

FOIA MARKER

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Collection/Record Group: Clinton Presidential Records
Subgroup/Office of Origin: Council on Environmental Quality
Series/Staff Member: Kathleen (Katie) McGinty
Subseries:

OA/ID Number: 2888
FolderID:

Folder Title:
Joint Appeal Mission to Washington [1]

Stack:	Row:	Section:	Shelf:	Position:
S	61	5	10	1

* Tobacco + Lung Cancer

(2)

Maurice Strong

- ② → Los Angeles (social infra)
- ① → Chicago (infrastructure)
- ③ → Earth's Infratr.

Wangari Maathai :

"How Sing?"

→ Purpose of Life - ^{To} Glorify God

→ Parable of Unfaithful Servant
(WATCH)

Kristallnacht

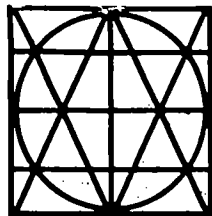
* Celebrate

* → Relationship between
Science + Religion

→ Ways of seeing

* Spectrum Metaphor
- Infrared

~~At the heart of the matter~~ (Role of FAITH)



**THE JOINT APPEAL
BY RELIGION & SCIENCE
FOR THE ENVIRONMENT**

**EXECUTIVE COMMITTEE
CO-CHAIRS**

The Very Rev. James Parks Morton
Dean
Cathedral of St. John the Divine

Dr. Carl Sagan
Professor of Astronomy and Director,
Laboratory for Planetary Studies
Cornell University

Bishop Vinton R. Anderson
President
World Council of Churches

Reverend Joan Campbell
General-Secretary
National Council of Churches of Christ

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Institute Professor of Physics Emeritus
Massachusetts Institute of Technology

Dr. Anne Whyte
Director
Division of the Social Sciences
International Development
Research Centre

*Affiliations for identification
purposes only*

Paul Gorman
Executive Director

Amy Elizabeth Fox
Associate Director

Ann Druyan
Sec'y., Federation of American Scientists
Senior Consultant

To: Al Gore, Katie McGinty
From: Paul Gorman
Subject: Your Joint Appeal speech

We began to talk the other day about your speech at the Joint Appeal meeting. I've been musing since. I know it's really easy for me to let these thoughts all hang out: you're the one being asked to put it all together. But here are some feelings about scope and tone, if not an outline.

YOUR TEXT? How about: "WE MUST ALL BECOME PARTNERS IN A BOLD EFFORT TO CHANGE THE VERY FOUNDATION OF OUR CIVILIZATION" (from Earth in the Balance, the Introduction.)

Tall order. But are these not the people most equipped to tackle such a challenge? And, therefore, is this not the occasion for you to really explore with them your best understanding of what it means to take on such an effort?

1. I think this could be a motivating, inspirational presentation. You should assume, especially after the scientific presentations, general literacy about conditions. And you should assume, from after the religious presentations, that you have some room to say what a faith commitment can really contribute. (Very important to praise the religious leaders for what they've done and are doing. Critical for momentum)

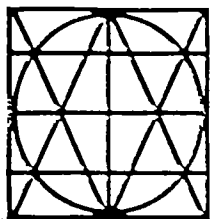
2. I think you could speak from the heart about how this present moment feels to you -- on the eve of UNCED, looking to what is going to be required of us at the deepest level for the long-run. In that spirit, you would be talking to these folks not as people to be convinced but truly as sisters and brothers, as allies, in solidarity.

3. Here might be room for assessment. People will want to hear how you feel not just about UNCED but about prospects for long-term change. I think you could feel free to be very frank about the administration and about resistance from other interests and about the growing counter-attack on environmentalism. This is a kind of chapter-turning moment for us all. Help us see what we're moving into. Where are we strong, where weak?

4. Given, then, the truth of this moment, what is really being asked of us? You address this challenge in your introduction. You talk about "a full and unreserved commitment to see it through." Well, what is getting in the way of that? You mention timidity, political expediency, keeping your finger in the wind. You say elsewhere that "a laziness in our spirit has estranged us from our true selves and from the quickness and vitality of the world at large."

*Package
on
this*

1047 Amsterdam Ave.
New York, NY 10025
212-316-7441
FAX 212-316-7404



SCHEDULE FOR THE MISSION TO WASHINGTON

Sunday, May 10

*talk
pts on
Wangari*

THE JOINT APPEAL
BY RELIGION & SCIENCE
FOR THE ENVIRONMENT

5:00-6:30 pm

Pre-Registration and Hotel Check-in
Capitol Hill Hyatt Regency
[Registration continues Monday morning in Room 106
of the Dirksen Senate Office Building]

6:30-8:30 pm

Welcome Reception
Home of Mrs. Teresa Heinz [dinner will not be served]

Monday, May 11

Remarks by Professor Wangari Maathai
Founder, Kenyan Green Belt Movement

Dinner / Discussions of Outcomes

NOTE: ALL ACTIVITIES EXCEPT LUNCH AND BREAK-OUT SESSIONS WILL
BE HELD IN ROOM 106 OF THE DIRKSEN SENATE OFFICE BUILDING

8:00-8:30 am

Registration and Continental Breakfast

8:30-9:00 am

"An Update on the Earth Summit"
Remarks by Mr. Maurice F. Strong
Secretary-General of the United Nations Conference on
Environment and Development

9:00-9:45 am

Presentations from the Scientific Community

Chaired by Dr. Carl Sagan
Professor of Astronomy and Director, Laboratory for
Planetary Studies, Cornell University

Ozone Depletion by Dr. F. Sherwood Rowland
Donald Bren Professor of Chemistry
University of California at Irvine

Loss of Biodiversity by Dr. Edward O. Wilson
Museum of Comparative Zoology, Harvard University

Global Warming by Dr. James Hansen
Director, Goddard Institute for Space Studies

Population and Development by Dr. Anne Whyte
Director, Division of the Social Sciences, International
Development Research Centre

The Very Rev. James Parks Morton
Dean
Cathedral of St. John the Divine
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647-5947

Monday, May 11th (Continued)

9:45-10:30 am

Presentations from the Religious Community

Chaired by The Very Reverend James Parks Morton
Dean, Cathedral of St. John the Divine

The Most Reverend William B. Friend
Chairman, Committee on Science and Human Values,
National Conference of Catholic Bishops, Bishop of Shreveport
—and—

Father Drew Christiansen
Director, Office of International Peace and Justice
United States Catholic Conference

Reverend Joan B. Campbell
General-Secretary, National Council of Churches of Christ
—and—

Reverend Dr. Benjamin F. Chavis Jr.
Executive Director, Commission for Racial Justice,
United Church of Christ

Rabbi Alexander Schindler
President, Union of American Hebrew Congregations

Dr. Robert Seiple
President, World Vision USA

10:30-10:45 am

Break
Coffee, tea, juice etc. will be available

10:45-11:15 am

"Ecology and the Human Spirit": An Address by Senator Al Gore

11:15-11:30 am

"A Spirit of Dialogue"
The Reverend Joan B. Campbell, General Secretary,
National Council of Churches of Christ
Ms. Ann Druyan, Secretary, Federation of American Scientists

11:30- 1:00 pm

OPEN DISCUSSION

1:00-1:45 pm

Lunch in Dirksen Senate Office Building Rooms 18 and 19

1:45-2:15 pm

"A Vision of the Future": An Address by Carl Sagan

*Pres. of Synagogue
Society of America*

Monday, May 11 (Continued)

2:30-3:45 pm Working Group Sessions--Locations To Be Announced

Environmental Justice: The Challenge for Science and Religion

Chairman:

Dr. W. Franklyn Richardson
General-Secretary, National Baptist Convention

Speakers:

Mr. John Carr
Secretary, Department of Social Development and World Peace,
United States Catholic Conference

Ms. Kaye Kiker
Former President, National Toxics Campaign

Chief Oren Lyons
Faithkeeper, Onandaga Nation

Professor Wangari Maathai
Founder, Green Belt Movement

Ms. Paz Artaza-Regan
Program Associate, Ministry of God's Creation,
Board of Church and Society of the United Methodist Church

America After UNCED

Speakers:

Senator Albert Gore Jr.

Dr. Irving Mintzer
Director, Center for Global Climate Change, University of Maryland

Rabbi David Saperstein
Director, Religious Action Center of Reform Judaism

Dr. Stephen H. Schneider
Head, Interdisciplinary Climate Systems Section,
National Center for Atmospheric Research

Dr. N. Jean Sindab
Program Officer for Economic and Environmental Justice,
National Council of Churches of Christ

Ms. Frances Spivy -Weber
Director of the International Program, Audubon

Monday, May 11 (Continued)

Science and Religion: Continued Dialogue and Collaboration

Chairman:

Reverend William J. Byron, S.J.
President, The Catholic University of America

Dr. Henry Kendall
Chairman, Union of Concerned Scientists

The Theological Agenda

Speakers:

Father Drew Christiansen, S.J.
Director, Office of International Peace and Justice
United States Catholic Conference

Reverend Calvin DeWitt
Director, AuSable Institute of Environmental Studies

Dr. Arthur Green
President, Reconstructionist Rabbinical College

Dr. James A. Nash
Executive Director, Church's Center for Theology and Public Policy

4:00-5:00 pm Plenary Session
Review Statement, Prepare for Congressional Meetings

~~5:30-7:30~~

5:00-7:00 pm Reception

Tuesday, May 12

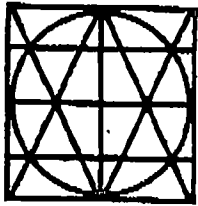
8:00-8:45 am Q & A on meetings w/ members
Continental Breakfast
SD-106

9:00-12:00 pm Joint Congressional Hearing

Small Group Meetings w/ Members

12:00-12:30 am Concluding Remarks for Conference
SD-106

12:30-1:00 pm Press Conference



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Sagan / Merck

To: Al Gore, Carl Sagan, Joan Campbell, Jim Morton
From: Paul Gorman
Subject: Tuesday, May 5th 6:00 PM Conference Call

We have four points to cover:

1. The Statement.

Rather than use precious conference call time, I will ask you to get me your proposals by 9am tomorrow, along with those of Bishop Friend and Chancellor Schorsch. It will be my responsibility to get you the final draft with these suggestions by Noon so that we can begin faxing to 100 participants. Who signs cover letter? → *Call, Jim & Al*

2. Meetings with Members of Congress

On Monday at 4pm we will review the statement and try to reach agreement on key points to be brought to members of Congress (we also have breakfast at 8:30 Tuesday. What should these points be? How do we present them? How are they best conveyed?

3. Questions and Process for "Open Discussion" - Monday 11:30-1:00

In conversations with you all privately, I have heard consensus on the following questions to be put before the group and be facilitated by a person as yet unchosen:

"From within your discipline, what is at the heart of this issue? What are its root causes? What do we need to understand better in order to meet the challenge?"

What further instructions do we want to give a facilitator and who should that be?

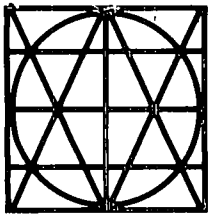
4. Outcomes

Are there any initiatives we can agree upon to announce at the press conference? Keep in mind that the Science and Religion panel is designed to bring such ideas forward and we will might be able to say, "In these preliminary conversations, we identified several promising initiatives which we intend to explore further." But do we have any ideas now?

5. Maurice Strong

I want to raise the question of whether people will be disappointed only to have 15 minutes to question Strong, who probably has at this moment as clear a sense of anyone of what we're up against and what is really needed? Your reactions? Any suggestions?

Kenedy
Morgan
Call Al & Jim
Panel facilitator to continue exploring how to become partners



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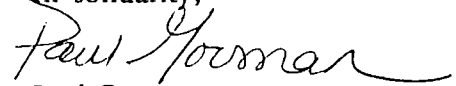
Could you find some way of encouraging us all to address this "laziness in our spirit" --- by really taking this crisis to heart, taking it inside, owning it as a calling, developing the "inner ecology," however. Recognizing, as you quote W.H. Murray, "that the moment one definitely commits oneself, then providence moves too."

5. Here, then, you could talk a little about your own faith perspective. More than half the people there are from the religious community. There's no reason why you should have to tiptoe. But you can speak of your faith perspective in a way that helps others who don't share it, scientists say, get a feel for what it gives you personally ... and what it offers the issue.

6. There, you'll have a chance to make your points about religion and science not so much in the context of their historic encounter but rather what you think is required of them now ... what they might look at within their own traditions ... what they can learn from one another ... what can they offer in partnership....

7. There are broad themes from your book that might be worth touching upon in all this: The estrangement from nature, whether through cool, "objective", technological science or abstract, platonic, otherworldly religion. The need to see in the ecological crisis the central organizing context for the future of world struggle. The threat of the real irreversibility of these conditions. The loss of faith in the future. The experience of powerlessness. I think this is a moment and this is an audience in need of hearing these most fundamental points.

7. Once again, this is not a proposed outline, merely my own "feel" for the group and the moment. If it's not useful for the speech, just take it as an affirmation from me of what I think you most deeply have to offer ... whenever, wherever. Meanwhile, this final thought. Why not trust the Holy Spirit a little extra on this one? You've written the book. You've done your talk shows. You've got your Slide Show rap down pat. You'll probably come prepared with an outline and some thoughts and structure. But maybe you might give yourself a little room, at certain places, to come from the heart unprepared, spontaneous, in the moment. Just a thought.

In solidarity,

Paul Gorman

M E M O R A N D U M

DATE: 4/29/92

TO: KM, HWM

FROM: LKS

SUBJECT: Senators/Congressman contacted for relenv lobbying meetings.

YES

Burns--CONFIRMED 11:00 am/Kathy/send names (LKS)

Chaffee--CONFIRMED 11:30 am (RAG)

Hatfield--CONFIRMED 9:30 am (RAG)

Kennedy--CONFIRMED 11:30 D428 Beth Cummings Has a hearing suppose to be over at 11:30, meet w/ Mimi Brody 11:30 Kennedy 11:45.

Pell--TENATIVE 11:30 am/S116 (Capitol) chairing a hrg that morning./Susan Cameron

Reid--CONFIRMED 11:30 am (chairing a hrg that morning)/Margaret Stout/fax names 4-3467

Simpson--CONFIRMED 11:30 Lori Rosen lks

Cong. Bevill--TENATIVE 11:30 am/2302 Rayburn/Gayle (LKS) Flying in from Alabama try to be back in time.

Cong Boehlert--CONFIRMED 10:30 am/1127 long/Dorothy (LKS)

Cong. Brown--CONFIRMED 9:00 am/Ray 2300/Ruth Hogue (LKS)

Cong John Bryant--CONFIRMED 11:30 am/208 cann/Carol Jordan (HWM)

Cong. Clement--CONFIRMED 9:45 am/325 cann/Carolyn (LKS)

Cong. Cooper--CONFIRMED 9:00 am/125 cann lks

Cong. Duncan--CONFIRMED 9:00 am (15 min)/115 cann/Susan Butler (LKS)

Cong Gejdenson--CONFIRMED Reece Painter 10:00 am (20 min) 2416 Ray (LKS)

Cong. Gordon--TENATIVE 11:45 am/103 cann/Lee Ann (will just be getting in town) lks

Cong. Fascell--CONFIRMED 11:30 am/Ray 2354/Nina (LKS)

Cong. Lloyd--CONFIRMED 9:00 am/2266 ray/Claudia Collins (LKS)

Cong. Johnson--CONFIRMED 11:30 227 Cann (HWM)

Cong. McCurdy--CONFIRMED 10:30 am/2344 ray/AMY/ (RAG)

Cong. George Miller--CONFIRMED 9:30 am (15 min)/2228 ray/Sylvia Arthur (HWM)

Cong. Don Ritter--11:30/2202 Ray/Darryl lks

Cong. Tanner--CONFIRMED 10:30 am/1232 long/Kathy (LKS)

DECLARATION OF THE "MISSION TO WASHINGTON"

JOINT APPEAL BY RELIGION AND SCIENCE

FOR THE ENVIRONMENT

WASHINGTON, D.C. MAY 12, 1992

We are people of faith and of science who, for centuries, often have traveled different roads. In a time of environmental crisis, we find these roads converging. As this meeting symbolizes, our two ancient, sometimes antagonistic, traditions now reach out to one another in a common endeavor to preserve the home we share.

We humans are endowed with self-awareness, intelligence and compassion. At our best, we cherish and seek to protect all life and the treasures of the natural world. But we are now tampering with the climate. We are thinning the ozone layer and creating holes in it. We are poisoning the air, the land and the water. We are destroying the forests, grasslands and other ecosystems. We are causing the extinction of species at a pace not seen since the end of the age of the dinosaurs. As a result, many scientific projections suggest a legacy for our children and grandchildren of compromised immune systems, increased infectious disease and cancer rates, destroyed plants and consequent disruption of the food chain, agriculture damaged from drought and ultraviolet light, accelerated destruction of forests and species, and vastly increased numbers of environmental refugees. Many perils may be still undiscovered. The burdens, as usual, will fall most cruelly upon the shoulders of the poorest among us, especially upon children. But no one will be unaffected. At the same time, the human community grows

by a quarter of a million people every day, mostly in the poorest nations and communities. That this crisis was brought about in part through inadvertence does not excuse us. Many nations are responsible. The magnitude of this crisis means that it cannot be resolved unless many nations work together. We must now join forces to that end.

Our own country is the leading polluter on Earth, generating more greenhouse gases, especially CO₂, than any other country. Not by word alone but by binding action, our nation has an inescapable moral duty to lead the way to genuinely effective solutions. We signers of this declaration --- leaders in religion and science --- call upon our government to change national policy so that the United States will begin to ease, not continue to increase, the burdens on our biosphere and their effect upon the planet's people.

We believe that science and religion, working together, have an essential contribution to make toward any significant mitigation and resolution of the world environmental crisis. What good are the most fervent moral imperatives if we do not understand the dangers and how to avoid them? What good is all the data in the world without a steadfast moral compass? Many of the consequences of our present assault on the environment, even if halted today, will take decades and centuries to play themselves out. How will our children and grandchildren judge our stewardship of the Earth? What will they think of us? Do we not have a solemn obligation to leave them a better world and to insure the integrity of nature itself? Insofar as our peril arises from a neglect of moral values, human pride, arrogance, inattention, greed, improvidence, and a penchant for the short-term over the long, religion has an essential role to play. Insofar as our peril arises from our ignorance of the intricate interconnectedness of nature, science has an essential role to play.

Differences of perspective remain among us. We do not have to agree on how the natural world was made to be willing to work together to preserve it. On that paramount objective we affirm a deep sense of common cause.

Commitment to environmental integrity and justice, across a broad spectrum and at the highest level of leadership, continues to grow in the United States religious community as an issue of utmost priority --- significantly as a result of fruitful conversations with the scientific community. We believe that the dimensions of this crisis are still not sufficiently taken to heart by our leaders, institutions and industries. We accept our responsibility to help make known to the millions we serve and teach the nature and consequences of the environmental crisis, and what is required to overcome it. We believe that our current economic behavior and policies emphasize short-term individual material goals at the expense of the common good and of future generations. When we consider the long-term as well as the short-term costs, it seems clear that addressing this problem now rather than later makes economic as well as moral sense. We impoverish our own children and grandchildren by insisting that they deal with dangers that we could have averted at far less cost in resources and human suffering.

We reaffirm here, in the strongest possible terms, the indivisibility of social justice and the preservation of the environment. We also affirm and support the indigenous peoples in the protection and integrity of their cultures and lands. We believe the wealthy nations of the North, which have historically exploited the natural and human resources of the Southern nations, have a moral obligation to make available additional financial resources and appropriate technology to strengthen their capacity for their

own development. We believe the poor and vulnerable workers in our own land should not be asked to bear disproportionate burdens. And we must end the dumping of toxic waste materials disproportionately in communities of low income and of people of color. We recognize that there is a vital connection between peacemaking and protecting our environment.

Collectively, the nations of the world spend one trillion dollars a year on military programs. If even a modest portion of this money were spent on environmental programs and sustainable economic development we could take a major step toward environmental security.

We commit ourselves to work together for a United States that will lead the world in the efficient use of fossil fuels, in devising and utilizing renewable sources of energy, in phasing out all significant ozone-depleting chemicals, in halting deforestation and slowing the decline in species diversity, in planting forests and restoring other habitats, and in realizing worldwide social justice. We believe there is a need for concerted efforts to stabilize world population by humane, responsible and voluntary means consistent with our differing values. For these, and other reasons, we believe that special attention must be paid to education and to enhancing the roles and the status of women.

Despite the seriousness of this crisis, we are hopeful. We humans, in spite of our faults, can be intelligent, resourceful, compassionate, prudent and imaginative. We have access to great reservoirs of moral and spiritual courage. Deep within us stirs a commitment to the health, safety and future of our children. Understanding that the world does not belong to any one nation or generation, and sharing a spirit of utmost urgency, we dedicate ourselves to undertake bold action to cherish and protect the environment of our planetary home.

SIGNATORIES

Dr. Diane Ackerman
Poet, Naturalist, Author

Dr. John F. Ahearne
Executive Director, Sigma Xi

Dr. Richard Cartwright Austin, S.T.D.
Environmental Theologian with
Appalachian Ministries Educational Resource Center

Dr. Ian Barbour
Professor Emeritus, Religion Department, Carlton College

Reverend James Bell
Executive Director, Interfaith IMPACT for Justice and Peace

The Reverend Thomas Berry
Director, Riverdale Center for Religious Research

Dr. Alan Betts
Atmospheric Research

Sally Grover Bingham
California Diocese: Environmental Commission
Episcopal Church

Dr. Elizabeth Bowen
Representative, National Spiritual Assembly of the Bahai's of the United States
President-Elect, Physicians for Social Responsibility
Assistant Professor of Family Medicine, Morehouse School of Medicine

The Most Reverend Edmond L. Browning
Presiding Bishop, Episcopal Church of America

Reverend William J. Byron, S.J.
President, The Catholic University of America

Reverend Joan Campbell
General-Secretary, National Council of Churches of Christ

Mr. John Carr
Secretary for Department of Social Development and World Peace
United States Catholic Conference

The Rt. Reverend Frank S. Cerveney
Bishop of The Diocese of Florida, Episcopal Environment Commission

Dr. Charles Chambers
Executive Director, American Institute of Biological Sciences

Dr. Audrey Chapman
Program Director for Science and Human Rights
American Association for the Advancement of Science

Reverend Dr. Benjamin F. Chavis, Jr.
Executive Director of the Commission for Racial Justice
United Church of Christ

The Reverend Dr. Herbert W. Chilstrom
Bishop, Evangelical Lutheran Church in America

Dr. Eric Chivian
Professor of Psychiatry, Harvard Medical School
Psychiatrist, Massachusetts Institute of Technology
Co-Founder, International Physicians for the Prevention of Nuclear War

Father Drew Christiansen, S.J.
Director, Office of International Justice and Peace
United States Catholic Conference

Mr. Robert H. Cory
Quaker United Nations Office

Mr. Herman Daly
Senior Economist, World Bank

Dr. Calvin DeWitt
Director, Au Sable Institute of Environmental Studies

Ms. Ann Druyan
Secretary, Federation of American Scientists &
Senior Consultant, Joint Appeal by Religion and Science for the Environment

Reverend Dr. Milton Efthimou
Ecumenical Officer
Greek Orthodox Archdiocese of North and South America

Mr. Warren Eisenberg
Director of the International Council, B'nai B'rith

Mr. Joseph Fitzgerald
Executive Director, National Catholic Rural Life Conference

Ms. Susan Fletcher
Senior Analyst in International Environmental Policy
Congressional Research Service

Ms. Amy Elizabeth Fox
Associate Director, Joint Appeal by Religion and Science for the Environment

Dr. Jerome Frank
Professor Emeritus, Department of Psychiatry and Behavioral Sciences
Johns Hopkins University Hospital

The Most Reverend William B. Friend
Chair, Committee on Science and Human Values
National Conference of Catholic Bishops
Bishop of Shreveport

Mr. George T. Frampton Jr.
President, The Wilderness Society

Reverend Dr. William Gardiner
Director of the Department of Social Justice, Unitarian Universalist Association

Dr. Arthur Green
President, Reconstructionist Rabbinical College

Dr. Lester Grinspoon
Associate Professor of Psychiatry, Harvard Medical School

Mr. Paul Gorman
Executive Director, Joint Appeal by Religion and Science for the Environment

Dr. James Hansen
Director, Goddard Institute for Space Studies

Mr. Jaydee R. Hanson
Assistant General-Secretary, Ministry of God's Creation, United Methodist Church

Dr. John Haught
Chairman of the Department of Theology, Georgetown University

Dr. Raymond Hayes
Chairman of the Department of Anatomy, Howard University

Professor Theodore Hiebert
Associate Professor of Hebrew Bible/Old Testament, Harvard Divinity School

Reverend Theodore M. Hesburgh CSC
President Emeritus, University of Notre Dame

Dr. Roberta Hestenes
President, Eastern College

Reverend Gilbert Horn
Executive Director, Colorado Council of Churches

Reverend Father Vertanes Kalayjian
Diocese of the Armenian Church

Mrs. Annette Kane
Executive Director, National Council of Catholic Women

Dr. Henry Kendall
Stratton Professor of Physics, Massachusetts Institute of Technology
Chairman of the Board, Union of Concerned Scientists

Ms. Kaye Kiker
Member, Executive Board, National Toxics Campaign

Dr. Gail Buchwalter King
Associate Director for Program Services, Association for Theological Schools

Dr. Richard D. Land
Executive Director, Christian Life Commission of the Southern Baptist Convention

Dr. Dan Lashof
Senior Project Scientist, Natural Resource Defense Council

Dr. Harold Lohr
Retired Bishop, Northwestern Minnesota Synod, Evangelical Lutheran Church in America

Chief Oren Lyons
Faithkeeper and Chief of the Turtle Clan, Onondaga Nation

Professor Wangari Maathai
Founder, Kenyan Green Belt Movement

Dr. Jerry Mahlman
Director, Geophysical Fluid Dynamic Laboratory
United States Department of Commerce

Most Reverend James M. Malone
Chair, Domestic Policy Committee
United States Catholic Conference
Bishop of Youngstown

Dr. Thomas F. Malone
University Distinguished Scholar
Department of Marine, Earth and Atmospheric Sciences
North Carolina State University

Dr. Jessica Tuchman Matthews
Vice President, World Resources Institute

Sister Catherine McNamee
President, National Catholic Educational Association

Mr. Alden Meyer
Director, Climate Change and Energy Program
Union of Concerned Scientists

Reverend Charles Miller
Executive Director, Division of Church and Society
Evangelical Lutheran Church in America

Reverend Dr. Donald E. Miller
General Secretary, Church of the Brethren

Dr. Irving Mintzer,
Senior Research Fellow, Center for Global Change, University of Maryland

Dr. Wendell Mohling
President, National Science Teacher's Association

Ms. Katy Moran
Office for External Affairs, The Smithsonian Institution

The Very Reverend James Parks Morton
Dean, Cathedral of St. John the Divine

The Reverend Dr. Edwin G. Mulder
General Secretary, Reformed Church in America

Dr. James Nash
Executive Director, Churches' Center for Theology and Public Policy

Dr. C. William Nichols
General Minister and President, Christian Church (Disciples of Christ)

Dr. Richard S. Nicholson
Executive Officer, American Association for the Advancement of Science

Dr. Richard B. Norgaard
Professor of Energy and Resources, University of California at Berkeley

Dr. Kusumita P. Pedersen
Joint Secretary, Global Forum of Spiritual and Parliamentary Leaders for Human Survival

Dr. Albert M. Pennybacker
Professor of Homiletics, Lexington Theological Seminary

The Reverend Dr. William R. Phillippe
Executive Director, General Assembly Council
Presbyterian Church USA

Reverend Tyrone S. Pitts
Secretary General, Progressive National Baptist Convention Inc.

