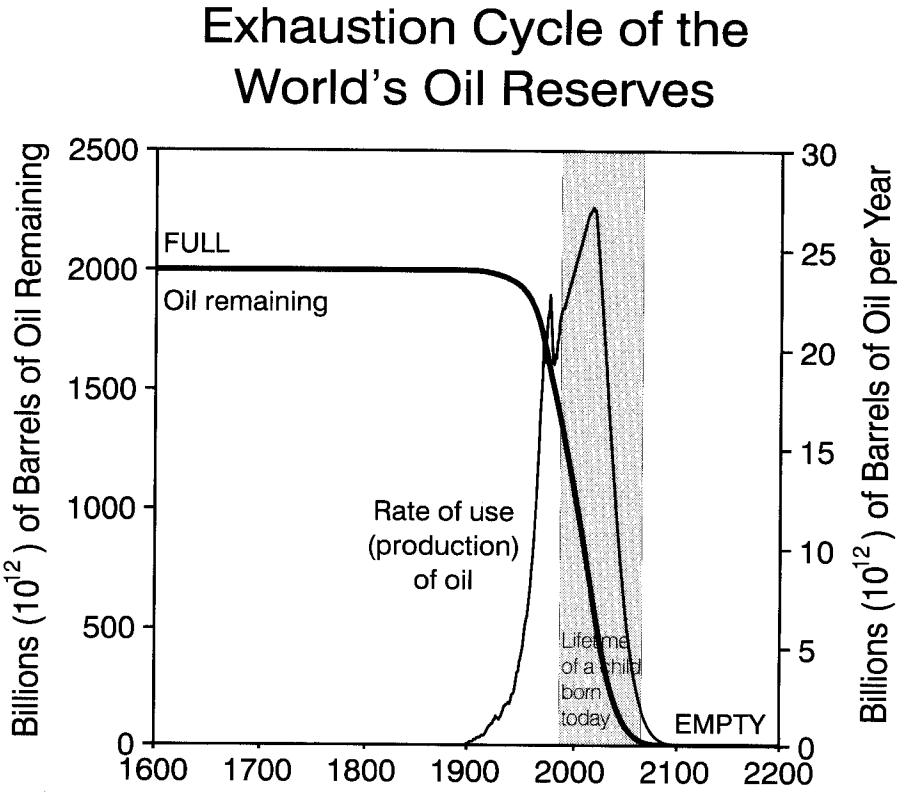


Figure 16: Exhaustion Cycle of the World's Oil Resources. Sources: Masters, C. D.; Root, D. H.; and Attanasi, E. D. 1991. Resource Constraints in Petroleum Production Potential. *Science.* vol. 253. 12 July 1991. pp. 146-152. DeGolyer and MacNaughton. 1992. *Twentieth Century Petroleum Statistics.* Dallas: DeGolyer and MacNaughton. p. 4.

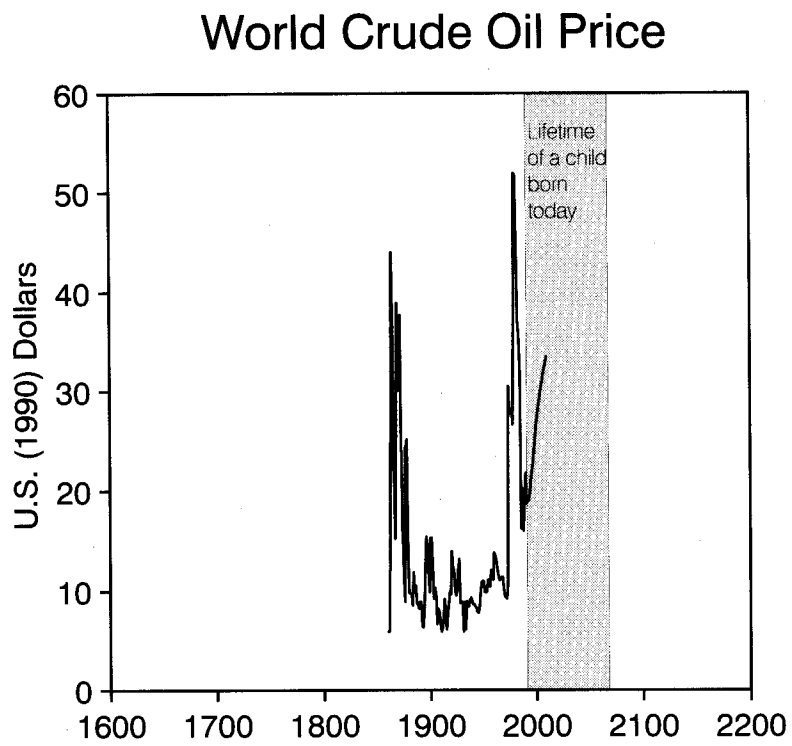


Figure 17: International price of imported crude oil from 1860 (first commercial oil production) to the present and a mid-level projection, 1990-2010. Source: Energy Information Administration. 1992. *Annual Energy Outlook 1992.* Washington: U.S. Department of Energy. DOE/EIA-3083 (92). p. 6; and Oak Ridge National Laboratory. 1989. *Energy and Technology R&D—What Could Make a Difference?* as reported in: U.S. Department of Energy. 1991. *National Energy Strategy.* Washington: U.S. Government Printing Office.

These and other petroleum price projections assume only modest increases in the use of energy in the countries of the South. The South is simply not assumed to "develop," meaning that energy use per capita in the South is assumed not to approach that in the North. If instead one assumed substantial development (i.e., substantial growth in per capita energy utilization) in the South, the depletion of the world's petroleum resource would proceed more rapidly and the price increases for petroleum and other forms of energy by the end of the decade would be higher than shown in Figure 17.

The depletion of the global petroleum resource does not present a serious problem if some other form of energy replaces fluid-fuels at comparable prices and without creating serious environmental problems. Although there are large coal reserves around the world, burning this coal would produce unacceptable quantities of carbon dioxide, and converting the coal to synthetic fluid fuels

(oil or gas) before burning would produce even more carbon dioxide than burning the coal directly. Nuclear,* solar, wind, and thermal power can produce electricity, but cannot produce efficiently the fluid fuels on which all industrial economies now depend. The least costly and least polluting option readily available is to radically increase the efficiency with which energy is used everywhere.[28]

The spectre of the unavailability of energy in a form and quality usable in an expanded global economy has not, as yet, affected the workings of the marketplace. Several decades will be needed to make an orderly transition to a world energy economy beyond the era of petroleum. We are already at the point of needing an alternative to the petroleum economy, and yet no transition is in progress to an energy economy that will meet the needs of all peoples. Yet, as can be seen in Figures 16 and 17, there has been essentially no response by the market mechanism.

Part of the reason for the lack of action on global energy for sustainable development is the United Nations System of National Accounts (UNSNA). Under this system, the primary measure of how well a nation's economy is doing is the Gross Domestic Product (GDP), which is a measure of the total goods and services produced by a country during a year. This grading system for nations takes no account of declining "natural capital" such as oil deposits. In fact, under the UNSNA a nation's resources have "value" only after they are used. The faster a nation converts its resources (for example, petroleum) into "goods" and its "goods" into wastes—the faster the "throughput" of resources to waste and pollution—the higher the nation's marks on the GDP scale. Even the $1 billion cost of the grossly inadequate cleanup after the Valdez oil spill in Alaska increased the U.S. GDP, giving the totally false impression that oil spills are good for the U.S. and other economies.

Although efforts are being made to revise the UNSNA,[29] there is strong resistance to change. Part of the resistance to change is based on a strong faith that the greed and self-interest underlying the market mechanism foresee all economic, resource, and environmental problems, and that the market mechanism will steer the ship of state safely through the rocks ahead. The

---

*Nuclear energy also poses unique safety and waste problems. These problems in the Soviet Union contributed to the Soviet decision to end the Cold War. Soviet ex-foreign minister Alexandr Bessmertnykh has said: "[The nuclear reactor accident at Chernobyl] had a tremendous impact. Now we realized the danger of everything nuclear. The accident only had the effect of what one-third of one [hydrogen bomb] explosion would do, and it was devastating."[30]

difficulty is that the market mechanism is so short-sighted that it can scarcely see beyond the bridge and certainly not as far as the rocks ahead.

The limited foresight provided by the market is a result of basing market decisions on "present values." There are three difficulties with this approach. First, the market mechanism works only for those who have the money necessary to be a part of the market. This is why, as far as the market mechanism is concerned, countries of the South are not now and never will be of a significant factor in world petroleum markets.

Second, the present value method of valuing future costs and benefits, which is now incorporated into all business calculators, allows individuals and corporations in a market system to look ahead, only as far as the discount rate (essentially the prevailing interest rate) permits—about ten years at a 7 percent discount rate, seven years at 10 percent, and about one year at 70 percent. The higher the interest rate, the more short-sighted market decisions become. For the market mechanism to look ahead, the decades needed to develop a new global energy system would require interest rates everywhere to be kept in the range of 1 percent to 2 percent.

Some faith traditions say that all societal decisions should be made based on the welfare of the seventh generation in the future, which means considering costs and benefits for the whole society about 140 years into the future. For the market to consider the interests of the seventh generation, interest rates would have to be kept below half of one percent (0.5%).

The third difficulty with present values is that they weigh future costs and benefits *to the individual or corporation making the decision*, and as a result, costs and benefits to the society as a whole are ignored as "externalities." Successful market-oriented national economies have developed many institutions and procedures to limit the neglect of externalities such as pollution and to control false advertising, dangerous products, and abuse of labor. The former centrally-planned economies of the world lack not only the entrepreneurial experience required in a market economy but also the regulatory institutions that limit the most rapacious and destructive aspects of capitalism. It is no wonder that they are finding the transition from a planned economy to a market economy difficult.

The market mechanism, as it functions in international trade, strongly favors the industrialized countries of the North and multinational corporations. The key international agreement concerning international trade is the General Agreement on Trades and Tariffs (GATT). Currently the GATT agreements encourage the sale of Southern resources to the North at

unreasonably low prices, encourage practices that bring toxic pollutants to the South, accelerate the destruction of genetic resources in the South, and discourage value-added processing of resources of the South.[31]

The point is simply this: Decisions concerning the global energy economy would be very different if they were based on the costs and benefits to the seventh generation and on a different system of national accounts. The future costs of present resource consumption, waste production, and pollution generation would then not be ignored. As things are, the limited world supplies of petroleum and the inability of the market mechanism to stimulate an early transition to a new global energy economy that can accommodate development in the South mean that the countries of the South face an impossible task of development, at least as "development" is now understood.

Our Environment

Human numbers, wealth, poverty, technology, and beliefs are now having planet-wide consequences.[32] The energy and agricultural scenarios sketched above have several large environmental implications. One of particular concern is certain chemicals that human activities are releasing into the atmosphere. Some of these chemicals are altering the planet's temperature-regulating systems, threatening to change the climate and temperature of the whole Earth. Others are depleting Earth's protective layer of stratospheric ozone, increasing the amount of dangerous ultraviolet light reaching ground level.

The greenhouse gases

A number of so-called "greenhouse gases" have the property of allowing high frequency solar radiation to pass through the atmosphere to the surface of Earth where the radiation is absorbed, providing warmth to Earth. These gases (carbon dioxide, chlorofluorocarbon 12, methane, chlorofluorocarbon 11, nitrous oxide, ozone (stratosphere), ozone (troposphere), and other chlorofluorocarbons) block the transmission of low frequency heat radiation back into space. The net effect of the greenhouse gases is to trap solar energy and keep the temperature of Earth within a range in which approximately 3 million species can live. Increased concentrations of greenhouse gases can disrupt the operation of the planet's temperature-regulating systems and cause the temperature of Earth to rise.[33]

Currently, the concentrations of all greenhouse gases are rising. Most alarming are the growing concentrations of carbon dioxide (see Figure 18). Northern transportation and industry are the principal sources, but Southern deforestation is also very significant.

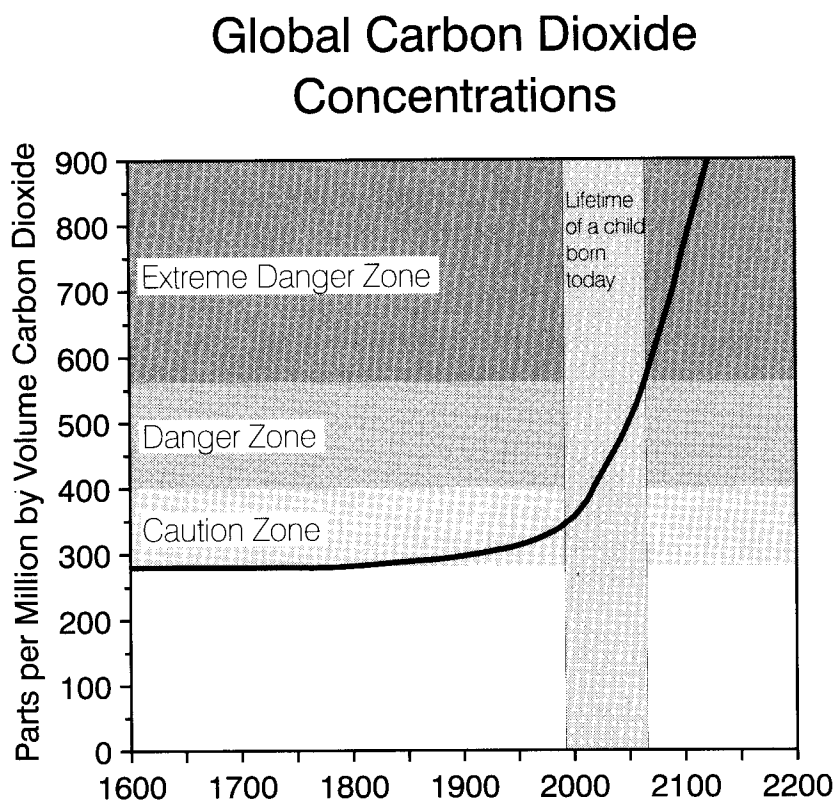


Figure 18: Carbon dioxide concentrations, historical and projected. Source: IPCC Working Group I. June 1990. *Policymakers Summary of the Scientific Assessment on Climate Change.* "Business-as-usual" scenario. Nairobi: U.N. Environment Programme. pp. 7-9.

As a result of the increasing concentrations of the greenhouse gases, the temperature of the entire planet is expected to begin increasing soon. The best estimate currently available of global temperature change comes from the Intergovernmental Panel on Climate Change (IPCC), which has been established jointly by the World Meteorological Organization and the U.N. Environment Programme. The IPCC estimates that the average temperature of the planet will increase by about 2.5°C by 2100 (see Figure 19).[34]

For the first time in 1991 the effect of ozone depletion (discussed below) on the overall temperature of Earth was calculated and measured. It was found that ozone depletion cools Earth so much that ozone depletion may have offset and masked a significant part of the temperature increase to be expected from greenhouse gases over the past decade.[35]

On first hearing, an increase of 2.5°C does not sound alarming. Local day-to-day temperature changes are much larger. On a planetary scale, however, an increase of 2.5°C has enormous significance. It is a change of a magnitude unprecedented since the last ice age 10,000 years ago.

Furthermore, the pollutants causing this global disaster are expected to continue accumulating in the atmosphere for at least several decades (see Figure 18), so the ultimate temperature rise could easily be even larger.

A major concern associated with temperature increase is a rise in the sea level and the flooding of low-lying coastal areas. Nearly a third of all humans live within 60 km (37 miles) of a coastline, and some of the world's most productive biological systems are also in coastal areas. The IPCC projects a sea-level rise of 60 cm by 2100 unless corrective measures are taken very soon. This projection takes into account both thermal expansion of sea water and melting of glaciers. Even if increases in greenhouse gas concentrations were to stop suddenly in 2030, the momentum of change would cause an increase in the sea level of 40 cm by 2100.[36]

The impacts on human settlements and the whole community of life are large. A 20-30 cm sea-level rise poses problems for low-

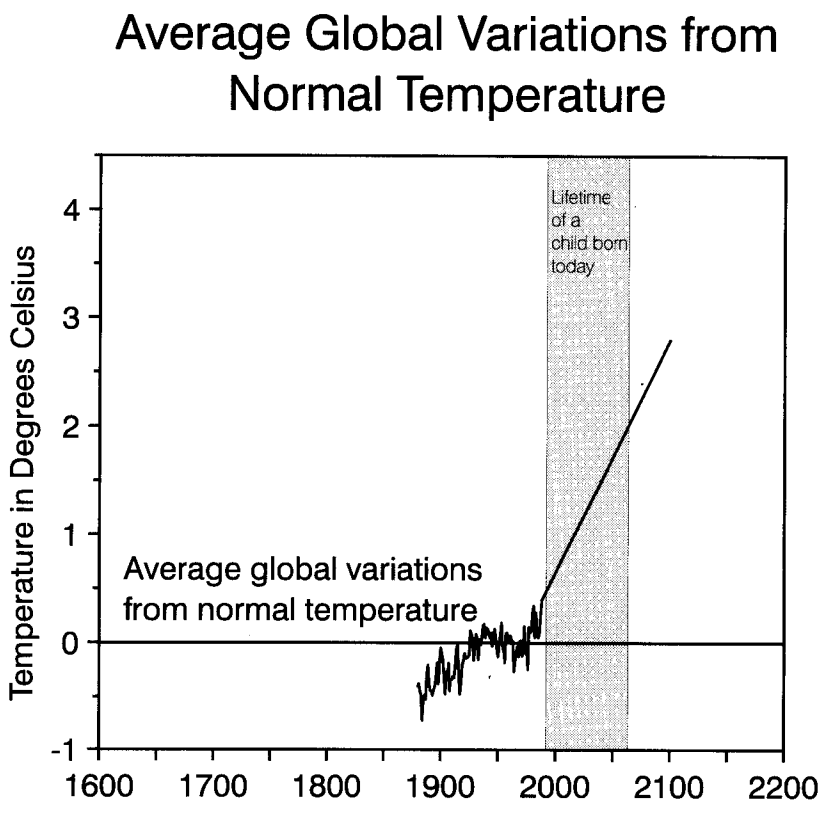


Figure 19: Average global variations from normal temperature, 1880-1988 and projection to 2100. Projections are from Scenario IS92a as presented in Intergovernmental Panel on Climate Change. 1992. *1992 IPCC Supplement.* Nairobi: U.N. Environment Programme. p. 25. The historical data are from Hanson, J. E. 1988. As reported in Shabecoff, P. "Global Warming Has Begun, Expert Tells Senate." *The New York Times.* 24 June 1988. p. A1.

lying coastal zones (for example, much of Bangladesh) and for island countries. Such a rise will destroy productive land and freshwater resources. A 100 cm rise (the high projection for 2100) would destroy several countries, displace large populations, destroy low-lying urban infrastructure, inundate productive lands, contaminate freshwater supplies, and alter coastlines. These effects could not be prevented except at enormous cost.[37]

Other effects of 2.5°C global warming will vary greatly from region to region. Some areas will experience only a modest temperature increase of a degree or so; other areas will experience changes two or more times the average. Major cropping areas of the world will be shifted, causing dislocations and disruptions. Exactly where these shifts will occur is beyond the predictive capabilities of current models on even the largest supercomputers. If cropping areas should move into regions of poorer soils, yields would likely fall or food become more expensive because of the additional fertilizer needed to maintain yields. As cropping areas move, existing agriculture infrastructure, capital equipment, and farm labor will be idled, and in the new areas infrastructure, capital, and labor will be inadequate to take advantage of the new conditions.