The Right Reverend Nathaniel Popp
Bishop of Detroit, Orthodox Church in America

Dr. Charles C. Price
Board Chairman, Chemical Heritage Foundation
Benjamin Franklin Professor of Chemistry Emeritus

Dr. H. Ronald Pulliam
Director of the Institute of Ecology, University of Georgia
President, Ecological Society of America

Ms. Paz Artaza-Regan
Program Associate, Ministry of God's Creation
Board of Church and Society, United Methodist Church

Dr. W. Franklyn Richardson
General Secretary, National Baptist Convention

Dr. Howard Ris
Executive Director, Union of Concerned Scientists

Most Reverend John R. Roach
Chair, International Policy Committee
United States Catholic Conference
Archbishop of St. Paul/Minneapolis

Mrs. Barbara Bellows Rockefeller
Professor of History, Middlebury College

Mr. Steven C. Rockefeller
Professor of Religion, Middlebury College

Dr. F. Sherwood Rowland
Donald Bren Professor of Chemistry, University of California at Irvine
President, American Association for the Advancement of Science

Dr. Robert John Russell
Founder and Director, Center for Theology and Natural Sciences

Dr. John Ruskay
Vice Chancellor for Public Affairs, Jewish Theological Seminary of America

Dr. Carl Sagan
Professor of Astronomy and Director of the Laboratory for Planetary Studies, Cornell
University & Co-Chair of the Joint Appeal by Religion and Science for the Environment

Rabbi David Saperstein
Director and Counsel, Religious Action Center of Reform Judaism

Rabbi Alexander Schindler
President, Union of American Hebrew Congregations

Dr. William Schlesinger
Department of Botany, Duke University

Dr. Stephen H. Schneider
Head of the Interdisciplinary Climate Systems Section
National Center for Atmospheric Research

Dr. Ismar Schorsch
Chancellor, Jewish Theological Seminary of America [Tues. only]

Mr. Leonard Schwartz
Chairman, Rainforest Alliance

Dr. Stephen E. Schwartz
Senior Physical Chemist, Brookhaven National Laboratory

Dr. Cecil E. Sherman
Coordinator, Cooperative Baptist Fellowship

Dr. Ronald Sider
Professor of Theology and Society, Eastern Baptist Theological Seminary
Executive Director, Evangelicals for Social Action

Mr. Art Simon
Christian Children's Fund

Dr. N. Jean Sindab
Program Officer for Economic and Environmental Justice
National Council of Churches of Christ

Dr. Bennett W. Smith
First Vice President, Progressive National Baptist Convention

Dr. Anthony Socci
Professional Staff Scientist
Science, Technology and Space Subcommittee
United States Senate

Mr. William Somplatsky-Jarman
Associate for Environmental Justice, Presbyterian Church USA

Ms. Frances Spivy-Weber
Director of the International Program, Audubon

Ms. Victoria Stack
The Albert Schweitzer Institute for the Humanities

Dr. Jeremy Stone
President, Federation of American Scientists

Sister Betty Sundry
Associate Director, Leadership Conference of Women Religious (Catholic)

Dr. Byron Swift
Executive Director
International Union for Conservation of Nature and Natural Resources

Professor Ronald F. Thiemann
Dean, Harvard Divinity School

Dr. Foy Valentine
Former Executive Director
Christian Life Commission of the Southern Baptist Convention

Dr. Anne Whyte
Director General
Division of Environment and Natural Resources
International Development Research Centre

Dr. Timothy Weiskel
Fellow at the Center for Science and International Affairs, JFK School of Government Research
Associate in Environmental Ethics, Harvard Divinity School

Dr. Edward O. Wilson
Baird Professor of Science, Harvard University

The Rt. Reverend William Winterrowd
Bishop of The Diocese of Colorado, Episcopal Environment Commission

Ms. Nancy Wisdo
Director, Office of Domestic Social Development, United States Catholic Conference

Dr. Steven J. Zeitlin
Center for Psychology and Social Change, Harvard Medical School

---Affiliations for identification purposes only---

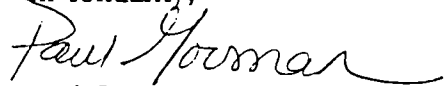
Could you find some way of encouraging us all to address this "laziness in our spirit" -- by really taking this crisis to heart, taking it inside, owning it as a calling, developing the "inner ecology," however. Recognizing, as you quote W.H. Murray, "that the moment one definitely commits oneself, then providence moves too."

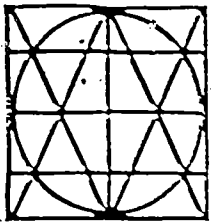
5. Here, then, you could talk a little about your own faith perspective. More than half the people there are from the religious community. There's no reason why you should have to tippie-toe. But you can speak of your faith perspective in a way that helps others who don't share it, scientists say, get a feel for what it gives you personally ... and what it offers the issue.

6. There, you'll have a chance to make your points about religion and science not so much in the context of their historic encounter but rather what you think is required of them now ... what they might look at within their own traditions ... what they can learn from one another ... what can they offer in partnership....

7. There are broad themes from your book that might be worth touching upon in all this: The estrangement from nature, whether through cool, "objective", technological science or abstract, platonic, otherworldly religion. The need to see in the ecological crisis the central organizing context for the future of world struggle. The threat of the real irreversibility of these conditions. The loss of faith in the future. The experience of powerlessness. I think this is a moment and this is an audience in need of hearing these most fundamental points.

7. Once again, this is not a proposed outline, merely my own "feel" for the group and the moment. If it's not useful for the speech, just take it as an affirmation from me of what I think you most deeply have to offer ... whenever, wherever. Meanwhile, this final thought. Why not trust the Holy Spirit a little extra on this one? You've written the book. You've done your talk shows. You've got your Slide Show rap down pat. You'll probably come prepared with an outline and some thoughts and structure. But maybe you might give yourself a little room, at certain places, to come from the heart unprepared, spontaneous, in the moment. Just a thought.

In solidarity,

Paul Gorman



SCHEDULE FOR THE MISSION TO WASHINGTON

Sunday, May 10

THE JOINT APPEAL

BY RELIGION & SCIENCE
FOR THE ENVIRONMENT

EXECUTIVE COMMITTEE CO-CHAIRS

The Very Rev. James Parks Morton
Dean
Cathedral of St. John the Divine

Dr. Carl Sagan
Professor of Astronomy and Director,
Laboratory for Planetary Studies
Cornell University

Bishop Vinton R. Anderson
President
World Council of Churches

Reverend Joan Campbell
General-Secretary
National Council of Churches of Christ

Bishop William B. Friend
Chairman
Committee on Science and Human Values
National Conference of Catholic Bishops

Archbishop Iakovos
Primate
Greek Orthodox Church of
North and South America

Dr. Ismar Schorsch
Chancellor
Jewish Theological Seminary of America

Dr. Robert Seiple
President
World Vision U.S.A.

Dr. Foy Valentine
Executive Director Emeritus
Christian Life Commission
Southern Baptist Convention

Dr. James Hansen
Director
Goddard Institute for Space Studies

Dr. Peter H. Raven
Director
Missouri Botanic Gardens

Dr. F. Sherwood Rowland
Professor of Chemistry
University of California

Dr. Victor F. Weisskopf
Institute Professor of Physics Emeritus
Massachusetts Institute of Technology

Dr. Anne Whyte
Director
Division of the Social Sciences
International Development
Research Centre

*Affiliations for identification
purposes only*

Paul Gorman
Executive Director

Amy Elizabeth Fox
Associate Director

Ann Druyan
Sec'y., Federation of American Scientists
Senior Consultant

5:00-6:30 pm

Pre-Registration and Hotel Check-in
Capitol Hill Hyatt Regency
[Registration continues Monday morning in Room 106
of the Dirksen Senate Office Building]

6:30-8:30 pm

Welcome Reception
Home of Mrs. Teresa Heinz [dinner will not be served]

Remarks by Professor Wangari Maathai
Founder, Kenyan Green Belt Movement

Monday, May 11

NOTE: ALL ACTIVITIES EXCEPT LUNCH AND BREAK-OUT SESSIONS WILL
BE HELD IN ROOM 106 OF THE DIRKSEN SENATE OFFICE BUILDING

8:00-8:30 am

Registration and Continental Breakfast

8:30-9:00 am

"An Update on the Earth Summit"
Remarks by Mr. Maurice F. Strong
Secretary-General of the United Nations Conference on
Environment and Development

9:00-9:45 am

Presentations from the Scientific Community

Chaired by Dr. Carl Sagan
Professor of Astronomy and Director, Laboratory for
Planetary Studies, Cornell University

Ozone Depletion by Dr. F. Sherwood Rowland
Donald Bren Professor of Chemistry
University of California at Irvine

Loss of Biodiversity by Dr. Edward O. Wilson
Museum of Comparative Zoology, Harvard University

Global Warming by Dr. James Hansen
Director, Goddard Institute for Space Studies

Population and Development by Dr. Anne Whyte
Director, Division of the Social Sciences, International
Development Research Centre

1047 Amsterdam Ave.

New York, NY 10025

212-316-7441

FAX 212-316-7404

Monday, May 11th (Continued)

9:45-10:30 am

Presentations from the Religious Community

Chaired by The Very Reverend James Parks Morton
Dean, Cathedral of St. John the Divine

The Most Reverend William B. Friend
Chairman, Committee on Science and Human Values,
National Conference of Catholic Bishops, Bishop of Shreveport
---and---

Father Drew Christiansen
Director, Office of International Peace and Justice
United States Catholic Conference

Reverend Joan B. Campbell
General-Secretary, National Council of Churches of Christ
---and---

Reverend Dr. Benjamin F. Chavis Jr.
Executive Director, Commission for Racial Justice,
United Church of Christ

Rabbi Alexander Schindler
President, Union of American Hebrew Congregations

Dr. Robert Seiple
President, World Vision USA

10:30-10:45 am

Break
Coffee, tea, juice etc. will be available

10:45-11:15 am

"Ecology and the Human Spirit": An Address by Senator Al Gore

11:15-11:30 am

"A Spirit of Dialogue"
The Reverend Joan B. Campbell, General Secretary,
National Council of Churches of Christ
Ms. Ann Druyan, Secretary, Federation of American Scientists

11:30- 1:00 pm

OPEN DISCUSSION

1:00-1:45 pm

Lunch in Dirksen Senate Office Building Rooms 18 and 19

1:45-2:15 pm

"A Vision of the Future": An Address by Carl Sagan

Monday, May 11 (Continued)

2:30-3:45 pm Working Group Sessions--Locations To Be Announced

Environmental Justice: The Challenge for Science and Religion

Chairman:

Dr. W. Franklyn Richardson
General-Secretary, National Baptist Convention

Speakers:

Mr. John Carr
Secretary, Department of Social Development and World Peace,
United States Catholic Conference

Ms. Kaye Kiker
Former President, National Toxics Campaign

Chief Oren Lyons
Faithkeeper, Onandaga Nation

Professor Wangari Maathai
Founder, Green Belt Movement

Ms. Paz Artaza-Regan
Program Associate, Ministry of God's Creation,
Board of Church and Society of the United Methodist Church

America After UNCED

Speakers:

Senator Albert Gore Jr.

Dr. Irving Mintzer
Director, Center for Global Climate Change, University of Maryland

Rabbi David Saperstein
Director, Religious Action Center of Reform Judaism

Dr. Stephen H. Schneider
Head, Interdisciplinary Climate Systems Section,
National Center for Atmospheric Research

Dr. N. Jean Sindab
Program Officer for Economic and Environmental Justice,
National Council of Churches of Christ

Ms. Frances Spivy -Weber
Director of the International Program, Audubon

Monday, May 11 (Continued)

Science and Religion: Continued Dialogue and Collaboration

Chairman:

Reverend William J. Byron, S.J.
President, The Catholic University of America

Dr. Henry Kendall
Chairman, Union of Concerned Scientists

The Theological Agenda

Speakers:

Father Drew Christiansen, S.J.
Director, Office of International Peace and Justice
United States Catholic Conference

Reverend Calvin DeWitt
Director, AuSable Institute of Environmental Studies

Dr. Arthur Green
President, Reconstructionist Rabbinical College

Dr. James A. Nash
Executive Director, Church's Center for Theology and Public Policy

4:00-5:00 pm Plenary Session
Review Statement, Prepare for Congressional Meetings

5:00-7:00 pm Reception

Tuesday, May 12

8:00-8:45 am Q & A on meetings w/ members
Continental Breakfast
SD-106

9:00-12:00 pm Joint Congressional Hearing

Small Group Meetings w/ Members

12:00-12:30 am Concluding Remarks for Conference
SD-106

12:30-1:00 pm Press Conference

DELEGATION FOR MEETING WITH SENATOR MITCHELL AND SENATOR DOLE

Bishop Edmond L. Browning
Presiding Bishop, Episcopal Church USA

Reverend Joan B. Campbell
General-Secretary, National Council of Churches of Christ

Bishop Herbert W. Chilstrom
Bishop, Evangelical Lutheran Church in America

Ms. Ann Druyan
Secretary, Federation of American Scientists

The Most Reverend William B. Friend
Chairman, Committee on Science and Human Values,
National Conference of Catholic Bishops

Mr. Paul Gorman
Executive Director, Joint Appeal By Religion and Science

Dr. Stephen Jay Gould
Harvard University

Dr. Thomas F. Malone
Professor, Department of Marine, Earth and Atmospheric Sciences
North Carolina State University

The Very Reverend James Parks Morton
Dean of the Cathedral of St. John the Divine and Co-Chair of the Joint Appeal

Dr. Henry Kendall
Chairman, Union of Concerned Scientists

Dr. Richard Land
Executive Director, Christian Life Commission of the Southern Baptist Convention

Dr. Peter H. Raven
Home Secretary for the National Academy of Science and Director, Missouri Botanical Garden

Reverend W. Franklyn Richardson
General Secretary, National Baptist Convention

Mr. Steven C. Rockefeller
Vice Chairman, Rockefeller Brothers Fund

Dr. F. Sherwood Rowland
Donald Bren Professor of Chemistry at the University of California at Irvine and
President, American Association for the Advancement of Science

Dr. Carl Sagan
Director of the Laboratory for Planetary Studies, Cornell University & Co-Chair, Joint Appeal

Rabbi Ismar Schorsch
Chancellor, Jewish Theological Seminary of America

DELEGATION TO SENATOR REID TUESDAY MAY 12 11:30 AM

Mr. Joseph Fitzgerald
Executive Director, National Catholic Rural Life Conference

C. Wolcott Henry
President, The Curtis and Edith Munson Foundation

Dr. Michael McElroy
Chairman, Department of Earth and Planetary Science, Harvard University

Dr. Wendell Mohling
President, National Science Teacher's Association

Dr. Stephen B. Noorgard
Professor of Energy and Resources, University of California at Berkeley

Dr. Priscilla K. Pederson
Joint Secretary, Global Forum of Spiritual and Parliamentary Leaders for Global Survival

Reverend William Phillippe
Executive Director, General Assembly Council
Presbyterian Church USA

Dr. Albert Pennybacker
Lexington Theological Seminary

The Right Reverend Nathaniel Popp
Bishop of Detroit and Romanian Orthodox Episcopate of America

Mr. Robert John Russell
Director, Center for Theology and Natural Sciences

Dr. Steven Schwartz
Senior Physical Chemist, Brookhaven National Laboratory

Ms. Victoria Stack
The Albert Schweitzer Institute for Humanities

Ms. Nancy Wisdo
Director of the Office of Domestic Social Development, United States Catholic Conference

DELEGATION TO SENATOR SIMPSON TUESDAY MAY 12 11:30 AM

Dr. Elizabeth Bowen
President, Physicians for Social Responsibility

Mr. John Carr
Secretary for the Department of Social Development and World Peace
United States Catholic Conference

Dr. Roberta Hestenes
President, Eastern College [Evangelical]

Reverend Dr. William Gardiner
Director of the Department of Social Justice, Unitarian Universalist Association

Dr. Arthur Green
President, Reconstructionist Rabbinical College

Dr. Alden Meyer
Director, Climate Change and Energy Program, Union of Concerned Scientists

Reverend Dr. Donald E. Miller
General-Secretary, Church of the Brethren

Mr. David Neff
Managing Editor, Christianity Today

Mr. Conn Nugent
Program Officer for Environment, Nathan Cummings Foundation

Dr. H. Ronald Pulliam
Director of the Institute for Ecology, University of Georgia

Ms. Paz Artaza-Regan
Program Associate, Ministry of God's Creation, Board of Church and Society
United Methodist Church

Dr. Stephen Schneider
Head, Interdisciplinary Climate Systems Section
National Center for Atmospheric Research

Dr. Cecil E. Sherman
Coordinator, Cooperative Baptist Fellowship

DELEGATION TO CONGRESSMAN BEVEILL TUESDAY MAY 12 11:30 AM

Ms. Sallie Bingham
Grace Cathedral, San Francisco CA

Dr. Eric Chivian
Professor of Psychiatry, Massachusetts Institute of Technology

Bishop Gerard Drainville
Bishop of Amos, Canadian Conference of Catholic Bishops

Reverend James A. Nash
Director, Churches' Center for Theology and Public Policy

Dr. Charles C. Price
Chairman, National Heritage Foundation of Chemistry

Ms. Deborah Tuck
Executive Director, Ruth Mott Foundation

Dr. Steven Zeitlan
Center for Psychology and Social Change, Harvard Medical School

DELEGATION TO CONGRESSMAN BOEHLERT TUESDAY MAY 12 10:30 AM

Reverend Richard Austin, S.T.D.
Environmental Theologian

Mr. David Beyers
Executive Director, American Board of Catholic Missions, United States Catholic Conference

Dr. Richard Hallgren
Executive Director, American Meteorological Society

Father Vertanes Kalayjian
Diocese of the Armenian Church [Washington DC]

Ms. Kaye Kiker
Executive Board, National Toxics Campaign

The Reverend Dr. Edwin Mulder
General-Secretary Reform Church in America

Dr. Rafe Pomerantz
Senior Associate for Public Affairs, World Resources Institute

Mr. Howard Ris
Executive Director, Union of Concerned Scientists

Ms. Judy Samuelson
Vice President of Communications, Charles Stewart Mott Foundation

Mr. William Somplotsky-Jarman
Presbyterian Church USA

Dr. Byron Swift
Executive Director, International Union for Conservation of Nature and Natural Resources

Ms. Frances Spivy-Weber
Director of the International Programs, Audubon

*Reverend Dr. Benjamin Chavis
Director of the Commission on Racial Justice
United Church of Christ*

DELEGATION FOR CONGRESSMAN BROWN TUESDAY MAY 12 9:00 AM

Dr. Elizabeth Bowen
President, Physicians for Social Responsibility

Mr. John Carr
Secretary for the Department of Social Development and World Peace
United States Catholic Conference

Dr. Roberta Hestenes
President, Eastern College [Evangelical]

Reverend Dr. William Gardiner
Director of the Department of Social Justice, Unitarian Universalist Association

Dr. Arthur Green
President, Reconstructionist Rabbinical College

Dr. Alden Meyer
Director, Climate Change and Energy Program, Union of Concerned Scientists

Reverend Dr. Donald E. Miller
General-Secretary, Church of the Brethren

Mr. David Neff
Managing Editor, Christianity Today

Mr. Conn Nugent
Program Officer for Environment, Nathan Cummings Foundation

Dr. H. Ronald Pulliam
Director of the Institute for Ecology, University of Georgia

Ms. Paz Artaza-Regan
Program Associate, Ministry of God's Creation, Board of Church and Society
United Methodist Church

Dr. Stephen Schneider
Head, Interdisciplinary Climate Systems Section
National Center for Atmospheric Research

Dr. Cecil E. Sherman
Coordinator, Cooperative Baptist Fellowship

DELEGATION TO CONGRESSMAN BRYANT TUESDAY MAY 12 11:30 AM

Reverend Richard Austin, S.T.D.
Environmental Theologian

Ms. Kaye Kiker
Executive Board, National Toxics Campaign

Ms. Judy Samuelson
Vice President of Communications, Charles Stewart Mott Foundation

Ms. Frances Spivy-Weber
Director of the International Programs, Audubon

DELEGATION TO SENATOR BURNS TUESDAY MAY 12 11:00 AM

Ms. Patricia Bauman
Executive Director, Bauman Family Foundation

Father Drew Christiansen, S.J.
Director of the Office of International Justice and Peace, US Catholic Conference

Bishop Gerard Drainville
Bishop of Amos, Canadian Conference of Catholic Bishops

Dr. James Hansen
Director, Goddard Institute for Space Studies, NASA

Professor Theodore Hiebert
Harvard Divinity School

Dr. Gerald Mahlman
Director, Geophysical Fluid Dynamic Laboratory
United States Department of Commerce

Reverend James A. Nash
Director, Churches' Center for Theology and Public Policy

Dr. Charles C. Price
Chairman, National Heritage Foundation of Chemistry

Reverend Syngmann Rhee
President, National Council of Churches of Christ

Dr. William Schlesinger
Professor of Botany, Duke University

DELEGATION TO CONGRESSMAN CLEMENT TUESDAY MAY 12 9:45 AM

Ms. Patricia Bauman
Executive Director, Bauman Family Foundation

Reverend Jim Bell
Executive Director, INTERFAITH IMPACT for Justice and Peace

Father Drew Christiansen, S.J.
Director of the Office of International Justice and Peace, US Catholic Conference

Bishop Gerard Drainville
Bishop of Amos, Canadian Conference of Catholic Bishops

Dr. James Hansen
Director, Goddard Institute for Space Studies, NASA

Dr. John Haught
Chairman of the Department of Theology, Georgetown University

Professor Theodore Hiebert
Harvard Divinity School

Mrs. Annette Kane
Executive Director, National Council of Catholic Women

Dr. Daniel Lashoff
Senior Project Scientist, Natural Resources Defense Council

Dr. Gerald Mahlman
Director, Geophysical Fluid Dynamic Laboratory
United States Department of Commerce

Ms. Katy Moran
Program Officer, Office of External Affairs, Smithsonian Institution

Reverend James A. Nash
Director, Churches' Center for Theology and Public Policy

Dr. Charles C. Price
Chairman, National Heritage Foundation of Chemistry

Reverend Syngmann Rhee
President, National Council of Churches of Christ

Dr. William Schlesinger
Professor of Botany, Duke University

DELEGATION FOR CONGRESSMAN COOPER TUESDAY MAY 12 9:00 AM

Dr. Alan Betts
Atmospheric Research

Reverend William Byron
President, The Catholic University of America

Dr. Charles Chambers
Executive Director, American Institute of Biological Sciences

Ms. Audrey Chapman
American Association for the Advancement of Science

Dr. Calvin DeWitt
Executive Director, Ausable Institute of Environmental Studies

Dr. Jerome Frank
Professor Emeritus of Psychiatry and Behavioral Sciences
Johns Hopkins University Hospital

Reverend Canon Joel Gibson
Sub-Dean, Cathedral of St. John the Divine

Reverend Gilbert Horn
Director, Colorado Council of Churches

Dr. Gail Buchwalter King
Associate Director Program Services, for Association for Theological Schools

Mrs. Barbara Bellows Rockefeller
Professor of History, Middlebury College

Reverend Tyrone S. Pitts
Secretary General, Progressive National Baptist Church

Mr. Leonard Schwartz
Executive Director, Rainforest Alliance

Sister Betty Sundry
Associate Director, Leadership Conference of Women Religious (Catholic)

Ms. Lynne Szwaja
Research Associate for Arts and Humanities, Rockefeller Foundation

Dr. Foy Valentine
Former Executive Director, Christian Life Commission of the Southern Baptist Convention

Bishop William Winterrowd
Bishop of Colorado, National Episcopal Environment Commission

DELEGATES FOR CONGRESSMAN DUNCAN TUESDAY MAY 12 10:45 AM

Dr. John Ahearne
Executive Director, Sigma Xi

Mrs. Patricia Ayres
Moderator, Cooperative Baptist Fellowship

Father Milton Efthimou
Director of Church and Society, Greek Orthodox Church in North and South America

Mr. Raymond Handlan
President, The Atlantic Philanthropic Service Company, Inc.