With increased carbon dioxide concentrations, crop plants will grow faster, but weeds will grow faster, too. In some areas, especially in sub-Saharan Africa, the growth of weed species is expected to increase more than the growth of crop species.

As air warms, its capacity to hold moisture increases, and this implies changes for Earth's hydrologic cycle. Most climate models project an overall increase in precipitation of 7-11 percent from 1960-2030.[38] Increased evaporation rates, however, would lead to dryer soils in major cropping areas, a situation with adverse implications for seed germination rates and crop yields. Greater fluctuations in river flows will increase the damage done by droughts and floods. The stress on dams, reservoirs, channels, and dikes will also be increased as these important facilities experience more frequent storm flows that exceed their design capacity.

Some cities would become much warmer. Currently temperatures in Washington, DC, for example, exceed 100°F only one day per year and 90°F only 35 days per year. By 2030, there could be 12 days over 100°F and 85 days over 90°F. Other cities around the world can expect similar changes.

The ozone layer

Part of the radiation the sun sends toward Earth is harmful to virtually all forms of life. Fortunately, there is a layer of

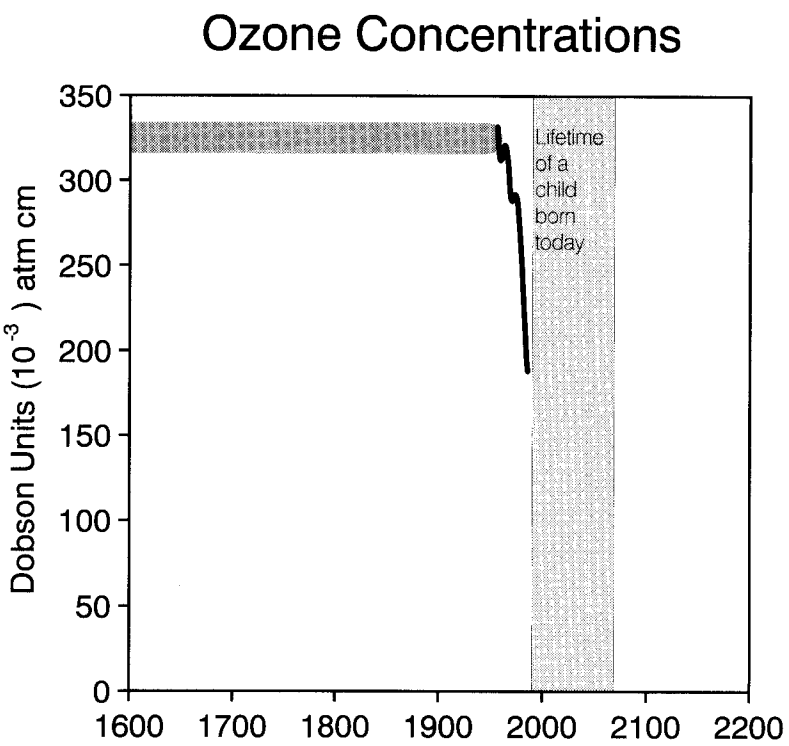


Figure 20: Total ozone concentrations above Halley Bay, Antarctica. Source: Global Environmental Monitoring System. 1987. *The Ozone Layer.* Nairobi: United Nations Environment Programme. p. 23; and Bowman, K. P. 1988. "Global Trends in Total Ozone." *Science.* 1 January 1988. pp. 48-50. Watson, R. T. and Albritton, D.C. 1991. *Scientific Assessment of Ozone Depletion*: 1991. Geneva: World Meteorological Organization, p. ES-v. Note: Although there are no data on ozone concentrations above Halley Bay earlier than 1957, many scientists feel the very constant concentrations during the 1957 to 1970 period probably extend well back in time, as shown in the figure.

stratospheric ozone surrounding Earth that absorbs and blocks much of this harmful radiation, which is known as ultraviolet B, or simply UV-B. Without the protection of this invisible ozone shield, all life on Earth would be endangered by UV-B radiation.

In 1985 scientists discovered, quite by accident, a continent-sized "hole" in Earth's ozone shield over Antarctica. (Measurements showing the formation of the hole were actually made by instruments on a satellite in the late 1970s, but the measured concentrations of ozone were so low that they were disregarded for years as an "obvious" measurement error.) The hole varies in size and depth from season to season. In some spots the ozone has been found depleted by as much as 60 percent. Figure 20 shows ozone declines measured in the ozone hole.[39]

The discovery of the "hole" in the ozone layer was a total surprise. No scientific theory and no computer model predicted the possibility of such a hole, and a full scientific explanation has still not been developed. No one knew if the hole would spread, endangering life over the whole planet.

As soon as the extremely low measurements of ozone concentrations were recognized as valid, intense research efforts were begun to determine the cause of stratospheric ozone depletion, to predict future trends, and to assess the ecological consequences of increased UV-B radiation. As a result of this research it is now known that the release of the chemicals shown in Table 3 adversely affect ozone concentrations. Chlorofluorocarbon (CFC) chemicals do 80 percent of the damage to the ozone layer. A decade or more is needed for these chemicals to migrate from the surface of Earth to the stratosphere, and once there, they catalyze ozone-depleting reactions for 75-110 years. Each CFC molecule can destroy 100,000 molecules of ozone. A 1 percent reduction of stratospheric ozone increases UV-B radiation at Earth's surface by 2 percent.

An increase in the amount of ultraviolet radiation will cause an increased number of cancers, especially skin cancers in humans and other animals. Scientists estimated that a 1 percent increase in UV-B would result in a 2 percent increase in skin cancers of light-skinned people.[40] (Dark-skinned people are not

Table 3: Trace Gases Affecting Ozone Concentrations

Gas	Average lifetime in atmosphere (years)	Average global concentration (ppbv)	Annual rate of increase (percent)
CFC-11	75	0.23	5
CFC-12	110	0.4	5
CFC-113	90	0.02	7
Halon 1301	110	very low	11
nitrous oxide	150	304	0.25
carbon monoxide	0.4	variable	0-2
carbon dioxide	7	344,000	0.4
methane	11	1,650	1

Source: UNEP/GEMS. 1987. "The Ozone Layer." Nairobi: United Nations Environment Programme.

as susceptible.) Caught early, wart-like melanoma tumors can be cured by surgical removal, but once the malignancy spreads to other parts of the body, it is among the most lethal and aggressive of cancers, resisting both chemotherapy and radiation treatment.

In addition to increasing melanomas, more exposure to UV-B radiation increases the general susceptibility to all cancers and infections. This is because exposure to UV-B impairs the effectiveness of the body's immune system, which helps fight cancer cells as well as infections.

An increase in UV-B would also increase the incidence of cataracts and other eye disease. The human retina is especially sensitive to damaging sunburn, but since there are no pain sensors in that part of the eye, we do not feel the burning.

Many crop plants and forest species are adversely affected by ultraviolet light. UV-B can slow growth, interfere with germination, damage plant hormones and chlorophyll, and, as a result, reduce the total plant mass produced during the growing season.

UV-B penetrates several meters in clear water and threatens many aquatic organisms. Single-celled algae, the beginning of the aquatic food chain, are seriously threatened. Experiments show that all anchovy larvae are killed to a depth of 10 meters by 15 days' exposure to UV-B at an intensity 20 percent higher than normal.

In September 1987, representatives of 24 countries met in Montreal to consider the problem. As with the greenhouse gases, the ozone-depleting chemicals are produced primarily by the wealthy, consuming countries of the North. CFCs are used in aerosols, refrigeration equipment, solvents, and foam producing agents, and there was reluctance on the part of Northern industrial and political leaders to ban them entirely. Instead, the Montreal Protocol called for a 50 percent reduction in CFC production in the 24 signatory countries by 1997.

Following the 1987 meeting, evidence accumulated that the protective ozone shield was thinning more rapidly than expected and that less damaging chemicals and processes could be developed more quickly and less expensively than industry leaders had expected. In 1990 the treaty's signatories met in London and adopted a deadline for phasing out the most damaging chemicals by 2000.

In 1992 the signatories (now 87 countries) met again and agreed to move up the phase-out deadlines as follows: 1996 for chlorofluorocarbons, 1994 for halons, and 2030 for hydro-chlorofluorocarbons. For methyl bromide, a previously

unregulated ozone-depleting pesticide, it was only agreed to limit 1995 production to 1991 levels.[41]

The situation at present is dangerous but hopeful.[42] From 1979 to 1992, the amount of total column ozone has decreased over most of the planet. Worldwide losses in 1992 were the largest ever recorded, probably due in part to the debris injected into the stratosphere by the 1991 eruption of Mt. Pinatubo in the Philippines. There are now for the first time significant decreases in ozone concentrations during the spring and summer in both the northern and southern hemispheres at the middle and high latitudes, where most humans live.

The ozone hole over Antarctica has become larger and deeper. Ozone losses have also been observed now over the Arctic, but no massive hole comparable to that over the South Pole has opened in the North.

There is strong evidence now that the ozone depletion is due primarily to chlorine and bromine containing industrial chemicals. Since stratospheric abundances of chlorine and bromine will increase at least until 2000, significant further losses of ozone must be expected at middle latitudes and in the polar regions.

Large increases in ultraviolet light have been observed at ground level in Antarctica. In the mid-latitudes, increases of ultraviolet light of about 12 percent occurred during the 1992-93 season of depletion, which now extends into the summer months.

If the Montreal Protocol is strengthened to limit further the emissions of chlorine and bromine-containing compounds, *if* all countries sign the protocol and fully comply with its provisions, and *if* no further surprises develop, the damage done to Earth's protective ozone shield might be repaired within about 100 years. A hundred countries (including India and China), however, have not signed the protocol.

Our Poverty, Violence, Hatred, and Despair

The issues discusses above—population, food, land, energy, species, climate change, stratosphere, ozone depletion—are all interrelated, and many other issues could be added to the list. The unchecked pandemic of the virus that causes AIDS has not even been mentioned. Nor has the reemergence of tuberculosis as a major disease that is furthered by AIDS, homelessness and poverty and that may kill even more people than AIDS. Nor has the global debt problem been mentioned, and the fact that net capital flows are now from that South to the North rather than from the North to the South. Water problems—both quantity and quality—are rapidly developing virtually everywhere. While the Cold War seems to be at an end, nuclear weapons having

destructive power equivalent to 5,000 times all the weapons used in World War II are still with us, and the nuclear weapons in the former Soviet Union are now under looser control than earlier. Toxic and radioactive wastes continue to accumulate with no satisfactory disposal methods in sight. Corruption, especially when related to drug trafficking, is bringing tragedy and despair to many communities and countries. The technologies needed to produce biological and chemical weapons, conventional weapons, and terrorist bombs are now much more widely available. Patent laws reward wealthy countries that can afford education and research and penalize poorer countries that can't. Education itself has become vital to the security and prosperity of every country. One could go on and on.

But there is one more issue that stands out from all the rest: What we are doing to Earth, we are doing to ourselves. The breaking of life-sustaining relationships in the biosphere parallels the breaking of life-sustaining relationships in the human community, our most critically important resource.

An old story from the book of Genesis in the Jewish *Torah* provides an illustration:

> So Abram went up from Egypt, he and his wife, and all that he had and Lot with him, into the Negeb.
>
> Now Abram was very rich in cattle, in silver, and in gold . . . . And Lot . . . also had flocks and herds and tents, so that the land could not support both of them dwelling together . . . and there was strife between the herdsmen of Abram's cattle and the herdsmen of Lot's cattle . . . .
>
> Then Abram said to Lot, "Let there be no strife between you and me, and between your herdsmen and my herdsmen; for we are kinsmen. Is not the whole land before you? Separate yourself from me. If you take the left hand, then I will go to the right; or if you take the right hand, then I will go to the left.
>
> And Lot lifted up his eyes and saw that the Jordan valley was well watered everywhere like the garden of the Lord . . . . So Lot chose for himself all the Jordan valley . . . . Abram dwelt in the land of Canaan . . . .[43]

This is the story of two wealthy families that together could not be supported by the land. As the environment deteriorated and adversely impacted their wealth (cattle) and income, there was fighting between their servants. To preserve family unity, Abram wisely proposed that the two families part and live separately where the land could support them.

Abram's solution worked again and again for centuries. As long as "the whole land was before [us]," we could separate,

migrate from country to country, continent to continent and settle where the land could support us. But the whole land is no longer before us. Now that we are 5 billion, much of the land cannot "support [us] dwelling together," and there is no well-watered Jordan valley waiting to be settled.

How will we respond now that the whole land is no longer before us? How will we respond when the deteriorating environment and resource base impacts on our wealth and income? Probably we will respond the same way that Abram's and Lot's herdsmen responded: in strife. Probably there will be more violence, hatred, and despair.

Already there are conflicts between communities and nations over land, water, oil, fish, "pollution rights," acid rain, genetic resources, forests, and many other resources. And such conflicts can be expected to intensify and to exacerbate already frayed relationships between nations, between women and men, between adults and children, and between peoples of differing cultures, races, and faiths. Some of the conflict will be motivated by greed, some by extreme poverty, and some by despair.

In Zaïre, for example, it is greed and corruption. Despite the fact that Zaïre has rich deposits of cobalt, copper, and diamonds and rich agricultural lands, clean water, and inexpensive electric power, the World Bank in 1992 ranked it as the world's 12th poorest country with income of $220 per capita. The reason is primarily corruption and repression led by President Mobutu Sese Seko himself. Mobutu treats the country's funds as his own and has chateaux in Spain and Belgium and other major properties in Paris, Monte Carlo, Switzerland, Portugal, and the Ivory Coast. The repression is brutal. Soldiers in plain khaki uniforms—the so-called "Owls"—roar through the capital most nights in unmarked vehicles attacking and killing uncounted people considered political threats to Mobutu.

In September 1992 tensions were high after Mobutu canceled a national political conference called to draft a new constitution and schedule a multi-party election. Then a group of Mobutu's elite soldiers, angry because they had not been paid, began looting and burning the city. Soon civilians joined in. In short order, the industry was destroyed and the housing burned. Medical and other professionals fled, followed by foreign nationals and their investments, and everyone else who could leave. In just a week the trust that held the society together vanished and the society with it.[44]

The story of the Ik told by anthropologist Colin Turnbull is another example of how the resource of "community" can vanish. The Ik, a tribe of nomadic hunters in the mountains separating Uganda, Sudan, and Kenya, lost their hunting area and were

forced to become "farmers" in an area not suited to settled agriculture. The result was chronic near-starvation for everyone and reduction of life expectancy to perhaps 20 years. Over the course of just three generations, the society lost all of the qualities we normally think of as human. Walled into compounds and fearful of each neighbor, their only goal was individual survival. A man and a woman no longer married for love, but because each thought they knew how to exploit the other. The only remaining concept of "good" was associated with food: A good person was a person with food—nothing more, nothing less.

Turnbull's story of Adupa, one of the Ik children, and her "insane" attempt to preserve love in her family and community illustrates what can happen to human values as environmental conditions and human community deteriorate.

> Hunger was indeed more severe than I knew, and the children were the next to go. It was all quite impersonal—even to me, in most cases . . . . But Adupa was an exception. Her stomach grew more and more distended, and her legs and arms more spindly. [She was mad, and her] madness was such that she did not know just how vicious humans could be . . . .
>
> Even worse, she thought that her parents were loving . . . . Adupa . . . brought them food that she had scrounged from somewhere. They snatched that quickly enough. But when she came for shelter they drove her out, and when she came because she was hungry they laughed, . . . as if she had made them happy . . . .
>
> Partly through her madness, and partly because she was nearly dead anyway, her reactions became slower and slower. When she managed to find food—fruit peels, skins, bits of bone, half-eaten berries, whatever—she held it in her hand and looked at it with wonder and delight, savoring its taste before she ate it. Her playmates caught on quickly, and used to watch her wandering around, and even put tidbits in her way, and watched her simple drawn little face wrinkle in a smile as she looked at the food and savored it while it was yet in her hand. Then as she raised her hand to her mouth they set on her with cries of excitement, fun and laughter, beat her savagely over the head and left her.
>
> I took to feeding her, which is probably the cruelest thing I could have done, a gross selfishness on my part to try and salve and save, indeed, my own rapidly disappearing conscience. I had to protect her, physically, as I fed her. But the others would beat her anyway, and Adupa cried, not because of the pain in her body, but because of the pains she

If we do these things in the greenwood,

What will happen in the dry?

From *Greenwood* by Peter Yarrow

felt at that great, vast empty wasteland where love should have been.

It was *that* that killed her. She demanded that her parents love her. She kept going back to their compound . . . . Finally they took her in, and Adupa was happy and stopped crying. She stopped crying forever, because her parents went away and closed the *asak* tight behind them, so tight that weak little Adupa could never have moved it if she had tried. But I doubt that she even thought of trying. She waited for them to come back with the food they promised her. When they came back she was still waiting for them. It was a week or ten days later, and her body was already almost too far gone to bury. In an Ik village who would notice the smell? And if she had cried, who would have noticed that? Her parents took what was left of her and threw it out, as one does the riper garbage, a good distance away . . . .[45]

Turnbull observed and wrote about the Ik into the early 1970s, and since then many other communities have experienced the forces of poverty, oppression, violence, and hatred that destroy communities and create despair. In most cases, there was no anthropologist like Turnbull there to record what happened to a community, but we do have anecdotal information from news accounts. In El Salvador, for example, we know that community continues to be torn by the knowledge that hundreds on both sides of the civil war committed atrocities. In Eastern Europe and republics of the former Soviet Union, community is being shredded by continuing discoveries of neighbors and friends who were informers for the secret police.

As community fails in one country or region, it has implications for other countries and regions. Now as desperate people from Eastern Europe, Asia, Africa, and Latin America attempt to relocate, they find they are not welcome in other lands. Over the 1984 to 1992 period, the number of people seeking asylum in Western Europe leaped from 100 thousand per year to 700 thousand people per year, a sevenfold increase in eight years. In response, asylum-granting procedures slowed and now stretch over seven years in Germany. Most applications are now rejected. Smugglers now transport not only illegal materials but also people into the Nordic countries.[46] The costs to Western European Governments of caring for the applicants and those rejected but not deported totaled $8.3 billion in 1992.[47]

The problem, of course, is not limited to Western Europe. Refugees are trying to escape from persecution, environmental deterioration, and economic collapse wherever they occur throughout the world. Desperate people are now willing to sell themselves into what amounts to slavery. Women have a

particularly difficult time, and many are being driven to prostitution, even as young as eight years old.[48]

Another measure of the deterioration of community is provided by what is *not* in our news reports. In spite of the fact that 40,000 infants and children die each day of hunger[49] and complications of malnutrition, starving children are not featured in the evening news programs or on the front page. After decades, they are no longer "news."