Reverend Theodore M. Hesburgh
President Emeritus, Notre Dame University

Dr. Harold Lohr
Retired Bishop, Northwestern Missouri Synod, Evangelical Lutheran Church in America

Professor Wangari Maathai
Founder, Green Belt Movement, Kenya

Dr. C. William Nichols
General Minister and President, Christian Church (Disciples of Christ)

Rabbi David Saperstein
Director and Counsel, Religious Action Center of Reform Judaism

Dr. Ronald Sider
Director, Evangelicals for Social Action

Dr. Bennett W. Smith
First Vice President, Progressive National Baptist Convention

Dr. Anne Whyte
Director of the Division of Social Sciences, International Development Research Centre

DELEGATIONS TO CONGRESSMAN FASCELL TUESDAY MAY 12 11:30

Dr. Ian Barbour
Professor Emeritus, Religion Department, Carlton College

Mr. Thomas Berry
Director, Riverdale Center for Religious Research

The Right Reverend Frank S. Cervený
Bishop of the Diocese of Florida, National Episcopal Environment Commission

Dr. Raymond Hayes
Chairman of the Department of Anatomy, Howard University

Sister Catherine McNamee
President, National Catholic Education Association

Reverend Charles Miller
Executive Director, Division of Church and Society
Evangelical Lutheran Church in America

Dr. Irving Mintzer
Senior Research Fellow, Center for Global Change, University of Maryland

Dr. Richard S. Nicholson
Executive Officer, American Association for the Advancement of Science

Mr. Joshua Reichert
Director of the Program of Conservation and Environment, Pew Charitable Trusts

Dr. Terry Root
Assistant Professor, School of Natural Resources, University of Michigan

Mr. Art Simon
Christian Children's Fund

Dr. N. Jean Sindab
Program for Economic and Environmental Justice
National Council of Churches of Christ

The Reverend Dr. Daniel E. Weiss
General-Secretary, American Baptist Churches

Dr. Timothy Wieskel
Fellow at the Center for Science and International Affairs, JFK School of Government
Research Associate in Environmental Ethics, Harvard Divinity School

DELEGATION TO SPEAKER FOLEY

TUESDAY MAY 12 10:45 AM

Mr. Syed Imtiaz Ahmad
President, Islamic Society of North America

Bishop Edmond L. Browning
Presiding Bishop, Episcopal Church USA

Bishop Herbert W. Chilstrom
Bishop, Evangelical Lutheran Church in America

Ms. Ann Druyan
Secretary, Federation of American Scientists

The Most Reverend William B. Friend
Chairman, Committee on Science and Human Values
National Conference of Catholic Bishops

Mr. Paul Gorman
Executive Director, Joint Appeal By Religion and Science

Dr. Stephen Jay Gould
Harvard University

Dr. Thomas F. Malone
University Distinguished Scholar, Department of Marine, Earth and Atmospheric Sciences
North Carolina State University

Dr. Henry Kendall
Chairman, Union of Concerned Scientists

Dr. Richard Land
Executive Director, Christian Life Commission
Southern Baptist Convention

Reverend W. Franklyn Richardson
General Secretary, National Baptist Convention

Mr. Steven C. Rockefeller
Vice Chairman, Rockefeller Brothers Fund

Dr. John Ruskay
Vice Chancellor, Jewish Theological Seminary of America

Rabbi Alexander Schindler
President, Union of American Hebrew Congregations

DELEGATION TO CONGRESSMAN GEJDENSEN TUESDAY MAY 12 10:00 AM

Dr. Ian Barbour
Professor Emeritus, Religion Department, Carlton College

Mr. Thomas Berry
Director, Riverdale Center for Religious Research

The Right Reverend Frank S. Cervený
Bishop of the Diocese of Florida, Episcopal Environment Commission

Dr. Raymond Hayes
Chairman of the Department of Anatomy, Howard University

Sister Catherine McNamee
President, National Catholic Education Association

Reverend Charles Miller
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Evangelical Lutheran Church in America

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Dr. Terry Root
Assistant Professor, School of Natural Resources, University of Michigan

Mr. Art Simon
Christian Children's Fund

Dr. N. Jean Sindab
Program for Economic and Environmental Justice
National Council of Churches of Christ

The Reverend Dr. Daniel E. Weiss
General-Secretary, American Baptist Churches

Dr. Timothy Wieskel
Fellow at the Center for Science and International Affairs, JFK School of Government
Research Associate in Environmental Ethics, Harvard Divinity School

DELEGATION TO DELEGATION TO CONGRESSMAN GORDON 11:45 AM

Ms. Patricia Bauman
Executive Director, Bauman Family Foundation

Dr. Joan Martin Brown
United Nations Environment Programme

Mr. Robert H. Cory
Quaker United Nations Office

Father Drew Christiansen, S.J.
Director of the Office of International Justice and Peace, US Catholic Conference

Dr. Lester Grinspoon

Dr. James Hansen
Director, Goddard Institute for Space Studies, NASA

Professor Theodore Hiebert
Harvard Divinity School

Dr. Gerald Mahlman
Director, Geophysical Fluid Dynamic Laboratory
United States Department of Commerce

Reverend Syngmann Rhee
President, National Council of Churches of Christ

Dr. William Schlesinger
Professor of Botany, Duke University

DELEGATION TO CONGRESSWOMAN JOHNSON MAY 12 11:30 AM

Reverend Jim Bell
Executive Director, INTERFAITH IMPACT for Justice and Peace

Dr. John Haught
Chairman of the Department of Theology, Georgetown University

Mrs. Annette Kane
Executive Director, National Council of Catholic Women

Dr. Daniel Lashoff
Senior Project Scientist, Natural Resources Defense Council

Ms. Katy Moran
Program Officer, Office of External Affairs, Smithsonian Institution

DELEGATION TO CONGRESSMAN LLOYD TUESDAY MAY 12 9:00 AM

Dr. Ian Barbour
Professor Emeritus, Religion Department, Carlton College

Mr. Thomas Berry
Director, Riverdale Center for Religious Research

The Right Reverend Frank S. Cervený
Bishop of the Diocese of Florida, National Episcopal Environment Commission

Dr. Raymond Hayes
Chairman of the Department of Anatomy, Howard University

Sister Catherine McNamee
President, National Catholic Education Association

Reverend Charles Miller
Executive Director, Division of Church and Society
Evangelical Lutheran Church in America

Dr. Irving Mintzer
Senior Research Fellow, Center for Global Change, University of Maryland

Dr. Richard S. Nicholson
Executive Officer, American Association for the Advancement of Science

Mr. Joshua Reichert
Director of the Program of Conservation and Environment, Pew Charitable Trusts

Dr. Terry Root
Assistant Professor, School of Natural Resources, University of Michigan

Mr. Art Simon
Christian Children's Fund

Dr. N. Jean Sindab
Program for Economic and Environmental Justice
National Council of Churches of Christ

The Reverend Dr. Daniel E. Weiss
General-Secretary, American Baptist Churches

Dr. Timothy Wieskel
Fellow at the Center for Science and International Affairs, JFK School of Government
Research Associate in Environmental Ethics, Harvard Divinity School

DELEGATION TO CONGRESSMAN MCCURDY TUESDAY MAY 12 10:30 AM

Dr. Elizabeth Bowen
President, Physicians for Social Responsibility

Mr. John Carr
Secretary for the Department of Social Development and World Peace
United States Catholic Conference

Dr. Roberta Hestenes
President, Eastern College [Evangelical]

Reverend Dr. William Gardiner
Director of the Department of Social Justice, Unitarian Universalist Association

Dr. Arthur Green
President, Reconstructionist Rabbinical College

Dr. Alden Meyer
Director, Climate Change and Energy Program, Union of Concerned Scientists

Reverend Dr. Donald E. Miller
General-Secretary, Church of the Brethren

Mr. David Neff
Managing Editor, Christianity Today

Mr. Conn Nugent
Program Officer for Environment, Nathan Cummings Foundation

Dr. H. Ronald Pulliam
Director of the Institute for Ecology, University of Georgia

Ms. Paz Artaza-Regan
Program Associate, Ministry of God's Creation, Board of Church and Society
United Methodist Church

Dr. John Ruskay
Vice Chancellor, Jewish Theological Seminary of America

Dr. Stephen Schneider
Head, Interdisciplinary Climate Systems Section
National Center for Atmospheric Research

Dr. Cecil E. Sherman
Coordinator, Cooperative Baptist Fellowship

DELEGATES FOR CONGRESSMAN MILLER TUESDAY MAY 12 9:30 AM

Dr. John Ahearne
Executive Director, Sigma Xi

Mrs. Patricia Ayres
Moderator, Cooperative Baptist Fellowship

Father Milton Efthimou
Director of Church and Society, Greek Orthodox Church in North and South America

Mr. Raymond Handlan
President, The Atlantic Philanthropic Service Company, Inc.

Reverend Theodore M. Hesburgh
President Emeritus, Notre Dame University

Dr. Harold Lohr
Retired Bishop, Northwestern Missouri Synod, Evangelical Lutheran Church in America

Professor Wangari Maathai
Founder, Green Belt Movement, Kenya

Dr. C. William Nichols
General Minister and President, Christian Church (Disciples of Christ)

Rabbi David Saperstein
Director and Counsel, Religious Action Center of Reform Judaism

Dr. Ronald Sider
Director, Evangelicals for Social Action

Dr. Bennett W. Smith
First Vice President, Progressive National Baptist Convention

Dr. Anne Whyte
Director of the Division of Social Sciences, International Development Research Centre

DELEGATION TO SENATOR PELL TUESDAY MAY 12 11:30 AM

Dr. Alan Betts
Atmospheric Research

Reverend William Byron
President, The Catholic University of America

Dr. Charles Chambers
Executive Director, American Institute of Biological Sciences

Dr. Calvin DeWitt
Executive Director, Ausable Institute of Environmental Studies

Dr. Jerome Frank
Professor Emeritus of Psychiatry and Behavioral Sciences
Johns Hopkins University Hospital

Dr. Gail Buchwalter King
Associate Director Program Services, Association for Theological Schools

Reverend Tyrone S. Pitts
Secretary General, Progressive National Baptist Church

Sister Betty Sundry
Associate Director, Leadership Conference of Women Religious (Catholic)

Ms. Lynne Szwaja
Research Associate for Arts and Humanities, Rockefeller Foundation

Dr. Foy Valentine
Former Executive Director, Christian Life Commission of the Southern Baptist Convention

DELEGATION TO CONGRESSMAN RITTER TUESDAY MAY 12 11:30 AM

Ms. Audrey Chapman
American Association for the Advancement of Science

Reverend Canon Joel Gibson
Sub-Dean, Cathedral of St. John the Divine

Reverend Gilbert Horn
Director, Colorado Council of Churches

Mrs. Barbara Bellows Rockefeller
Professor of History, Middlebury College

Mr. Leonard Schwartz
Executive Director, Rainforest Alliance

Bishop William Winterrowd
Bishop of Colorado, National Episcopal Environment Commission

DELEGATION TO CONGRESSMAN TANNER TUESDAY MORNING MAY 12 10:30 AM

Dr. Alan Betts
Atmospheric Research

Reverend William Byron
President, The Catholic University of America

Dr. Charles Chambers
Executive Director, American Institute of Biological Sciences

Ms. Audrey Chapman
American Association for the Advancement of Science

Dr. Calvin DeWitt
Executive Director, Ausable Institute of Environmental Studies

Dr. Jerome Frank
Professor Emeritus of Psychiatry and Behavioral Sciences
Johns Hopkins University Hospital

Reverend Canon Joel Gibson
Sub-Dean, Cathedral of St. John the Divine

Reverend Gilbert Horn
Director, Colorado Council of Churches .

Dr. Gail Buchwalter King
Associate Director Program Services, for Association for Theological Schools

Mrs. Barbara Bellows Rockefeller
Professor of History, Middlebury College

Reverend Tyrone S. Pitts
Secretary General, Progressive National Baptist Church

Mr. Leonard Schwartz
Executive Director, Rainforest Alliance

Sister Betty Sundry
Associate Director, Leadership Conference of Women Religious (Catholic)

Ms. Lynne Szwaja
Research Associate for Arts and Humanities, Rockefeller Foundation

Dr. Foy Valentine
Former Executive Director, Christian Life Commission of the Southern Baptist Convention

Bishop William Winterrowd
Bishop of Colorado, National Episcopal Environment Commssion

To: The Members of The Joint Appeal by Religion and Science for the Environment

**From: The Environmental Working Group of the Social Concerns Committee,
the Unitarian Church of Anne Arundel County, Maryland.**

Subject: The Environment, and Our Relationship to It.
an assessment of our condition and a call for action!

The Inevitability of Change.

The beginning of the last decade of the twentieth century has introduced a period of change that is unique in its challenge and uncommon in its breadth.

The new potential for peace and international cooperation; the growth of free market economies and transnational economic enterprise; the increasing disparity between rich and poor; the exponential growth of human population; and our heightened awareness of the destructive impact of many forms of human activity on the ecosystem of which we are a part; all mandate that we reconsider much of our customary individual, institutional, national and international behavior.

By any objective measure of our present circumstance, change is inevitable. We can shape it and influence it by proactive, considered and reasoned choice, or we can passively accept it as it is forced upon us by reactive and compelled necessity. We have no choice as to whether or not change will take place. *The question is, how shall we act?*

The Issue of the Environment and Development.

The issue of *the Environment* is the most comprehensive and compelling issue of our time. Its recognition as such is being forced upon us by a growing body of empirical evidence, and by often painful reflection on the consequences of human activity. Our failure to recognize our place in "the interdependent web of all existence", and to address the moral and ethical aspects of this relationship, has resulted in human activity that threatens the very existence of life as we know it, including our own.

The issue of *the Environment* is unique in that it is the first issue to affect all human individuals equally; it is unique in that for the first time individuals and societies that are over-privileged cannot seek security and protection from those that are under-privileged by the use of wealth and power; it is unique in that it defies national boundaries; it is unique in that humankind, as a whole, is being forced to consider the consequences of its present behavior on the well-being of future generations; it is unique in that it will never be solved until we have eliminated functional poverty and secured human rights for all, both locally and globally.

All of these continuing circumstances of our existence serve to reinforce and confirm the findings of the 1987 Report of the World Commission on Environment and Development which demonstrated the connection between the quality of our lives, the Environment, and all aspects of poverty and Development. The holistic understanding that the Brundtland Report put forth, that the condition and well being of those in need has a direct and practical (and we would propose, moral) influence on the well being of those with plenty, serves notice to all of humankind that the basic issue of extending to all equality of opportunity, justice, and the conditions of peaceful coexistence, is no longer a choice, but has become a necessity in the matter of human survival.

Human development is the great promise of democracy, and of its moral and ethical institutions.

If we conspire to deny it to others, we corrupt its moral conviction and authority. If we extend it to others in the form that we, in the industrialized western democracies have practiced it, we put at risk the future of all life, as well as our democratic institutions. In a state of environmental crises, survival is the ultimate pre-occupation of any species. In the pursuit of survival, no sacrifice is considered too great.

Basic Assumptions

In challenging ourselves and others, to consider these arguments and to begin effective debate and action, we contend that the following must be accepted as given:

- 1) - there is accumulating evidence of the negative influence of human activity on the natural systems of our planet, and on the health and well-being of many forms of life as we know them, including our own.
- 2) - there is a moral and practical need to address the issue of the growth of human population, and the inequity in wealth and opportunity for self fulfillment that exists among a growing number of the people of our planet.
- 3) - there is a need to recognize that economies and technologies are not in themselves accountable for their effect, and that it is we, as individuals and as a society, that bear the responsibility to ensure that our economy and the technologies that we accept and practice reflect our true values.
- 4) - there is a need to recognize that our knowledge and understanding of all that exists, its history, how it evolved, how it operates and how it may change, is incomplete, and that in particular, our knowledge of how human activity influences and changes our environment is inadequate.
- 5) - there is a need to include a number of important components that are missing in the current discussion about how humankind should relate to the environment and to other forms of life. Without these components, ranked equally with economic and political considerations, it will not be possible to develop meaningful and practical and lasting solutions.

The components that must be included are:

- i) a moral or ethical component that should be addressed publicly by religious and ethical institutions.
- ii) an objective and calculated component which seeks to evaluate the costs and benefits of all decisions taken to the general welfare of all of humankind, and to the total life system of the planet.
- iii) a respect and concern for the quality of life of future generations and for their ability to assume and practice a stewardship of the Earth.

The Questions That Must Be Addressed

As difficult and as painful as they may be, the following questions must be recognized, defined, debated and resolved. All of them serve to acknowledge the present condition of the existence of the human species and our effects, by default, on the ecosystem of this planet, and on each other.

- 1) - how shall we control and, if necessary, reduce, human population to a level that is sustainable, and compatible with the carrying capacity of our planet?
- 2) - how shall we determine what other forms of life shall live and prosper, and what other forms of life shall die and become extinct, and how shall we carry out these decisions?
- 3) - how shall we evaluate and determine whether, and to what extent, existing and newly developed technologies shall be accepted and practiced, and how shall we access their costs and benefits for ourselves, the ecosystem of our planet, and for future generations?
- 4) - how shall we determine the minimum amenities, the material wealth, the level of medical care, the educational and work opportunities, that are the right of every human being?
- 5) - how shall we determine the appropriate response to acts of chance, such as famine, changes in weather patterns and human genetic deficiencies? Shall we accept them and allow them to take their course, so as to strengthen the ability of the human species as a whole to evolve and survive, or shall we exercise *human compassion* and intervene at the expense of our long term adaptability and well-being? Do we have the right to interfere in the process of human evolution?
- 6) - how shall we access the human practice of war, its waste of resources and its destruction of the environment, and, if we deem it necessary, how shall we develop and implement the means to control it or eliminate it?
- 7) - how shall we act to mollify nationalistic, ethnic, cultural and religious passions, in furthering *our common security and our common future*, while respecting human rights and the richness and value of ethnic, cultural and religious diversity?

Conclusion

We believe that unless the issue of the Environment and Development is addressed with the frankness and candor suggested here, we will soon arrive at a state of chaos, where the survival of our species will be the preeminent issue. We believe that under such conditions we will have no choice but to surrender our hard won democratic freedoms and institutions, and the exercise of our personal morality, to a central authority that will make the necessary decisions for us. The implications this prospect has for the growth and development of the "human spirit", inspires us to evaluate our condition and issue this call for action!

United States Senate

WASHINGTON, DC 20510-4202

TO: Ad Hoc Hearing Participants
Joint Appeal of Religion and Science for the Environment

From: Katie McGinty
Office of Senator Al Gore

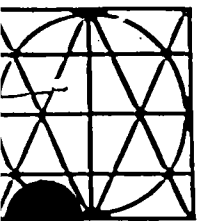
This package of materials contains background readings for the Ad Hoc hearing we are holding as part of the Mission to Washington: Religion and Science in Partnership for the Environment Conference that will take place from May 10 through May 12. The hearing itself will be held on Tuesday, May 12 from 9:00 am - 11:30 in the Dirksen Senate Office Building room 106.

We certainly appreciate your participation in this event; we believe that it will offer us a very interesting opportunity to explore how we may better come to understand our relationship with the natural world and how we may better take environmental considerations into account in our decision-making processes.

Later today -- or definitely by first thing Monday morning -- I will fax to you a list of suggested questions. Please do not hesitate to call if you have any questions or are in need of additional information.

*Thank -
Later*

*Al - This is info of above
sent to Senators Congressmen
who will participate in
hearing. You need to read this
stuff, too. I will add some
stuff from Schweitzer & others over
weekend as well as develop
some questions.*



THE JOINT APPEAL
RELIGION & SCIENCE
FOR THE ENVIRONMENT

EXECUTIVE COMMITTEE
CO-CHAIRS

The Very Rev. James Parks Morton
Dean
Cathedral of St. John the Divine

Dr. Carl Sagan
Professor of Astronomy and Director,
Laboratory for Planetary Studies
Cornell University

Bishop Vinton R. Anderson
President
World Council of Churches

Reverend Joan Campbell
General-Secretary
National Council of Churches of Christ

Bishop William B. Friend
Chairman
Committee on Science and Human Values
National Conference of Catholic Bishops

Archbishop Iakovos
Primate
Greek Orthodox Church of
North and South America

Dr. Ismar Schorsch
Chancellor
Jewish Theological Seminary of America

Robert Seiple
World Vision U.S.A.

Dr. Fay Valentine
Executive Director Emeritus
Christian Life Commission
Southern Baptist Convention

Dr. James Hansen
Director
Goddard Institute for Space Studies

Dr. Peter H. Raven
Director
Missouri Botanic Gardens

Dr. F. Sherwood Rowland
Professor of Chemistry
University of California

Dr. Victor F. Weisskopf
Institute Professor of Physics Emeritus
Massachusetts Institute of Technology

Dr. Anne Whyte
Director
Division of the Social Sciences
International Development
Research Centre

*Affiliations for identification
purposes only*

Paul Gorman
Executive Director

Amy Elizabeth Fox
Associate Director

Ann Druryan
Sec'y., Federation of American Scientists
Senior Consultant

Amsterdam Ave.

New York, NY 10025

212-316-7441

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STATEMENT BY RELIGIOUS LEADERS

THE JOINT APPEAL CONSULTATION ON ENVIRONMENT

JUNE 3, 1991

NEW YORK CITY

STATEMENT BY RELIGIOUS LEADERS AT THE SUMMIT ON ENVIRONMENT

On a spring evening and the following day in New York City, we representatives of the religious community in the United States of America gathered to deliberate and plan action in response to the crisis of the Earth's environment.

Deep impulses brought us together. Almost daily, we note mounting evidence of environmental destruction and ever-increasing peril to life, whole species, whole ecosystems. Many people, and particularly the young, want to know where we stand and what we intend to do. And, finally, it is what God made and beheld as good that is under assault. The future of this gift so freely given is in our hands, and we must maintain it as we have received it. This is an inescapably religious challenge. We feel a profound and urgent call to respond with all we have, all we are and all we believe.

We chose to meet, these two days, in the company of people from diverse traditions and disciplines. No one perspective alone is equal to the crisis we face — spiritual and moral, economic and cultural, institutional and personal. For our part, we were grateful to strengthen a collaboration with distinguished scientists and to take stock of their testimony on problems besetting planetary ecology. As people of faith, we were also moved by the support for our work from distinguished public policy leaders.

What we heard left us more troubled than ever. Global warming, generated mainly by the burning of fossil fuels and deforestation, is widely predicted to increase temperatures worldwide, changing climate patterns, increasing drought in many areas, threatening agriculture, wildlife, the integrity of natural ecosystems and creating millions of environmental refugees. Depletion of the ozone shield, caused by human-made chemical agents such as chlorofluorocarbons, lets in deadly ultraviolet radiation from the Sun, with predicted consequences that include skin cancer, cataracts, damage to the human immune system, and destruction of the primary photosynthetic producers at the base of the food chain on which other life depends. Our expanding technological civilization is destroying

an acre and a half of forest every second. The accelerating loss of species of plants, animals and microorganisms which threatens the irreversible loss of up to a fifth of the total number within the next thirty years, is not only morally reprehensible but is increasingly limiting the prospects for sustainable productivity. No effort, however heroic, to deal with these global conditions and the interrelated issues of social justice can succeed unless we address the increasing population of the Earth — especially the billion poorest people who have every right to expect a decent standard of living. So too, we must find ways to reduce the disproportionate consumption of natural resources by affluent industrial societies like ours.

Much would tempt us to deny or push aside this global environmental crisis and refuse even to consider the fundamental changes of human behavior required to address it. But we religious leaders accept a prophetic responsibility to make known the full dimensions of this challenge, and what is required to address it, to the many millions we reach, reach and counsel.

We intend to be informed participants in discussions of these issues and to contribute our views on the moral and ethical imperative for developing national and international policy responses. But we declare here and now that steps must be taken toward: accelerated phaseout of ozone depleting chemicals; much more efficient use of fossil fuels and the development of a non-fossil fuel economy; preservation of tropical forests and other measures to protect continued biological diversity; and concerted efforts to slow the dramatic and dangerous growth in world population through empowering both women and men, encouraging economic self-sufficiency, and making family education programs available to all who may consider them on a strictly voluntary basis.

We believe a consensus now exists, at the highest level of leadership across a significant spectrum of religious traditions, that the cause of environmental integrity and justice must occupy a position of utmost priority for people of faith. Response to this issue can and must cross traditional religious and political lines. It has the potential to unify and renew religious life.

We pledge to take the initiative in interpreting and communicating theological foundations for the stewardship of Creation in which we find the principles for environmental action. Here our seminaries have a critical role to play. So too, there is a call for moral transformation, as we recognize that the roots of environmental destruction lie in human pride, greed and selfishness, as well as the appeal of the short-term over the long-term.

We reaffirm here, in the strongest possible terms, the indivisibility of social justice and ecological integrity. An equitable international economic order is essential for preserving the global environment. Economic equity, racial justice, gender equality and environmental well-being are interconnected and all are essential to peace. To help ensure these, we pledge to mobilize public opinion and to appeal to elected officials and leaders in the private sector. In our congregations and corporate life, we will encourage and seek to exemplify habits of sound and sustainable householding — in land use, investment decisions, energy conservation, purchasing of products and waste disposal.

Commitments to these areas of action we pledged to one another solemnly and in a spirit of mutual accountability. We dare not let our resolve falter. We will continue to work together, add to our numbers, and deepen our collaboration with the worlds of science and government. We also agreed this day to the following initiatives:

1. We will widely distribute this declaration within the religious community and beyond. We have established a continuing mechanism to coordinate ongoing activities among us, working intimately with existing program and staff resources in the religious world. We will reach out to other leaders across the broadest possible spectrum of religious life. We will help organize other such gatherings as ours within individual faith groups, in interfaith and interdisciplinary formats, and at international, national and regional levels.
2. We religious leaders and members of the scientific community will call together a Washington D.C. convocation and meet with members of the Executive and

Congressional branches to express our support for bold steps on behalf of environmental integrity and justice. There too we will consider ways to facilitate legislative testimony by religious leaders and response to local environmental action alerts.

3. We will witness firsthand and call public attention to the effect of environmental degradation on vulnerable peoples and ecosystems.
4. We will call a meeting of seminary deans and faculty to review and initiate curriculum development and promote bibliographies emphasizing stewardship of Creation. We will seek ways to establish internships for seminarians in organizations working on the environment and for young scientists in the study of social ethics.
5. We will prepare educational materials for congregations, provide technical support for religious publishers already producing such materials, and share sermonical and liturgical materials about ecology.
6. We will establish an instrument to help place stories on environment in faith group and denominational newsletters and help assure coverage of the religious community's environmental activities in the secular press.
7. We will urge compliance with the Valdez Principles and preach and promote corporate responsibility.
8. We will encourage establishment of one model environmentally sound and sustainable facility within each faith group and denomination. We will provide materials for environmental audits and facilitate bulk purchasing of environmentally sound products.

It has taken the religious community, as others, much time and reflection to start to comprehend the full scale and nature of this crisis and even to glimpse what it will

require of us. We must pray ceaselessly for wisdom, courage and creativity. Most importantly, we are people of faith and hope. These qualities are what we may most uniquely have to offer to this effort. We pledge to the children of the world and, in the words of the Iroquois, "to the seventh generation," that we will take full measure of what this moment in history requires of us. In this challenge may lie the opportunity for people of faith to affirm and enact, at a scale such as never before, what it truly means to be religious. And so we have begun, believing there can be no turning back.