Increasingly in the industrialized North and among the wealthy classes of the South, the poor are thought of as "them," somehow different from "us." The focus shifts from love and compassion to distancing and objectifying, to valuing anything that keeps "us" from being like "them."[50]

But as Buddhist monk Thích Nhât Hanh has noted, this shift to objectifying is not a realistic model:

> [L]ook at wealth and poverty. The affluent society and the society deprived of everything inter-are. The wealth of one society is made of the poverty of the other. "This is like this, because that is like that." Wealth is made of non-wealth elements, and poverty is made of non-poverty elements . . . .
>
> We are not separate. We are inextricably interrelated. The rose is garbage, and the non-prostitute is the prostitute. The rich man is the very poor woman, and the Buddhist is the non-Buddhist. The non-Buddhist cannot help but be a Buddhist, because we inter-are. The emancipation of the young prostitute will come as she sees into the nature of inter-being. She will know that she is bearing the fruit of the whole world. And if we look into ourselves and see her, we bear her pain, and the pain of the whole world.[51]

To preserve and foster this sense of community that Thích Nhât Hanh calls "inter-are," we urgently need alternatives to despair and tragedy, and examples are emerging.[52] One is the city of Curitiba, the tenth-largest city in Brazil. Here, the mayor Jaime Lerver and the citizens of Curitiba have worked together to produce a first-world city in the third world.

Mayor Lerver, an architect turned political leader, builds community while thinking small and cheap. Subways, for example, do not appeal to him because they are expensive and time consuming to build. Using tube-shaped loading platforms and special buses, Lerver has built a municipal transit system as efficient as a subway. The tube stations are elevated so that people walk directly into the bus rather than up steps. Passengers pay their fares at turnstiles on entering the tube station rather than on entering the bus. People board at two per second, eight times as fast as on a conventional bus. Selected

streets are reserved for buses, and as a result, buses travel at an average of 32 km/h (20 m.p.h.) and can transport more than three times as many people per day as conventional buses.

Another key to the mass transit system is integration of all modes of transport—cars, buses, trains, streetcars, boats, and bicycles. A 90-mile bike path offers an attractive alternative to motorized transport and has become a vital part of the city's transportation system.

Only two decades ago, the city had just 0.46 sq. m. (5 sq. ft.) of open space per person. Now, Curitiba has 51 sq. m. (550 sq. ft.) per person—three and a half times as much as New York City. Lerver feels that parks and high quality public transport give dignity to citizens and encourage them to take responsibility for helping with other problems.

And help they do. Over 20 years, 1.5 million trees have been planted. Seventy percent of the people regularly participate in the recycling program. Vouchers for surplus food encourage slum dwellers to bring in and recycle trash. Recovering alcoholics and homeless men work the trash sorting lines. Small businesses adopt street children. There is community.[53]

Like Mayor Lerver, Iceland's President Vigdís Finnbogadóttir listens to the people and motivates them. When she became president of this largely deforested island, she announced that the people must bring their children to all of her speeches. Now after each speech, she and the children go out together to plant three trees: one for the girls, one for the boys, and one for the unborn. After she leaves, the girls must care for their trees, the boys for theirs, and together the girls and boys must care for the tree for the unborn.[54]

Another model is provided by the Salvadoran Center for Appropriate Technology (CESTA) in San Salvador. Dr. Ricardo Navarro, an ecologist and engineer, left a university position to form CESTA, which focuses on bringing technology to the service of people and on bringing peace to a community divided by a brutal civil war.

To bring technology to the people, CESTA operates a school to teach people how to build and repair bicycles and pedal-powered tools, such as the bici-taxi, bici-mill, bici-compressor, bici-garbage collector, and bici-carts. They also produce wheelchairs for the many maimed in the war. "El Salvador will never have enough gasoline to give everybody a car, so what we need are bicycles and pedal-powered tools," says Dr. Navarro.

Another technology CESTA promotes is composting latrines. "For our people to stay healthy, we need clean, non-polluting

latrines. We have a fiesta and teach communities how to build latrines that are affordable and work well for years."

Although the war has stopped, peace has not yet returned between the Armed Forces and the Farabundo Martí National Liberation Front (FLMN). As a step toward peace, Dr. Navarro and his colleagues at CESTA have begun planting the Forest of Reconciliation on Guazapa Mountain. The goal is to plant one tree for each of the 75,000 soldiers, FLMN fighters, and civilians killed in the war. With each tree is the name, photograph, and a paragraph about the person honored. In the forest, there are no ideological divisions; trees remembering National Guard troops, FLMN members, and civilians grieve together all over the mountain.

The Reconciliation Forest provides conciliatory honors forever for all fallen, and especially for Archbishop Oscar Arnulfo Romero for whom the first tree—a chestnut—was planted. The Forest also contributes to the ecological restoration of Guazapa Mountain, which was severely damaged in the war.

Each of us must fight poverty, violence, and hatred that destroy the community and create despair. Like Adupa, we must insist on keeping our love. Humans cannot live without the resources of love and community.

Choices and an Uncertain Future

Earth has reached a fork in the path to the future. Down one path is a tragic wasteland. The climate has become hotter than today; floods and droughts are more frequent and more violent. Massive amounts of soil have washed into the sea. Most forests are gone. A large fraction of Earth's species are extinct, and the remaining ones are being lost rapidly. Oil and natural gas are gone.

Nine-tenths of the human population lives in hopeless poverty. Education and health services are gone. Economic, environmental, and moral decay spread uncontrollably. Ever wider areas cease to have any semblance of social order. Ethnic and religious rivalries fuel hatred, corruption, atrocities, and warfare. Many more children die in infancy from childhood diseases and malnutrition. AIDS, tuberculosis, and hunger kill adults so fast the bodies cannot be dealt with. Hope lies only in migration to other less crowded, less ecologically disrupted countries.

One-tenth of the human population ignores what is happening to the nine-tenths. The one-tenth attempts to maintain a rich, consumptive, industrialized economy by using military forces to obtain foreign resources (especially coal and uranium), to slow the migration of refugees, to slow drug trafficking and to counter terrorist attacks.[55]

A few individuals scattered around the world live in great opulence, supported by a vastly increased dependence of the industrialized populations on crack cocaine and other drugs.

Down the other path is a very different Earth. A just, sustainable development for the whole Earth has become the principal goal of every nation and people. The peoples are united in planet-wide efforts to understand Earth and its peoples and to envision what Earth and its peoples can become. Protection of Earth has become a top priority for every person. Human ignorance, poverty, and bigotry are recognized everywhere as primary threats to national security and the future of Earth. Living conditions on the whole planet are comparable with the average level that existed in Europe in 1990.[56]

None of us wants to go down the path to the tragic wasteland. We all want a very different kind of future for ourselves, our children, and our grandchildren. How can we avoid the tragic wasteland and reach a just, sustainable future? What follows is a sampling of suggestions from several sources:[57]

FOR THE CHILDREN

The rising hills, the slopes,
of statistics
lie before us.
the steep climb
of everything, going up,
up, as we all
go down.

In the next century
or the one beyond that,
they say,
are valley, pastures,
we can meet there in peace
if we make it.

To climb these coming crests
one word to you, to
you and your children:

stay together
learn the flowers
go light

Gary Snyder
Turtle Island

- to recognize that a sustainable, just, and healthy human development requires as its first condition a sustainable, just, and healthy human relationship with Earth;
- to create everywhere the social, economic, political, religious, and legal conditions necessary to reduce human fertility to replacement levels or below;
- to reduce significantly the per capita use of both source resources (oil, gas, rich mineral ores, forests, etc.) and sink resources (disposal space in the atmosphere and oceans) by the wealthiest individuals and nations;
- to create national economies everywhere capable of providing basic education, primary health care, and civil order and justice for everyone;
- to modify the agricultural, forestry, and urbanization practices across the planet to preserve arable soils;
- to double agricultural yields while reducing the dependence of agricultural systems on fossil fuels, the contamination of ground and surface waters with fertilizers and pesticides, and the creation of agricultural pests through the use of pesticides;
- to provide orderly transition from carbon dioxide emitting energy sources (oil, coal, fuelwood) to a highly efficient, renewable, and non-polluting energy economy that is affordable for even the poorest;
- to cut the emissions of all greenhouse gases to eliminate the prospect of highly disruptive changes in climatic conditions and the levels of the world's oceans;
- to eliminate everywhere by 2000 the emissions of chlorofluorocarbons and other chemicals now destroying the ozone layer in the stratosphere;
- to find and employ alternatives to war, violence, and militarism in resolving differences among nations and peoples; and
- to keep alive hope, love, and compassion and to build relationships of trust and cooperation that will allow us all to get through the difficult times ahead with a minimum of violence, hatred, and despair.

While North and South are both integral parts of a single planet, their situations are so different that it has frequently been difficult for them to work constructively together. Nonetheless, there are several actions that must be undertaken cooperatively by the North and South. Together North and South must:

- use the opportunity afforded by the end of the Cold War to build a just and equitable new world order. New participatory mechanisms must be designed to replace those designed for the Cold War era (for example, the U.N. Security Council);
- promote education, information and democracy, which are the things that make nations different now and that can make the whole world different in the 21st century;
- make development peace. Over the past 40 years capital transfers from the North to South have not been as successful as planned, and there has been a tendency for unproductive finger-pointing on both sides. It would be much more useful to acknowledge that the transfers could have been more successful but for:
    - the pursuit in both the North and South of an unsustainable development model that ignored the fact that the human economy is embedded in a finite biosphere;
    - a sometimes desperate need of Northern banks to lend to the South;
    - excessive and preemptive use by the North of global source and sink resources needed by the South;
    - flawed governmental policies in the South promoting (a) mislocated, inefficient industries; (b) misallocation of capital, including government expenditures; (c) support of the interests of affluent urban elites, the large (and often corrupt) governmental bureaucracy, and the military at the expense of peasant agriculture;
    - the failure of the South to establish policies that consistently make family limitation advantageous to couples and make safe and affordable contraceptives readily available;
    - abuse of military, political, and economic power by the North to obtain access to Southern resources at unreasonably low prices; and
    - continuation in the South of social systems that doom three-fourths of the population, especially women and low social classes, to an unproductive and stagnating existence.
- shore up the feeling that it is possible for international norms to bring a just and equitable peace to world affairs. A strong, clear, non-discriminatory body of international

law is urgently needed, as are confidence-building measures to improve international participation and break the mold of the old discriminatory international system. The strengthening of international law and the rule of law is essential to restore the global political confidence that will permit action;

- establish a continuing forum for global discussions of the whole human mega problem, the global problematique, and renegotiate the terms upon which nations communicate with each other. The agenda must cease to be limited to a few narrow topics and be opened to embrace in an orderly way everything each nation (whether developing or industrialized) fears. Only by opening up the agenda can we reconceptualize and begin to deal with the nature of threats to national and global security, the reality of economic and ecologic interdependence, and the design of participatory, cooperative solutions;
- reinforce positive values in the international community, values such as dignified self-reliance and independence, and acknowledgment of developmental needs such as participatory democracy, the guaranteeing of international law on the basis of equality and principle (rather than on the basis of force), and above all, solidarity;
- replace the outmoded and misleading U.N. System of National Accounts (UNSNA) with a new set of national indicators that provide a yardstick for measuring the degree to which a nation is living sustainably within its own source and sink resources;
- expand the negotiations under the General Agreement on Trade and Tariffs (GATT) to address how international trade can become a force for sustainable development and protection of the global environment;
- assess the current global agricultural research agenda in terms of its ability to lead to a sustainable and secure global food supply that is profitable for the world's farmers and affordable for the world's poorest;
- establish everywhere social and institutional conditions that actively resist corruption and favoritism by making opportunities for upward social mobility dependent on personal contribution rather than on class, cultural, or religious background or on race or gender; and
- accelerate the transfer of up-to-date, socially and environmentally beneficial technologies, especially technologies for: processing raw materials efficiently into

value-added products, generating renewable energy, conserving energy, water, and other resources, providing safe and effective contraception, preventing waste and pollution, recycling, furthering agricultural systems that are low-input, organic, and recycling of nutrients, and reducing the material- and energy-intensity of manufacturing.

Some essential actions can only be taken by the North and some only be done by the South.

The North should:

- make its primary contribution to global sustainability by stabilizing its resource consumption and reducing its direct and indirect damage to the global life-support systems of Earth. People living in the North must become aware of their addiction to consumerism, to never having enough wealth, property, and "things," and to careers of advancement and power. Northerners must find a grander meaning for their lives than consumerism and power. They must learn how their lifestyles and expectations deplete the resources needed by the South. Generally, Northerners live well enough that they do not need to increase their incomes and use of global resources. But Northerners do need to address domestic poverty and homelessness, a major disgrace in some Northern countries;

- provide international debt relief by: (a) canceling or writing off those debts that accelerate the liquidation of natural capital, fail to internalize the full costs of pollution, are clearly unsustainable, or are inherently not repayable; (b) addressing the current imbalance between commercial rate loans, subsidized investments, and grants to the South; and (c) improving the relative proportions of the Northern transfers as loans, subsidized or concessionary arrangements, or grants;

- accelerate its transition to a renewable energy economy. To do this it will be necessary to include the environmental costs of non-renewable energy supplies in the price consumers pay. For example, there needs to be a "carbon tax" on all energy derived from oil, gas, and coal reflecting the cost to Earth of the carbon dioxide released by the use of these fuels;

- internalize the costs of disposal of its toxic and other wastes within its own borders. Even if the countries of the South have a "comparative advantage" in being "under-polluted," the countries of the North should not be shipping waste to the South;

- use "defense" funds to invest in the South. If the countries of the North used some of their enormous military budgets to reduce poverty and protect the local (and global) environment in the South, it would improve conditions in the South, reduce desperation and the willingness to engage in acts of terrorism, and thereby reduce Northern feelings of insecurity; and
- acknowledge that the wealth and strength of the economies and military forces of the North have been achieved in part through the preemptive use of the planet's limited resources, including both source resources and sink resources. Then, engage in negotiations with the South on suitable reparation payments for historically disproportionate preemption of the global resources.

The South should:

- make its primary contribution to global sustainability by achieving population stability. For this to happen government policies must change consistently from pro-natalist to anti-natalist and consistent laws and policies must be established to make family limitation strongly advantageous for couples and to make large families highly disadvantageous. It will be necessary to:
  - make formal education (primary and secondary) compulsory—especially for girls—and effectively enforce attendance;
  - outlaw child labor even within family-owned businesses;
  - place on parents the major financial responsibility for raising their own children, including education and health care;
  - give women access to income-earning opportunities in the labor market, including jobs not easily compatible with childbearing and childrearing;
  - maintain and strengthen family planning programs, giving attention to ensuring that contraceptives are safe, effective, affordable;
  - provide effective legal guarantees of property rights and legal enforcement of private contracts; and
  - develop private and public insurance and pension programs that are reliable and attractive, thus offering an alternative to children as a source of old age security;

- pursue poverty alleviation through: (a) employment and self-reliance strategies using local resources to produce for domestic needs, (b) value-added processing of resources, and (c) microloan programs for women;
- engage in direct poverty alleviation through: (a) programs that include social safety nets and targeted aid, and (b) the use of foreign exchange both from loans and exports to serve the needs of the poor more than the desires of the rich;
- give emphasis to "human capital" formation through education, training, and employment creation, particularly for girls and women;
- replace, as soon as possible, "throughput growth" (as measured by GDP) with growth by productivity improvements as the path of progress;
- accelerate its transition to renewable energy by internalizing environmental costs in energy prices and phasing in carbon and non-renewable energy taxes;
- recognize that the North's past "damage the environment and then cure it" approach has proved to be enormously expensive and unwise. The "prevention approach" is probably the only strategy that is affordable for the South. In particular, the South should prevent, to the fullest extent possible, irreversible environmental losses, especially loss of biodiversity and losses of soils. These are the true "non-renewable" resources of a nation because these resources, once gone, cannot be replaced at any cost; and
- bypass the technologies used in the North's environmentally damaging stage of economic evolution and choose instead the most up-to-date technologies to conserve energy and other resources, prevent pollution, and create (rather than eliminate) jobs.

How much time do we have to do these things? There is no precise answer to this question. It is like we are walking down a slippery path that is becoming steeper and more slippery with every step. Steps we have already taken have produced needless suffering, hatred, and irreparable ecological damage, but if we turn now we can avoid much further suffering and damage. If we keep on our present course much longer, there will come a time when we will inevitably slip and slide uncontrollably into global disaster.

The signs are all around us. Every year of delay in stabilizing population growth adds 90 million children to the human population, most of whom are not receiving adequate nutrition, education, and health care. Every year we delay developing the post-petroleum energy economy we burn 20 billion barrels of our declining petroleum resource and increase the risk of planet-wide disruptions of commercial energy supplies. Every year we delay protecting the habitat of endangered species leads to another 30,000 extinctions. Every year of delay in developing alternative technologies for increasing agricultural yields places the food supply of our children and grandchildren in further jeopardy. Every year we delay in stabilizing greenhouse gas emissions commits the world to more global warming and a greater rise in the sea level.

The awful truth remains that a large part of humanity will suffer no matter what is done.

E. O. Wilson
"Is Humanity Suicidal?"
The New York Times Magazine. 30 May 1993. p. 24.

All of us have had the experience of stopping. When walking, we can stop in seconds, in a step or two at most. Many of us have ridden a bicycle, and we know that it takes a bit longer to stop a bicycle. Many of us, too, have driven an automobile, and the delay between applying the brakes and coming to a stop has led to many collisions and injuries. Fewer of us have ever tried to stop a small truck loaded with a ton of cargo, or a large truck loaded with several tons. Very few of us here ever tried to stop a 100-car train fully loaded with coal or iron ore. Almost none of us has tried to stop a fully loaded supertanker, which has so much momentum that 10 miles are required to stop. But even the momentum of a supertanker is trivial compared to the momentum inherent in the current unsustainable growth in human numbers and human consumption, and we humans have never even tested the brakes on these huge, complex global systems. Even now, the momentum of these systems will carry them to much destruction and tragedy. If we humans are to stop short of an enormously destructive collision with reality, we must act very soon. We do not have decades or generations to spare. If we take the "braking" actions described above within the next five to ten years, the land we need to meet human needs (see Figure 21) would probably approach but not exceed the land available, and a sustainable future for Earth would be possible.

Before me, beauty.
Behind me, beauty.
Below me, beauty.
Above me, beauty.
Around me, beauty.
May I speak beauty.
May I walk in beauty always.
Beauty I am.
All is restored to beauty.
All is restored to beauty.
All is restored to beauty.
All is restored to beauty.