BISHOP VINTON R. ANDERSON PRESIDENT, WORLD COUNCIL OF CHURCHES	HIS EMINENCE ARCHBISHOP IAKOVOS PRIMATE, GREEK ORTHODOX ARCHDIOCESE OF NORTH AND SOUTH AMERICA
RABBI MARC D. ANGEL PRESIDENT, RABBINICAL COUNCIL OF AMERICA	THE VERY REVEREND LEONID KISHKOVSKY PRESIDENT, NATIONAL COUNCIL OF CHURCHES OF CHRIST
THE MOST REVEREND EDMOND L. BROWNING PRESIDING BISHOP AND PRIMATE OF THE EPISCOPAL CHURCH	CHIEF OREN LYONS CHIEF OF THE TURTLE CLAN OF THE ONONDAGA NATION
REVEREND JOAN CAMPBELL GENERAL-SECRETARY, NATIONAL COUNCIL OF CHURCHES OF CHRIST	DR. DAVID McKENNA PRESIDENT, ASBURY THEOLOGICAL SEMINARY
THE REVEREND HERBERT W. CHILSTROM BISHOP, EVANGELICAL LUTHERAN CHURCH IN AMERICA	THE VERY REVEREND JAMES PARKS MORTON DEAN, CATHEDRAL OF ST. JOHN THE DIVINE
FATHER DREW CHRISTIANSEN, S. J. DIRECTOR, OFFICE OF INTERNATIONAL JUSTICE AND PEACE UNITED STATES CATHOLIC CONFERENCE	DR. W. FRANKLYN RICHARDSON GENERAL SECRETARY, NATIONAL BAPTIST CONVENTION
MS. BEVERLY DAVISON PRESIDENT, AMERICAN BAPTIST CHURCH	DR. PATRICIA J. RUMER GENERAL DIRECTOR, CHURCH WOMEN UNITED
REVEREND DR. MILTON B. EFTHIMIOU DIRECTOR OF CHURCH AND SOCIETY GREEK ORTHODOX ARCHDIOCESE OF NORTH AND SOUTH AMERICA	DR. JAMES R. SCALES PRESIDENT EMERITUS, WAKE FOREST UNIVERSITY
BISHOP WILLIAM B. FRIEND CHAIRMAN OF THE COMMITTEE FOR SCIENCE AND HUMAN VALUES NATIONAL CONFERENCE OF CATHOLIC BISHOPS	DR. ISMAR SCHORSCH CHANCELLOR, JEWISH THEOLOGICAL SEMINARY
DR. ALFRED GOTTSCHALK PRESIDENT, HEBREW UNION COLLEGE-JEWISH INSTITUTE OF RELIGION	DR. ROBERT SCHULLER PASTOR, THE CRYSTAL CATHEDRAL
DR. ARTHUR GREEN PRESIDENT, RECONSTRUCTIONIST RABBINICAL COLLEGE	DR. ROBERT SEIPLE PRESIDENT, WORLD VISION U.S.A.
	BISHOP MELVIN TALBERT SECRETARY OF THE COUNCIL OF BISHOPS UNITED METHODIST CHURCH
	DR. FOY VALENTINE FORMER EXECUTIVE DIRECTOR CHRISTIAN LIFE COMMISSION SOUTHERN BAPTIST CONVENTION

Affiliations for identification purposes only

June 3, 1991
New York City

HISTORICAL NOTE

The Summit on Environment, sponsored by the Joint Appeal in Religion and Science, grew out of a collaboration which began in January 1990 with an Open Letter to the Religious Community sent by 34 internationally renowned scientists. Of the peril to planetary environment they wrote, "Problems of such magnitude and solutions demanding so broad a perspective must be recognized from the outset as having a religious as well as a scientific dimension." "Efforts to safeguard and cherish the environment need to be infused with a vision of the sacred."

Struck by the initiative, several hundred religious leaders of all major faiths from all five continents responded, "This invitation to collaboration marks a unique moment and opportunity in the relationship of science and religion. We are eager to explore as soon as possible concrete, specific forms of action."

The Summit on Environment was held on June 2nd and 3rd at the American Museum of Natural History and the Cathedral of St. John the Divine. It was a next step in an ongoing partnership and an effort to support the American religious community as it moves forward to act upon the vision of environmental justice and a sustainable future.

This is a follow up to our conversation regarding the hearing for the Religion and Environment Conference. I have attached the schedule for the conference. Every major denomination is represented by either the head of the denomination or a top official & the scientific delegation is very strong.

Location:

DieKsen { One of the most important events during the conference is the ad hoc Joint Congressional Hearing, Tuesday, May 12, 9:00 am - 11:30 am. Senator Gore is putting a group of members together and would really like your boss to participate--even if only for part of the proceedings. Katie McGinty, Gore's senior environmental aid, would be happy to assist in developing a statement and/or questions for your boss. She will fax a comprehensive packet of background and suggested questions to you Monday.

The hearing will focus on a fundamental inquiry: what is the true "value" of the environment? How do we properly measure the costs and benefits of the choices we make that affect the natural world. What questions should we ask, what considerations should we take into account, what tools do we use.

The hearing will NOT focus on specific legislation or proposals, but be more of an informal discussion of the issues--although the set-up and procedure will be like a traditional hearing.

Thus far those testifying at the hearing will be:

- * Carl Sagan: Co Chair of the Joint Appeal
- * Rev. James Parks Morton: Co chair of Joint Appeal, and Dean of St. John's the Divine Cathedral
- * Rev. Joan Campbell: Gen. Sec., Natl. Council of Churches
- * Dr. Ismar Schorsch, Chancellor, The Jewish Theological Seminary of America
- * Rev. William Byron: President, Catholic University
- * Chief Oren Lyons: Chief of the Onondaga Nation and Head of the Turtle Clan (Native American)
- * Dr. F. Sherwood Rowland: President, American Assoc. Advancement Science
- * Dr. Peter Raven: Home Secretary, National Academy of Sciences
- * Dr. Herman Daly: Senior Economist, World Bank
- * Art Fitzgerald: Senior VP, Northern Telecom
- * Dr. Mark Sagoff: Center for Philosophy & Public Policy University of Maryland

Please let me, Winston McGregor, or Katie McGinty know if you have any questions about the hearing. Senator Gore would be more than happy to talk to your boss personally about the hearing. Let us know and we'll work it out on this end.

Mark Sagoff is a professor at the Center for Philosophy and Public Policy at the University of Maryland. He has written extensively on the guiding philosophy of environmental economics and policy.

His collection of essays *The Economy of the Earth: Philosophy, Law, and the Environment* explores social policy in the areas of environment, pollution, the workplace, safety, and health. The questions he poses include:

- To what extent is government justified in interfering with the wishes of individuals?
- What are the goals of social legislation?
- How can they best be achieved, and are they worth the costs?

Professor Sagoff debunks an influential approach to environmental policy that reduces social values to benefits and costs incurred by individuals. He presents an analysis based on ethical, cultural, and political concerns that reveals how environmental legislation can be sensitive to political reality and economic costs. Sagoff has explored the relationship to classic liberalism and environmentalism, the place of values in environmental science, the importance of a "land ethic," the role of public interest groups, and efforts to reform environmental law.

Sagoff examines how many environmental economists, and policymakers who would listen to them, make a "category mistake" by trying to value environmental quality in terms of consumer satisfaction as revealed in the marketplace. By distinguishing the role of a person as a consumer and as a citizen, he points out that many important public values are created independently of private economic calculation. This means that efforts to place market values on environmental quality will collide with the cherished view that the environment has moral, ethical, and aesthetic qualities that cannot, and should not, be reduced to ordinary market prices.

Sagoff traces the view of the relationship of humankind to natural environment through American history and literature. The evolution of environmental values, and public policies that embody these values, has often been at odds with other visions of "progress." Nevertheless, environmental ethics remain the appropriate underpinning of environmental policy, and efforts to set environmental goals based on strict economic calculus are destined to fail because they ignore the fact citizens prefer to debate environmental values as political issues, not consumer choices.

Herman Daly is a Senior Economist with the World Bank. He has written extensively on environment and development. He has:

- critiqued conventional economics for ignoring physical reality of production and consumption;
- extended economic analysis to incorporate physical and ecological aspects; and
- examined moral and spiritual dimensions of economic activity and policy.

Modern economic theory has become successively more abstract, and one of the realities that theory has discarded is the physical basis for production of goods and the generation of waste. Thus, "land" as a productive input has become "rent," labor has become "wage" and by-products are ignored or labeled "externalities." Some economic theory actually violates the first law of thermodynamics (conservation of mass and energy) and most theory violates the second law (increase in entropy as a result of work). The implications of ignoring these realities for large economic systems is to discount the fact that economic activity occurs within the biophysical world -- economy is a subset of ecology.

While Daly does not embrace purely physical economic modeling (e.g. an energy theory of value) he does insist that fundamental physical laws be observed in order for realistic long-run economic outcome to be properly evaluated. Thus, while market economies naturally substitute capital, labor and knowledge for materials, and technology trends can help alleviate scarcity over long periods of time, the basic Malthusian dilemma of increasing material scarcity will eventually reduce economic well-being if economic growth exceeds physical and natural capacities. In addition to input scarcity, the fact that economic production occurs within in a finite ecosystem implies that the waste absorption capacity of the ecosystem will become progressively more stressed as more by-products are delivered into the environment.

Daly has pioneered the development of "ecological economics" of which environmental macroeconomics is important. Here, the notion of the scale of the economy relative to the finite ecosystem become central. This leads to the proposition that infinite "growth" in economic activity is impossible (unsustainable), while economic "development" can improve well-being. Development in this context is concerned with improving the quality of life without exceeding the limits of natural resource exploitation and waste absorption -- the "scale of the physical economy" as measured by material throughput must remain constant.

Along with theologian John Cobb, Daly has also explored the moral and spiritual dimension of economics. Their book *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future* expands economic analysis to include "community with other people, other species, and other generations."

Cambridge Studies in Philosophy and Public Policy

GENERAL EDITOR: Douglas MacLean

The purpose of this new series is to publish the most innovative and up-to-date research into the values and concepts that underlie major aspects of public policy. Hitherto most research in this field has been empirical. This series will be primarily conceptual and normative; that is, it will investigate the structure of arguments and the nature of values relevant to the formation, justification, and criticism of public policy. At the same time it will be informed by empirical considerations, addressing specific issues, general policy concerns, and the methods of policy analysis and their applications.

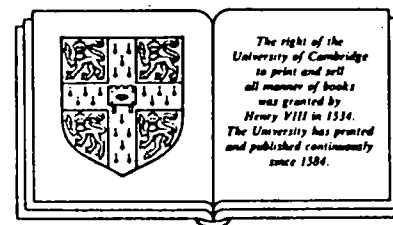
The books in the series will be inherently interdisciplinary and will include anthologies as well as monographs. They will be of particular interest to philosophers, political and social scientists, economists, policy analysts, and those involved in public administration and environmental policy.

The economy of the earth

Philosophy, law, and the environment

MARK SAGOFF

CENTER FOR PHILOSOPHY AND PUBLIC POLICY
UNIVERSITY OF MARYLAND



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Chapter 2

At the Shrine of Our Lady of Fatima; or, Why political questions are not all economic

Lewiston, New York, a well-to-do community near Buffalo, is the site of the Lake Ontario Ordinance Works, where the federal government, years ago, disposed of residues from the Manhattan Project. These radioactive wastes are buried but are not forgotten by the residents, who say that when the wind is southerly, radon gas blows through the town. Several parents at a conference I attended there described their terror on learning that cases of leukemia had been found among area children. They feared for their own lives as well. At the other side of the table, officials from New York State and from local corporations replied that these fears were unfounded. People who smoke, they said, take greater risks than people who live near waste disposal sites. One state official spoke about methodologies of rational decision making. This increased the parents' resentment and frustration.

The official told the townspeople that risks they casually accept, for example, by drinking alcohol or by crossing the street, were greater than the risks associated with the buried radioactive residues. He argued that the waste facility brought enough income and employment into the town to compensate for any hazards the residents might face. They remained unimpressed by his estimate of their "willingness to pay" for safety; his risk-benefit analysis left them cold. They did not see what economic theory had to do with the ethical questions they raised. They wanted to talk about manipulation and the distribution of power in our society. They did not care to be lectured about benefits and costs.

If you take the Military Highway (as I did) from Buffalo to Lewiston, you will pass through a formidable wasteland. Landfills stretch in all directions where enormous trucks – tiny in that landscape – incessantly deposit sludge, which great bulldozers, like yellow ants, then push into the ground. These machines are the only signs of life, for in the miasma that hangs in the air, no birds, not even scavengers, are seen. Along colossal power lines that crisscross this dismal land, the dynamos at Niagara push electric power south, where factories have fled, leaving their remains to decay. To drive along this road is to feel the awe and sense of mystery one experiences in the presence of so much energy and so much decadence.

Henry Adams responded in a similar way to the dynamos displayed at the Paris Exposition of 1900. To him the dynamo became a "symbol of infinity" and functioned as the modern counterpart to the Virgin – that is, as the center and focus of power: "Before the end, one began to pray to it; inherited instinct taught the natural expression of man before silent and infinite force"

Adams asks in his essay "The Dynamo and the Virgin" how the products of modern industrial civilization will be compared with those of the religious culture of the Middle Ages. If he could see the landfills and hazardous-waste facilities bordering the power stations and honeymoon hotels of Niagara Falls, he would know the answer. He would understand what happens when efficiency replaces infinity as the central conception of value. The dynamos at Niagara will not produce another Mont-Saint-Michel. "All the steam in the world," Adams writes, "could not, like the Virgin, build Chartres."

At the Shrine of Our Lady of Fatima, on a plateau north of the Military Highway, a larger-than-life sculpture of Mary looks into the chemical air. The original of this shrine stands in central Portugal, where in May 1917 three children said they saw a lady, brighter than the sun, raised on a cloud in an evergreen tree.⁴ Five months later, on a wet and cold October day, the lady again appeared, this time before a large

crowd. Some in the crowd reported that "the sun appeared and seemed to tremble, rotate violently and fall, dancing over the heads of the throng."⁵

The shrine was empty when I visited it. The cult of Our Lady of Fatima, I imagine, has few devotees. The cult of allocative efficiency, however, has many. Where some people see only environmental devastation, its devotees perceive welfare, utility, and the maximization of wealth. They see the satisfaction of wants. They envision the good life.

As I looked from the shrine over the smudged and ruined terrain, I thought of all the wants and needs that are satisfied in a landscape full of honeymoon cottages, commercial strips, and dumps for hazardous waste. I hoped that Our Lady of Fatima, worker of miracles, might serve, at least for the moment, as the patroness of cost-benefit analysis. I thought of the miracle of perfect markets. The prospect, however, looked only darker in that light.

WHAT WE WANT VERSUS WHAT WE ARE

This book concerns the economic decisions we make about the environment. It also concerns our political decisions about the environment. Some people have suggested that, ideally, these should be the same – that every environmental problem should be understood as an economic one. William Baxter, for example, writes, "All our environmental problems are, in essence, specific instances of a problem of great familiarity: How can we arrange our society so as to make the most effective use of our resources?"⁶ He adds:

To assert that there is a pollution problem or an environmental problem is to assert, at least implicitly, that one or more resources is not being used so as to maximize human satisfactions. In this respect at least environmental problems are economics problems, and better insight can be gained by the application of economic analysis.⁷

On this view, there is really only one problem: the scarcity of resources. Environmental problems exist, then, only if

environmental resources could be used more equitably or efficiently so that more people could have more of the things for which they are willing to pay. "To the economist," Arthur Okun writes, "efficiency means getting the most out of a given input." Okun explains: "This concept of efficiency implies that more is better, insofar as the 'more' consists of items people want to buy."⁸

Environmental economists generally define "efficiency" as the "maximum consumption of goods and services given the available amount of resources."⁹ On this approach to environmental policy, it is the preferences of the consumer that are important. "The benefit of any good or service is simply its value to a consumer."¹⁰ The only values that count or that can be counted, on this view, are those that a market, actual or hypothetical, can price. "In principle, the ultimate measure of environmental quality," one text assures us, "is the value people place on these services . . . or their willingness to pay."¹²

Willingness to pay. What is wrong with that? The rub is this. Not all of us think of ourselves primarily as consumers. Many of us regard ourselves as citizens as well. As consumers, we act to acquire what we want for ourselves individually; each of us follows his or her conception of *the good life*. As citizens, however, we may deliberate over and then seek to achieve together a conception of *the good society*.

In a liberal state, we are all free to pursue our personal ideas of the good life, for example, by buying the books we want to read. In a democracy, however, we are also free to pursue our ideal of ourselves as a good society, by trying to convince one another and our political representatives of a particular idea of our national goals and aspirations.

Americans, like citizens of other countries, have national goals and aspirations – a vision of what they stand for as a nation. They believe, for example, that each person must be secure in certain basic rights if he or she is to be able to form preferences that are not merely imposed but are autonomous and express personal values and uncoerced choice. Thus, the freedoms guaranteed by the Constitution are not to be con-

strued as preferences for which they are willing to pay. They are, on the contrary, protections needed to form and express preferences that are truly one's own and that therefore may claim societal recognition and respect.¹³

Americans' conception of their own as a good society, however, includes more than these rights, which, in any event, may be universal and would, perhaps, belong to any good society, not simply theirs. They also recognize in their legislation and, as I shall argue in a later chapter, in their culture – for example, in their literature and art – other national goals and aspirations that are more particular to them. These do not necessarily follow from (although they must be consistent with) an abstract or universal conception of justice or the rights of man. Rather, they may derive from America's history and heritage; they may have to do with the particular role Americans can play in human progress. Americans might object to policies foreign or domestic that benefit them as individuals, if those policies disgrace or depart from national ideals and ethical commitments.

Consumers who have to pay higher prices as a result, for example, nevertheless may favor safety regulations in the workplace, not as a matter of personal self-interest but as a matter of national pride and collective self-respect. I shall argue, likewise, that our environmental goals similarly derive not necessarily from self-interest – not from consumer willingness to pay in markets – but from a common recognition of national purposes and a memory even newcomers adopt of our long historical relationship to a magnificent natural environment.

Our environmental goals – cleaner air and water, the preservation of wilderness and wildlife, and the like – are not to be construed, then, simply as personal wants or preferences; they are not interests to be “priced” by markets or by cost-benefit analysis, but are views or beliefs that may find their way, as public values, into legislation. These goals stem from our character as a people, which is not something we choose, as we might choose a necktie or a cigarette, but something we recognize, something we are.

These goals presuppose the reality of public or shared values we can recognize together, values that are discussed and criticized on their merits and are not to be confused with preferences that are appropriately priced in markets. Our democratic political processes allow us to argue our beliefs on their merits – as distinct from pricing our interests at the margin. Our system of political representation and majority vote may be the best available device for deciding on these values, for “filtering the persuasive from the unpersuasive, the right from wrong, and the good from bad.”¹⁴

WHAT IS COST-BENEFIT ANALYSIS?

In this book, I shall argue that policies for health, safety, and the environment are and ought to be grounded in what Richard Andrews calls the “philosophy of normative constraints.” Andrews explains:

In this conceptual framework, government is not simply a corrective instrument at the margins of economic markets but [a] central arena in which the members of society choose and legitimize . . . their collective values. The principal purposes of legislative action are to weigh and affirm social values and to define and enforce the rights and duties of members of the society, through representative democracy. The purpose of administrative action is to put into effect these affirmations by the legislature, not to rebalance them by the criteria of economic theory.¹⁵

Andrews contrasts this conception of government with one “grounded in the language, logic, and values of public investment economics.”¹⁶ Those who advocate the primacy of the language, logic, and values of public investment economics generally argue that regulatory decisions, insofar as they are rational, must be based on a conception of markets or on a theory about costs and benefits and, therefore, not necessarily on the goals or purposes set out in legislation. These analysts have mounted a strong a priori, or conceptual,

argument to show that efficiency in the allocation of resources is the principal goal of sound regulatory policy.

The argument for the efficiency criterion, as Allen Kneese, for example, states it, begins with a definition of a perfect market, a market, in other words, that meets certain ideal conditions. "All participants in the market" first "are fully informed as to the quantitative and qualitative characteristics of goods and services and the terms of exchange among them."¹⁷

According to the model, moreover, all valuable assets in the economic system are fully owned, managed, and exchanged in competitive circumstances, which is to say, no individual or firm "can influence any market price significantly by decreasing or increasing the supply of goods and services" it offers.¹⁸ For environmental policy, two corollary conditions are especially important. First: "Individual ownership of all assets plus competition implies that all costs of production and consumption are borne by the producers and consumers directly involved in economic exchanges." Second: "A closely related requirement is that there must be markets for all possible claims."¹⁹

Markets that meet these conditions will lead, voluntary exchange by voluntary exchange, to a situation, at least in theory, in which all possible gains from voluntary exchange have been exhausted. Kneese points out that theorists who accept a certain value premise have found that "the results of an ideal market are desirable or normative." The premise "is that the personal wants of the individuals in the society should guide the use of resources . . . and that those personal wants can most efficiently be met through the seeking of maximum profits by all producers."²⁰

The argument for allocatory efficiency may proceed in one of two ways, depending on whether one adopts the "ideal market" (Pareto) or the "benefit-cost" (Kaldor-Hicks) definition of efficiency. Those who emphasize the model of the ideal market point out that it provides a number of useful concepts to guide social regulation. This is true because exchange in an ideal market is *not* like what happens in the

actual economy. As Kneese notes, the "connection between such a market exchange and the real working economy has always been tenuous at best." The idealized model serves, then, "as a standard against which an actual economy could be judged as a resource-allocation mechanism for meeting consumer preferences."²¹

The government, on this approach, may intervene to make actual markets more perfect, for example, by charging for the use of unowned assets (such as clean air) and by requiring polluters to pay costs associated with the negative side effects, the "spillovers" or "externalities," of the production process. Markets would allocate resources much more efficiently if these "externalized" costs of production were "internalized," which is to say, made subject to the pricing mechanism. As Kneese sees it, "the main source of our environmental problems is the inability of market exchange as it is presently structured to allocate environmental resources efficiently – that is, to price their destructive use appropriately."²² More generally, as D. W. Pearce writes, "economists have regarded environmental degradation as a particular instance of 'market failure.'"²³

Many economists, however, see a big problem in the voluntary or "unanimous consent" processes associated with perfect competition in a free market. In a system in which everyone who is affected by a transaction must consent to it, anyone who would lose from and therefore opposes an exchange may veto it, for example, by refusing to sell a property right. This problem, as John Krutilla and Anthony Fisher note, is an old one in welfare economics. They ask, "How is a project or land use policy which results in gains to some individuals and losses to others properly evaluated? In particular, can the gains and losses be algebraically added over all affected individuals to determine the gain (from each of the alternative uses of an area's resources)?"²⁴

Many economic theorists observe that we cannot make very much progress if we demand unanimous consent, that is, if we operate entirely within the criterion (associated with Vilfredo Pareto) that allocation *A* is better than allocation *B*

only if at least one person prefers *A* to *B* and *no one* prefers *B* to *A*. Fisher and Krutilla observe that any cost-benefit policy prescription, to avoid such a static situation, must adopt the potential-Pareto or Kaldor-Hicks criterion, "according to which the project is efficient, and presumably therefore desirable, if the gains exceed the losses, so that the gainers could compensate the losers and retain a residual gain."²⁵

A project or allocation *A* is more efficient than *B* in the Kaldor-Hicks sense, then, if those who prefer *A* would outbid and, therefore, at least theoretically, could compensate those who prefer *B*, and still retain a residual benefit. To apply this criterion, a cost-benefit analyst will turn to markets, real or hypothetical, for data concerning the prices people are willing to pay for commodities and resources. The analyst will then recommend projects and policies that allocate resources efficiently, that is, to those who would pay the highest prices for them and, in that sense, those who benefit from or value them most.

It is worthwhile to note here, although I shall examine this problem more in Chapter 8, that an allocation meeting the Kaldor-Hicks criterion is likely to differ substantially from the outcome that a consensual market would reach. This is true, in part, because those whom a transaction damages are unlikely to consent to it unless compensation not only could be but is actually paid. What is more, people may be unwilling to sell property rights, or they may be willing to sell them only for much more than they would have paid to acquire them in the first place. The outcome of consensual exchange (since willingness to sell might not track with willingness to pay) will depend to a large extent, then, on the way property rights are originally distributed.

In the sort of universal auction or bidding game envisioned by the Kaldor-Hicks test, in contrast, the efficient allocation of resources (as Ronald Coase has shown in a well-known theorem) is invariant with respect to the initial distribution of property rights.²⁶ Owners of resources in this sort of auction seek to maximize their profit or wealth; they would, therefore, always sell a property right for a bit more than

they would have paid for it. I will return, in Chapter 8, to the question whether the cost-benefit criterion, in basing efficiency on willingness to pay rather than willingness to sell, remains in touch with such values as consent and respect for property rights, which are often thought to justify the market as a social institution.

In a formal cost-benefit analysis, the analyst, using market and other data, estimates, on a willing-to-pay basis, the gains and losses associated with all the major effects of a policy, program, or regulation. The analyst must go through a series of steps, which include

... identification of all nontrivial effects, categorization of these effects as benefits or costs, quantitative estimation of the extent of each benefit or cost associated with an action, translation of these into a common metric such as dollars, discounting of future costs and benefits into the terms of a given year, and a summary of the costs and benefits to see which is greater.²⁷

The resulting sums must also be compared across alternatives. These tasks are Herculean. An enormous amount of highly skilled work goes into foreseeing the possible consequences of a program (which may differ considerably given other policies and decisions) and estimating the benefits and costs associated with those consequences. A good cost-benefit analysis, which may run into several volumes, can be an impressive document.

In the rest of this chapter, I shall analyze two concepts that are central to the notions of efficiency I have described. First, I shall discuss the concept of an externality as it arises in environmental policy and in economic analysis. Second, I shall investigate the conception of value or valuation on which the cost-benefit approach to social policy is based.

TWO CONCEPTIONS OF EXTERNALITIES

The concept of efficiency, when it is defined in terms of the functioning of a market free of "externalities" and other

structural causes of failure, can be used in either a narrow or an expanded sense. When economists speak of "efficiency" in the narrow sense, they use the concept of an externality to refer only to physical side effects, such as pollution, that cause actual damage – the sort defined, for example, by the common law of tort – to person or property. These analysts may then measure the cost of the pollution – to individuals or to society as a whole – in terms of the health damage it causes to people and the economic losses it inflicts upon them.

During the 1950s and 1960s, economists generally worked within this narrow conception of what an externality is, and as a result they showed us how wastefully we had been using many of our environmental resources. They pointed out that publicly owned goods, such as water and air, are overexploited because no one can demand a price for their use; they argued forcefully that sound principles of conservation and management may be founded on the proper functioning of markets. During this period economists spearheaded attempts to conserve natural resources, and we cannot be too grateful for their efforts.

Resource and environmental economists during the 1950s and 1960s generally defined efficiency in the narrow sense, that is to say, in terms of a conception that tied externalities to the physical side effects of market transactions. These economists did not try to estimate on a willing-to-pay basis the "worth" of moral, aesthetic, political, or cultural concerns and convictions. On the contrary, these economists, quite reasonably, associated externalities with the failure of markets correctly to price commodities of the sort for which markets are appropriate and which they usually do price. These analysts did not speculate about our failure to have markets to cover the goals, values, and concerns that are and ought to be identified and resolved through the political process.

During the 1960s and 1970s, a series of popular statutes set out goals and programs for ending racial discrimination, improving public safety and health, controlling pollution, and enhancing the quality of life. These statutes represented

a considered moral judgment about our responsibilities to one another, to future generations, and to the environment. They expressed public disgust with racism, pollution, industrial blight, and other horrors; these laws set out a policy to control and, insofar as possible, eliminate these evils.

Many of the economists who developed the techniques of cost-benefit analysis – E. J. Mishan would be an example – recognized, at least implicitly, the intractability of quantifying benefits associated with the ethical and aesthetic concerns expressed in public law.²⁸ These economists urged analysts to list these "qualitative" benefits separately to bring them to the attention of public officials. They did not try to "price" ethical and aesthetic values but saw them as the appropriate subject of political deliberation within the legislative process.