Navajo

The Real Problem

The actions described on the preceding pages are daunting. They require extraordinary engineering and management skills and extraordinary creativity and inventiveness. Demanding as the economic, engineering, and management tasks are, there is yet a still more difficult matter: the many barriers to the necessary political action.[58]

1. There are areas of uncertainty about the nature of the ecological crisis we face, and some people seize upon

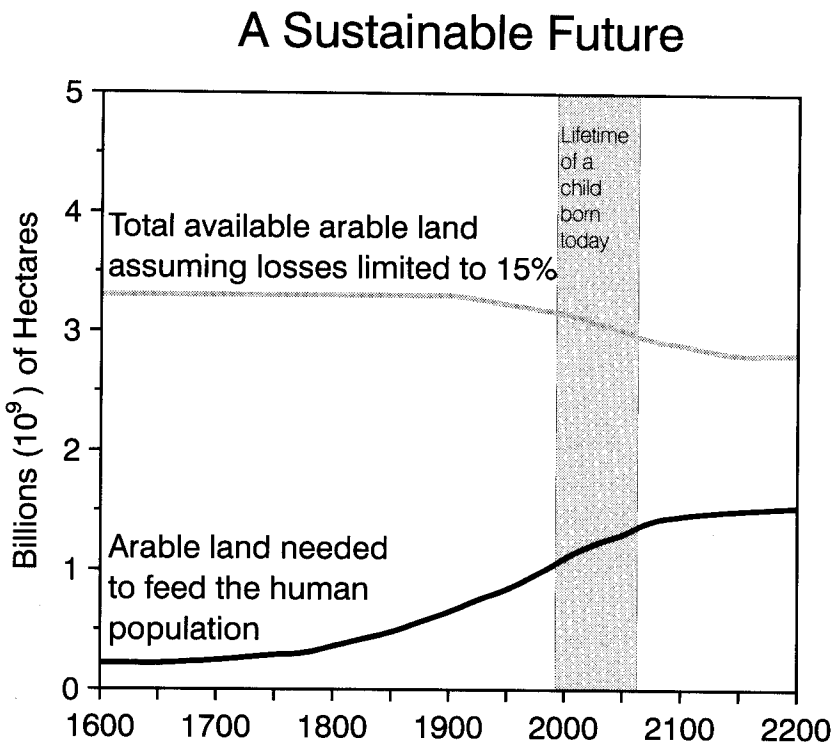


Figure 21: The sustainable future: Arable land needed to feed the human population assuming agricultural yields double, population does not exceed 12 billion, and losses of arable land are limited to 15 percent.

these uncertainties as excuses for inaction. Most well informed physical and social scientists today agree that we face an ecological crisis without any precedent in historical times. Those who, for the purpose of maintaining balance in debate, take the contrary view that there is significant uncertainty about whether it is real are hurting our ability to respond.

2. There is an instinctive unwillingness to believe that something so far outside the bounds of historical experience can, in fact, be occurring. The trends presented in this report, for example, have not been absorbed and owned by many people, and as a result, they assume the trends can't be real.

3. There is a human tendency, encouraged by some faith traditions, toward exceptionalism, which holds that humankind so intelligent and so spirited that, as a species, we are not bound by ecological laws as other species are. Exceptionalists in several faith traditions believe that no matter how serious the problem, the ingenuity and sheer

will of the human species—combined with divine dispensation—will produce a solution.

4. There is an assumption made by many that it will be easier and more sensible to adapt to whatever change occurs than it will be to prevent the crisis. Unfortunately, changes of the magnitude and complexity that seems likely can come so swiftly that adaptation is essentially impossible. The collapse of the Soviet Union is just one small reminder of how seemingly large, stable systems can change very quickly.

5. There is the lack of widespread awareness among the peoples of the world about the nature of the global problematique. Many spiritual leaders, many political leaders, and much of the general public are unaware of what is happening and how serious it is.

6. There is also the knowledge among those few who do know what is happening and how severe it is that the solutions are harder than anything we humans have done before. A redirection of much of our science and technology would be required. Our economies would have to be largely redesigned. Why try, especially when it may all come to naught anyway?

In addition to these six barriers to action, there is a seventh of overriding importance: Our shared moral basis for a sustained, cooperative effort—our development model—has failed. We are now a people—a species—without a vision. This is our *real* problem.

Our current development model begins with the assumption that all that is—Earth, the solar system, all stars, and beyond—was created for us, the human species. The non-human part of Earth, "nature," is specifically for use of the human species in any way humans see fit. Nature is a "resource" for all human use.

Nature, however, is dangerous. In our relationship to nature, we humans are vulnerable to death and disease and must work for food and shelter. This vulnerability in which we live in nature is termed the "human condition."

Most humans have long resented their condition vis-a-vis nature. Plato began a conceptual separation of human and the non-human. But it was the millennial vision of John of Patmos and its secular interpretation in the industrial West generally and especially in the United States that stirred in humans the thought of something better.

In his Book of Revelation in the Christian Bible, John of Patmos foresaw (see chapters 20 and 21) a period of a thousand years during which Christians, through their faith, will rise above

the human condition, immune to the dangers of nature. In his words: " . . . and death shall be no more, neither shall there be mourning nor crying nor pain anymore . . . ."[59]

Gradually, the millennial dream began to be seen not as a spiritual state, but as a physical condition to be achieved by human control over nature. Francis Bacon (1561-1626) accelerated this shift in thinking by arguing that the human species not only could gain control over nature but should make doing so the primary goal of the human species. The Western concept of "development" is essentially a secularized version of the millennial dream: a rising above the human condition not through spiritual development, but through ruthless control and manipulation of nature.[60]

The principal instrument through which humans seek development and progress is the institution called the nation-state. Groups of humans have marked off areas of Earth as their own "nation," and each nation has declared itself "sovereign," i.e., an independent entity subject to no other power on Earth.[61]

Through their respective nations, groups of humans attempt to rise above the human condition through "development." Development means using capital equipment, technological knowledge of nature, and non-human energy sources to replace human labor in providing human food and shelter. It also means destroying species that compete with humans for food-producing habitat or that pose a threat to human life and safety. And finally, it means achieving security against other groups of humans—other nations—through violence or the threat of violence.

Nations developed a variety of subsidiary institutions, the most important being corporations, the military, and schools. Elaborate rules (laws) govern the behavior of individuals and institutions within nations.

Corporations proved to be particularly important to nations as a means of accumulating capital. Corporations are "fictitious persons," institutions able to do virtually anything a person can do—own property, enter into contracts, hire and fire employees, and even reproduce—and motivated through fiduciary responsibility to maximize return on stockholders' investments. Unlike real persons, corporations have no biological need for clean air, safe water, non-toxic food, and other environmental conditions, and the liability of stockholders for damages and injuries caused by the corporation is limited. Corporations have proven to be effective accumulators of capital, and many now are larger economically than small nation-states. As they have grown in economic power, corporations have become increasingly difficult for nation-states to control or regulate.

Most major faith traditions have generally accepted the legitimacy of the reigning development model—the whole collection of assumptions, theories, and institutions described above. Those few faith traditions that have not accepted the legitimacy of the reigning development model have been unable to make a thorough and effective criticism.

Nonetheless, the reigning development model has failed. It is being rejected now both by humans and by Earth.

As far as humans are concerned, the legitimacy of the reigning development model rested primarily on the assumption that the model was inherently equitable and replicable among nations. Disparities in the human conditions found in different nations were assumed not to be a result of an inequity inherent in the development model or the resulting system of nation-states and corporations, but in the lack of intelligence and tenacity among those humans living in the "poorer" parts of the world. It was not unjust that some nations have large pieces of the global economic pie, because if the people of other nations were simply diligent, they could make their piece of the pie as large as they like. The total pie could be arbitrarily large.

This foundation of legitimacy has crumbled to dust. For the people of the South to live as the people in the North now live would require an increase by a factor of five to ten in the total economic activity on the planet.[62] Few who have reflected on the matter feel that the source and sink resources of the planet could sustain such a large increase in the total economic activity. So, the reigning model fails because it is neither equitable nor replicable[63] for all nations.[64]

The model fails from the human perspective for another reason: it has left half of the human population—the female half—outside of progress. The reigning model embraces and perpetuates all of the "patriarchal" institutions: the nation-state, the modern corporation, and the ecclesiastical hierarchies of several faith traditions. Under these institutions, invented by and still governed by men, most women in the world are born into cradle-to-grave oppression, discrimination, and poverty with no possibility of escape. All across a planet controlled by patriarchal institutions, girls are fed less, pulled out of school earlier, forced into hard labor sooner, and given less care than boys, as has been demonstrated by study after study.[65] There is no legitimacy to a development model that perpetuates institutions oppressing half of humanity.

Finally, Earth itself rejects the model. The non-human part of Earth is not for humans to "own," use, and abuse any way they please. Nation-states are not independent entities subject to no other power on Earth. The human economy is only a part of a

much larger, but still finite, global biosphere, and the human economy cannot flourish if the biosphere does not flourish. The human destiny and the destiny of Earth are inseparably linked. Any development theory that begins with a different premise is fundamentally flawed.

The Task Ahead

The first principle of the new model must be that humans and Earth be in a mutually enhancing relationship. Without this principle as a starting point, no model of development, no vision of progress is sustainable.

The task ahead is to rethink our model of development, our vision of what we and Earth can become, and our concept of progress.

This is a large task, as has been explained well by Father Thomas Berry:

> This task concerns every member of the human community, no matter what the occupation, continent, ethnic group, or age. It is a task from which no one is absolved and with which no one is ultimately more concerned than anyone else. Here we meet as absolute equals to face our ultimate tasks as human beings within the life systems of the planet Earth. We have before us the question not simply of physical survival, but of survival in a human mode of being, survival and development into intelligent, affectionate, imaginative persons thoroughly enjoying the universe about us . . . . It is a question . . . of a concern that reaches out to all the living and nonliving beings of the earth and in some manner out to the distant stars in the heavens.[66]

The task ahead is to reexamine, reconsider, and reformulate every human institution to ensure that it fosters and supports our first principle: a mutually enhancing relationship between the human species and Earth as an unavoidable necessity for mutually enhancing relationships among humans. The institutions in question include international organizations, nation-states, domestic and multinational corporations, the family, and the faith traditions.

The nation-state system of international organization began in 1648. It was the time of collapse of the Holy Roman Empire and the signing of the Peace of Westphalia. At that time, the concept of sovereignty made sense, but then the global issues of "development," nuclear war, and climate change were not yet in anyone's mind.[67]

The original international organization was the League of Nations, created by nation-states after World War I. It was to

have prevented further world wars. After World War II, the League of Nations was replaced by the United Nations system of international organizations, again to prevent world war.

With the end of the world Cold War, the U.N. system needs to be completely reexamined in terms of the needs of the 21st century. A principal need of the 21st century will be a global institution speaking to nations about the need for a mutually enhancing relationship between the human species (and its various national groupings) and Earth. The U.N., as it currently functions, is not well-suited to this task,[68] and Secretary General Boutros Boutros-Ghali is encouraging some major institutional reforms by 1995, the 50th anniversary of the U.N.

The premise of "sovereignty" underlying modern nation-states is false. Nations are not independent entities subject to no other power on Earth. They are all interdependent and very much subject to the health and welfare of the entire ecosystem of Earth, of which they are but a modest part. The imaginary lines around nations, the "borders," generally have no relationship to the boundaries of watersheds, airsheds, and other natural systems and complicate the development of mutually enhancing Earth-human relationships. The rules (laws) nations establish to govern human and institutional behavior within their borders are generally based on the assumption that the non-human part of Earth is simply a "resource" of no value until "used" by humans.

Nation-states must change radically. Nations now do absolutely appalling things to their own people, to other nations, and to Earth. Within a few decades, the fallacious notion of sovereignty must disappear and be replaced with an understanding that "nations" (or whatever name we give to the institutions that replace nation-states) are all intimately interconnected with each other and with Earth. Laws that implicitly assume the non-human part of Earth to be merely a "resource" must all be replaced. Gross National Product, the reigning measure of development of a nation, must be replaced with indicators that measure the sustainability of the human-Earth relationship within the nation's boundaries.

Relationships between nations will require major revision. Trade, migration, and the use of global-commons sources and sinks must all be reconsidered from the standpoint of the equity of patterns of interaction, sustainability, and replicability and of an overall mutually enhancing human-Earth relationship.

The assumed right of nations to wage war requires total reconsideration. Wars, especially with modern nuclear, chemical, and biological weapons, do not promote a mutually enhancing human-Earth relationship, and the intellectual talent, money, and physical resources are urgently needed for other purposes. Since

peoples will probably always kill as a last resort to protect themselves and their children, it may not be possible to eliminate war entirely. However, there must be more attention to ways of resolving inter-nation, ethnic, religious, and sectional disputes short of war.

Alternatives to war are beginning to be discussed internationally. "Preventive diplomacy" and "new dispute resolution techniques" have been proposed by U.S. Secretary of State Warren Christopher to keep conflicts from spreading. Some diplomats are beginning to suggest that the international community may have the right to intervene in a country simply because that country is mistreating its minority groups. Another possibility is an international tribunal to hear the claims of aggrieved minorities in countries, a responsibility beyond that of the International Court of Justice, which is limited to adjudicating claims between countries. Others are openly suggesting that states incapable of governing themselves be taken over by force and placed under U.N. Trusteeship, thus making the United Nations a new colonial power.[69]

But perhaps we need a level of globally accepted means of international challenge that stops short of war. The quintessential image of people willing to die, but not kill, for their country is Mahatma Ghandi's men marching peacefully on the British Dharsana Salt Works in May 1930 where rank after rank after rank were brutally clubbed down by four hundred Surat

attract corporations (and the tax base and jobs they create) by readily granting corporate charters and imposing few restraints on what corporations can do.

In the United States, at least one organization (Charter, Ink.)(sic) is attempting to increase citizen control of corporations by asking chartering governments to strengthen the laws governing corporations and by initiating campaigns and legal proceedings to take back the charters of particularly offensive corporations.[73] To be effective, however, such efforts must be made on a global basis. The laws defining fictitious corporate persons need to be strengthened in a coordinated way throughout the world. Soon, within a decade or two at most, corporations throughout the world must be in a mutually enhancing relationship with Earth. Such a relationship is essential for the future of business because, ultimately, ecological destruction is bad even for business.

The family is the primary school for teaching values. It is in the family that we must learn the mutually enhancing Earth-human relationships that are necessary for mutually enhancing relationships among humans. It is in the family that our children learn from the example of their parents (and sometimes the parents from the children) the difference between needs and wants and the meaning of enough. It is also from the example of

The Role of Faith Traditions

We humans have begun asking questions about "sustainable development." This is an important question, but it does not go deep enough. We must also begin asking questions about "sustainable faith."

Is there a faith tradition in existence today that is practicing a way of life that provides "progress" for the whole community of life, not just the human species? Is there a faith tradition such that if everyone on Earth suddenly adopted it, the human future on Earth would be assured?

I do not know enough about the faith traditions of the world to provide a well-considered answer to this question, but on the basis of my limited personal experience, I doubt that there is a faith tradition on Earth today that can provide the moral foundation needed for the 21st century.

Specifically, I do not believe my own faith, Christianity, is a sustainable faith—at least not as it is generally understood and practiced. The Bible, especially the New Testament, is a weak document on the subject of mutually enhancing human-Earth relations. Admittedly, there are a few scattered texts in the Bible (especially the Old Testament) that suggest "stewardship" of resources and concern for the land:

- Is it not enough for you to drink the clear water? Must you also muddy the rest with your feet? (Ezek. 34:18)
- Woe to you who add house to house and join field to field, til no space is left and you live alone in the land. (Isaiah 5:8)
- Take with you . . . every kind of . . . animal . . . to keep their various kinds alive throughout the earth. (Gen. 7:3)
- I brought you into a fertile land to eat its fruit and rich produce. But you came and defiled my land and made my inheritance detestable. (Jer. 2:7)
- The time has come . . . for destroying those who destroy the earth. (Revel. 11:18)

But if gathered together, such texts would scarcely cover a single page of the Bible. There is no unequivocal commandment, "Thou shalt not destroy Earth." Furthermore, the only biblical guidance on the stewardship of the gift of human fertility is: "Be fruitful and multiply" (Gen. 1:28), and such limited and

inappropriate guidance on this critical matter is not adequate for a sustainable faith.*

To make matters worse, the institutional manifestations of Christianity have shown little or no serious interest in a mutually enhancing human-Earth relationship. With perhaps a few exceptions, churches are not prime examples of excellent stewardship of resources; they are generally as wasteful and environmentally thoughtless as any other human institution. Churches have no active environmental programs comparable with secular environmental groups. Churches do not use effectively what limited environmental guidance the Bible provides. The few Earth-sensitive texts in the Bible (such as those above) are not in the lectionary and as a result are almost never the subject of sermons and homilies. Seminaries teach the Bible, church history, theology, inter-human ethics, and homiletics, but do not provide even primer-level knowledge of Earth or inter-species ethics. Budgets and most major statements[74] by Christian churches lack commitment and substance on human relations with Earth.

Why is this? The God I know cares a great deal about Earth and is not at all pleased with what we humans are doing to Earth and to each other. Why then is the sacred text of my faith such a weak source of inspiration and guidance on caring for Earth and on the stewardship of the gift of human fertility?

Personally, I suspect it is because the early Christian community understood that the second coming of Christ would be very soon, within their generation. They delayed decades before writing the gospels probably thinking Christ would return so soon that it would not be necessary to write for future generations. Three hundred years later, Christ had not returned, but at the Council of Nicea Christians closed their sacred text, the Bible, confident that they had all the revelation needed until Christ's return.

Now 1700 years later there still has been no second coming of Christ, and there have been no further revelations added to our sacred text to guide us in addressing the issues of the 21st century. We do have some "church tradition" that has evolved

---

*In 1991 the member churches of the World Council of Churches have resolved to encourage each other to "[d]evelop and implement educational programs . . . , both in churches and in other communities, on matters related to environmental and ecological concerns. *This should include the matter of responsible stewardship of human fertility . . . .*"[75] (Emphasis added.)

over the centuries, but it is not particularly helpful in dealing with many of the issues before us. I wonder if God has stopped speaking to us, or if we have stopped listening.*

Sir Shridath Ramphal, former Secretary General of the Commonwealth and Foreign Minister of Guyana, has implicitly raised this same question in the context of "the holy texts of many religions." He writes as follows in the official report prepared for the opening the United Nations Conference on Environment and Development:

> In the language of the Independent Commission on International Humanitarian Issues . . . , the holy texts of many religions, not to mention legal traditions, philosophies, and custom " . . . abound in moral injunctions that imply an ethic of human solidarity . . . . For centuries, the great religious texts have taught the essential oneness of the human race." What scriptures have not always taught is that nature is the loom on which is woven life's seamless fabric of which humanity is a significant, but not unduly dominant, part.[76]

New Revelations

The God I know is still speaking,[77] and there have been at least four new revelations.

---

*Some of my fellow Christians have reviewed drafts of the previous paragraphs and expressed some discomfort and dissatisfaction. They have asked that I identify my specific Christian affiliation (Protestant, and more specifically, Lutheran) and to acknowledge that my observations on Christianity are on the basis of my personal experience (which I do acknowledge).

Some Christian reviewers have also taken exception to my assertion that all of the Christian scriptures addressing a mutually enhancing human-Earth relationship "would scarcely cover a single page of the Bible." In support of their position, they refer to the following parts of the Bible: Gen. 1 and 2 "properly exegeted," 8:22; 9:8-17; Deut. 6:1-3; 8:7-10; Psalms 24:1-2; 50:10-12; 65:9-13; 96:10-13; 104; 145; 146; 147; 148; Is. 40-55; 65:17-25; Hos. 2:18-20; 4:1-3; Matt. 6:26-30; 12:11-12; Luke 12:6-7, 24-25; 15:4-7; Rom. 8:18-23; Ephes. 1:9-10; Col. 1:15-20; John 1:1-14.

While I admit that these passages would not fit on one page, I find the guidance given them is not as direct, unambiguous, and specific, as I and many friends and colleagues would wish and does indeed need to be "properly exegeted." Inferences can be drawn from these and other parts of the Bible about human-Earth and Earth-God relations, but what little *unambiguous* and *direct* guidance there is would probably fit on less than one page. On the whole the Bible seems to me focused on human-human and human-God relations, not on human-Earth or even Earth-God relationships, and none of the several institutional manifestations of Christianity have been able to surmount this great weakness inherent in Christianity's sacred text, the Bible. (continued...)

First, it has been revealed that among the most destructive forces on Earth today is hatred between the followers of different faith traditions. Of the fifty plus armed conflicts in progress currently, the majority are motivated in significant part by hatred of the followers of one faith for the followers of another faith.[78] The arms industry—the largest industry in the world, larger even than illegal drugs and oil—is supported in significant part by the hatred of the followers of one faith for the followers of another faith.

Stories of interreligious hatred and violence are found on page after page of our history books and now almost daily in our newspapers. There are so many that it takes an extraordinary one to catch our attention. An extraordinary one appeared recently in

---

(...continued) I am not arguing that Christians should abandon their faith in search of another (as one concerned reviewer thought I was), but only that the God I know—and I think it is the Christian God—is much more concerned about human-Earth relations and about the stewardship of the gift of human fertility than would be apparent to most readers of the Bible or to most observers of the institutional manifestations and traditions of Christianity. For this reason, I think all forms of Christianity must open themselves increasingly to the possibility of further revelation and knowledge, especially on matters relating to human-Earth relations and the stewardship of the gift of human fertility.

Some Christian reviewers have objected that I undervalue the Christian concept of "stewardship of resources." In my view, a very serious part of the human problem is the Christian (or other) notion of "resources," something of Earth taken and given value when passed though the human economy and made "useful" to humans. The notion that parts of Earth are of no value unless of benefit to humans may derive from the Christian nation of "redeeming the whole creation."[79] What can it mean to "redeem the non-human parts of the creation"? Obviously, to assure that they serve their God-given purpose, which, in most Christian thinking, means to be of use to humans.[80] This wrong concept is central to much of western law concerning human-Earth relations and is especially destructive in the notion that the "highest and best use of land" is always to be desired and is always measured in terms of current human benefits. The Christian concept of "stewardship of resources" is inadequate and inappropriate because the Christian concept of "resource" denies any value to the non-human parts of Earth except to the extent that they benefit humans.

Finally, some Christian reviewers have objected that we are not trying to save "Earth." Earth they argue, will still be here even if the human species destroys itself. I disagree. Earth and its possibilities would be so immeasurably reduced and impoverished by the loss of the human species that it would no longer be Earth. In fact, it is even impossible to imagine Earth without humans.[81] The human destiny is inseparably linked to that of Earth, and we humans have become a bio-geo-chemical force reshaping Earth. The God I know wants us humans—one species—as a responsible co-creator of an Earth-future worthy of the original creator. Nothing less will do for me.

the *National Catholic Reporter* under the headline "Torture, Rape, Murder Outlaw Love in Bosnia:"

> You ask me my name? So the entire world can witness my shame? Just write: female Muslim, 35 years old, professor of literature. As for my newborn son, I have simply given him the name Jihad. The first time I ever nursed him I said, "If you ever forget, may this milk curse you so help me God."
>
> The Serbians have taught me to hate. For the last two months, within me I have only hatred, no pain or bitterness. Emptiness.
>
> Not so long ago I taught my students only love. But my Serbian neighbor's only son, Zoran, who was also my pupil, urinated in my mouth. While wild-bearded vagabonds were roaring with laughter, Zoran told me: "You are good for nothing, you stinking Muslim woman."
>
> I don't recall if I heard a scream or felt a blow to my body. This colleague, a physics professor who yelled like a maniac at me, began to beat me continuously. My mouth filled with blood.
>
> There is nothing strange here; I have been deadened to the pain but my soul . . . it hurts, oh how it hurts so much. I taught my students to love, and they were preparing themselves, and even bringing up their children to slaughter all who are not Orthodox Christian. Jihad, war! As simple as that!
>
> Our best man at our wedding was even a Serbian! Poor me and my people. Leave the fine words of love for someone else. You may talk about Muhammad and Muslim goodness as much as you wish. Even if I lose another eye, I will walk blind and curse every Muslim who speaks of "forgiveness."
>
> You ask what they have done. They raped my mother before my eyes, my good—beyond beautiful—old mother.
>
> I remember my childhood, the garden near the house, and my mother hesitating beneath the trees. She would seek the blossoms where the fragrance was most intense; she would spread the bed linen. Yes, she would bow to Allah and pray.
>
> Wherever I turn now I smell my mother's fragrance. I wait for her footsteps, those soft, quiet steps and the rustling sounds from her Muslim robes.
>
> I cannot forget the stench and roar of my neighbor Sava Pejic, whom my cousin once dated. As he jumped on my mother, I lost consciousness.

Blows to my body woke me. Her hand was still warm; lifeless, but warm. The heat still burns within me; so does regret, for just that same morning we quarreled. It was about Papa. She always worried about where he was.

That same day he had gone to his relatives in a village nearby, which saved his life, but not for long. People say when he heard about his wife he didn't cry. But he stood in silence all day. In the morning he was found hanging, facing the meadow where my mother saw him the very first time.

No, my husband doesn't know about our second child's birth and I don't know where he and my other son are. They assure me they are somewhere in Macedonia. What can I do? I have to believe if for the sake of Jihad.

Believe me, it's very hard to concentrate. They pulled me off from my dead mother and dragged me by my hair. They asked me, "Where is the gold?" Instinctively, I pointed at my pregnant stomach of eight months, but I suddenly remembered and I showed them.

On the way to headquarters in Vogosce, they spit on me and kicked me. I recognized the Duke of Chetniks, Jovan Tintor, who stood silent and watched. The others had been drinking. Tintor said, "Bring Janko!" He cut my hair so it formed a cross. On my hand with a knife he carved "S" (the sign of the Serbian Chetniks) four times.

"This is just the beginning if you don't tell us where the rest of your relatives are," Tintor yelled. They poured drinks over me and forced me to strip.

Nightmare was interrupted by the noise coming from the street. They took me outside, naked as I was. In the middle of the courtyard stood a girl. She was less than 10 years old. Naked and surrounded by a group of bearded beasts. There were plenty of onlookers from the neighboring windows. She stood silent, uncomprehending.

I stood there leaning against a steel monster—it seemed to be a tank. I began to bang my head against the steel.

When I opened my eyes it was very dark. Apparently from the beatings I lost an eye. Where I went, what I did, whether I walked or crawled, I do not know. Some villagers found me by a brook near Ilidza two days later and informed the Territorial Defense (Bosnian defense forces).

They are the only ones who visit me now. They call me "little sister" because of the pain we all share. Also because of our goal, Jihad. Misery makes us brothers and sisters.[82]

This story happens to be about Christians—people of my faith—hating, raping, and killing people because they are Muslims. But in the same area during the 1389 battle of Kosovo, it was Muslims hating and killings Orthodox Serbs, and the Serbs still have not forgotten. Nor have they forgotten when, during the Nazi-supported Croat regime, Roman Catholic priests forcibly baptized thousands of Orthodox Serbs living there. And now, how long will it be before little Jihad, if he still lives, forgets or forgives what happened to his grandmother, grandfather, and mother.

And this story has many other applications. Change the faith names to Hindu, Buddhist, Jew, indigenous peoples, . . . and this same story would apply in India, Sri Lanka, Ireland, Nigeria, Senegal, Iraq, Israel, Sudan, Algeria . . . . What faith is now *not* involved in acts of hatred and violence in one or more of the 48 religious and ethnic wars now in progress?[83] What a revelation we have of the destructive hatred between followers of different faith traditions!

The second revelation comes from a meditation on Earth that has been continuing for about 1500 years, a meditation we usually call "science." From this meditation we know that Earth is the product of a 15-billion year journey from the first burst of creative energy. We know that we humans and all other life on Earth are intimately connected through a single, integral, and continuing creation journey and that we humans are related genetically to everything that contains the DNA molecule: to eagles, apes, snakes, frogs, trees, grasses, molds, bacteria . . . . We are all distant cousins. And we all depend on each other through the complex bio-geo-chemical cycles of Earth. Earth is not just our home; we are Earth. Our entire physical being is made up of bits and pieces of Earth—water, air, rice, potatoes, etc.—all of which are products of countless deaths. Life, at a point, concedes itself to death, and all new life has its origins in death. Collectively, we humans are an important part (but not the only part) of the consciousness of Earth.[84]

A third revelation derives in part from the second: we know now that the characterizations of man and woman, male and female, in the origin stories and traditions of many faiths are factually wrong and socially destructive. Sexual differentiation occurred very early in the continuing evolution and continuing creation of Earth, long before there was a human species, and the human female certainly has nothing to do with the origin or the perpetuation of a "dark side" of human nature. There is no defensible justification for any faith tradition perpetuating the pernicious falsehood that woman is the source of "evil" and "death" in human society. There is no justification for any man or

for any male-dominated institution or faith defining man as superior to woman and normative for society.

The fourth revelation is that we humans have become co-creators of the future with the Divine. We humans—not as individuals, but as a species—will exercise an enormous influence on the future of Earth. Five billion of us individual humans, both poor and affluent, are acting today in ways that are destroying the life-sustaining capabilities of Earth and thereby destroying our own prospects. There is little question that we humans can destroy our species and many others with us. We can create an Earth future without humans. Now, nothing survives—no person, no species, no lake, no river, no ocean, no forest, no soil, no mountain, not even the atmosphere—unless we humans will it to survive. We can create a wasteland Earth-future or we can create a rich, vital Earth-future. We humans as a species will decide which way to go, for we have become co-creators with the Divine Earth-future.

This fourth revelation is of some considerable import, but to my knowledge, no faith tradition has prepared us for it. No faith anticipated the development of human power over Earth's future, this enormous responsibility. To my knowledge, no faith tradition has prepared us to know ourselves not as individuals but as a species. To my knowledge, no faith tradition has provided moral precepts to guide inter-species behavior, to decide which species should cease to exist, to understand which new species should be created through genetic engineering (and then patented), and to judge the alternative futures humans are considering for Earth.[85]

Where can we turn with questions about what to do, with questions that deal with matters of ultimate meaning and direction, with cherished beliefs, with fears and insecurities about the future? Where can we turn to learn to act responsibly as a species? Where can we turn for insights as to what possibilities there might be for a mutually enhancing human-Earth relationship in the future? Where can we turn for insights into what the original creative energy might desire our species—humans collectively—to make of Earth?

These are fundamentally spiritual questions, and they are being raised openly today in many communities, by scientists and economists, by philosophers and theologians, by historians and anthropologists, by religious and secular leaders alike.[86] Such questions are in the hearts of ordinary men and women who wonder about the future for all life and wonder how to answer their children's questions.

The questions being raised are unique to the experience and consciousness of peoples of our times, peoples who have looked

into the farthest reaches of space, seen back in time to the very origins of the cosmos, have come to know Earth to be a relatively small planet in a galaxy of billions of stars and planets in a cosmos of billions of galaxies; people who have probed the core of the atom, lived with the prospect of nuclear annihilation, and now face the possibility of ecological annihilation. The questions are welling up from the human spirit struggling to be faithful to the moment, and a faith tradition, if it is to remain viable and relevant, must have answers to the ultimate questions welling up in the human spirit. So, in hope and trust, we turn to you, the carriers of our spiritual wisdom, with our questions.

What Shall We Do?

1. **What are the traditional teachings—and the range of other opinions—within your faith on how to meet the legitimate needs of the growing human community without destroying the ability of Earth to support the community of all life?**

   a. How does your faith tradition view the global trends that face us today? Does your faith tradition have people who monitor and understand global trends? How is information about global trends shared with the followers of your faith tradition?

   b. What does your faith tradition teach about how the needs of the poor and the wants of the rich are to be met as human numbers continue to grow? What trends and prospects do you see for the poor? What is the cause of poverty? Of greed?

   c. How are the needs and wants of humans to be weighed relative to the survival of other forms of life? What trends and prospects do you see for other forms of life? Does Earth exist for the human species to use in any way humans wish, independent of the welfare of other species? Is the human species justified in efforts to destroy species that limit the human food supply or the growth of human numbers?

   d. What does your faith tradition teach concerning the proper relationship between the human species and all other species? Can the concepts of justice, unity, and peace be extended beyond the human community to the whole community of life?

   e. What does your tradition teach about the taking of life? What does your tradition teach about humans killing humans? About humans killing members of other species—animals, plants? What teachings of your tradition might bear on the killing of *all* members of a species, the extinction of a species? What wisdom can you

offer on the ethics of our species genetically modifying other species to create new races or even new species?

f. The origin stories of many faith traditions provide a basis for the human community valuing the whole community of life. Does your faith tradition have an origin story? If so, how does it place the human species relative to the whole community of life?

g. In addition to stories about the origin of life, there are stories about the continuation of life, about fertility. How do the fertility stories of your faith relate to its teachings on human procreation? How important are high fertility rates of the followers of your faith to the perpetuation of your tradition? How are its teachings to be understood today in light of the rapidly growing human population and the threat that even the present human population poses to the whole community of life? What norms are to be applied to the stewardship of the gift of human fertility? What cultural practices and technologies are appropriate for individuals to employ in regulating their own fertility?

h. There are also stories about abundance and fruitfulness of Earth and about human greed. What are human needs? When do needs become wants? How much is enough?

i. How are we to "value" the future in decisions we make today? What ethical and moral standards should be brought to "discounting" the interests of future generations in economic and other decisions made by us today? What does your faith tradition tell us about issues of intergenerational equity?

2. **What are the traditional teachings—and the range of other opinions—within your faith on the meaning of "progress" and how it is to be achieved?**

a. What dreams and hopes does your tradition inspire in young people?

b. What does your faith tradition offer as a vision for the future of Earth? For example, is the future of Earth viewed as a glorious climax, or a terrifying catastrophe, or something else entirely?

c. Is there some expectation in your tradition that humankind progresses through history toward some goal? If so, what is that understanding?

d. What does your faith tradition teach about the human destiny? Is the human destiny separable from that of Earth?

e. What is your destiny, the destiny of the followers of your faith tradition? What does your tradition teach concerning the destiny of followers of other traditions?

f. How are we to measure "progress?" Can there be progress for the human community without progress for the whole community of life?

g. How does your faith tradition relate personal "success" to "progress" for the whole? What is your image of a life well lived and how does that image relate to progress for the whole?

h. What does your faith tradition teach about human nature? What human qualities (sinfulness, fate, karma, freedom, greed, imagination, creativity) either limit or enhance what is possible for the individual or for society? What does your tradition teach with respect to fate, freedom of will, choice, and human responsibility? Is there a limit to how good humans can be? Or to how evil we can be?

i. How does your tradition respond to the suggestion that we humans are now capable of annihilating all life on Earth? Is the development of such a capability by humans anticipated in your faith tradition?

j. What is a "developed" country? What standards are to be applied in gauging the true state of development for a country? For example, is the United States a fully "developed" country? Is Haiti? Is India?

k. What does your tradition have to say about the scope of legitimate power of the nation-state? For example, is sovereignty a valid concept? Is any nation, institution, or group of people truly independent, subject to no other power on Earth?

l. What does your tradition teach about the ethics and morality of war? Under what circumstances are nations justified in going to war, declared or undeclared? How does your faith tradition value enmity versus solidarity?

m. When, if ever, is an individual entitled to kill for his or her country? When is an individual entitled to die for his or her country? When, if ever, is it appropriate to swear to kill upon order of an appointed officer? When is an individual, man or woman, entitled to design, manufacture, sell, or transport equipment for killing—weapons? What ethical and moral limitations, if any, does your tradition recognize on the types of weapons that individuals and nations may use to kill? How do the environmental consequences of war bear on the ethics and morality of using particular weapons or of warfare

generally? What special moral considerations are associated with the use of "smart" weapons and other types of weapons that separate and distance the person using the weapon from the reality of his or her actions?

n. What teachings of your tradition bear on the establishment and control of the associations and corporations, which nation-states, under their laws, give the same legal status as people? What are the implications for faith and for society of creating such "fictitious persons" that are neither mortal nor concerned with ultimacy?

o. What does your faith tradition have to say about consumerism, about the manipulation and stimulation of desire, about advertising? Under what circumstances does one have enough?

I, _____, do solemnly swear that I will support and defend the Constitution of the United States against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same; and that I will obey the orders of the President of the United States and the orders of the officers appointed over me, according to the regulations and the Uniform Code of Military Justice. So help me God.

The enlistment oath, United States military forces

3. **What are the traditional teachings—and the range of other opinions—within your faith tradition concerning a proper relationship with those who differ in race or gender (conditions one cannot change), or culture, politics, or faith?**

a. Much hatred and violence is carried out in the name of religion. What teachings of your faith tradition have been used—correctly or not—in an attempt to justify such practices?

b. What can individuals or groups within your tradition do to reduce hatred and violence toward those who differ in race, gender, culture, politics, or faith?

c. What does your faith tradition teach—and practice—concerning the struggles of minorities (and even majorities) for freedom, both political and economic?

d. Discrimination and even violence by men toward women is often justified in the name of religion. Which, if any, of the teachings of your faith have been used—correctly or incorrectly—in this way?

e. Many faith traditions are singled out by women today as examples of "patriarchy." By "patriarchy," women refer to institutions or traditions that have defined man as superior to woman and normative for society. In your tradition, how long ago were the roles, rights, and responsibilities of men and women defined? What do your definitions imply about the superiority of men relative to women?

f. Are the current teachings of your tradition about the roles, rights, and responsibilities of women and men changing?