During the 1960s and 1970s, however, owing in part to the work of Ronald Coase, which I shall not pause to describe here, economists began to argue that inefficiencies result not so much from spillover damage to unconsenting third parties, for example, damage caused by pollution, as from the inability of these third parties, because of the costs of bargaining, to organize themselves to enter into and thus influence the transactions that affect them. Accordingly, economists began to replace the notion of a *physical spillover* with the notion of a *transaction* or *bargaining cost* as the paradigm of a market failure. In evaluating the overall efficiency of a project or a policy, analysts began to ask not "What is a cause of what?" but "What is a cost of what?"²⁹ They widened the idea of an externality, then, to include any unpriced benefit or cost, which is to say, anything a person may be willing to pay for but which does not receive a market price that fully reflects willingness to pay.

An efficient policy was understood, at first, to be one that would result from the functioning of markets free of externalities, where externalities were conceived in the old, narrow sense, that is, in terms of physical damage or economic loss to unconsenting third parties. When the notion of an externality expanded to cover *any* unpriced benefit or cost, however, the ideas of an efficient market and an efficient

policy widened as well. An efficient market then had to "internalize" or "price" not only the physical damage or property loss a transaction may inflict on unconsenting third parties, but also every belief, argument, or reason those parties might give for or against that transaction, as long as they conceivably were willing to back up those opinions with money.

Theorists who defend cost-benefit analysis as a tool for policymaking face a dilemma. In identifying the costs and benefits of an action, they must construe externalities in either the narrow or the broad sense, that is, narrowly as damage to person or property of the sort recoverable under common law or broadly as any value – economic, moral, aesthetic, or political – that markets leave unpriced. If analysts construe externalities narrowly, they must concede that many policies that appall them and almost all the rest of us for cultural, aesthetic, and ethical reasons might be perfectly efficient when externalities are understood as physical spillovers and "efficiency" is construed, therefore, in the narrow sense.

We might replace our national parks, for example, with tourist traps, we could convert every arcadia into an arcade, without lessening the market value of anyone's property or damaging anyone's lungs. More people might visit the parks, indeed, if they found casinos there. The value of surrounding property would go up. Another Shopper's World need not hurt the ecosystem terribly even if it destroys the habitat of one or more rare or endangered species. Another tract development in place of open land may not injure anyone's health.

As these and other examples suggest, many policies that are efficient in the narrow sense would conflict with and, indeed, reverse many popular environmental laws, such as the Clean Air Act, the Endangered Species Act, and various wilderness acts, the intention of which is plainly ethical and not narrowly economic. We can assume, for example, that no one would suffer any injury or loss remotely recognizable under common law as a result of the commercial develop-

ment of the habitats of the Colorado squawfish and the Indiana bat, now protected as endangered species. Everyone in Tulare County, California, might benefit financially from the conversion of the little-used wilderness at Mineral King into a Disney resort in the heart of Sequoia National Park.

Many commercially exploitative policies such as these, which surely appear efficient in the narrow sense and which have no nasty spillovers that markets fail to price, are nevertheless so unpopular among the citizenry for cultural and ethical reasons that no one seriously believes Congress will permit them. Laws that protect the natural environment are intended to do just that – not necessarily to balance interests, internalize externalities, maximize benefits, or increase social wealth.

In order to make market and cost-benefit analysis applicable to public values, analysts may appeal to the wider notion of an externality, which includes not simply injury or damage of the sort that might give third parties standing to sue in common law but also any relevant attitude, opinion, argument, or belief that a person might conceivably be willing to back up with money. When analysts expand the notion of an externality in this way to embrace the opinions and beliefs of the citizenry, which are central to environmental legislation, they make a bald attempt not to inform but to replace the political process, an attempt they may not acknowledge. It is for the political process – not for economic analysis – to gather and judge these opinions and beliefs.

Policymakers need to know which beliefs about facts are credible and which arguments about values are sound. The credibility of a belief (e.g., that the earth is round) depends on evidence and expert opinion, not the amount people are willing to bet that it is true. Nor does the soundness of an ethical argument depend on willingness to pay, although economic information, of course, may be relevant. Thus, cost-benefit techniques, when they go beyond the confines of determining efficiency in the narrow sense, do not provide useful information. Rather, they confuse preference with ethical and factual judgment.

Cost-benefit analysis does not, because it cannot, judge opinions and beliefs on their merits but asks instead how much might be paid for them, as if a conflict of views could be settled in the same way as a conflict of interests. Analysts who take this approach, of course, tend to confuse views with interests. They do this by giving political, ethical, and cultural convictions technical names – “bequest values,” “existence values,” “intangibles,” “fragile values” or “soft variables” – as if by this nomenclature they could transform beliefs that have carried the day before legislatures into the data of economic methodology.

I recognize the importance of cost-benefit analysis when it is used narrowly to inform the public and its officials about the actual market costs associated, for example, with reclaiming mined lands or increasing highway safety. To make a wise decision, society must know these costs and recognize the law of diminishing returns. Economic analysis, moreover, may also reveal less expensive ways society may reach its cultural and ethical goals, for example, by replacing “command and control” bureaucratic approaches with market incentives in order to abate pollution.

In Chapter 9 I shall discuss the usefulness of cost-effectiveness analysis and other techniques that differ from cost-benefit analysis in the following way: *Cost-benefit* analysis fixes our societal goals in advance; it presupposes that any rational policy will seek efficiency (or some mix of efficiency and equity) in the allocation and distribution of resources. *Cost-effectiveness* analysis, in contrast, helps us find the least costly means to achieve societal goals we choose through the political process and approve on moral or cultural grounds.

Although I shall defend some techniques of economic analysis in later chapters, I believe any such technique becomes invidious when used not only to help society achieve its political and ethical objectives – for example, a safer, cleaner environment – but also to determine what those goals are or ought to be. Analysts who do this may be convinced that efficiency in the wide sense is itself a goal worth pursuing, or they may construe efficiency as a meta-value in relation

to which all other values may be compared or judged. In Chapters 2, 3, and 4, I shall argue against this expanded conception of efficiency and against the crazy kind of second-guessing of “consumer” preferences that is carried on in its name.

Here it suffices to say that when cost-benefit analysis attempts to do the work of ethical and political judgment, it loses whatever objectivity it might have had and becomes a tool of partisan politics. I shall argue in Chapter 3 that when cost-benefit analysis assigns “shadow” prices to “amenity,” “option,” “bequest,” and other citizen beliefs and values, theoretical “breakthroughs” replace sound judgment and common sense. At that point, economic analysis deteriorates into storytelling and hand-waving likely to convince no one except those partisans who agree with – and possibly have paid for – its results.

EFFICIENCY AND EQUALITY

Policy analysts who favor efficiency as a social goal respect the importance of another social objective, namely, equality, equity, or justice. (Under the broad conception of efficiency, of course, they might construe justice as another “benefit” for which individuals are willing to pay.)³⁰ I believe that “equality,” like “efficiency,” may mean two different things. It may refer, first, to the way wealth is distributed: It may mean equality of income or equality of access to resources. It may refer, second, to equality before the law and within the political process. Individuals are treated as equals in this second sense only if their views receive a fair hearing on the basis of the arguments they make for them. No society can grant equality of this kind if it considers only the views of a “vanguard” party or if it dismisses all arguments but those adhering to the “correct” line.

Some commentators argue that policies favored by environmentalists – strict air-quality standards, for example – make consumer products more expensive and thus hurt the poor more than the rich.³¹ Environmental protection, then,

may sometimes conflict with attempts to enhance social equality in the first sense. There is some evidence, for example, that the average income of Americans who visit the national parks exceeds that of Americans generally.³² I do not know what to make of these observations. I imagine, however, that no generalizable connection holds between equality in this first sense and programs that attempt to improve the quality or maintain the authenticity of the natural environment.

Equality or justice may also refer to the right of all citizens to argue for their views or opinions *in foro publico* and to have these arguments discussed on their merits without bias or prejudice. This kind of justice may be secured, in part, when all sides to a dispute recognize that finding a solution is a shared rational enterprise in which each has an equal right to participate. This enterprise subscribes to certain virtues such as civility, respect for the opinions of others, and an unwillingness to resort to force. No one can claim a special or privileged access to the "right" decision or to the "correct" methodology. It is "equality" in this sense that is most likely to conflict with efficiency.

Those who favor efficiency as the goal of social policy tend to think of it as a grand value that takes up, incorporates, and balances all other values – because these are simply preferences for which individuals are willing to pay. These partisans, therefore, may regard views opposed to theirs not as arguable opinions deserving a fair hearing but as ideological "wants" that markets fail to price. A policy analyst, if convinced that efficiency or wealth-maximization constitutes the value of values, would not read this book to savor and answer its arguments. He or she would judge the value of the arguments by the sales of the book!

VALUES AS WANTS

Values enter political deliberation and cost-benefit analysis in very different ways. The idea behind deliberation is that the process of negotiation and discussion can be educational.

Because people must argue their views on the merits and from a public or intersubjective point of view in order to persuade each other, they may refine or even change their positions to make them plausible representations of the public interest or the general good. Disagreements are likely to turn, therefore, on scientific, technical, and legal considerations, about which both sides may then seek more evidence or better information. In the context of deliberation, in other words, positions are not construed as exogenous variables but are endogenous to the decision-making process. Participants, therefore, may redefine a problem or consider alternatives that permit an unexpected resolution.

Values enter cost-benefit analysis as exogenous variables, that is, as "given" or "arbitrary" preferences for which individuals are willing to pay. An analyst may therefore construe any policy (for example, a decision to allow air pollution in national parks) as a benefit to those who approve and as a cost to those who oppose it. Thus, analysts may construe judgments a person may back up with reasons as if they were preferences of the sort he or she would reveal in a market. The analyst supposes in all such cases that "This is right for the following reasons: . . ." and "I believe this because . . ." are equivalent to "I want this" and "This is what I prefer."

Value judgments lie beyond criticism if, indeed, they are nothing but expressions of personal preference; they are incorrigible, since every person is in the best position to know what he or she wants. All valuation, according to this approach, happens *in foro interno*; debate *in foro publico*, other than incantations in favor of efficiency or some balance of efficiency and equity, has no point.

This approach denies the educative function of political discussion; from its point of view, the political process is continuous with the kind of trading that goes on in markets. The reasons people give for their views (outside the journals of economic analysis, where *argument* apparently is to be respected) are not to be counted; what counts is how much individuals will pay to satisfy their wants. Those willing to

pay the most, for all intents and purposes, have the right view; theirs is the better judgment, the deeper insight, and the more informed opinion.

The assumption that valuation is subjective, that judgments of good and evil are nothing but expressions of desire and aversion, is not unique to the economic theory on which much policy analysis is based. There are some psychotherapists – Carl Rogers is an example – who likewise deny the objectivity or cognitivity of valuation. For Rogers, there is only one criterion of worth: It lies in the “subjective world of the individual. Only he knows it fully.”³³ The therapist, according to Rogers, succeeds when the client “perceives himself in such a way that no self-experience can be discriminated as more or less worthy of positive self-regard than any other.”³⁴ The client then “tends to place the basis of standards within himself recognizing that the ‘goodness’ or ‘badness’ of any experience or perceptual object is not something inherent in that object, but is a value placed in it by himself.”³⁵

Rogers points out that “some clients make strenuous efforts to have the therapist exercise the valuing function, so as to provide them with guides for action.”³⁶ The therapist, however, “consistently keeps the locus of evaluation with the client.”³⁷ As long as the therapist refuses to “exercise the valuing function” and as long as he or she practices an “unconditional positive regard”³⁸ for all the affective states of the client, the therapist remains neutral among the client’s values or “sensory and visceral experiences.”³⁹ The therapist accepts all felt preferences as valid and imposes none on the client. The role of the therapist is legitimate, Rogers suggests, because of this neutrality.

Policy analysts sometimes argue that their role in policy-making is legitimate because they are neutral among competing values in the client society. The political economist, according to James Buchanan, “is or should be ethically neutral: the indicated results are influenced by his own value scale only insofar as this reflects his membership in a larger group.”⁴⁰ The analyst, to maintain his or her value neutrality,

might try to derive policy recommendations formally or mathematically from the preferences of all members of society. If theoretical difficulties make such a social welfare function impossible, however, the next best thing, to preserve neutrality, may be to let markets function to transform individual preference orderings into a collective ordering of social states.⁴¹

The analyst is able, then, to claim that the methods of cost-benefit analysis are neutral among competing preferences. The question remains, however, whether the use of cost-benefit analysis is neutral among competing conceptions of the role of regulation in a good society. The question arises whether reliance on this analytic tool is consistent with the content of current legislation or, indeed, with the idea of democracy and the rule of law.

TWO CONCEPTIONS OF NEUTRALITY

Consider, by way of contrast, what I shall call a Kantian conception of value.⁴² The individual, for Kant, is a judge of values, not a mere haver of wants, and the individual judges not merely for himself or herself but as a member of a relevant community or group. The central idea in a Kantian approach to ethics is that some values are more reasonable than others and therefore have a better claim upon the assent of members of the community as such.⁴³ The world of obligation, like the world of mathematics or the world of empirical fact, is objective – it is public not private – so that the intersubjective virtues and standards of argument and criticism apply.

Kant recognizes that values, like beliefs, are subjective states of mind, but he points out that, like beliefs, they have objective content as well; therefore, values are either correct or mistaken. Thus, Kant discusses valuation in the context not of psychology but of cognition. He believes that a person who makes a value judgment – or a policy recommendation – claims to know what is *right* and not just what is *preferred*. A value judgment is like an empirical or theoretical judgment in that it claims to be *true* not merely to be *felt*.

We have, then, two approaches to social regulation before us. One approach assumes that political and economic decisions about the environment are justified in roughly the same way, that is, in relation to preferences individuals express or would express in their consumer and, possibly, their voting behavior. According to this approach, the policy that may be defended on objective grounds – as the right thing to do – is the policy of maximizing the satisfaction of these preferences; every other policy decision is an application of that one.

The Kantian approach, on the other hand, assumes that policy recommendations in general are to be judged on the basis of reasons rather than wants. This view maintains a notion of the common good as an object posited and understood by reason; this is different from thinking of the public interest as a matter to be measured in terms of subjective wants. The Kantian approach also makes individuals the ultimate sources of policy – but it submits policy to their judgment rather than deriving it from their preferences. This view treats people with respect and concern insofar as it regards them as thinking beings capable of discussing issues on their merits. This is different from regarding people as bundles of preferences capable primarily of revealing their wants.

The Kantian approach assumes that public policies may, in general, be justified or refuted on objective grounds, that is, on the basis of what can be said for or against them, not necessarily on the basis of the intensity of competing desires. The Kantian concedes, nevertheless, that many decisions are either too trivial, too personal, or too knotty to be argued *in foro publico* and thus should be left to some nonpolitical resolution, usually to a market. How many yo-yos should be produced as compared to how many Frisbees? Should pants be cuffed? These questions are so trivial or inconsequential or personal, it is plain markets should handle them. It does not follow from this, however, that we should adopt a market or quasi-market approach to every public question.

A market or quasi-market approach to arithmetic, for example, is plainly inadequate. No matter how much people

are willing to pay, three will never be the square root of six. Similarly, segregation is a national curse, and if we are willing to pay for it, that does not make it better but only makes us worse. Similarly, the case for or against abortion rights must stand on the merits; it cannot be priced at the margin.⁴⁴ Similarly, the war in Vietnam was a moral debacle, and this can be determined without shadow-pricing the willingness to pay of those who demonstrated against it.⁴⁵ Similarly, we do not decide to execute murderers by asking how much bleeding hearts are willing to pay to see a person pardoned and how much hard hearts are willing to pay to see him hanged.

Our failures to make the right decisions in these matters are failures in arithmetic, failures in wisdom, failures in taste, failures in morality – but they are not market failures. There are no relevant markets to have failed.

What separates these questions from those for which markets are appropriate is this: They involve matters of knowledge, wisdom, morality, and taste that admit of better or worse, right or wrong, true or false – and these concepts differ from that of economic optimality. Surely environmental questions – the protection of wilderness, habitats, water, land, and air as well as policy toward environmental safety and health – involve moral and aesthetic principles and not just economic ones. This is consistent, of course, with cost-effective strategies for implementing our environmental goals and with a recognition of the importance of personal freedoms and economic constraints.

The neutrality of the economist, like the neutrality of Rogers's therapist, is legitimate if private preferences or subjective wants are the only values in question. A person should be left free to choose the color of his or her necktie or necklace – but we cannot justify a theory of public policy or private therapy on that basis.

What Rogers's therapist does to the patient the cost-benefit analyst does to society as a whole. The analyst is neutral among our "values" – having first assumed a view of what values are, that is, having assumed a particular theory of the good. This is a theory that fails to treat values as values and

therefore fails to treat the persons who have them with respect or concern. It does not treat them even as persons but only as locations at which affective states may be found. And thus we may conclude that the "neutrality" of cost-benefit analysis is no basis for its legitimacy. We recognize this neutrality as an indifference toward value – an indifference so deep, so studied, and so assured that at first one hesitates to call it by its right name.

THE CITIZEN AS CLIENT

The residents of Lewiston at the meeting I attended argued that there are crucial moral, aesthetic, and political differences between the risks they take, for example, by smoking or by driving, and the risks imposed on them, for example, by a nearby but hidden depository for nuclear wastes. There is an ethical difference between jumping and being pushed – even if the risks and benefits are the same. Many risks are acceptable because they have been accepted; they are familiar, voluntary, part of everyday life. Some risks are unacceptable because they have not been accepted: They are unknown, insidious, out of one's own hands. What is important to the residents of Lewiston is not necessarily the magnitude of the risk, about which they know experts will disagree, but its meaning, that is, what it suggests about their relationship with their government and about their ability to participate in the decisions, public and private, that affect their lives.

The officials at the other side of the table found much of this anxiety "irrational," given the trade-offs the residents were willing to make, as a rule, between safety and other goods and services. What the residents saw, fundamentally, as a political problem involving the maintenance and functioning of our democratic institutions the officials understood as a matter of making markets efficient and of balancing benefits and costs.

One official from a large chemical company dumping wastes in the area told the residents, in reply, that corpo-

rations were people and that people could talk to people about their feelings, interests, and needs. This sent a shiver through the audience. Like Joseph K. in Franz Kafka's *Trial*, the residents of Lewiston asked for an explanation, justice, and truth, and they were told that their wants would be taken care of. They demanded to know the reasons for what was continually happening to them. They were offered a personalized response instead.

This response, that corporations are "just people serving people," is consistent with a particular view of power. This is the view that identifies power with the ability to get what one wants as an individual, that is, to satisfy one's personal preferences. When people in official positions in corporations or in the government put aside their personal interests, it would follow that they put aside their power as well. Their neutrality then justifies their directing the resources of society in the ways they determine to be best. This managerial role is legitimate, they believe, because it serves their clients' interests and not their own.

Behind this managerial role, as William Simon observes of the lawyer-client relationship, lies a theory of value that tends to personalize power. "It resists understanding power as a product of class, property, or institutions and collapses power into the personal needs and dispositions of the individuals who command and obey."⁴⁶ Once economists, therapists, lawyers, or managers abjure their own interests and act wholly on behalf of client individuals, they appear to have no power of their own and thus justifiably manipulate and control everything. "From this perspective it becomes difficult to distinguish the powerful from the powerless. In every case, both the exercise of power and submission to it are portrayed as a matter of personal accommodation and adjustment."⁴⁷

Once the affective, that is, the economic, self becomes the source of all value, the public self becomes merely "apparent" and cannot participate in the exercise of power. Power, indeed, appears to be entirely private; it is the power to satisfy one's personal preferences. It ceases to be the power

to join with others in effective political action to define and pursue collective values and shared aspirations. As Philip Rieff remarks, "the public world is constituted as one vast stranger who appears at inconvenient times and makes demands viewed as purely external and therefore with no power to elicit a moral response. There is no way to distinguish tyranny from the legitimate authority that public law and public values create."⁴⁸

The key to the emotive or interest theory of value, as one commentator has rightly said, "is the fact that emotivism entails the obliteration of the distinction between manipulative and non-manipulative social relations."⁴⁹ As soon as we accept the theory that values are subjective, that they are just "wants," we must also accept the idea that managers – whether therapists, lawyers, or cost-benefit analysts – are in the best position to handle them for us. We must also accept the idea that we all want the same thing, namely, the satisfaction of as many preferences as possible, taking their intensity into account. We consent hypothetically, counterfactually, or implicitly, therefore, to the same policies, those that promote efficiency and maximize wealth. Not socialism, but this kind of economic analysis takes us into an untenable communistic fiction about the unity of society.⁵⁰ In welfare economics, the Marxist dream is realized: the triumph of society over polity, administration over government – and thus the final withering away of the state.

"At the rate of progress since 1900," Henry Adams speculates in his *Education*, "every American who lived into the year 2000 would know how to control unlimited power."⁵¹ Adams thought that the Dynamo would organize and release as much energy as the *Virgin*. Yet in the 1980s the citizens of Lewiston, surrounded by dynamos, high-tension lines, and nuclear wastes, are powerless. They do not know how to criticize power, resist power, or justify power – for to do so depends on making distinctions between good and evil, right and wrong, innocence and guilt, justice and injustice, truth and lies.

These distinctions have no significance within an emotive or psychological theory of value. To adopt such a theory is to imagine society as a market in which individuals trade to satisfy their arbitrary and subjective preferences. No individual, no belief, no faith, has authority over them. To have power to act as a nation, however, we must be able to act, at least at times, on a public philosophy, conviction, or faith. We cannot permit welfare economics to replace the moral function of public law. The antinomianism of cost-benefit analysis is not enough.

FOR THE COMMON GOOD

Redirecting the Economy
toward Community,
the Environment, and a
Sustainable Future

Herman E. Daly and
John B. Cobb, Jr.

With Contributions by
Clifford W. Cobb

Beacon Press • Boston

The Religious Vision

Alternative Biospheric Visions

In Chapter 10 we discussed briefly what is most essential to the religious understanding that underlies this book, namely, the biospheric vision. However, our efforts to be as inclusive as possible in choosing the premises from which we have argued has led us to underplay this theme, leaving our argumentation, in our own view, not fully grounded. In this chapter we want to develop biospheric thinking in general, but also we want to clarify the form and basis of biospheric thinking that has in fact guided us throughout. We are both Christian theists, and we want to show how our belief supports the biospheric vision.

A second reason for including this chapter is that there are in fact multiple biospheric perspectives. When viewed from a distance against the background of the anthropocentrism and dualism that have dominated the modern world, these various perspectives appear similar. But the theological and philosophical issues that divide them are important not only theoretically but practically. Despite our hope for support from all who share the biospheric perspective, we know that both our own attention to economic issues and the way we have treated them follow from our particular version of the biospheric perspective. Other biospheric perspectives lead to raising different issues and to treating them in different ways. As biospheric thinking becomes more widespread, the importance of these divergences will grow.

There is a third reason for adding this chapter. There are many theists who suppose that belief in God is opposed to biospheric thinking. Like economics, modern Western Christianity has often allied itself to anthropocentrism and the neglect of nature. It has generated suspicion of organismic views of human beings and of their communities, and fear that the distinctiveness of human beings, both their specialness

by virtue of having been created *imago dei* and their radical sinfulness, which distinguishes them from the rest of creation, will be obscured. Some modern Christians have been led by their investment in concern for human rights and identification with the oppressed to a suspicion that any major focus on the biosphere is a distraction from social justice issues. We take these suspicions seriously, but we believe that the biospheric perspective can be integrated into and grounded by theocentrism in a way that does not neglect justice, and indeed is required by justice. We want to show this and to channel the energies of our fellow Christian believers in directions that we think are more truly appropriate to our shared heritage.

The biospheric vision is richly inclusive and transformative of human perceptions. Once community with other living things is truly experienced and appreciated, aspects of our thinking and our way of life previously taken for granted become unacceptable. In short it is in itself a religious vision. The rise of this vision, especially through the influence of ecological and feminist sensitivities, has been one of the great advances of this generation. Only as the vision deepens and spreads is there hope for making the changes that are required by the wild facts.

The term "deep ecology" is sometimes used to refer to this vision and the move away from anthropocentrism that it entails. Two of the leaders of this movement, Arne Naess and George Sessions, have proposed eight basic principles for this movement.

1. The well-being and flourishing of human and nonhuman life on Earth have value in themselves (synonyms: intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes.
2. Richness and diversity of life forms contribute to the realization of these values and are also values in themselves.
3. Humans have no right to reduce this richness and diversity except to satisfy vital needs.
4. The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of nonhuman life requires such a decrease.
5. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening.
6. Policies must therefore be changed. These policies affect basic economic, technological, and ideological structures. The resulting state of affairs will be deeply different from the present.
7. The ideological change is mainly that of appreciating life quality (dwell-

ing in situations of inherent value) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great.

8. Those who subscribe to the foregoing points have an obligation directly or indirectly to try to implement the necessary changes. [Devall and Sessions 1985, p. 70]

We find ourselves in basic agreement with the principles of deep ecology as thus formulated. We would reword proposition 4 to refer to a "substantial decrease in the human niche, effected either by a reduction in population or in per capita resource consumption." Still we are in full alliance with those who have defined deep ecology in this way.

But matters are not this simple. For Naess and Sessions our position is in fact excluded from deep ecology despite our acceptance of the eight basic propositions. For them, basic points 1 and 2 are interpreted in terms of "biocentric equality," the intuition "that all things in the biosphere have an equal right to live and blossom and to reach their own individual forms of unfolding and self-realization . . . that all organisms and entities in the ecosphere, as parts of the interrelated whole, are equal in intrinsic worth" (Devall and Sessions 1985, p. 67).

We do not share this view. We believe there is more intrinsic value in a human being than in a mosquito or a virus. We also believe that there is more intrinsic value in a chimpanzee or a porpoise than in an earthworm or a bacterium. This judgment of intrinsic value is quite different from the judgment of the importance of a species to the interrelated whole. The interrelated whole would probably survive the extinction of chimpanzees with little damage, but it would be seriously disturbed by the extinction of some species of bacteria. We believe that distinctions of this sort are important as guides to practical life and economic policy and that the insistence that a deep ecologist refuse to make them is an invitation to deep irrelevance.

This dispute may be less substantial than it initially seems. Naess suggests that biocentric equality as an intuition is true in principle, although in the process of living, all species use each other as food, shelter, and so on. This suggests some openness to making judgments about which species it is better to use as food and for shelter and other needs. But the "basic intuition" actually governs the further development of the discussion, turning attention away from these practical issues. We, in contrast, encourage the emergence of a basic vision that will guide practical action by differentiating grades of both instrumental and intrinsic

sic value while affirming the basic intuition that all living things have value independent of their usefulness for human purposes (Birch and Cobb 1981).

Perhaps the most widely influential expression of the biospheric vision has been that of Aldo Leopold (1966). Leopold proposed a land ethics with the fundamental principle: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community; it is wrong when it does otherwise" (Leopold, 1966, p. 240). This gives much clearer guidance to human action than does "biocentric equality." Leopold believed that the feeling expressed in this ethics can arise from the human recognition of kinship and interdependence with all living things.