If so, how? To what degree are women participating in the change process?

g. What does your faith tradition teach about the origin of truth and wisdom? For example, is your faith tradition the holder of the *only* divinely revealed truth?

h. How does your faith tradition characterize the teachings and followers of other faiths? Do some adherents of your tradition hold that the teachings and followers of other faiths are evil, dangerous, misguided? Is there any possibility that your faith tradition can derive wisdom, truth, or insight from the teachings of another faith?

i. Is it the responsibility of your faith tradition to bring your divinely revealed truth to the whole world? Are you to share your faith by example—by living it? Are you to ensure the future of your faith by producing children—more children than produced by the followers of other faiths? Are you to share your faith by teaching? By compelled conversion under threat of death, "ethnic cleansing," crusades, or war? Does your divine truth allow or encourage followers of your faith tradition to kill others who know a different divine truth?

4. What are the traditional teachings—and the range of other opinions—within your faith on the possibility of criticism, correction, reinterpretation, and even rejection of ancient traditional assumptions and "truth" in light of new understandings or revelations?*

a. Does your faith tradition envision new revelation, new understanding, new interpretation, new wisdom, and new truth concerning human activity affecting the future of Earth?*

b. What are the most recent revelations in your faith concerning: the human community's relations with the whole community of life on Earth; the disparities of poverty and affluence within the human community; the

---

*These questions—especially the inclusion of the word "revelation"—have caused concern and uneasiness among the followers and leaders of some faith traditions, and some have suggested an alternative question: "What are the teachings and resources within the tradition of your faith that may open up possibilities for new understanding, interpretation, and wisdom which would lead to a more developed religious teaching from an engagement with the data of science concerning human activity affecting the future of the earth?" The original wording expresses more clearly than the suggested rewording the question that I (and many others) have not only about my own faith (Christianity) but also about other faith traditions.[87] GOB

human concept of progress; the superiority of men over women; and the use of violence toward those of a different faith, culture, race, or gender?

c. How does your tradition respond to the revelation from the past 1,500 years of meditation on Earth and its origins—a revelation we usually call "science?" How will the disciplines of religious and scientific inquiry relate to each other in the future? Can science be a source of new inspiration for understanding and interpreting religious traditions? Can science provide new understanding of the primary, original source of religious insight—the universe itself?

Changing Course

In a sense, Earth is no longer orbiting peacefully about the Sun. Earth is careening toward the spiritual equivalent of a massive stone wall.

The brutality of humans to each other—the "ethnic cleansing," the ignoring of hunger and poverty, the acts of terrorism—and the environmental destruction and loss of natural beauty are already draining us of the spiritual and emotional energy we need to change course, and the situation is growing worse daily. We are becoming numb, unable to feel and react as we must if we are to put Earth back into a peaceful orbit.

Changing course will require an immense amount of energy. Not the energy that comes from coal, gas, oil, or even nuclear fuel, but rather spiritual and emotional energy, enough to change the thinking and lives of more than 5 billion people.

Can so much energy be generated? Can so many people become empowered to think and live differently? Maybe.

An Invitation to Help

It is the conviction of the Trustees and staff of the MILLENNIUM INSTITUTE that a unique opportunity to set Earth on a new course is offered by the 1999-2001 period, and we are working steadily to make the most of this opportunity. We invite spiritual leaders, and others, too, to join us in this effort.

The opportunity relates to the fact that deep in the human psyche is a compulsion to celebrate anniversaries, birthdays, and other recurring dates.[88] The entry into the 21st century and the third millennium will be a psychological experience vastly more profound than any anniversary we humans have yet experienced. Already hotel ballrooms are being booked along the Greenwich meridian by people who want to be the first to enter the 21st century. Concord supersonic jets are being chartered to fly people across time zones so that they can attend parties and celebrate the entry into the new millennium *twice*.[89] These are just the beginning signs of the emotional energies that will be released during the 1999-2001 period.[90]

This occasion, the entry into the new millennium, has special significance for Christians as the approximate bimillennium (2000th anniversary) of Christianity, and there is danger that it could come to be seen as an exclusively Christian event. The Gregorian calendar, however, never was an exclusively Christian calendar. Beginning the year at 1 January was a pagan Roman custom resisted by the Church, and most scholars now agree that

the Nativity of Christ did not occur in 0 (or 1) A.D. but rather before Herod's death in 4 "B.C." Furthermore, the Gregorian calendar has become the calendar of commerce and science throughout the world.[91] The entry into the new millennium must be understood to be an anniversary of Earth to be enjoyed and celebrated by peoples of all faiths.

Earth's entry into the next millennium is a planetary "transitional" event,[92] and as a "mega anniversary" it has potential for reinforcing the identity of human beings, first and foremost, as citizens of Earth, as "Earthlings." This potential must be developed and utilized.

In most cultures, the transition from an old state to a new one (birthdays, graduations, marriages, funerals) is marked by celebrations having three elements. The first element is a period of preparation and grieving. During this period, we prepare to give up our past condition or to "die" to our old state. For our entry into the new millennium, we must prepare to give up our old, 20th century ways of thinking and living.

The second element is a moment of transition, the actual giving up of the old state and the entry into the new. It requires a symbolic act of change, such as the embrace or kiss at a wedding, the movement of the tassels at a graduation, the closing of the casket or the lighting of the pyre at a funeral. For our entry into the 21st century, we need a new symbol, perhaps crossing a stream or river to a new place and a new way of being.

The third element is the celebration of the new and its possibilities. Music, dance, song, and other forms of celebration are appropriate and needed. Gifts are an essential part of the celebration. Gifts are our way of expressing our good wishes and support for the new, and also a means of helping to ensure that something good and enduring comes of the new. For our entry into the new millennium, we must celebrate the opportunities and possibilities of the new era not only with music and joy, but also with generous gifts for the poor, for our enemies, and for Earth on this most extraordinary occasion.

Earth's entry into the next millennium cannot be just another major event. It cannot even be just the event of a lifetime. Or of a hundred years. Or even of a thousand years. That would not be enough. This must be *the* event of the whole Earth-time, the whole history of Earth. This must be the moment when humans interchange bad and good, unreal and real, and set themselves and Earth on a new course.

Over the next five years all 5 billion plus of us humans must prepare to die to 20th century ways of thinking and being. We must also prepare to see the possibilities and opportunities in our new condition in our new millennium.

To make these preparations, all 5 billion of us must devote the next five years to learning from each other about Earth and how to live sustainably and peacefully on Earth. Every person must learn to think in a way that leaves room in one's mind for the thoughts of others. Every person must come to understand much better how Earth's natural systems function and how human institutions, governments, political systems, social systems, international organizations, corporations, and spiritual institutions operate and influence the future of Earth. Every person must learn again the immense power and value of life. (Does all the money or wisdom in the whole world have the *power* to restore a single life?) Every person must learn to think like Earth, to act like Earth, to be Earth.

As a part of this learning process, we must all think through how our part of Earth can contribute to the new. Each person, each family, each corporate institution, each community, each country, each faith needs a plan to contribute to the new. What laws must be changed, what traditions, what beliefs, what institutions?

We also need ideas of appropriate gifts for Earth on this anniversary. What gift can a person give? What can a family, a corporate institution, a community, a country, a faith give to Earth on this momentous anniversary?

For this event to do what it must, the spiritual leaders of Earth must help lead the way and help plan the events. We humans, all five billion of us, depend on our spiritual leaders to make this all happen. Only the spiritual leaders of Earth—the recognized and the not-yet recognized—command the emotional energies needed to move heads of state, leaders of corporations and other institutions, and ordinary citizens to the acts of generosity and changed thinking and living that must occur.

We need you to lead us in teaching each other about Earth and how to live sustainably on Earth. We need you to help us all design a once-in-an-Earth-time celebration of Earth's entry into a new era. We need you to bring every person, every community, and every country to the celebration with their gifts. And most importantly, we need you to bring to the celebration a gift from your own faith tradition, a gift that will help change the course of Earth. What gift could your faith give Earth?

To do what must be done, Earth's spiritual leaders of all faiths and all traditions must work together in ways previously unimagined and unimaginable. We must count on you to develop a community of Earth's faith traditions that is an example of the kind of open communication, mutual respect, acceptance, cooperation, and good will that should characterize the emerging global community of nations and peoples. Each tradition has at

its core a vision of Divine harmony that it urges its followers to embody in the social sphere. These visions have evolved in distinct historical and geographic contexts. The religions have not successfully been able to transcend their own historical origins so as to express their visions of unity in a fashion appropriate to the needs of the pluralistic global society that is taking form at the beginning of the new millennium.* The greatest single scandal in which Earth's faith traditions are now involved is their failure to practice their highest ethical ideals in their relations with one another.

As soon as we humans learn to think like Earth, we together will see a new future for Earth. Then we can die in peace, all 5 billion of us, to our old ways of thinking. We can cross the waters together. And we can celebrate Earth's safe arrival in a new era in a way that will be remembered forever.

Optimism, Hope, and Confidence

Many people—especially young people—look at our situation and prospects and ask, can we be optimistic? We have acted too

---

*In his recent message acknowledging the Church's error in the conviction of Galileo, Pope John Paul II introduced some thoughts that might provide a basis not only for increased understanding and respect between science and religion, but also among religions. To paraphrase and abbreviate the Pope's argument:

> The church must teach the truth, but what are we to do when a new scientific datum seems to contradict the truths of the faith?
>
> There are two things we must do. First, it is a duty for theologians to keep themselves regularly informed of scientific advances in order to examine whether there are reasons for introducing changes in their teachings.
>
> Second, it is necessary to recognize the distinction between Sacred Scripture and its interpretation. If it happens that authority of sacred Scripture is set in opposition to clear and certain reasoning, this must mean that the person who interprets scripture does not understand it correctly. Truth cannot contradict truth, and we may be sure that some mistake has been made.
>
> From the Galileo affair we can learn a lesson that remains valid in relation to similar situations. In Galileo's time it was inconceivable to depict the world as lacking an absolute physical reference point, which could only be situated in the Earth or in the sun. Today, however, after Einstein and within the perspective of contemporary cosmology, neither of these two points of reference has the importance they once had. The lesson, therefore, is that often beyond two partial and contrasting perceptions there exists a wider perception that includes them and goes beyond both of them.

This lesson of Pope John Paul II might point the way for a new approach to the distrust, hatred, and violence that currently plagues interreligious relations. Might there be beyond the "partial and contrasting perceptions" of the many faith traditions "a wider perception that includes them and goes beyond . . . them?"[93]

slowly to help tens of millions of people, and if hundreds of millions, even billions, are to be spared the same fate, massive changes are needed over just the next few years. Can we be hopeful?

There is a difference between being optimistic and being hopeful. An optimistic person has a habitual disposition to expect the best possible outcome as the most likely. A hopeful person has a reasoned commitment to and faith in a good outcome, even though it may be unlikely in the light of past experience.

There is reason for us all to be hopeful but not optimistic. We can be hopeful because Earth is such a fertile, supporting place. We can be hopeful because Earth is showing remarkable resilience in the face of tremendous abuse. We can be hopeful because we now have a much greater understanding of Earth and its limits. We can be hopeful because we humans are recognizing that, as a species, we cannot indefinitely increase our numbers and our demands on Earth. We can be hopeful because we humans are beginning to recover from our erroneous notion that we are separate, above, and independent of all other life.

But perhaps something more than hope is justified. At least one person, Father Thomas Berry, thinks so:

> [W]e need to realize that the ultimate custody of the earth belongs to the earth. The issues we are considering are fundamentally earth issues that need to be dealt with in some direct manner by the earth itself. As humans we need to recognize the limitations in our capacity to deal with these comprehensive issues of the earth's functioning. So long as we are under the illusion that we know best what is good for the earth and for ourselves, then we will continue our present course, with its devastating consequences on the entire earth community.
>
> Our best procedure might be to consider that we need not a human answer to an earth problem, but an earth answer to an earth problem. The earth will solve its problems, and possibly our own, if we will let the earth function in its own ways. We need only listen to what the earth is telling us.
>
> Here we might observe that the basic mood of the future might well be one of confidence in the continuing revelation that takes place in and through the earth. If the dynamics of the universe from the beginning shaped the course of the heavens, lighted the sun, and formed the earth, if this same dynamism brought forth the continents and seas and atmosphere, if it awakened life in the primordial cell and then brought into being the unnumbered variety of living beings, and finally brought us into being and guided us safely

> through the turbulent centuries, there is reason to believe that this same guiding process is precisely what has awakened in us our present understanding of ourselves and our relation to this stupendous process . . . . .[94]

Let us all *listen to and allow ourselves to be guided* by the creative energy that shaped and lighted the universe from the beginning. Let us all *awaken* to a new understanding of ourselves and the continuing revelation that takes place in and through Earth. Let us *take back our lives* from cynicism, optimism, addictions, and despair. Let us *act* with conviction and confidence.

Appendix: Proposal for a Meeting of Heads of State and Spiritual Leaders in Iceland in 2000

In 1991, the MILLENNIUM INSTITUTE submitted a proposal to the government of Iceland for a meeting of heads of state and spiritual leaders to be held in 2000 at Thingvellír, Iceland, the natural amphitheater that was the original meeting place of the Icelandic Parliament.

Thingvellír is now a beautiful national park where the Parliament of Iceland still meets on the most important occasions. Use of Thingvellír is controlled by the Thingvallanefnd (the Thingvellír committee of the Icelandic Parliament) and virtually no meetings are permitted there except meetings of the Icelandic Parliament.

There have been several meetings and discussions of the proposal with the senior leaders of Iceland, including Prime Minister David Odson; Former Prime Minister Steingrímur Hermannsson; Mr. Björn Bjarnason, Vice-President of the Parliament; Mr. Jón Sígardsson, Minister of Industry and Commerce; The Most Reverend Bishop of Iceland Ólafur Skúlasou; The Most Reverend Catholic Bishop of Iceland Alfred Jolson; Pastor Hanna María Pétursdóttir, Director of the National Park and Thingvellír.

The Icelandic leaders are interested, but cautious. They wonder if heads of state and spiritual leaders would be willing to come to what many who have never visited this beautiful country regard as "the very edge of the inhabitable world."

It would encourage Icelanders greatly if spiritual leaders individually or collectively wrote letters asking that Iceland host this much-needed meeting. Letters from others would also be helpful. Letters should be addressed to: His Excellency Björn Bjarnason, Vice-President of the Icelandic Parliament and Chair of the Thingvallanefnd, Althingi, 150 Reyjavík, Iceland and should refer to the following proposal.

A Proposal to the Thingvallanefnd for a Meeting of Heads of State and Spiritual Leaders at Thingvellír in 2000*

I am writing at the direction of the Board of Trustees of the MILLENNIUM INSTITUTE. We would like to begin exploration of the possibility that a major meeting of the world's heads of state and spiritual leaders could be held at Thingvellír in the summer of 2000.

The following paragraphs are our first attempt to put our ideas on paper. After you have reflected on them, we would appreciate you raising them with the members of the Thingvallanefnd. If there is openness to some discussion, we would like to join with an appropriate group of Icelanders in the development of a plan for the meeting and the preparation of a feasibility study.

For almost a decade now, we at the INSTITUTE have been encouraging nation after nation to prepare what we call a 21st Century Study, i.e., a long-term exploration of how a nation will manage its affairs in the 21st century. Over the years we have developed training materials and a Tool Kit to facilitate these studies.

A fifth of the nations of the world now have study projects that meet or approximate our definition of a 21st Century Study. As you know Iceland is one of these countries. Before 2000 we hope to persuade every nation to prepare a 21st Century Study.

In the course of working with many nations, it has become clear to us that we humans face an uncertain 21st century. While there will certainly be many opportunities, there will also be enormous challenges: growing nationalism; conflicts of ethnicity and religion; limitations of petroleum and fresh water resources; disruption of Earth's atmosphere and climate; destruction of habitat and the extinction of huge numbers of species; continued rapid growth of human numbers; risks of AIDS and other diseases; drug trafficking; the poverty, neglect, and abuse of women and minorities; the destructiveness of modern weapons; and the fragility of our global economic systems. To meet these challenges and take advantage of our opportunities, we humans must find ways to work much more closely together in the future than ever before.

---

* This proposal was submitted to the Thingvallanefnd on October 7, 1991. The copy presented here has been updated and edited slightly to reflect developments since the original submission.

It is the conviction of the Trustees and staff of the INSTITUTE that rational analysis of the opportunities and challenges can help guide human steps into the future. However, if we humans are to achieve the cooperation and understanding essential to a successful 21st century, something inspirational is also needed. Because of this conviction, we are trying to combine the rational analysis of the 21st Century Studies with the spiritual inspiration of the 1993 Parliament of the World's Religions. Our fondest hope is that the national 21st Century Studies, the religions of the world, and the unique and special traditions of Thingvellír can be combined into an enormously powerful, planetary event at the entry into the 21st century.

Deep in the human psyche is a compulsion to celebrate anniversaries and birthdays, and the entry into the 21st century will be no exception. If anything, this particular anniversary will be a psychological experience more profound than the usual transition to a new century because it is also (on the most widely used calendar) the transition to a new millennium. Already hotel ballrooms are being booked up for December 31, 1999. The entry into the 21st century will be a birthday and anniversary of planetary proportions, and if the energies it will generate can be channeled in a constructive direction, the future of Earth could be radically better than might otherwise be the case.

We are convinced that if the anniversary compulsion is to be channeled in a constructive direction, that direction must be determined with care through systematic analysis. We also believe that the vision for the future must arise from multiple perspectives, not from a single source. That is why we are now devoting so much time and effort to the encouragement of integrated, multi-sectoral national 21st Century Studies.

In virtually every country in which a 21st Century Study has been successfully completed, the study has had a major impact on the thinking of the people and leaders of the country. Part of the impact comes from the fact that there are so few well-developed analyses of the future possibilities for a country; when one comes along, it quite naturally attracts attention. Another reason is that the reports help nations to overcome the denial of some of the issues that everyone senses but for which there exists no suitable forum for discussion. In one country, it was the dumping of massive amounts of toxic wastes in rivers and on the land. In another it was unsustainably high rates of population growth. In another it was excessive dependence on imports of petroleum and other resources. Thus the 21st Century Studies are a tremendous help to nations in overcoming denial and addressing critical national issues affecting their future development.

But the studies by themselves are inadequate to allow nations to overcome one very important denial, namely that they are part

of a single planet. As a result, we find virtually every nation assuming that its balance of payments problems in the early years of the 21st century will be solved by exporting more that it imports. (In reality, of course, it is impossible for *all* nations to export more than they import.) Virtually every nation is assuming that it will be able to import more oil from the Middle East, import more food from the world's bread baskets, and release more carbon dioxide and chloroflurocarbon into the atmosphere. While such assumptions seem to make sense in the context of a single nation looking in isolation at its own future, in total they imply disastrous consequences for the planet as a whole.

To help nations see themselves within a planetary context, we are beginning to synthesize all of the studies into a picture of Earth in the 21st century. The first version of this synthesis is our book, *Studies for the 21st Century*, which summarizes about forty 21st Century Studies. This book, which has been prepared with funding from UNESCO, will be ready for publication before the end of the year. The next version of our synthesis is being prepared for the 1993 Parliament of the World's Religions.

The religions of the world will have a powerful influence on the human future. Currently there are about forty wars in progress around the world, and the hostilities inspired by religions are major factors in virtually every one of these wars. Religious beliefs also stand in the way of attention to a number of critical issues. The best known of many examples is the attitude of various faiths to family planning, but equally important are teachings concerning "progress" and the difference between needs and wants. For these reasons, it is critically important that the leaders of the world's religions be engaged in a dialog on the critical issues of the future. This is what will happen at the 1993 Parliament of the World's Religions, August 28 to September 4, 1993, in Chicago.

The first Parliament of the World's Religions was held in Chicago in 1893. It was an enormously successful and influential event that focused on increasing inter-religious understanding and tolerance. Now a centennial of the original Parliament is being organized. The 1993 Parliament will be a major global event at which influential representatives of the world's religions will be asked to address the critical issues of the 21st century.

The MILLENNIUM INSTITUTE is a partner with the Council for a Parliament of the World's Religions in organizing the 1993 Parliament. Our part of the overall task is to prepare a synthesis of everything available on the future of Earth. The report, to be entitled *Global 2000 Revisited: What Shall We Do?*, will describe what Earth will be like in the 21st century if all nations continue as they now plan and will ask the world's spiritual leaders to

share their wisdom on how we humans should manage our affairs on Earth in the 21st century.

We are also beginning to assemble a "catalog" of key projects and major actions that need to be done for Earth. One example might be to utilize the best satellite technology now available to build and deploy a highly effective famine early warning system. Another might be a system to provide at least an elementary education to every child on the planet.

The report and a very early draft of the catalog will be major inputs into the 1993 Parliament of the World's Religions. The Parliament will provide a high-visibility forum at which thoughtful spiritual leaders will have a global audience. Many prominent spiritual leaders have already agreed to attend, including His Holiness The Dalai Lama and Dr. Abdula Omar Nasseef, Director General, Muslim World League. An agenda item for the 1993 Parliament is the possibility of establishing a continuing institution called the Parliament of the World's Religions.

Following the 1993 Parliament, we want to work with the continuing Parliament of the World's Religions (if it comes into being), with other interreligious organizations, with individual spiritual leaders, and with individuals from all faith traditions to prepare an event or series of events in the 1999-2001 period. Part of the preparation will be the development of three documents: (1) the report on the projected state of Earth in the 21st century; (2) the combined wisdom of the faith traditions with respect to the critical issues; and (3) the catalog of key projects and actions that the respective traditions could support and recommend. This work should be completed by about 1996.

We will need the assistance of a group of dedicated and committed spiritual leaders. We need them to help think through what are the key projects and actions needed to put Earth on a sustainable course and to help arrange the participation of fifty to one hundred of the most respected spiritual leaders of the world. We also need them and the leaders of the national 21st Century Studies to help arrange meetings with all heads of state of the world, and to ensure that all heads of state participate.

To the political leaders, we will say, in effect:

> We, the peoples of the world, are approaching a major anniversary, an anniversary of Earth.
>
> Anniversaries, of course, are a time for celebration, but they are also a time for giving gifts. Since this is an *extraordinary* anniversary, your nation may want to join other nations in making a gift to Earth for the 21st century.

> To help you to think through what gift might be appropriate for your nation to give, we have brought you three reports: a picture of the future of the planet in the 21st century; the wisdom and teaching of the faith traditions on the critical issues of the 21st century; and a catalog of major projects and actions that experts, visionaries, and spiritual leaders recommend be done for Earth.
>
> We ask that you share these documents with your parliament (or congress, etc.) and begin consideration of a major gift that your nation could make to Earth in the 21st century.

Then, we would present to each head of state a formal invitation and a few large, blank sheets of special paper. The invitation would be for the head of state to attend a gathering at Thingvellír sometime in the summer of 2000. We would like the invitations to the heads of state to be issued both in the name of a group of spiritual leaders of the world and in the name of the people of Iceland.

The invitation would also ask the heads of state, after deciding with their parliament on a suitable gift for Earth, to search out their nation's best calligraphist and have their nation's pledge to Earth recorded on the large sheets of special paper. They should then bring their nation's pledge with them to the gathering at Thingvellír.

The event at Thingvellír in 2000 will require careful planning, and we would like to work closely with Icelanders and spiritual leaders in exploring the possibilities. Currently we envisage fifty to one hundred spiritual leaders assembled under a beautiful tent at one end of the upper flats at Thingvellír. In front of the spiritual leaders would be a stone table, constructed for the occasion by an artist. Beyond the table on the plane would be an even larger colorful tent, and under this tent would be assembled the almost two hundred heads of state of the world, each accompanied only by a spouse.

The actual celebration would have the three parts traditional to most "transition" celebrations: a ritual death to and giving up of the old 20th century and its ways of being and thinking; a brief, symbolic transitional event to mark the entry into the new; and a celebration of the possibilities of the new. Gifts to Earth from both heads of state and spiritual leaders would be a part of the celebration and would express our collective best wishes for Earth during the new era. The gifts from spiritual traditions may be even more important than the gifts from nations.

For the actual gifting ceremony, the spiritual leaders and heads of state would rise and walk to the stone table. Then, facing their peers and (by television) the peoples of the world, they would each read from the beautifully hand-written page

their faith's or nation's pledge of what it will do for Earth in the 21st century. Similar events could be planned and held in individual nations, provinces, communities, and even families throughout the world.

After the announcement of each gift, the head of state or spiritual leader would place the written pledge on the stone table. At the end of the ceremony, the pages would all be bound together in what might be called *Earth Book, 2000* and entrusted to the Icelandic Parliament, the Althingi, for safekeeping. The book would also be translated into many languages and distributed widely as a palpable symbol and reminder of what the peoples of Earth committed themselves to on the occasion of their entry into the 21st century and the third millennium.

The meeting would need to continue for several days. There are three reasons. First, the importance of this milestone, this anniversary of Earth, demands that the spiritual and political leaders of Earth pause for several days to mark and celebrate it. Second, two hundred heads of state and a hundred spiritual leaders will need at least a few minutes each to announce their gifts. And, finally, the event must not be rushed. There must be time for celebration, music, and perhaps even dancing. This will be an event that will be remembered forever, and we must do it well.

You may ask, Why hold this meeting at Thingvellír? In answer, we would say that perhaps there are other places on Earth where such a meeting could be held, but of the places we know of, Thingvellír seems best for several reasons.

- Iceland is a unique place. Not only is it one of the few nations in the world which would welcome the heads of state of all nations, it is also one of the few nations in the world to which every head of state would feel comfortable in accepting an invitation. In addition, Iceland has begun, with the Reagan-Gorbachev meeting, to build a reputation as a place where diplomatic meetings can be held at the highest and most thoughtful level.
- Iceland is also special in that women hold important leadership positions. The future of Earth is critically dependent on humans everywhere learning to value and utilize the talents of women. Since the political and spiritual leaders of the world are predominantly men, ways must be found to include women in the Thingvellír event. Perhaps the women of Iceland will be able to help imagine how this can be done.
- Then, there is the setting itself. Thingvellír is simply beautiful. The natural amphitheater below the cliff; the plain where hundreds of people can easily gather; the

clear, blue Öxará river; the inspiring clouds; the simple, yet elegant style of the few buildings; and the powerful symbolism of the joining of the European (Eastern) and American (Western) tectonic plates. This is truly a place that holds the world together. All this is perfect, exactly as it should be.

- There are long summer days at Thingvellír. The midnight sun creates a special, magical environment that could enhance the gathering greatly.
- Iceland is the only place in the world we know of where when something *really* important is to be decided or remembered, the artificial, human-made environment of the Parliament building is abandoned in favor of the outdoor, natural environment at Thingvellír, the original site of the oldest continuing parliament. This practice is important for the meeting in 2000. If humans are to have a successful 21st century, they must make peace with their original environment, and the symbolism of a major meeting of Earth's of heads of state and spiritual leaders in our original environment could start us off in the right direction.
- Thingvellír has a tradition of diplomacy and self-sacrifice that will be important in the human future. These traditions range from the work of the Law Speaker to the final acts of Njal and his children as recounted in *Njal's Saga*.
- Thingvellír has a tradition of religious tolerance. The little known story of how Christianity came to Iceland in 1000 is an example. Under the double threat of foreign invasion if Christianity *was not* adopted as the national religion and of civil war it *was*, the Althingi acted with great wisdom in adopting Christianity but allowing everyone to worship as they pleased privately. This solution satisfied everyone, avoided war, and established a unique tradition of religious tolerance, diplomacy, and compromise in Iceland.
- But most important, is the tradition of more than a thousand years that *Thingvellír is a place where even enemies can meet*. Like the feuding Icelanders in 930, the entire human community today desperately needs a place where even enemies can meet. By sharing Thingvellír and its traditions with the world, Iceland can make a gift to Earth that no other nation could, a gift truly beyond value.

This last tradition could be important in solving one of several logistical details of such a gathering, namely security. Providing security for a meeting of the world's spiritual leaders and heads

of state could be a major burden if Iceland should choose to assume full responsibility. But by tradition, security for meetings at Thingvellír is not the responsibility of a single group or community; it is a responsibility shared by all who attend. This tradition can and should be continued. The invitation to the gathering should include information on the tradition and on the Thingvellír oath of safety for all participants. Each participant should be asked to guarantee to all other participants that neither they nor any of their nation's people will harm anyone during the meeting or while they are traveling to or from the meeting. The meeting itself should begin with a modernized version of the Thingvellír oath.

Facilities and accommodations are another consideration. We would hope that the whole gathering could be kept simple. If it were held in the summer, the meeting itself might be in the open air tradition of Thingvellír. We envision the use of large colorful tents so that no new buildings would be needed at Thingvellír. If the guests were strictly limited to the spiritual leaders and heads of state, their principal spouse or partner, a single aid or assistant, and no news media, the numbers would probably not exceed the capacity of the accommodations and food services in Reykjavik in 2000.

The 21st century holds many opportunities and obstacles for our generation and for our children. An event that draws on the traditions of Thingvellír and the emotional energies of the entry into the new millennium could help all of us on Earth to make the best of the opportunities and to overcome the challenges.

When you have had an opportunity to reflect on this letter, we would appreciate an opportunity to meet with the members of the Thingvallanefnd. Then, if there is interest, we could begin together developing a plan and preparing a feasibility study.

Sincerely,

Gerald O. Barney
Executive Director
MILLENNIUM INSTITUTE

References

[1]Barney, G. O. 1980. *The Global 2000 Report to the President*, Volumes 1, 2, and 3. Washington: U.S. Government Printing Office.

[2]*Time*. 2 January 1989. pp. 29-30.

[3]Novácek, P. 1992. Personal communication.

[4]Pimental, D. 1992. *Competition for Land: Development, Food, and Fuel*. In Kuliasha, M. A.; Zucher, A.; and Ballew, K. J., Eds. *Technologies for a Greenhouse Constrained Society*. Boca Raton: Louis Publishers. 1992. pp. 325-348.

[5]U.S. Department of Agriculture, Economic Research Service, Commodity Economics Division, Trade Analysis Branch. 1993. Based on Agrostate data from the U.N. Food and Agriculture Organization, Rome.

[6]For a well-written description of what happens when there is not enough food to feed a large number of people, see: Brown, D. 1993. "Starving Somalis Face Ultimate Survival Test: As Malnutrition Leaches Cells' Needs, the Human Body Rations Remaining Glucose." *The Washington Post*. 4 January 1993. p. A1.

[7]United Nations. 1992. *Long-Range World Population Projections*. New York: United Nations. p. 22.

[8]United Nations. 1992. *Ibid.*

[9]Kristof, N. D. 1993. "China's Crackdown on Births: A Stunning, and Harsh, Success." *The New York Times*. 25 April 1993. p. A1.

[10]Ruttan, V. W. 1990. "Constraints on Sustainable Growth in Agricultural Production: Into the 21st Century." In: Agriculture and Rural Development Department and Training Division, World Bank, eds. 1991. *Eleventh Agricultural Symposium: Agricultural Issues in the Nineties*. Washington: The World Bank.

[11]U.N. Food and Agriculture Organization. 1989. FAO Production Yearbook tapes. Rome: U.N. Food and Agriculture Organization.

[12]Ruttan, V. W. December 1992. Personal communication.

[13]Ruttan, V. W. 1990. "Constraints on Sustainable Growth in Agricultural Production: Into the 21st Century." In: Agriculture and Rural Development Department and Training Division, World Bank, eds. 1991. *Eleventh Agricultural Symposium: Agricultural Issues in the Nineties*. Washington: The World Bank.

[14]Brown, L. R. 1970. *Seeds of Change: The Green Revolution and Development and the 1970s*. New York: Praeger Publishers. Dalrymple, D. 1980. *Development and Spread of Semi-Dwarf Wheat and Rice in the United States: An International Perspective*. Washington: U.S. Department of Agriculture. Crosby, A. W., Jr. 1972. *The Columbian Exchange: The*

Biological and Cultural Consequences of 1492. Westport, CT: Greenwood Press. Viola, H. J. and Margolis, C. 1991. *Seeds of Change.* Washington: The Smithsonian Institution Press.

[15]Carroll, C. R.; Vandermeer, J. H.; and Rosset, P. M. 1990. *Agroecology.* New York: McGraw-Hill Publishing Company, 641 pages.

[16]National Research Council. 1989. *Alternative Agriculture.* Washington: National Academy Press. 448 pages.

[17]Ruttan, V. W., ed. 1993. *Agriculture, Environment, and Health: Toward Sustainable Development into the 21st Century.* Minneapolis: University of Minnesota Press. Ruttan, V. W. 1990. "Constraints on Sustainable Growth in Agricultural Production: Into the 21st Century." In: Agriculture and Rural Development Department and Training Division, World Bank, eds. 1991. *Eleventh Agricultural Symposium: Agricultural Issues in the Nineties.* Washington: The World Bank. Ruttan, V. W. December 1992. Personal communication.

[18]Leopold, A. 1953. *Round River.* New York: Oxford University Press.

[19]Masters, C. D., et al. 1991. *Ibid.*

[20]Raven, P. H. 1987. *We're Killing Our World: The Global Ecosystem in Crisis.* Occasional Paper. Chicago: The MacArthur Foundation. pp. 12-13.

[21]Wilson, E. O. 1993. "Is Humanity Suicidal?" *The New York Times Magazine.* 30 May 1993. p. 24.

[22]Ruttan, V. W. December 1992. Personal communication.

[23]Hubbert, M. K. 1977. "World Oil and Natural Gas Reserves and Resources." In: Congressional Research Service. *Project Independence: U.S. and World Energy Outlook Through 1990.* Washington: Government Printing Office. pp. 632-644. Neehring, R. 1978. *Giant Oil Fields and World Oil Resources.* Santa Monica, CA: Rand Corp. Masters, C.D.; Root, D. H.; and Attanasi, E. D. 1991. "Resource Constraints in Petroleum Production Potential." *Science.* 12 July 1991, vol. 253, pp. 146-152.

[24]Masters, C. D.; Root, D. H.; and Attanasi, E. D. 1991. "Resource Constraints in Petroleum Production Potential." *Science.* 12 July 1991, vol. 253. pp. 146-152.

[25]Masters, C. D.; et al. 1991. *Ibid.*

[26]Pimental, D. and Dazhong, W. "Technological Changes in Energy Use in U.S. Agricultural Production." In: Carol, C. R.; Vandermeer, J. H.; and Rosset, P. M. *Agroecology.* New York: McGraw Hill Publishers. 1990. p. 154.

[27]Energy Information Administration. 1992. *Annual Energy Outlook 1992.* Washington: U.S. Department of Energy. DOE/EIA-3083 (92). p. 6; and Oak Ridge National Laboratory. 1989. *Energy and Technology R&D—What Could Make a Difference?* as reported in: U.S. Department of

Energy. 1991. *National Energy Strategy*. Washington: U.S. Government Printing Office.

[28]Goldberg, J., et al. 1985. "Basic Needs and Much More One Kilowatt Per Capita." *Ambio*. vol. 14, no. 4-5, pp. 190-200. Levins, A. B. 1977. *Soft Energy Paths: Toward a Durable Peace*. Cambridge, MA: Bellinger.

[29]See, for example: Daly, H. E. and Cobb, J. B., Jr. 1989. *For the Common Good: Redirecting the Economy Toward Community and the Environment and a Sustainable Future*. Boston: Beacon Press; and Ahmad, Y. J.; El Serafy, S.; Lutz, E. 1989. *Environmental Accounting for Sustainable Development*. Washington: The World Bank.

[30]Reuters. 1993. "SDI, Chernobyl Helped End Cold War, Conference Told." *New York Times*. 27 February 1993. p. A17.

[31]Daly, H. E. and Cobb, J. B., Jr. 1989. *For the Common Good: Redirecting the Economy Toward Community and the Environment and a Sustainable Future*. Boston: Beacon Press.

[32]Turner, B. L., II, et al. 1990. *The Earth As Transformed by Human Action*. New York: Cambridge University Press.

[33]UNEP/GEMS. 1987. *The Greenhouse Gases*. Nairobi: United Nations Environment Programme.

[34]Intergovernmental Panel on Climate Change. 1992. *1992 IPCC Supplement*. Geneva: World Meteorological Organization. p. 25. New historical data show that massive changes in the average global temperature can occur in decades rather than in centuries. Sullivan, W. "Study of Greenland Ice Finds Rapid Change in Past Climate." *The New York Times*. July 1993. p. A1.

[35]Watson, R. T. and Albritton, D. C. 1991. *Scientific Assessment of Ozone Depletion: 1991*. Geneva: World Meteorological Organization. p. ES-v.

[36]Intergovernmental Panel on Climate Change. 1990. *Policymakers Summary of the Scientific Assessment of Climate Change*. Geneva: World Meteorological Organization. pp. 22-23.

[37]Intergovernmental Panel on Climate Change. 1990. *Policymakers Summary of the Scientific Assessment of Climate Change*. Geneva: World Meteorological Organization. p. 33.

[38]Global Environment Monitoring System. 1987. *The Greenhouse Gases*. Nairobi: U.N. Environment Programme.

[39]Watson, R. T. and Albritton, D. C. 1991. *Scientific Assessment of Ozone Depletion: 1991*. Geneva: World Meteorological Organization. p. ES-v.

[40]UNEP/GEMS. 1987. "The Ozone Layer," Nairobi: United Nations Environment Programme.

[41]Stevens, W. K. "Peril to Ozone Hastens a Ban on Chemicals." *The New York Times*. 26 November 1992. p. A1.

[42]Watson, R. T. and Albritton, D. C. 1991. *Scientific Assessment of Ozone Depletion*: 1991. Geneva: World Meteorological Organization. ES-i - ES-viii. Gleason, J. F., et al. 1993. "Record Low Global Ozone in 1992." *Science*. vol. 260. 23 April 1993. pp. 523-526. Kerr, R. A. 1993. "Ozone Takes a Nose Dive After The Eruption of Mt. Pinatubo." *Science*. vol. 260. pp. 490-491.