The strongest objection to Leopold's ethics has come from those who fear that human responsibility to human beings will be drastically subordinated to concern for the health of the land, and that indeed there is no basis for real interest in individual animals. The suffering of individuals seems to count for little if only the integrity, stability, and beauty of the biotic community are in view.

J. Baird Callicott has recently defended Leopold against this charge and has shown that an adequately developed biocentric doctrine can do justice both to the commitment to the whole and to sensitivity to individuals—especially, but not exclusively, human individuals. His formulation is very close to ours in Chapter 9, where we speak of the community of communities as extending to the entire biosphere. In a community of communities there is a special relation to the more immediate community, but there is concern also for the other communities with which it is in relation. Also, the concern for the well-being of the community as a whole cannot be separated from respect for its individual members. Callicott quotes Leopold to show that this is not alien to him: "A land ethic changes the role of *Homo sapiens* from conqueror of the land community to plain member and citizen of it. It implies respect for fellow-members and also respect for the community as such" (Callicott 1980, p. 408).

Callicott's vision of the biotic community leads him to project developments in human society in much the way we have: "A human civilization based upon nonpolluting solar energy for domestic use, manufacturing and transportation and small-scale, soil conserving organic agriculture. There would be fewer material things and more services, information, and an opportunity for aesthetic and recreational activities; fewer people and more bears; fewer parking lots and more wilderness"

(Callicott 1980, p. 415). This indicates that indeed the policies we have advocated in Part Three can flow from the vision of a community of communities including all living things, the vision with which we concluded Part Two. We support Callicott's vision and argument.

Nevertheless, we are not wholly satisfied with it. Although we agree strongly with Callicott's balance of concern for individuals and for the whole, we find some difficulties on both points. Although we agree that it is possible to have respect for all other living creatures, it is not quite clear why we should do so. Sometimes the argument seems to be that the awareness of kinship and interdependence by itself generates this respect. We think it may or it may not. When it does not, is there any basis for calling for it, for claiming that one *should* have such respect? In part the argument seems to be that the evolutionary process selects for those who have such wider affections. Again we are not sure that this is true. Callicott's account of evolution puts the emphasis on the greater survival capacity of communities in which there is mutual support. This is indeed one aspect of the process. But evolution seems also to have selected those human communities that had superior technologies and did not hesitate to use them in war against others. It is a mixed process, not altogether benign. We fear that the factors for which evolution has selected may lead human beings to act in ways that will destroy much of the biosphere. This seems to be what is happening, and we doubt that it is safe to await a change of heart brought about by evolutionary selection. Actually we do not see Callicott as doing this. He is presenting us an attractive candidate for an ethic, one that is self-consistent, adequate, and practical. He appeals to people to accept it on the basis of those among their feelings that lead in this direction. We hope his appeal is widely successful. But thus far it has not been. We wonder if it is not possible to give stronger grounds for adopting the ethic he supports.

There is some ambiguity also on the side of the "whole" to which he appeals. Occasionally it seems that this might be the cosmos, but generally it seems to be the biotic community or biosphere. We agree that this is as far as it is meaningful to go in seeking to extend a sense of community beyond the human species. But what is the nature of this whole? Where does it exist? Does it exist only in and for the individuals of which it is composed? Callicott's language suggests that this is not what he means. Yet if not, what status does it have? And finally, is the biotic community practically a sufficient and appropriate object of commitment? When biospheric thinking, which we strongly endorse, takes the

biosphere as the ultimate object of concern, when it becomes in this sense biocentric, limitations appear.

Biocentrism can fall short of what is needed if it distinguishes too sharply between the animate and the inanimate. Community based on similarity and concern for individuals declines to the vanishing point when inanimate things are included. But something like community based on interconnectedness and interdependence remains. Furthermore, the sense of such community has not been absent to human history. It was common among the pre-European inhabitants of North America. The feeling for the landscape of one's native land is not a strange sentiment even among moderns. The picture of the planet taken from outer space aroused deep feelings of love for the earth as home. A geocentric vision includes the biospheric perspective in its more comprehensive context. We think that the policies we propose are appropriate from a geocentric perspective and indeed can be derived from it. The whole earth should, for its human inhabitants, be like a community of communities.

Systems thinking has led some in this direction. Recently, Lovelock has given moving expression to this sense of the earth in his book on *The Gaia Hypothesis* (1979). It has received surprisingly wide and favorable attention. In much the way biocentric thinking is based on biology, and especially ecology as a branch of biology, Lovelock's geocentric thinking is based on chemistry. He focuses on atmospheric gases and global temperature as affected by them, showing how remarkable their relative constancy of balance is. Whereas it has often been supposed that the composition of the atmosphere was given and happened to make life possible on this planet as it is not possible elsewhere, Lovelock argues that to an extraordinary extent it is the living systems on the planet that produce and maintain the atmosphere. He pictures the earth as a self-regulating system.

From all that has been learned about the interactions of the organic and inorganic parts of the planet "has arisen the hypothesis, the model, in which the Earth's living matter, air, oceans, and land surface form a complex system which can be seen as a single organism and which has the capacity to keep our planet a fit place for life" (Lovelock 1979, p. vii). Earth viewed in this way Lovelock calls Gaia.

Lovelock emphasizes that the processes through which the earth regulates itself are automatic in the sense that they do not involve conscious thought. This is true of homeostatic processes generally. But he

argues that "some form of intelligence is required even within an automatic process, to interpret correctly information received from the environment. . . . The body's automatic temperature-regulating system is intelligent to the point of genius" (p. 146). Lovelock sees Gaia as intelligent at least in this limited sense.

If, as Lovelock believes, the earth is properly understood as Gaia, "then we may find ourselves and all other living things to be parts and partners of a vast being who in her entirety has the power to maintain our planet as a fit and comfortable habitat for life" (p. 1). This leads to a quasi-religious vision of human destiny:

The evolution of homo sapiens, with his technological inventiveness and his increasingly subtle communications network, has vastly increased Gaia's range of perception. She is now through us awake and aware of herself. She has seen the reflection of her fair face through the eyes of astronauts and the television cameras of orbiting spacecraft. Our sensations of wonder and pleasure, our capacity for conscious thought and speculation, our restless curiosity and drive are hers to share. This new interrelationship of Gaia with man is by no means fully established; we are not yet a truly collective species, corralled and tamed as an integral part of the biosphere, as we are as individual creatures. It may be that the destiny of mankind is to become tamed so that the fierce, destructive, and greedy forces of tribalism and nationalism are fused into a compulsive urge to belong to the commonwealth of all creatures which constitutes Gaia. It might seem to be a surrender, but I suspect that the rewards, in the form of an increased sense of well-being and fulfillment, in knowing ourselves to be a dynamic part of a far greater entity, would be worth the loss of tribal freedom [Lovelock 1979, p. 148]

Admirable as Lovelock's vision is, and much as we hope to be able to collaborate with those who share it, its limitations should also be noted. Because it focuses on the chemical cycles, those aspects of the earth's living system that are not important for these cycles tend to be slighted. Less important, perhaps, is the obvious fact that the earth is part of a still larger system, so that abstracting it from that larger system as the object of ultimate concern exaggerates its autonomy and continues to encourage devotion to a part rather than to the whole.

We have noted the tendency among biocentric thinkers to focus on the earth's system as a whole in ways that depreciate the importance of the suffering of individual creatures. This tendency is, if anything, stronger in Lovelock's geocentric perspective. We believe there is need for a vision that combines the systemic interests that have been identi-

fied by these thinkers with appreciation for the importance of each individual participant in the system quite apart from its contribution to the whole.

The Prophetic Tradition

Our appreciation for the biocentric and geocentric thinkers we have considered, as well as our critique of them, stem from our own immersion in the biblical faith. This leads us to be concerned for individual creatures and their individual suffering and also with the importance of giving our final commitment and loyalty to the whole. To commit oneself finally to anything less than the whole is, in this perspective, idolatry.

Idolatry can be defined formally as treating as ultimate or whole that which is not ultimate or whole. It is very much like the fallacy of misplaced concreteness, which treats as concrete what in fact is abstract. Many instances of that fallacy lead to idolatry. We cannot live without abstractions, and yet there is profound danger when we forget that they are abstractions. Similarly we cannot live without committing ourselves to what is less than ultimate. Yet there is a profound danger when we forget that the object of our commitment is only a part of a larger whole. Everyone commits the fallacy of misplaced concreteness. All of us are idolators. That will always be the human condition. But we must not for that reason cease to distinguish between abstract and concrete in an effort to check our reasoning and correct our errors. Nor can we deny or ignore the difference between the part and the whole, the human and the divine perspective, if we are to submit our thinking to continuous correction. We need a constant reminder that our functional commitments, however worthy, fall short of the ultimate.

The canonical prophets prophesied primarily against their own community, Israel, and it was in this context that there arose the deepest roots of Western individual personhood. The prophet as individual was addressed by God and claimed God's authority for his message. The absolute authority of human community was exposed as idolatrous. No human community can finally control an individual's relation to God.

But for the prophets of Israel this individual autonomy was a minor note in comparison with the importance of community and the assumption that to be a person is to be person-in-community. God's Word is normally addressed to whole communities, and especially to Israel. Israel's chosenness by God was for the highest responsibility. Hence it is criticized most severely for its failings as a community.

In general Christianity derived from the prophetic tradition within Judaism. It accentuated the emphasis on the individual over against natural communities, while elevating itself as a community to a nearly supernatural status. Its history has been filled with prophetic critique of its own life and practice, but it has also often turned prophetic criticism outward against society as a whole and against other religious communities as well. Too often Christian theory and practice, rather than God, have been the norms for this critique and there has been far too little appreciation for the inherent, if penultimate, value of diverse communities.

This one-sided appropriation of the prophetic tradition characterized much of the Protestant Reformation. Among its own believers it established new communities. In the understanding of these communities it continued something of the passion of the Hebrew prophets for the righteousness of Israel as a community. It emphasized the immediacy of each individual to God, modifying that only with respect to the instruments of grace through which God has chosen to express that immediacy. But it failed to emphasize that all human community is an instrument of grace. The Enlightenment took place chiefly on Protestant soil. It swept away the instruments of divine grace and the community that served them. Only the individual and God were left alongside the nation. Individuals might join together in projects that they could not complete alone, but all such associations were contractual. Thus unnurtured, the very idea of community began to atrophy.

As the Enlightenment proceeded even the immediacy of God disappeared. Human beings were immediate to themselves individually, and that was enough. "God" was no longer seen in and through the creatures but was viewed as standing outside them and above them, known to exist only by reason. The creatures functioned quite autonomously without God. Then "God" became redundant and disappeared. The human soul alone was sacred. The rest was atoms in a void. For some, the soul, too, was a part of this meaningless physical world; nothing was sacred.

The children of the Enlightenment spread their gospel everywhere. All the ancient cultures of the world felt the power of the Enlightenment critique. For the enormous accomplishments of their communities rooted in great traditions they heard no support. Then there fell upon them the power of an economic system, rooted in this way of thinking. To succeed in this new system, the ancient cultures required modernization or rationalization, which meant the destruction of the power of tra-

dition and community. Land and labor—that is, the earth and human beings—had to become commodities. The result has been a holocaust, and this process of rationalization and commodification threatens to destroy yet more.

The prophetic tradition as it functioned in Protestant Christianity has failed humankind in one other way. In its biblical origins it appreciated the land not as a commodity but as the creation and gift of God. In the creation story of Genesis it is said that God sees the many creatures as "good" before and quite apart from the creation of human beings. Throughout the Jewish scriptures the land is God's, not a commodity to be owned by human beings. All the creatures are seen as praising God. In Jesus' teaching God cares for the sparrows and for the lilies of the field. Jesus taught that God cares even more for human beings, but the care for the lilies and for the sparrows is not just for the sake of human beings; it is for the lilies and the sparrows themselves.

But this aspect of the prophetic tradition failed to advance and develop in Christianity. On the contrary, the tradition especially in its Protestant form became narrowly focused on God and the human soul. Thus Protestantism paved the way for the anthropocentrism of the Enlightenment and the relegation of the rest of creation to the status of passive matter to be shaped by human beings to human ends.

We, the authors of this book, are heirs through Protestantism of the prophetic tradition and also of the Enlightenment. We understand deeply from within both their purifying and their annihilating power. We do not deny their truth. But we repent of the one-sidedness with which they have functioned. We would combine that truth with another one, the truth powerfully affirmed in the biblical origins of the prophetic tradition that we are persons-in-community, that there is no genuinely human life when community is destroyed. We would affirm that *all* community is to be celebrated, as our Catholic sisters and brothers have long known.

This message, we think, is now the one of greatest urgency for the world. Hence in our book the emphasis lies here. We celebrate all human community as it struggles against the atomization inherent in Enlightenment thought and modern practice, especially economic practice. We rejoice in the extension of community among those of our time who have come to reaffirm community with all peoples, with other animals, with all living things, and with the whole earth. But in this celebration of community we do not want to lose what is valid in the prophetic tradition: the warning against idolatry. This concern forces us to

distinguish ourselves from the biocentric and geocentric forms of biospheric thinking. Penultimately what the biocentric and geocentric thinkers say is what needs to be said. But ultimately their limits, too, must manifest themselves. It is well from the beginning to know that these limits are there and to reserve one's ultimate commitment for God, even though the proper expression of that ultimate commitment in this time and place will be to give ourselves enthusiastically to the penultimate.

The modern prophetic tradition, when it stands alone, can belittle not only human community but all earthly things. The immediacy of God can loom so large that all interest in the world and even in the neighbor appears as a distraction. In this it can unite with some currents in neoplatonic mysticism. Truly to love God sometimes seems to mean that one is totally absorbed in the immediacy of that relationship.

That is not the biblical prophetic view. In the Bible the immediacy of God frees people from absolute worldly loyalties in order to bring about justice and righteousness within the world. The unity of love of God and love of neighbor are affirmed unequivocally. Indeed, the way to serve God truly is to serve the neighbor. What one does to the neighbor, especially the lowly neighbor, one does to God.

It is our strong desire to stand in solidarity with all those who are expanding the horizons of concern. Our interest in this book is certainly not to argue with them but to offer a program of action on which many can agree. Nevertheless, the difference in ultimate perspective can lead to disagreements with respect to how more immediate matters are considered. Where our perspective is distinctive, we need to acknowledge that.

Sometimes there is tension between those who emphasize the appropriateness of concern for individual members of other species and those who focus on the biosphere and its total health, downplaying the importance of individual creatures. The humane society and the ecological movement can be allies in many struggles, but their emphases are different and sometimes clash. One emphasizes fellow feeling for all that suffer. The other emphasizes the interconnectedness of all living things such that the health of one part of the biosphere is important to all. Both points should be made. The task is to integrate them into a larger whole.

Our conviction is that the prophetic theistic point of view provides the best basis for accomplishing this important task. In this perspective each animal is immediate to God. Its suffering is immediate to itself and immediately shared by God. Those who love God will avoid causing unnecessary suffering even to the least of God's creatures.

But whatever else God is, God is also the inclusive whole. The diversity of the innerconnected parts of the biosphere gives richness to the whole that is the divine life. The extinction of species and simplification of the ecosystems impoverishes God even when it does not threaten the capacity of the biosphere to sustain ongoing human life. Hence the danger of collapse of the life-system is by no means the only reason to oppose the decimation of tropical forests!

Some people who do not affirm theism still affirm both the value of individuals and that of the whole system. We are in alliance with them, and we believe that many people intuitively share our conviction that both are important. Our point is that this affirmation can best be grounded in the view that there is a unified whole sensitive to all that transpires within it. We affirm this inclusive unity as the God of the prophetic tradition, and that this prophetic theism can lead beyond some of the costly conflict among those seeking to break out of the anthropocentric heritage which continues to bind the culture.

The Place of Human Beings

Some of those who view the world from a biospheric perspective emphasize that human beings are simply one species among others. They attack the biblical notion of human dominion as a fundamental error and distortion responsible for much of the evil that has been visited on this planet.

On these matters there is a real difference between us and some of those with whom we hope to be allied. Human beings do constitute one species of animals among others. We not only acknowledge that but want to do what we can to reinforce that perception, which struggles against deep-seated habits of denial. The biblical line is not drawn between humanity and the other animals but between God and creatures. The word translated in the English Bible as "all flesh" expresses the commonality.

But human beings are not "simply" one species among others. The human role is unique. It was unique already in hunting and gathering societies even if their relation with their environment was generally less destructive than ours. Even then people experienced a certain dominion. Today that dominion is almost complete. Any improvement of the relations between human and other species will come about by better ways of exercising dominion, not by renouncing it.

The problem has been that the idea of dominion has been misunderstood by the readers of the Bible. It has been forgotten that in God's

order the ruler rules for the sake of the ruled. Dominion has been taken to justify exploitation of those over whom it is exercised. There is no doubt that the biblical call for dominion has been responsible for much unjustified cruelty and destruction. But the way forward is to understand it more deeply and more responsibly. The best exercise of dominion now possible would be to make more space for other species to live their lives without human interference. This, in fact, is what many mean by renouncing dominion. But this policy would still come about through human decision and would thereby reflect our dominion.

Some of those who criticize the biblical affirmation of human dominion go much further and much deeper. They see the whole movement of the human spirit toward self-transcendence, the prophetic urge to self-criticism, as part of what is destructive. In *Nature and Madness* (1982), Paul Shepard has given particularly powerful and insightful expression to this line of thought. Rather than seek to understand themselves and change themselves, rather than to relativize their own perspectives in light of a comprehensive one, human beings should, like other animals, be what they are. The cultivation of a distinctive human possibility inevitably leads to anthropocentrism of a dangerous sort. It leads human beings to think that they can manage the course of events rather than allow the natural course to carry through. A naive anthropocentrism is said to be acceptable. Human beings without self-transcendence naturally view the world through human eyes and from their own point of view. But this is harmless. Viewed in that way they function as part of a natural order rather than as standing above it.

The issues posed here are utterly fundamental. If Shepard is correct, then the prophetic-Enlightenment tradition is without any redeeming feature. Its supposed spiritual accomplishments have been simply destructive. The only hope is for those "accomplishments" to wither and die, leaving something more basic in the human soul to express itself again in a healthy way, something that accepts the status of human beings as merely one animal species among others.

The argument has two levels. There is first the question of whether the world would have been better off if the process of "advance" had not occurred—if humanity had continued to live as hunters and gatherers. Even in biblical terms this is a difficult question. It is the question whether humanity would have been better off if there had been no Fall.

The Garden of Eden corresponds to the hunting and gathering society. The Garden in Christian myth differs from the normative condition of humanity as Shepard pictures it in two respects. First, even be-

fore the Fall, God gave to human beings dominion over plants and animals. Second, whereas hunting is a part of the normative condition for Shepard, and domestication represents the Fall, in the Garden of Eden dominance is not expressed either in hunting or in domestication. These belong to the fallen condition. There is a less full acceptance of the killing of other animals in the biblical tradition than in Shepard. But we will not pursue that point.

In biblical terms, the state of being before the Fall had a certain perfection. The Fall is a consequence of sin and the cause of suffering for both humanity and other animals. It is certainly not viewed primarily as a gain! Yet there is an ambiguity about the judgment. The knowledge of good and evil remains attractive to human beings and is something they would not cheerfully give up. The salvation for which they hope is not a return to the original innocence of Adam and Eve but something fundamentally better.

We find ourselves continuing this biblical ambivalence. When we observe the hastening march to self-ruin on the part of the world's dominant institutions, and when we see the role played in that by the knowledge of good and evil, we cannot help but see that it might indeed have been better had our ancestors never left the Garden. There is a health about contemporary hunting and gathering societies that our civilizations have taken from us. We think there is an inherent enjoyment of the knowledge of good and evil to which Shepard's formulations are insensitive, but unless some future lies before the planet other than the one that now appears most likely, we have to concede that he is right. In Christian terms, the temptation to eat of the fruit of that tree was indeed a temptation. Human beings, and the biosphere as a whole, would be better off if that fruit had been uneaten.

Even if we concede that point to Shepard, the real issue remains unresolved. Once the Fall has occurred, can humanity return? The Bible says no. An angel blocks the way. Apart from the mythology, the message is clear. That solution is impossible. The knowledge of good and evil that destroyed our innocence must now function to guide us through the fallen world. Shepard, on the other hand, while knowing that there is never any way to duplicate a past situation, holds as the goal whatever approximation is possible—a life in which the knowledge of good and evil is gone.

Shepard's argument against the biblical position is impressive. The force of human transcendence is inherently disruptive. As human society settles into patterns, as community forms, as the immediacy of en-

joy out of life becomes possible, criticism disturbs this. In the interest of higher ideals, the good that is real is rejected. Yet the results never embody those ideals. The attainment of a new equilibrium becomes ever more difficult.

The response of the prophetic tradition has often been to become more apocalyptic. Recognizing that human efforts to impose virtue make the course of history more bloody, some believers cry out for a final fulfillment that will reverse all this and yet make some sense of the slaughter bench that is history. Rather than see God as working through human efforts and the transcending perspective that guides those efforts, they appeal to God as one outside the historical process to intervene and put all things right. If that is the best the prophetic tradition can offer, then Shepard is right. Better to abandon the knowledge of good and evil, to accept what is for what it is, than to view it with helpless horror while counting on a supernatural intervention to redeem it in the end.

But we are not convinced that these are the only options. We think that deepening the knowledge of good and evil even now can put our situation into perspective that makes possible choices to reduce if not avoid the catastrophes toward which history hastens. We do not think it would be better if everyone simply went along uncritically in the course of present events.

Of course, in reality, Shepard does not adopt the stance he recommends. There is no more powerful and discerning prophetic voice in our time. It is only by the most radical self-transcendence that he has come to the insight as to the immensely destructive role of self-transcendence in the history of this planet. He is caught in the same dilemma as we, the dilemma of fallen human beings, and his response is the same. It differs in details, but it seeks to deepen the prophetic critique made possible by self-transcendence.

There is, then, really no alternative to the prophetic stance in fallen history. The choice is between calling for the return to the Garden and proposing some end different both from where we began and from where we have been since then. Shepard chooses the Garden; we choose a different end.

Our choice of the latter depends on a somewhat different reading of history. We see, with Shepard, the horrors of history and how often they have been induced by the very efforts to change a situation that the tainted fruit of the tree of knowledge has allowed people to judge as evil. That pattern appears all too clearly in recent times in most of the

aid that has been given for development in the Third World. Those who would reform others have done some good and much evil.

Nevertheless here and there are instances in which self-transcendence has led to visions that have inspired actions which, with all their ambiguities, are good. In our lifetime we can cite the work of Gandhi and Martin Luther King as the most influential and widely admired examples. The women's movement has lifted to conscious criticism unrecognized habits of oppression and has begun to deliver on its promise of better modes of human relationship. There are thousands of others. They have not changed the broad sweep of events, but they have shown that good, too, can result from self-transcendence. We have not given up hope, and we continue to appraise hope, not as the final evil but as God's grace to those who persevere.

Biologism and Theism

A more typical exponent of a nontheistic and even antitheistic biocentric point of view is E. O. Wilson. His position is a form of biologism. It is important to him that a scientific biological approach provide the comprehensive framework within which human beings understand themselves. His self-critical defense of this position is refreshingly honest and opens the way for us to explain our preference for a theistic rather than a biologicistic form of the biospheric perspective. In his book, *On Human Nature*, Wilson spells out the dilemma of biologism. The first dilemma is that: "The species lacks any goal external to its own biological nature. . . . Traditional religious beliefs have been eroded, not so much by humiliating disproofs of their mythologies as by the growing awareness that beliefs are really enabling mechanisms for survival. Religions, like other human institutions, evolve so as to enhance the persistence and influence of their practitioners" (Wilson 1978, p. 3).

Wilson, to his credit, sees that "the danger implicit in the first dilemma is the rapid dissolution of transcendental goals toward which societies can organize their energies" (p. 3). Of course Wilson is a scientific materialist and does not believe in transcendental goals, but he recognizes their important role in the social order, even if illusory. Rather than base our society on transcendental illusions, Wilson suggests that we "search for a new morality based upon a more truthful definition of man, [that we] dissect the machinery of the mind—and retrace its evolutionary history."

But this only leads us, Wilson points out, to a second dilemma,

"which is the choice that must be made among the ethical premises inherent in man's biological nature. . . . We must consciously choose among the alternative emotional guides we have inherited." How are we to decide which emotional guides to follow and which to stifle? "At the center of the second dilemma is found a circularity: we are forced to choose among the elements of human nature by reference to value systems which these same elements created in an evolutionary age now long vanished" (Wilson 1978, p. 196).

Wilson's view is indeed problematic. To the extent that we have inherited value systems genetically, these value systems are a by-product of the earlier environment of the hunter-gatherer, and are not reliable guides for the age of atomic power and genetic engineering. The difficulty is even more general: no moral value (indeed no rational thought at all) can be valid, can have authority, if it is fully explainable as the result of amoral or arational causes. Random mutation and natural selection are amoral and arational events, and although they can certainly explain much, they cannot possibly entirely explain rational and moral thought. Otherwise the theory of evolution would itself be merely a product of genetic chance and natural selection and would in the long run stand or fall not by its legitimate claim to be in large part true, but by its survival value. But Wilson has explicitly admitted this survival value is rather low because in his version the theory must undercut a belief in transcendental value which, right or wrong, does have high survival value in providing a basis for social cohesion. If there is no transcendental source of value that somehow makes contact with nature in the mind, or alternatively, if there is no providential force behind the genetic chance and environmental necessity of evolution, then to what, besides chance or whim, can one appeal in choosing how to remake human nature?

One must admire the hard-headed logical consistency of the scientific materialist at his best. Wilson has followed logic where it has led, and that is to a dilemma. There are two alternatives: affirm transcendental value as a reality to which we can turn for guidance, or affirm the nihilism implicit in scientific materialism and give up all claim to truth or righteousness. Which leap does Wilson make? Neither. He tries to weasel out: "Fortunately, this circularity of the human predicament is not so tight that it cannot be broken through an exercise of will" (Wilson 1978, p. 196).

There are two logical problems with this escape act. First, where does "will" come from for a scientific materialist who expects that "the mind

will become more precisely explained as an epiphenomenon of the neuronal machinery of the brain"? (p. 195). Is will a part of the neuronal machinery? If so, it is determined by past evolution and cannot suddenly overthrow its master. Or is will an epiphenomenon? Strange epiphenomenon that can alter the basic phenomena! Or might will be contraband smuggled into the land of scientific materialism from the theistic lands of transcendental value?

The second problem is worse. Even if the general appeal to will were legitimate there remains the question of whether what is specifically asked of will is legitimate. Can will break a logical circularity? Not even the most ardent believers in free will have ever claimed that one could evade a logical conclusion by an exercise of will. One could understand how will might be appealed to as a general urge to action, but not as a criterion for deciding which action to take. The resolution of Wilson's dilemma requires a criterion, not an urge. Not only does Wilson appeal to will while professing not to believe in it (except as an epiphenomenon), but he also requires that will perform the miraculous tasks of breaking a purely logical circularity and serving as a criterion as well as an urge. This just will not do.

As a final irony, Wilson cautions that "Whenever other philosophers let their guard down, deists can, in the manner of process theology, postulate a pervasive transcendental will." Wilson's honest struggle with the insoluble dilemmas of scientific determinism opens the way for us, as process theologians, to fulfill his warning. We are not sure that other philosophers have let down their guard, but we do think his own formulations indicate that there must be something in reality that transcends physical determinism; otherwise thinking and choosing make no sense at all. But when Wilson posits the human will in this capacity, he generates a radical dualism. This runs counter to his whole evolutionary understanding. Also, once something transcendent is affirmed it is arbitrary and ad hoc to restrict it to the human will.

From our point of view as process thinkers it seems better to avoid this apparently metaphysical dualism of blind matter and human will by seeing both as abstractions from the actual events of which the world is made up. We believe that all events, including acts of human willing, are largely the outcome of antecedent events. But we also hold that none are wholly determined by the past. Something happens afresh in each event. There is everywhere some respect in which what happens is decided only as it happens. This is the principle of self-determination that limits the strict predeterminism that scientists so often posit. The hu-

of choice is the most dramatic, the most vivid instance of a feature of reality that is universal. It is not a metaphysically discontinuous element in an otherwise perfect machine.

If human willing does belong to the same universe as all other events, if it is less free than humans like to think, and if some faint analogue is found in mice and amoeba as well, then there is more to the universe than matter in motion. There are also real options among which to choose. Much as all things are determined by the past, they also transcend the past by virtue of the presence in each event of real possibilities among which only one can be actualized. Usually these "decisions" are trivial, but their cumulative effect in the course of time is not. And in the human case, occasionally, the decision rises to consciousness and has dramatic immediate consequences.

In the human case, at least, these options are experienced as weighted. Some are felt as better than others. Sometimes they appear as right or wrong, true or false. This weighting does not predetermine the outcome. People can resist the claim of righteousness and truth; indeed, they often do. But it is hard to deny that such a claim is present. The direct experience of purpose and choice is as real as anything we experience. It cannot be a sensory illusion since the experience is unmediated by the senses. In this meaning at least we agree with Descartes in believing in a God who, while allowing us to be badly mistaken, does not allow us to be fundamentally and hopelessly deceived.

All of this means that in addition to the past something else is given for each event. It is that which makes of each event a response to its world rather than an inert product. Martin Heidegger once wrote of the "call forward." Whitehead used the term "lure," and emphasized the pull of final causation as well as the push of efficient causation. However it is named, it points to a pervasive feature of the totality within which all events occur and whose neglect leads to perplexities and contradictions. It is that feature by virtue of which possibilities take on weighted relevance to the actual world and become claims upon it. We believe this to be universal throughout the cosmos rather than a peculiar feature of life on this planet. Hence, we connect it to the whole. We call it God. Apart from God, we think, there would be no meaning, no life, no righteousness, no truth, no value. There would be only the mechanistic determination of the present by the past that Wilson envisions. We believe that human life is lived most richly and most rightly when it is lived from God and for God.

Strengths of Theocentrism

We commend this theocentric undergirding of the biospheric perspective on several grounds.

First, it is a check against idolatry. Those who do not consider God at all nevertheless orient themselves around something. In the modern world, in the case of ethicists and economists and many others, this orientation is around the ultimate worth of human beings, whether as individuals (for the economist), or as a collectivity (for some ethicists). But, however valuable, human beings are not of ultimate worth. Treating themselves as if they were has led to the brink of destruction. And such treatment of what is not ultimate as if it were ultimate, of a part as if it were the whole, of what is worthy of relative commitment as if it were worthy of final commitment—that is idolatry.

Of course, speaking of "God" cannot prevent idolatry. Those who think of God are also in grave danger of identifying God with some fragment of the whole, or some figment of the imagination. The use of the word God may heighten the fanaticism that accompanies all idolatries. But the thought of God in the context in which the prophetic tradition has not died at least opens up the subject for critical examination. It can drive the heart and mind beyond idolatry.

This assertion that theism functions as a safeguard against uncriticized idolatry runs counter to deep-seated claims of the Enlightenment in its most fully secularized forms. Atheism and positivism see themselves as destroying the last vestiges of superstition and view theism as idolatrous and superstitious. Whereas humanistic forms of the Enlightenment transfer the sense of the sacred to the human person or the human soul, these more radical approaches undertake to eliminate any ground of religious, and therefore of idolatrous, feeling. By reducing everything to matter and space, or to the immediate data of sense experience, all the mysteries that had tantalized the human mind from time immemorial, tempting it to identify this or that as sacred, were set aside. The only tasks remaining were those of explaining and controlling material processes. People thought that by directing their attention to the practical and answerable questions they could gain control of events and build the society of their dreams.

That expectation has now collapsed. The world constructed by those who refused ultimate questions is not more safe, more just, more loving, or more hopeful than the ones constructed by cultures preoccupied

with ultimate questions. This approach has succeeded in greatly increasing the numbers of people and the quantity of artifacts on the earth. But even in these accomplishments it is not secure. The growth economy is faltering. There are massive threats to human life, and now it appears that the very growth in which such pride has been taken is the cause of the threat to its continuance. With the abandonment of ultimate questions, horizons shrank to too-limited a range for effective guidance of human decisions. Even the resources on which the great expansion of population and goods was built were ignored in planning for the future. Their limits caught the planners by surprise.

But it may be thought that at least the refusal to spend time with ultimate mysteries has cleared the mind of superstition and error, that people have understood the limits of what can be known and have appreciated the relativity of beliefs and opinions. Alas, would that it were so! But we have already seen that built into the very structure of modern thought are assumptions, false assumptions, that take on the form of absolutes and that the university has been so organized as to discourage any question or challenge to these absolutes. We suspect that the modern mind has been more successful than its predecessors in squashing heresy. It has declared the heretic's teaching meaningless rather than false, thereby justifying ignoring it rather than attempting to show its error. Whereas earlier societies have excommunicated publicly, giving reasons for their actions, modern savants have done so silently. The result is dogmatism. Among economists, for example, no real argument needs to be given for devoting oneself ultimately to the promotion of productivity and growth. No recitation of the horrors that this commitment has inflicted upon human beings, not to speak of the other creatures, no explanation that the physical conditions that made growth possible in the past are rapidly disappearing, no clarification of how human welfare can be met in other ways—none of this has yet sufficed to shake the conviction so deeply rooted in the discipline that growth is both the supreme end and the supreme means for achieving the end. Precisely by limiting the horizons of inquiry one can attain to this state of mind. The rest, economists often think, is "theology," and hence not worthy of their time. But if so, then has the application of Enlightenment positivism to thinking about the economy freed it from idolatry? Or are not the rigid commitments so characteristic of the discipline of economics an indication that idolatry has reasserted itself, all the more powerful because its presence is so vehemently denied?

Second, to be theocentric is to recognize a perspective that transcends

one's own and embodies the truth about the whole. The world is as God knows it because God's knowledge is God's undistorted inclusion of all things. God knows and values each sparrow and knows and values each human being as well. The sparrow is of value in itself, and human beings are of value in themselves. But it is hard, simply within the world, to compare the value of the sparrow and the value of the human being. It is in God that each value is just what it is and in proper union with all other values.

Ethicists who do not believe in God sometimes say that what we really ought to do in each situation is what an impartial and omniscient spectator would favor. They often deny that this is what religious people mean by "God" because it does not correspond to the idolatrous images of "God" against which they have reacted. But the true God is, the omniscient and impartial unifying source of all. What we really should do in each situation is what will correspond to God's purposes and enrich God's life. People can to some extent live "as if." They can make their decisions as if there were such a being while believing that it does not exist. But to believe that God does exist makes the ethical life more authentic. Belief heightens sensitivity to aspects of reality that are otherwise neglected. It gives real importance to what happens in the world, especially to the despised.

Third, belief elicits committedness and directs commitment. Those who strive to avoid idolatry may try to have no commitment at all or else to frame as inclusive a commitment as they can. The former effort is a dangerous and unfruitful one. The latter can lead to results quite similar to theocentrism; for example, a commitment to some relatively encompassing unity such as "Gaia." When it does so, many of the results are quite similar to that of our theism. We rejoice in working together with all who share with us a love of the Earth and a desire to preserve and enhance its living systems. Nevertheless, philosophical and theological positions in their precise details direct commitment in divergent ways. Lovelock's position directs him to those features of the planetary system most crucial for Earth to maintain its chemical balance. Living things have their value only in their contribution to these chemical systems that keep Earth alive. Hence many are unimportant. Their immediacy to themselves makes no claim on human concern. And the rich complexity of the biosphere does not, of itself, have much interest since it is not required by Gaia.

From our theistic point of view maintenance of the Earth's chemical balance is indeed important. If that is lost, the whole biosphere will de-

cannot the value is located primarily in that entire biosphere. Its rich diversity and complex patterns contribute a rich beauty to the divine life. And each of its individual members is immediate both to itself and to God. From this point of view the commitment of Lovelock to Gaia does not do justice to the intrinsic value of each living thing or of the biosphere as a whole. For all the attractiveness of the Gaia hypothesis, the commitment it elicits to one part of the whole rather than to the whole does lead to distortion. The prophetic critique is relevant.

A fourth reason for recommending theism is that it provides a basis for understanding our relation to the future. Chapter 7 discussed the problem of discounting the future that troubles economic theory. Robert Heilbroner, an economist with unusual breadth of philosophical interest, has written perceptively about this issue with respect to its implications for attitudes toward "the human prospect." Heilbroner is himself committed to the long-term preservation of human life on this planet, and he hopes that others will join him in readiness to make sacrifices to this end. But he does not believe that any argument can be given in favor of this commitment. The voice of rationality, he says, speaks through "a distinguished Professor of political economy" at the University of London: "Suppose that, as a result of using up all the world's resources, human life did come to an end. So what? What is so desirable about an indefinite continuation of the human species, religious convictions apart? It may well be that nearly everybody who is already here on earth would be reluctant to die, and that everybody has an instinctive fear of death. But one must not confuse this with the notion that, in any meaningful sense, generations who are yet unborn can be said to be better off if they are born than if they are not" (Heilbroner 1980, p. 180).

We agree that "religious convictions apart," this may be "rational." But that only points to the importance of religious convictions. Rationality, apart from belief in God, may indeed dictate indifference to the yet unborn. Since they do not now exist, they have no wants to be respected. But rationality that includes a rational belief in God has quite different consequences. God is everlasting, and future lives are as important to God as present lives. To serve God cannot call for sacrifice of future lives for the sake of satisfying the extravagant appetites of the present. Believers in God know that the community to which they belong extends through time. One cannot discount a future that will be immediate to God. Belief in God grounds the ethical course that Heilbroner favors but does not know how to justify.

Concluding Comments

We have not attempted to prove the truth of Christian faith or the existence of God, but we have tried to show that how humans think about themselves and the natural world, and whether we think also of the whole that contains us and enlivens us, does make a difference. We have commended our form of Christian theism as making sense of experience and directing thought and action helpfully. In this exposition we have been critical of various forms of nontheistic biocentrism and geocentrism.

In fact, however, the gulf separating us from some forms of Christianity is as great or greater than what differentiates our form of biospheric perspective from others. Christian theism has done much to bring about the dangerous situation to which the world has come. In varied forms it has supported anthropocentrism, ignored or belittled the natural world, opposed efforts to stop population growth, directed attention away from the urgent needs of this life, treated as of absolute authority for today teachings that were meant to influence a very different world, aroused false hopes, given false assurances, and claimed God's authority for all these sins. Those of us who know the power of Christian faith from within also know how dangerous are its distortions and misdirections of human thought and feeling. To channel the power of faith into life-affirming passion and a sense of belonging to the community of creatures is one of our life purposes.

Our Christian theism has led us to perceive this world in deeply troubling ways. Each passing year we see foreclosed happier possibilities for the future. Today we know the earth will get hotter in the coming decades and that many destructive consequences will follow. We know that the ozone layer will shrink and that much of the protection it has afforded us will be denied to our children and grandchildren. It is too late to avoid the greenhouse effect or the reduction of the ozone shield. The question now is how rapidly and how far the situation will deteriorate. But that question is not unimportant. Our actions now may determine whether the deterioration of the planetary environment can be slowed and stopped at a level that will allow much of the biosphere to survive.

The recognition of possibilities gone forever inspires us with a sense of urgency. Delay is costly to us and even more to our descendants and to the other species with which we share the planet. It is already very late. It is hard to avoid bitterness about what might have been done and

about the additional missed opportunities each day. It is hard to avoid resentment toward those who continue so successfully to block the needed changes.

Yet there is hope. On a hotter planet, with lost deltas and shrunken coastlines, under a more dangerous sun, with less arable land, more people, fewer species of living things, a legacy of poisonous wastes, and much beauty irrevocably lost, there will still be the possibility that our children's children will learn at last to live as a community among communities. Perhaps they will learn also to forgive this generation its blind commitment to ever greater consumption. Perhaps they will even appreciate its belated efforts to leave them a planet still capable of supporting life in community.

APPENDIX

The Index of Sustainable Economic Welfare

Introduction

Discussion in Chapters 3 and 19 pointed to the need for a way of measuring the economy that will give better guidance than the GNP to those interested in promoting economic welfare.

One response would be to bring up to date one of the welfare measures that has already been proposed. However, on closer examination, none of the available candidates seems adequate today. For example, Zolotas (1981) does not consider sustainability, whereas Nordhaus and Tobin (1972), who do take sustainability into account, do not consider environmental issues that have become increasingly important since they published their work. We find Zolotas more helpful on some points and Nordhaus and Tobin on others. We have learned something also from the Japanese measure of Net National Welfare. Accordingly, rather than revising and bringing up to date one of the existing measures, we propose to build on their accomplishments and propose a new one. This includes some elements not dealt with by any of the three indices that were discussed in Chapter 3 as well as fresh ways of treating topics that were included in them.

All welfare measures with which we are familiar overlap with the GNP by including personal consumption. But from that point on these measures differ from each other as well as from GNP. We begin with this figure. In the following pages we describe the major theoretical decisions that entered into our own proposed measure, the Index of Sustainable Economic Welfare. We then offer the table of ISEW statistics from 1950 to 1986 and certain other conclusions. The remainder of the Appendix explains in detail the columns composing the table.

We are especially grateful to Clifford W. Cobb for his painstaking work and leadership in preparing this Appendix.

STEADY-STATE ECONOMICS

Second Edition with New Essays

HERMAN E. DALY

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9

THE STEADY-STATE ECONOMY: ALTERNATIVE TO GROWTHMANIA

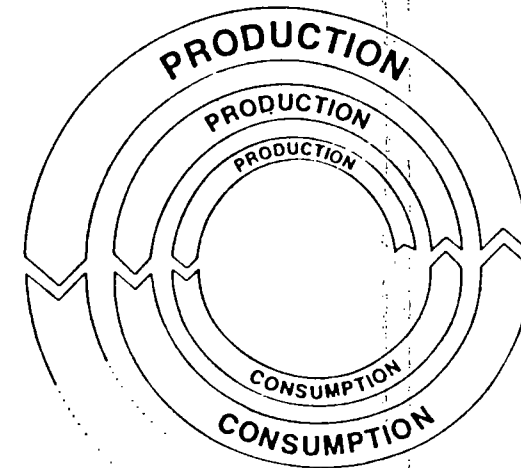
Introduction

The economy grows in physical scale, but the ecosystem does not. Therefore, as the economy grows it becomes larger in relation to the ecosystem. Standard economics does not ask how large the economy should be relative to the ecosystem. But that is the main question posed by steady-state economics. Standard economics seeks the optimal allocation of resources among alternative uses and is, at best, indifferent to the scale of aggregate resource use. In fact it promotes an ever-expanding scale of resource use by appealing to growth as the cure for all economic and social ills. While not denying the importance of optimal allocation, steady-state economics stresses the importance of another optimum—the optimum scale of total resource use relative to the ecosystem. These contrasting visions are represented in figure 7.

What Is a Steady-State Economy?

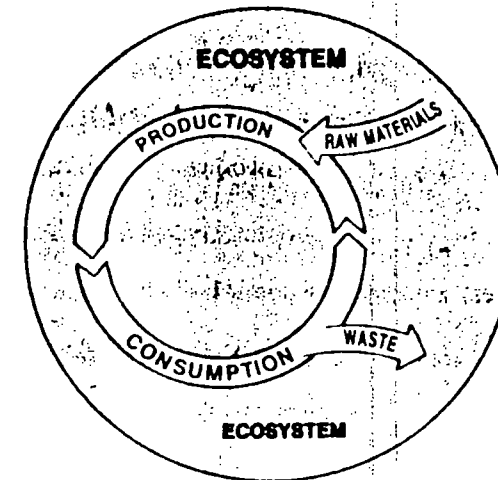
A steady-state economy (SSE) is an economy with constant stocks of artifacts and people. These two populations (artifacts and people) are constant, but not static. People die, and artifacts depreciate. Births must replace deaths, and production must replace depreciation. These "input" and "output" rates are to be equal at low levels so that life expectancy of people and durability of artifacts will be high. Since the input flow of matter-energy equals the output flow when both populations are constant, the two flows may be merged into the concept of

STANDARD ECONOMICS



Standard economics considers ever-growing cycles of production and consumption but does not consider the role of the supporting ecosystem. Such a view can encourage an economy that can ultimately strain the surrounding environment.

STEADY-STATE ECONOMICS



Steady-state economics considers cycles of production and consumption that take the surrounding ecosystem into account and try to achieve a state of equilibrium with it

Figure 7

Source: "Towards a New Economic Model," *Bulletin of the Atomic Scientists*, April 1986.

"throughput." The throughput flow begins with depletion, followed by production, depreciation, and finally pollution as the wastes are returned to the environment. The economy maintains itself by this throughput in the same way that an organism maintains itself by its metabolic flow. Both economies and organisms must live by sucking low-entropy matter-energy (raw materials) from the environment and expelling high-entropy matter-energy (waste) back to the environment.¹ In the SSE this throughput must be limited in scale so as to be within the regenerative and assimilative capacities of the ecosystem, insofar as possible.

It is important to be clear about what is *not* constant in the SSE. Knowledge and technology are not held constant. Neither is the distribution of income nor the allocation of resources. The SSE can develop qualitatively but does not grow in quantitative scale, just as planet earth, of which the economy is a subsystem, develops without growing. Neoclassical growth models notwithstanding, the surface of the earth does not grow at a rate equal to the rate of interest! Neither can the physical stocks and flows that make up the economy continue for long to grow at compound interest. As Nobel laureate chemist and underground economist Frederick Soddy noted long ago:²

You cannot permanently pit an absurd human convention, such as the spontaneous increment of debt [compound interest], against the natural law of the spontaneous decrement of wealth [entropy].

The concept of the SSE can be clarified by analogy to a steady-state library, an idea that has attracted the attention of some librarians who realize that their stock of books cannot continue to grow exponentially. A steady-state library would have a constant stock of books. Whenever a new book is added, an old one must be gotten rid of. The rule would be to add a book only if it were qualitatively better than some other book whose place it would take. The steady-state library would continue to improve qualitatively, but its quantitative physical scale would remain constant. Likewise for a steady-state economy. The end of physical accretion is not the end of progress. It is more a precondition for future progress, in the sense of qualitative improvement.

One might object to this argument on the grounds that conventional economic growth is not defined in physical units but in terms of GNP, which is in units of value, not tons of steel or barrels of oil. It is quite true that GNP is in value units, because this is necessary to aggregate diverse physical units by means of a common denominator that bears some relation to the degree to which diverse things are wanted. Nevertheless, a dollar's worth of GNP, just like a dollar's worth of gasoline or wheat, is an index of physical quantities. In calculating growth in real GNP, economists correct for price changes in order to capture only changes in quantity. It is also true that GNP includes services, which are not physical things. But a service is always rendered by something physical, either a skilled person or a capital good, over some time period

Growth in the service sector does not at all escape physical constraints. In any case the SSE is defined in physical terms, *not* as zero growth in GNP.

What Is Growthmania?

The above definition of a steady-state economy stands in great contrast to the regime of economic growthmania characteristic of the modern world. Economic growth is currently the major goal of both capitalist and socialist countries and, of course, of Third World countries. Population growth is no longer a major goal for most countries, and in fact a slowing of demographic growth is frequently urged in spite of considerable retrogression on this issue by the Reagan administration. But the usual reason for urging slower demographic growth is to make room for faster economic growth. Economic growth is held to be the cure for poverty, unemployment, debt repayment, inflation, balance of payment deficits, pollution, depletion, the population explosion, crime, divorce, and drug addiction. In short, economic growth is both the panacea and the *summum bonum*. This is growthmania. When we add to GNP the costs of defending ourselves against the unwanted consequences of growth and happily count that as further growth, we then have hyper-growthmania. When we deplete geological capital and ecological life-support systems and count that depletion as net current income, then we arrive at our present state of terminal hyper-growthmania.

World leaders seek growth above all else. Therefore to oppose growth, to advocate a SSE, is not something to be done carelessly. One must present good reasons for believing that the growth economy will fail and also offer good reasons for believing that a SSE will work. That is the aim of the remainder of this article.

Origins of the Growth Dogma

How did we come to believe so strongly in the dogma of economic growth? What vision of the world underlies this commitment to continuous expansion, and where does it go wrong?

Open any standard introductory text in economics, and in the first chapter you will find a circular flow diagram. In this diagram, exchange value embodied in goods and services flows from firms to households and is called national product, while an equal flow of exchange value embodied in factors of production returns from households to firms and is called national income. The picture is that of an isolated system. There are no inflows or outflows connecting the circular flow to its "other," the environment.

If we think only in terms of abstract exchange value, the picture is reasonable. If we think in terms of money, the physical token of exchange value, the

picture is not unreasonable, but is no longer strictly correct because, although money flows in a circle, on each circuit it wears out a bit. New money must be minted or printed to make up for worn-out money. Thus there is a physical throughput associated with this circulation of currency. Yet we may argue that with money the circular flow is dominant and the throughput is incidental. But when we shift to real goods and services making up national income, the real physical processes of production and consumption, then the throughput is dominant and the circular flow is incidental. Yet we find leading textbooks proclaiming that "The flow of output is circular, self-renewing, and self-feeding" and that "the outputs of the system are returned as fresh inputs."³ One wonders what "fresh" could possibly mean in this context of an isolated circular flow? The authors were trying to explain how the circular flow is replenished so it can go on for another round. But in an isolated system, replenishment must be internal. A self-replenishing isolated system is a perpetual motion machine! Replenishment requires a throughput. Abstract exchange value may circulate in an isolated system because it has no physical dimension. Money may be thought of as flowing in a circle even though some throughput is required. But real production and consumption are in no way circular. They are based on a linear throughput beginning with depletion and ending with pollution. An economy is an open system, not an isolated system. Connections to the larger environment cannot be abstracted from without losing the most essential fact.

In the circular flow vision, matter is arranged in production, disarranged in consumption, rearranged again in production, etc. Nothing gets used up. The first law of thermodynamics can be appealed to in support of this vision: matter can be neither created nor destroyed, only rearranged. Economic growth is just a question of speeding up the circular flow, and if nothing is used up there are no limits to growth, there is no problem of replenishment from the outside.

Of course this picture flatly contradicts the second law of thermodynamics, which says, in effect, that the capacity to rearrange indestructible building blocks is not itself indestructible. It gets used up irrevocably. As we have seen, the standard vision sees the economy as a perpetual motion machine.

The gravity of such a contradiction for any theory is indicated by Sir Arthur Eddington:⁴

The law that entropy increases—the Second Law of Thermodynamics—holds, I think, the supreme position among the laws of nature. If someone points out to you that your pet theory of the universe is in disagreement with Maxwell's equations—then so much the worse for Maxwell's equations. If it is found to be contradicted by observation—well, these experimentalists do bungle things sometimes. But if your theory is found to be against the Second Law of Thermodynamics, I can give you no hope: there is nothing for it but to collapse in deepest humiliation.

Economists, however, are not without some excuses for their predicament. They do not really deny that raw materials come from the environment, or that waste returns to the environment. But economic theory developed at a time

when the environment was considered an infinite source and sink because it was so large relative to the economy. Since the throughput flow went from an infinite source to an infinite sink it involved no scarcity and could, presumably, be abstracted from for purposes of economic theory. But economic growth means that the scale of the economy gets bigger, and it is now no longer reasonable to treat it as infinitesimal relative to the ecosystem. It is time for the concept of throughput to displace the circular flow from the center stage of economic theory.⁵

If such a restructuring of economic theory is to be avoided, then the assumption of infinite sources and sinks must be in some way maintained, or else a substitute premise that has similar logical consequences must be found. The latter strategy has been more common and consists in discovery of an "ultimate resource," which is both infinite in amount and infinitely substitutable for other resources, and therefore has the same limits-abolishing effect as the original premise of infinite sources and sinks for physical resources. This "unlimited resource" is variously referred to as technology, information, knowledge, or the human mind. Anyone who asserts the existence of limits is soon presented with a whole litany of things that someone once said could never be done but subsequently were done. Certainly it is dangerous business to specify limits to knowledge. But it is equally dangerous to presuppose that the content of new knowledge will abolish old limits faster than it discovers new ones. The discovery of uranium was new knowledge that increased our resource base. The subsequent discovery of the dangers of radioactivity did not further expand the resource base, but contracted it. Before getting carried away with the idea that the human mind is an "ultimate resource" that can generate endless growth, let us remember that, while certainly not reducible to physical or mechanical terms, the mind is not independent of the physical body. "No phosphorous, no thought," as Frederick Soddy put it. Or as Loren Eiseley reminds us, "The human mind, so frail, so perishable, so full of inexhaustible dreams and hungers, burns by the power of a leaf." Minds capable of such insight ought to be capable of showing more restraint toward leaves and phosphorous than is usually exhibited by our growth-bound economy. Mere knowledge means little to the economic system unless it is embodied in physical structures. As Boulding reminds us, capital is knowledge imprinted on the physical world in the form of improbable arrangements. But knowledge cannot be imprinted on any kind of matter by any kind of energy. The constricted entry point of knowledge into the physical economy is through the availability of low-entropy resources. No low-entropy resources, no capital—regardless of knowledge, unless the second law of thermodynamics is abolished.

It has been said that the best measure of a scientist's influence is how long he can hold up progress in his own discipline. By this measure, the editors of the major economics journals are probably the most influential scientists of all time! Continuing to study economies only in terms of the circular flow model is like studying organisms only in terms of the circulatory system, without ever

mentioning the digestive tract. Yet that is what the mainline professional journals, in their dogmatic commitment to growth, insist on.