[43]Gen. 13:1-12

[44]For details on Zaïre, see Nobel, K. B. 1992. "As the Nation's Economy Collapses, Zaïrians Squirm Under Mobutu's Heel." *The New York Times*. 30 August 1992. p. 14. "Zaïre Farce." 1992. *The Economist*. 12 December 1992. pp. 53-4. Wa Mutua, M. "The Last Chapter?" *Africa Report*. September/October 1992. pp. 54-56. Linden, E. "Kinshasa, Zaïre." *Time*. 11 January 1993. pp. 30-31. Lumumba-Kasongo, T. "Zaïre's Ties to Belgium: Persistence and Future Prospects in Political Economy." *Africa Today*. 3rd Quarter 1992. pp. 23-48.

[45]Turnbull, C. M. 1972. *The Mountain People*. New York: Simon and Schuster. pp. 131-132.

[46]Kamm, H. 1993. "'People Smugglers' Send New Tide of Refugees Onto Nordic Shores." *The New York Times*. 15 February 1993. p. A1.

[47]Kamm, H. "In Europe's Upheaval, Doors Close to Foreigners." *The New York Times*. 10 February 1993. p. A1.

[48]Simmons, M. "The Sex Market: Scourge on the World's Children." *The New York Times*. 9 April 1993. p. A3.

[49]Bread for the World. 1990. *Hunger 1990: A Report on the State of World Hunger*. Washington: Bread for the World Institute on Hunger and Development.

[50]Buber, M. 1958. *I and Thou*. New York: Collier Books.

[51]Nhât Hanh, T. 1988. *The Heart of Understanding: Commentaries on the Prajñaparamita Heart Sutra*. Berkeley, CA: Parallax Press. pp. 33-38.

[52]For other examples of alternatives that are working, see: Starke, L. 1990. *Signs of Hope: Working Towards Our Common Future*. Oxford: Oxford University Press. Ekins, P. 1992. *A New World Order: Grassroots Movements for Global Change*. London: Routledge. Schmidheiny, S. 1992. *Changing Course: A Global Business Perspective on Development and the Environment*. Cambridge, MA: The M. I. T. Press. Goldberg, J.; Johansson, T. B.; Reddy, A. K.; and Williams, R. H. "Basic Needs and Much More With One Kilowatt Per Capita." *Ambio*. vol. 14. no. 4-5. pp. 190-200.

[53]Linden, E. "Megacities." *Time*. 11 January 1993. pp. 30-31. Margolis, M. 1992. *World Monitor*. March 1992. pp. 42-50

[54]Finnbogadóttir, V. 8 April 1992. Personal communication.

[55]Few people realize how common terrorist bombings have become in the United States. See: Thomas, P. 1993. "Use of Explosives in Crimes

Doubles Since 1987, Killing Two Dozen a Year." *The Washington Post.* 13 March 1993. p. A3.

[56]Meadows, D. H.; Meadows, D. L.; and Randers, J. 1992. *Beyond the Limits.* Post Mill, VT: Chelsea Green Publishing. p. 196.

[57]The suggested actions presented here have been drawn from many sources including: Goodland, R. and Daly, H. "Ten Reasons Why Northern Income Growth is not the Solution to Southern Poverty." In: *International Journal of Sustainable Development* 1 (2) 23-30, 1992. Serageldin, I. "Agriculture and Environmentally Sustainable Development." *Bank's World.* April 1993. pp. 18-21. Peccei, A. 1977. *The Human Quality.* Oxford: Pergamon; The World Commission on Environment and Development. 1987. *Our Common Future.* Oxford: Oxford University Press. Demeny, P. 1992. "Policies Seeking a Reduction of High Fertility: A Case for the Demand Side." ESD/P/ICPD.1994/EG.II/INF.16. New York: Population Division of the United Nations. MacNeill, J.; Winsemius, P.; and Yakushiji, T. *Beyond Interdependence.* Oxford: Oxford University Press. Brown, L. R.; Flavin, C.; and Postel, S. 1991. *Saving the Planet.* New York: Norton. Secretariat, U. N. Conference on Environment and Development. 1992. *Agenda 21.* Oxford: Oxford University Press. Korten, D. C. 1990. *Getting to the 21st Century: Voluntary Action and the Global Agenda.* Hartford, CT: Kumarian Press. Brown, L. R. 1981. *Building a Sustainable Society.* New York: Norton; Brown, L. R., et al. 1990. *State of the World 1990.* New York: Norton.

[58]Gore, A. "What Is Wrong With Us?" *Time.* 2 January 1989. p. 66. Wilson, E. O. "Is Humanity Suicidal?" *The New York Times Magazine.* 30 May 1993. p. 24.

[59]Rev. 21:4.

[60]Berry, T. 1988. *The Dream of the Earth.* San Francisco: Sierra Club Books. p. 29.

[61]Berry, T. 1988. *op. cit.* p. 153

[62]The World Commission on Environment and Development. 1987. *Our Common Future.* Oxford: Oxford University Press. McNeill, J. "Strategies for Sustainable Economic Development." *Scientific American.* September 1989. pp. 154-165.

[63]The attribute of "replicability" is an important aspect of sustainability. It invites the North to live in a way that would be sustainable *globally* if the North's lifestyle were replicated throughout the South, too. For further information on this concept, see: Corea, G. "The Rich Must Show the Way to a Replicable Lifestyle." *South Letter.* June 1991. p. 15.

[64]McNamara, R. S. 1991. *A Global Population Policy to Advance Human Development in the 21st Century: Rafael M. Salas Memorial Lecture.* New York: United Nations. pp. 15-16. Goodland, R. 1991. "The Case That the World Has Reached Limits." In: Goodland, R.; Daly, H.; and El Serafy, S., eds. 1991. *Environmentally Sustainable Economic Development*

Building on Brundtland: Environment Working Paper No. 46. Washington: The World Bank. Vitousek, P. M.; Ehrlich, P. R.; Ehrlich, A. H.; and Matson, P. A. "Human Appropriation of the Products of Photosynthesis." *Bioscience.* May 1986.

[65]Anderson, J. W. and More, M. 1993 "Born Oppressed." In *The Washington Post.* Washington: *The Washington Post.* 14 February 1993. p. A1.

[66]Berry, T. 1988. *The Dream of the Earth.* San Francisco: Sierra Club Books. p. 37.

[67]A short, thoughtful analysis of the U.N. Conference on Environment and Development in the context of the decline of the Westphalian system of international order is provided in Suter, K. 1992. "Toward a More Equitable World Order." An unpublished paper prepared for the Kuala Lumpur Conference of the Club of Rome. 15-19 November 1992. Available from K. Suter, GPO Box 4878, Sydney, NSW, 2001, Australia.

[68]An unusually candid portrait of the problems in the United Nations is provided in Thornburgh, D. 1 March 1993. *Report to the Secretary General of the United Nations by the Under Secretary-General for Administration and Management.* New York: United Nations.

[69]Binder, D. and Crossette, B. 1993. "As Ethnic Wars Multiply, U.S. Strives for a Policy." *The New York Times.* 7 February 1993. P. A1.

[70]Fischer, L. 1954. *Ghandi: His Life and Message for the World.* New York: Mentor Books. pp. 100-101.

[71]Sharp, G. 1985. *National Security Through Civilian-Based Defense.* Omaha, NE: The Association for Transarmament Studies.

[72]Schmidheiny, Stephan, et al. 1992. *Changing Course: A Global Business Perspective on Development and the Environment.* Cambridge, MA: The MIT Press.

[73]See Grossman, R. L. and Adams, F. T. *Taking Care of Business: Citizenship and the Charter of Incorporation.* Cambridge MA 02140 (P. O. Box 806): Charter, Ink./CSPP. 1993.

[74]One that is far above average is: General Assembly of the Presbyterian Church (U.S.A.) 1990. *Restoring Creation for Ecology and Justice.* Louisville, KY: Presbyterian Church (U.S.A.), and an associated study guide: Presbyterian Eco-Justice Task Force. 1989. *Keeping and Healing the Creation.* Louisville, KY: Presbyterian Church (U.S.A.). Others that are more disappointing include: John Paul II, His Holiness. 1990. "Peace with God the Creator, Peace with All of Creation: A Message for the Celebration of the World Day of Peace, 1 January 1990." Rome: The Vatican; and John Paul II, His Holiness. 1991. "Centesimus Annus." Rome: The Vatican.

[75]Kinnamon, M., ed. 1991. *Signs of the Spirit: Official Report of the Seventh Assembly.* Geneva: WCC Publications. pp. 68-69.

[76]Ramphal, S. 1992. *Our Country, The Planet: Forging A Partnership for Survival.* Washington: Island Press. pp. 202-203.

[77]From an evolutionary point of view, there are many interesting questions about how and when early humans became aware of the divine or began to hear or sense revelations. One examination of this matter that I have found very helpful and insightful is: Jaynes, J. 1976. *The Origin of Consciousness in the Breakdown of the Bicameral Mind.* Boston: Houghton Mifflin Company.

[78]Binder, D. and Crossette, B. 1993 "As Ethnic Wars Multiply, U.S. Strives for a Policy." *The New York Times.* 7 February 1993. p. A1

[79]Romans 8: 18-24.

[80]Genesis: 1: 28-30.

[81]An Earth-future without humans is really not an *Earth*-future. Without humans, the loss of potential and consciousness would be so large that Earth would simply not be Earth. Furthermore, an Earth-future without humans is impossible for humans even to imagine. For a thoughtful attempt to imagine an Earth-future without humans, see Schell, J. 1982. "The Second Death." In Schell, J. *The Fate of the Earth.* New York: A. Knopf. pp. 99-178.

[82]The original article was written by Branimir Talajic, a Sarajevo-based reporter for *Novi Vjesnik,* a daily newspaper in Zagreb. His article was translated for Pacific News Service by Branimir and Yelka Talajic, Croatian immigrants who live in Saratoga, California. Reprinted by permission.

[83]For a list of the 48 religious and ethnic wars now in progress on every continent, see: Binder, D. and Crossette, B. "As Ethnic Wars Multiply, U.S. Strives for a Policy." *The New York Times.* 7 February 1993. p. A1.

[84]See Swimme, B. and Berry, T. 1992. *The Universe Story.* Cloud, P. *Oasis in Space: A History of the Planet from the Beginning.* Cambridge: Cambridge University Press; Capra, F. and Steindl-Rast, D. *Belonging to the Universe.* San Francisco: Harper-Collins; and Wilson, E. O. 1992. *The Diversity of Life.* Cambridge, MA: Belknap Press of Harvard University Press; and Crosby, A. W. 1986. *Ecological Imperialism: The Biological Expansion of Europe, 900-1900.* Cambridge: Cambridge University Press.

[85]While no faith tradition has gone very far in developing inter-species ethics and morality, a few individuals have made significant steps in this direction. See, for example: Engel, J. R., and Engel, J. G., eds. 1990. *Ethics of Environment and Development: Global Challenge and International Response.* University of Arizona Press. Pinches, C. and McDaniel, J. B., eds. 1993. *Good News for Animals: Christian Approaches to Animal Well-Being.* Maryknoll, NY: Orbis Books.

[86]For examples of questions being raised by others, see: Union of Concerned Scientists. 1992. "World Scientists' Warning to Humanity."

(This statement signed by 1,575 scientists from 69 countries and a press release are available from Union of Concerned Scientists, 1616 P Street, NW, Suite 310, Washington, DC, 20036, USA.) Lasch, C. "Is Progress Obsolete?" *Beyond the Year 2000: A Special Issue.* Time. Fall 1992. p. 71. International Coordinating Committee on Religion and Earth. 1993. "An Earth Charter: A Spiritual Perspective." Available from: International Coordinating Committee on Religion and the Earth, P.O. Box 67, Greenwich, CT 06831, USA. Kyser, R. 1993. "The Role of the Churches in Population Growth, Immigration and the Environment." 1993. *The Social Contract.* Winter 1992-93. pp. 75-142. Goodland, R. 1991. *Tropical Deforestation Solutions, Ethics, and Religions: Environment Working Paper No. 43.* Washington: The World Bank. Goodland; R., Daly, H.; and El Serafy, S. 1991. *Environmentally Sustainable Economic Development Building on Brundtland: Environment Working Paper No. 46.* Washington: The World Bank. Forrester, J. W. 1971. "Churches at the Transition Between Growth and World Equilibrium." In: Forrester, J. W. 1975. *Collected Papers of Jay W. Forrester.* Cambridge, MA: The M. I. T. Press. pp. 255-269. Shiva, V. 1989. *Staying Alive: Women, Ecology, and Development.* London: Zed Books. Spretnak, C. 1991. *States of Grace: The Recovery of Meaning in the Postmodern Age.* San Francisco: Harper Collins. Hardin, G. 1963. "A Second Sermon on the Mount." *Perspectives in Biology and Medicine.* vol. vi, no. 3, Spring 1963. Hardin, G. 1968. "The Tragedy of the Commons." *Science.* vol. 162. 13 December 1968. pp. 1243-1248. Vickers, G. 1970. *Freedom in a Rocking Boat: Changing Values in an Unstable Society.* Middlesex, England: Pelican Books. Linden, E. "Too Many People." *Beyond the Year 2000: A Special Issue.* Time. Fall 1992. pp. 64-65.

[87]Professor Julian Jaynes at Princeton University argues that "revelation" (hearing the gods) is a capability that humans have largely lost since the founding of the great religious traditions. Those few that still hear "voices" are largely dismissed by society as having one form or another of mental illness. See: Jaynes, J. 1976. *The Origins of Consciousness in the Breakdown of the Bicameral Mind.* Boston: Houghton Mifflin Company.

[88]Aykroyd, P. H. 1992. *The Anniversary Compulsion.* Toronto: Dundurn Press.

[89]1992. "A Fast Journey to 2 Celebrations." *The New York Times.* 29 November 1992. Section 5, p. 3.

[90]*Beyond the Year 2000: What to Expect in the New Millennium: A Special Issue.* 1992. New York: Time.

[91]Boorstin, D. J. 1983. *The Discoverers.* New York: Random House. pp. 596-603.

[92]Several thoughtful books and papers have now been published relating to how we humans might mark Earth's entry into the 21st century. These include: Aykroyd, P. H. 1992. *The Anniversary Compulsion.* Toronto: Dundurn Press. Schwartz, H. 1990. *Century's End: A Cultural History of the Fin de Siècle from the 990s through the 1990s.* New York: Doubleday. Hyde, L. 1979. *The Gift.* New York: Vintage

Books. Johnson, W. M. 1991. *Celebrations*. New Brunswick: Transaction Publishers.

[93]John Paul II, His Holiness. 1992. "Lessons of the Galileo Case." Origins: *CNS Documentary Service*. 12 November 1992. pp. 370-373.

[94]Berry, T. 1988. *The Dream of the Earth*. San Francisco: Sierra Club Books. p. 137.

Order Form

Please send me:	Quantity	Price	Total
Summary of *Global 2000 Revisited: What Shall We Do?*	_____	US$8.00	_____
Global 2000 Revisited: What Shall We Do?	_____	US$20.00	_____
		Subtotal	_____
		Shipping (see below)	_____
		Total	_____

Shipping Method	***First Book***	***Subsequent Books***
In the United States		
Book Rate	US$2.00	US$0.50
UPS	US$3.50	US$0.50
International		
Surface Rate	US$5.00	US$1.00
Other	call for rate	call for rate

Method of Payment

Mastercard or Visa Number _____

Expiration Date _____

Signature _____

or, send your check or money order to: Public Interest Publications, P.O. Box 229, Arlington, Virginia 22210, USA

Phone: +1-(800) 537-9359 in the U.S., Canada, and Mexico or
+1-(703) 243-2252
Fax: +1-(703) 243-2489

Ship to:

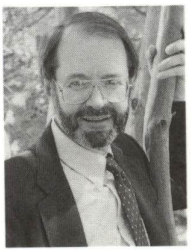
Name: _____

Address: _____

_____

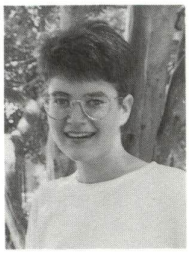
Country: _____

Telephone/Fax: _____



Gerald O. Barney is Founder and Executive Director of the Millennium Institute. Previously, he directed the U.S. Government's *Global 2000 Report to The President* and headed the National Program for the Rockefeller Brothers Fund. He has traveled and lectured widely and written numerous books on sustainable futures for Earth. He conducted post-doctoral research in global modeling at the Massachussets Institute of Technology and holds a doctoral degree in fusion energy physics from the University of Wisconsin. He lives with his wife, Carol, in Arlington, Virginia, in the United States.

Jane Blewett is Founder and Director of the EarthCommunity Center, which helps create and deepen awareness of the sacred relationship between humankind and Earth. She studied the religious and scientific dimensions of the universe story at the Holy Cross Centre for Ecology and Spirituality in Ontario, Canada. She spent 13 years on the research staff of the Center of Concern, in Washington, D.C., and served as Chief Liaison for the Center of Concern to the United Nations. She has written, lectured, and traveled widely, and lives with her husband, Lou, in Laurel, Maryland, in the United States.



Kristen R. Barney is a Research Associate at the Millennium Institute. She was a New Generation Leader at the Global Assembly on Women and the Environment and has spear-headed the Exploratory Project of the New Generation Leaders. She has published several articles, taught, and lectured, and is on the Editorial Board of the *Tribuna da Vida* of the Brazilian Movement in Defense of Life. She holds a master's degree in Hispanic language and literature from the University of Wisconsin, and lives in Arlington, Virginia, in the United States.

If present beliefs and policies continue, the world in the 21st century will be more crowded, more polluted, less stable economically and ecologically, and more vulnerable to violent disruption than the world we live in now . . . . Overall, Earth's people will be poorer in many ways than they are today.

Global 2000 Revisited: What Shall We Do?

Global 2000 Revisited is both thunder and lightning across the landscape! Thunder of terror if we continue as of the present! Lightning revealing the grandeur of a possible future!

Father Thomas Berry
Author of *The Dream of the Earth*
and Co-Author of *The Universe Story*

What Shall We Do? explains gently but powerfully the seriousness of the human situation. I've read parts of it to my family members. It has changed their thinking and mine— and helped put environment on the agenda of Muslim women.

Sharifa Alkhateeb
President, The North American Council for Muslim Women

Like the original *Global 2000 Report*, this book shows the dire straits to which humans have brought the world. But I have no faith that the world's spiritual leaders will help. They are themselves a major part of the problem!

Robert Jenkins
Vice President for Science, The Nature Conservancy

Loved it! Read it four times! Terrifying, prophetic, but with heart and soul! Gives all 5.5 billion of us a bridge across the abyss—and *demands* we start walking!

Carolyn Ford
Director, Jabala Society

A non profit organization promoting long-term integrated global thinking

ISBN 0-937585-00-9