Money Fetishism

Money fetishism is a particular case of what Alfred North Whitehead called the "fallacy of misplaced concreteness," which consists in reasoning at one level of abstraction, but applying the conclusions of that reasoning to a different level of abstraction. It is to argue that since abstract exchange value flows in a circle, so does real GNP. Or since money can grow forever at compound interest, so can real wealth. What is true for the abstract symbol or token of wealth is held to be true for concrete wealth itself. This is money fetishism.

Marx, and Aristotle before him, pointed out that the danger of money fetishism arises when society shifts its focus from use value to exchange value. Simple commodity production, the sequence of C-M-C' (commodity-money-other commodity) begins and ends with a concrete use value embodied in a commodity. Money is merely an intermediary facilitating exchange, the object of which is to acquire an increased use value. C' is a greater use value than C, but both are limited by their specific purposes. One has, say, greater need for a hammer than a knife, but has no need for two hammers, much less of fifty. As simple commodity production gave way to capitalist circulation the sequence shifted to M-C-M' (money-commodity-more money). The sequence begins and ends with money capital, and the commodity or use value is an intermediary step in bringing about the expansion of exchange value. M' is greater than M, representing growth in abstract exchange value, which does not impose its own concrete limits. One dollar of exchange value is not as good as two, and fifty dollars is better still, and a million is much better, etc. Unlike concrete use values, which spoil or deteriorate when hoarded (due to entropy), abstract exchange value can accumulate indefinitely without spoilage or storage cost. In fact exchange value grows by itself, it earns interest. But as Soddy told us, we cannot permanently pit an absurd human convention against a law of nature. The physical limit to growth at the micro level imposed by the absurdity of accumulating use values has been bypassed by accumulating exchange value (money and interest-bearing debt). But unless the aggregate of real concrete wealth can grow as fast as the accumulations of abstract exchange value, there will be a devaluation of exchange value (inflation) or some other form of debt repudiation or confiscation in order to bring accumulations of exchange value back into equality with accumulations of real wealth.

Money fetishism and growthmania are alive and well in a world in which banks in wealthy countries make loans to poorer countries, and when the debtor countries cannot make the repayment the banks simply make new loans to enable the repayment of interest on old loans, and thereby avoid taking a loss on a bad debt. The exponential snowballing of the debt that results when new loans

are needed to pay interest on old loans cannot continue. The faith is that somehow real growth in the debtor countries will also snowball. The international debt crisis is a clear symptom of the basic disease of growthmania. Too many accumulations of money are seeking ways to grow exponentially in a world in which the physical scale of the economy is already so large relative to the ecosystem that there is not much room left for exponential growth of anything having a physical dimension.

The paper economy offers more scope for "growth" than the real economy. Mergers, takeovers, "greenmail," tax-avoidance schemes, and other forms of rent seeking seem more profitable than production of commodities. Accountants, investment bankers, and tax lawyers make more money than engineers because manipulating abstract symbols is easier than rearranging concrete materials into more useful structures. M-M' replaces M-C-M'. Commodity use values disappear altogether and with them all natural limits to the expansion of exchange value. The "paper economy" is the result.

Limits to Growth: Biophysical and Ethicosocial

Biophysical conditions limit the possibility of economic growth even in cases where growth may still be desirable. Ethicosocial conditions limit the desirability of growth even in cases where growth is still possible.

Three interrelated conditions—finitude, entropy, and complex ecological interdependence—combine to provide the biophysical limits to growth. The growth of the economic subsystem is limited by the finite size of the total ecosystem, by its dependence on the total system as a source for low-entropy inputs and a sink for high-entropy waste outputs, and by the intricate ecological connections that are more pervasively disrupted as the physical scale of the economic subsystem grows relative to the enveloping ecosystem. Moreover, these three limits interact. Finitude would not be so limiting if everything could be recycled, but entropy prevents complete recycling of matter and forbids any recycling of energy. The entropy law would not be so limiting if environmental sources of low entropy and sinks for high entropy were infinite, but both are finite. The fact that both sources and sinks are finite, plus the entropy law, means that the ordered structures of the economic subsystem are maintained at the expense of creating a more than offsetting amount of disorder in the rest of the system. If the part of the system that pays the entropy bill is the sun (as in traditional peasant economies), then we need not worry. But if the disorder is imposed mainly on parts of the terrestrial ecosystem (as in modern industrial economies), then we need to count the cost of that disorder.

This disordering of the ecosystem (depletion and pollution) interferes with the life-support services rendered to the economy by other species and by natural biogeochemical cycles. The loss of these services should surely be counted as a cost of growth, to be weighed against benefits at the margin. But, as

we have already seen, our national accounts do not do this. Indeed we now count the extra economic activity made necessary by the loss of free natural services as further growth. If the source of our drinking water becomes polluted, then we need more purification plants, and up goes GNP.

Even when growth is still biophysically possible, other factors may limit its desirability. Four ethicosocial propositions limiting the desirability of growth are considered below.

(1) The desirability of growth financed by drawdown of geological and ecological capital is limited by the opportunity cost imposed on future generations. Since future people cannot bid in present markets, we cannot reasonably expect current resource prices to reflect opportunity costs beyond ten or fifteen years in the future.

(2) The desirability of growth financed by takeover of the habitats of other species is limited by the extinction or reduction in number of sentient subhuman species whose habitat disappears. The loss of natural services rendered by these species (their instrumental value to us) was considered under the heading of biophysical limits. The issue here is the intrinsic value of these species as centers of sentience and creatures of God. It is not suggested that subhuman species' "utility" should count equally with that of humans, even if it were possible for these creatures to bid in the marketplace. But surely their feelings of pleasure and pain deserve a weight greater than zero in our cost-benefit analyses. Even Jeremy Bentham, from whom economists took their utilitarian philosophy, was of this opinion.

(3) The desirability of aggregate growth is limited by its self-cancelling effects on individual welfare. Growth in rich countries is, at the current margin, dedicated to the satisfaction of relative rather than absolute wants. Welfare increments are more a function of changes in relative position than of absolute level of consumption. After some level of absolute income is reached, we must agree with J. S. Mill that, "Men do not desire to be rich, but to be richer than other men." Aggregate growth cannot possibly make all people richer than other people! Relative improvement is a zero sum game in the aggregate.

(4) The desirability of growth is limited by the corrosive effects on moral capital of the very attitudes that foster growth, such as glorification of both self-interest and the technocratic-reductionistic world view. On the demand side of the market, growth is stimulated by greed and acquisitiveness. On the supply side, technocratic scientism proclaims limitless expansion and preaches a reductionistic, mechanistic philosophy that, in spite of its success as a research program, has serious shortcomings as a world view. As a research program, it furthers power and control, but as a world view it leaves no room for purpose, much less for any distinction between good and bad purposes. "Anything goes" is a convenient moral stance for a growth economy because it implies that anything also sells. Expanding power and shrinking purpose lead to uncontrolled growth for its own sake. To the extent that growth has a well-defined purpose, it is limited by the satisfaction of that purpose. For example, if growth

were really for the sake of the poor, we would limit it to producing things needed by the poor, and would stop when the poor were no longer poor. But if growth must never stop, then we must never define our purposes too clearly, lest they should be attained and we lose our reason to grow!

The Issue of Optimal Scale

If growth must never stop, then neither should we measure the costs of growth in our national accounts, lest we discover that they become equal to the benefits at the margin and thus define an optimal scale beyond which it would be antieconomic to grow! By discovering the existence of such an optimal scale, we would threaten ourselves with a question to which we do not know the answer: namely, how can we shift from a growth economy to a steady-state economy without risking economic collapse? It is nonsensical to advocate growing beyond the optimum, but politically risky to advocate nongrowth. What to do?

The answer given by some neoclassical economists is, "don't worry, the market will automatically keep us from growing beyond any optimal scale even if such were likely, which it is not because technical progress pushes aside all apparent limits to growth."

For all its virtues, technological advance cannot escape the entropy law, nor can the market register the cost of increasing its own scale relative to the ecosystem. The market measures the relative scarcity of individual resources; it cannot measure the absolute scarcity of resources in general, of environmental low entropy. The best we can hope for from a perfect market is a Pareto optimal allocation of resources (i.e., a situation in which no one can be made better off without making someone else worse off). Such an allocation theoretically could be attained at any scale, just as it is theoretically attainable for any distribution of income.

Most of the consequences of increasing scale are experienced as pervasive external costs. Services and amenities that were free at a smaller scale become scarce at the larger scale. Once the growing scale has turned formerly free goods into scarce goods, then it is certainly better to give them positive prices than to continue to behave as if their price were zero. But there remains a prior question. How do we know that we were not still better off at the smaller scale, before the free good became an economic good? Perhaps we are just always making the best of an increasingly bad situation. The optimal allocation of resources (Pareto optimum) is one thing. The optimal scale of the economy relative to the ecosystem is something else entirely. As growth in scale forces us to turn previously free goods into economic goods, it swells GNP but may reduce welfare, even if the newly scarce goods are optimally priced.

There is an instructive parallel between the relation of scale to the price system and the more familiar relation of distribution to the price system. It is

well known economic theory that the price system in pure competition would attain an efficient allocation of resources in the sense of a Pareto optimum. It is further known that Pareto optimality is independent of the distribution of ownership of physical resources—i.e., there is a Pareto-efficient allocation for any distribution, including unjust distributions. Therefore the social goal of distributive justice must be pursued independently of (but not necessarily in conflict with) the price mechanism. Likewise, I suggest, for the question of scale of throughput. At any stage of growth, at any scale of throughput, the price system can optimally allocate the given volume of throughput among alternative uses. But just as there is nothing in the price system that can identify the best distribution of ownership according to criteria of justice, neither is there anything that allows the price system to determine the best scale of throughput according to ecological criteria of sustainability. Just as a Pareto optimal allocation may coexist with a socially unjust distribution, so may it coexist with an ecologically unsustainable scale. Indeed, there is a sense in which the unsustainable scale is simply an unjust distribution with respect to future generations.

Perhaps an analogy will clarify this important point. Consider a boat. Suppose we want to maximize the load that the boat carries. If we place all the weight in one corner of the boat it will quickly sink or capsize. Therefore we spread the weight out evenly. To do this we may invent a pricing system. The heavier the load in one part of the boat the higher the price of adding another pound in that place. We allocate the weight so as to equalize the cost per additional capacity used in all parts of the boat. This is the internal equimarginal rule for allocating space (resources) among heavy objects (alternative uses) so as to maximize the load carried. This pricing rule is an allocative mechanism only; a useful but dumb computer algorithm that sees no reason not to keep on adding weight and allocating it optimally until the optimally loaded boat sinks, optimally of course, to the bottom of the sea. What is lacking is an absolute limit on scale, a recognition that the boat can displace only so much water, a rule that says, "stop when total weight is one ton, or when the waterline reaches the Plimsoll mark." Price is only a tool for finding the optimal allocation. The optimal scale is something else. The market by itself has no criterion by which to limit its scale relative to its environment. Its basic thrust of exchange value accumulation at the micro level, amplified by Keynesian policies at the macro level, is toward continuous growth in GNP, which under present conventions of national accounting, implies a growing scale of throughput.

Transition from Growth to the Steady State

A realistic discussion of a transition cannot assume a blank slate, but must start with the historically given initial conditions currently prevailing. These given initial conditions I take to be the institutions of private property and the price

system. These basic institutions must be bent and stretched, but not abolished, because we lack the wisdom, the leadership, and the time to replace them with something novel. This consideration lends a fundamental conservatism to a line of thought that will nevertheless appear quite radical to many.

A complementary design principle for guiding our speculations on the transition is to seek to combine micro freedom and variability with macro stability and control. This means, in practice, relying on market allocation of an aggregate resource throughput whose total is not set by the market, but rather fixed collectively on the basis of ecological criteria of sustainability and ethical criteria of stewardship. This approach aims to avoid both the Scylla of centralized planning and the Charybdis of the tragedy of the commons.

From the definition of a steady-state economy in the Introduction to this chapter, it is clear that it requires two kinds of limits: limits on the population of human bodies; and limits on the population of artifacts. A third limit, not derivable from the definition, but important in the interest of justice, is to impose limits on the degree of inequality in the distribution of artifacts among people—i.e., limited inequality in the distribution of income. How could these three limits be institutionalized so as to achieve necessary macro level control with the minimum sacrifice of freedom at the micro level?

The population of artifacts could be limited by controlling its "food supply," the throughput. By limiting the aggregate throughput at the point of origin (depletion) we indirectly limit the scale of physical stocks, and indirectly limit pollution outflow as well, at least in a gross quantitative sense. There remains the important problem of controlling the qualitative nature of wastes (degrees of toxicity and biodegradability) that would have to be dealt with separately by pollution taxes or standards. Several institutions could be used to limit depletion. Elsewhere I have suggested a depletion quota auction, and Talbot Page has suggested a national *ad valorem* severance tax.⁶

In the depletion quota auction, the resource market would become two-tiered. In the first tier the total amount to be extracted of each resource category would be set by a government agency and auctioned off in divisible units as rights to purchase or extract the resource up to the specified amount. Purchase of the depletion quota allows entry into the second tier of the market, which would be a private competitive market. In addition to paying the market price to the extracting company, the purchaser must present the previously purchased depletion quota rights that the firm will present to auditors at tax time. The scheme sets total quantity centrally, but leaves the decentralized price system to determine allocation of the fixed total among alternative uses.

The severance tax alternative is similar. By taxing depletion, we lower the throughput to some socially determined level judged to be within ecosystem tolerance limits. Once again aggregate throughput is controlled, yet the allocation at the micro level is left to the market. The advantage of the severance tax is that it is administratively simpler. Indeed, Page argues that it amounts to nothing more than reversing the algebraic sign of the existing depletion

allowances. Instead of subsidizing depletion we would tax it. The disadvantage of the tax is that the aggregate throughput is controlled only indirectly and less tightly than with a depletion quota. Quantity as well as price is free to vary, whereas in the quota system all adjustment is in terms of price. The ecosystem is sensitive to quantities, not prices, so the quota system is safer ecologically. Yet the severance tax is surely simpler administratively and more likely to gain support as a first step.

Either of these institutions will have the following effects: (1) reduce the levels of depletion and pollution, and limit the scale of the aggregate stock of artifacts; (2) raise relative prices of resources, which will force greater efficiency in resource use; (3) result in a large revenue or rent to the government in the form either of tax or auction receipts. This third consequence ties in with limits on inequality.

Higher resource prices would by themselves likely have a regressive effect on income distribution, much like a sales tax. However this effect can be more than offset by distributing the receipts progressively. Inequality might be limited simply by setting minimum and maximum income limits. The minimum might work along the lines of a negative income tax and be financed by the resource rents collected by the government. In this way we would serve the goal of ecological sustainability by limiting throughput scale, would serve the goal of efficiency by high resource prices, and serve the goal of equity by redistributing the resource rents resulting from the higher prices that in turn result from limits on the scale of throughput.

The minimum income and negative income tax ideas have some political support, but the maximum income does not. Many fear that a maximum would dull incentives and reduce growth. But if growth is no longer the *summum bonum*, then incentives at the top become less important. A range of inequality would continue to exist to reward real differences in effort, risk, and conditions of work. Incentive differentials are important, and fairness in a larger sense is certainly not served by trying to equalize all incomes. But probably a factor of ten difference would be a sufficient range of functional inequality. The incentives argument for unlimited inequality is much exaggerated, especially in the United States. Japanese auto executives reportedly make six to eight times what assembly-line workers earn. American auto executives make about fifteen times the wage of the unionized assembly line worker. Furthermore U.S. workers are laid off when sales drop, while managers keep their jobs, usually with no cut in salary, whereas in Japan everyone shares the burden of bad times. It is very clear that this larger inequality has not resulted in the U.S. auto industry being more efficient than the Japanese! In fact it may be that the richer the managers become the less incentive they have to work hard, and the greater the resentment and uncooperativeness of workers who know that they will be laid off at the first sign of recession.

The proper range of inequality is a subject for further research, reflection, and debate, once the principle of a limited range of inequality is accepted.

Regarding limits to population, there are many possibilities, ranging from the coercive Chinese system to complete laissez faire. My own favorite institution is that first suggested by Kenneth Boulding: exchangeable birth quotas issued in an aggregate amount corresponding to replacement fertility, distributed equally among individuals, but reallocated voluntarily by sale or gift. This plan combines macro control with micro freedom to a very high degree. However the idea of reproduction rights being exchanged on a market is for many people unacceptable, and some cannot even distinguish between selling a legal right to reproduce and selling a baby. How some people can get so upset with this proposal while accepting the current "rent-a-womb" practices and the Nobel Laureate sperm bank for single mothers is beyond me. In any case debate on this controversial issue detracts attention from the other institutions that do not depend on it. Therefore, for present purposes I will invite the reader to substitute his or her own population policy.⁷ I mention this one for logical completeness only.

These proposed institutions have the advantage of being capable of gradual application during a transition period. Initially the depletion quotas could be set high, near current levels (or severance taxes low), and applied first only to energy, the most general of resources. The distributive limits could be initially set far apart. Birth quotas could be issued in amounts not much different from actual fertility. Once the institutions were in place the limits could be tightened, like the jaws of a vice, as gradually as desired. Of course in a democratic society they could also be loosened to the point of being totally ineffective, if the political will be lacking.

There may, of course, be better ways of stretching and bending the institutions of private property and the market system than the ones I have suggested. But I think one is obliged to suggest something specific in the same way that an auctioneer is obliged to call out an initial price to start the bidding. He does not believe that his price will actually be the sale price, but without a specific starting point the trial and error feedback of bidding will never get started. Nor will the feedback process of critical discussion begin as long as economists think that the concept of the SSE is not worth "bidding on"—as long as they remain committed to the illusion of growthmania.

There are many further problems and issues in the transition to a SSE, such as international trade adjustments between growing and steady-state economies, and legitimate Third World needs for further growth up to a sufficient level. These are important issues that merit discussion. But in a sense it is premature to discuss further these problems of transition as long as we have not yet firmly established the case that: (1) the growth economy is unworkable; and (2) the SSE is, in broad outline, a feasible and desirable alternative.

The first order of business is to make that case as clearly and cogently as possible. However, that is not likely to be sufficient. The Keynesian revolution did not occur because Keynes' arguments were so compellingly lucid and unanswerable. It was the Great Depression that convinced people that some-

thing was wrong with an economic theory that denied the very possibility of involuntary unemployment. Likewise it will probably take a Great Ecological Spasm to convince people that something is wrong with an economic theory that denies the very possibility of an economy exceeding its optimal scale. But even in that unhappy event, it is still necessary to have an alternative vision ready to present when crisis conditions provide a receptive public.

NOTE: This chapter appeared originally as *Population-Environment Balance Monograph*, 1987.

NOTES

1. For a brilliant analysis of the relevance of the entropy law to economics, see Nicholas Georgescu-Roegen, *The Entropy Law and the Economic Process* (Cambridge, Mass.: Harvard University Press, 1971).
2. *Cartesian Economics* (London, 1922). For an exposition of Soddy's economics and further references, see H. E. Daly, "The Economic Thought of Frederick Soddy," *History of Political Economy*, 12:4, 1980.
3. See Robert Heilbroner and Lester Thurow, *The Economic Problem* (New York: Prentice-Hall, 1981), pp. 127, 135.
4. *The Nature of the Physical World* (New York: Cambridge University Press, 1953), p. 74.
5. H. E. Daly, "The Circular Flow of Exchange Value and the Linear Throughput of Matter-Energy: A Case of Misplaced Concreteness," *Review of Social Economy*, December 1985.
6. See H. E. Daly, ed., *Economics, Ecology, Ethics* (San Francisco: W. H. Freeman Co., 1980), pp. 337-344 and pp. 317-320.
7. For an attempt at persuasion, pp. 56-61.

10

THE CIRCULAR FLOW OF EXCHANGE VALUE AND THE LINEAR THROUGHPUT OF MATTER-ENERGY: A CASE OF MISPLACED CONCRETENESS

Circular Exchange Value and Linear Physical Throughput

Much of modern economic theory derives from the model of the circular flow of exchange value found in the initial pages of almost every economic textbook. This is especially the case for macroeconomics and national income accounting. In this familiar model, value embodied in goods and services flows from firms to households and is called national product. An equal value, reincarnated in factors of production, flows back to firms from households and is called national income. The circular flow model traces exchange value (purchasing power) around its repetitive cycle, back and forth between the two exchanging, decision-making units, one governing production (firms) and one governing consumption (households). Although the physical embodiments differ, the exchange value in the two loops of the cycle is the same because of the principle that both sides of a transaction have equal exchange value (though different use values), along with the inclusion in national income of residually defined profit as the "value" of the noncontractual "factor" of entrepreneurship. As we know from Say's Identity, there must always be, in the aggregate, sufficient income generated in the act of production to buy the total product.

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The circular flow of exchange is coupled with a physical flow of matter-energy that is *not* circular. The matter-energy flow is ultimately linear and unidirectional, beginning with the depletion of low-entropy resources from the environment and ending with the pollution of the environment with high-entropy wastes. Materials can be recycled, but since no material recycling is ever 100 percent complete and energy recycling is never feasible, the matter-energy flow (or throughput) is ultimately linear—just as the flow of a river is ultimately linear, though it may contain oxbows, whirlpools, and eddies. It is, of course, the linear throughput, not the circular flow of value, that impinges on the environment in the forms of depletion and pollution. Studying economics in terms of the circular flow without considering the throughput is like studying physiology in terms of the circulatory system without ever mentioning the digestive tract. It is impossible to study the relation of the economy to the ecosystem in terms of the circular flow model because the circle flow is an isolated, self-renewing system with no inlets or outlets, no possible points of contact with anything outside itself.¹ Yet in economic theory, the circular flow has the spotlight, while the concept of throughput is only dimly visible in the shadows. Consequently, the relation of the economy to its environment is a topic that economic theory has only occasionally illuminated and often obscured.

The above criticism applies as much to Marxist economics as to neoclassical economics. Marx's models of simple and expanded reproduction are basically isolated circular flows. Contacts with the environment are played down because resources are held to be free gifts of nature, not a source of value independent of labor. Furthermore, for a materialistic determinist, economic growth is crucial in order to provide the overwhelming material abundance that is the objective condition for the emergence of the new socialist man. Environmental limits on growth would contradict "historical necessity," while a circular flow does not.

The circular flow and the linear throughput are both important, and, although related, neither is reducible to the other. The two concepts are different abstractions from the same concrete reality, made for different purposes. Physical scientists often complain that GNP (circular flow) is meaningless because it does not tell us how many tons of iron ore, barrels of oil, etc. are being used. Economists complain that mere physical measures of throughput—tons of iron and barrels of oil—are meaningless because they say nothing about the balance of human cost and benefit occasioned by these diverse flows, whose relative importance is consequently unknown. Both complaints are in a limited sense true, but they both commit the fallacy of misplaced concreteness—trying to answer a question pertinent to one level or direction of abstraction with concepts relevant to a different level or direction of abstraction.²

The verb "to abstract" means "to draw away from." We may draw away from an actual entity in different directions and by different distances in each direction. To lose track of, or mix, the levels or directions of abstraction in an argument is to commit the fallacy of misplaced concreteness. Of course, we

cannot think without abstractions, but neither can we think clearly by mixing up abstractions.

A specific example of the error I am talking about is found in a popular textbook. The student is told, with the emphasis of bold print, that "The flow of output is circular, self-renewing, self-feeding" (Heilbroner and Thurow, 1981, p. 127). Note that the flow of *output*, not purchasing power, is considered circular. The first study question at the end of the chapter is: "Explain how the circularity of the economic process means that the outputs of the system are returned as fresh inputs" (Heilbroner and Thurow, 1981, p. 135). One might as well ask an engineering student to explain how a car can run on its own exhaust, or ask a biology student to explain how an organism can metabolize its own excreta. It would have been reasonable to ask the economics student to explain how dollars spent reappear as dollars earned and how purchasing power is regenerated in the act of production. But to explain how outputs are returned as inputs, nay, *fresh* inputs, requires the student to discover the secret of perpetual motion.

Correspondence with one of the textbook's authors on this question revealed that the authors really do not believe in perpetual motion but were simply trying to get across to the student the importance of replenishment—how the economic process reproduces itself and keeps going for another round. Certainly this is an important idea to stress, but the key to understanding it is precisely the recognition that replenishment must come from *outside* the system. Replenishment from within an isolated circular flow really does require perpetual motion, just as the words "self-renewing" and "self-feeding" clearly imply. Curiously, the authors specify that the returned outputs constitute *fresh* inputs. What can "fresh" mean in this context of continuous reuse? The word "fresh" suggests something newly brought in from outside, which, however, would require the abandonment of the circular flow model. I hasten to add that I do not advocate erasing the circular flow diagram from all texts but rather insist on applying it only to abstract purchasing power and not to real physical products or to their somewhat less real aggregate, "real GNP."

But is it not boorish to make such a fuss about an unfortunate inexactitude in an elementary text and rather ungracious to boot in that the textbook is, overall, pretty good? First, I believe the error is generic and not just a lapse in one text.³ The virtue of the text in question is that its clarity of expression makes obvious an error that is usually hidden beneath ambiguities and rapid changes of subject. Second, errors at an elementary level are far more deserving of attention than those in advanced treatises because, by virtue of being more fundamental, they have more far-ranging implications, as we will see later in this chapter.

Perhaps the standard example of misplaced concreteness in economics is "money fetishism"—applying the characteristics of money, the token and measure of wealth, to concrete wealth itself. Thus if money can grow forever at compound interest, then, presumably, so can wealth; if money flows in a circle,

then, presumably, so does output. Money, the physical token of abstract purchasing power, does indeed flow in a circle. But, as Georgescu-Roegen (1971, 1980) has pointed out, even the monetary flow, the quintessentially circular flow, has a physical throughput associated with it and is ultimately linear in terms of its physical dimension. Monetary tokens wear out little by little on each cycle and eventually must be replaced by new materials imported from forests (in the case of paper money) and from mines (in the case of metallic money). The circular flow holds only for exchange value at its most abstract. Everything else—not only real product but also the physical tokens by which the exchange value of wealth is measured—flows linearly, not circularly, in the final analysis. The circular flow model has taken a characteristic of money (which is not strictly true even for money) and over-generalized it into a basic paradigm for the economic process.

Recently some economists have gone so far as to deny the relevance of matter and energy. Witness George Gilder (1981, p. 232): "The United States must overcome the materialistic fallacy: the illusion that resources and capital are essentially things, which can run out, rather than products of the human will and imagination which in freedom are inexhaustible." One more quote so there can be no doubt that he means it (Gilder, 1981, p. 261): "Because economies are governed by thoughts, they reflect not the laws of matter but the laws of mind." For Gilder, the escape from the materialist fallacy is to embrace the angelist fallacy. Certainly the laws of mind are important, but that is hardly a reason for ignoring the laws of matter.

Recent retrogressions notwithstanding, most economists do recognize the existence of matter and energy and have never denied that production and consumption have physical dimensions. But these physical conditions have been thought to play only a very passive role. For example, Alfred Marshall noted that

Man cannot create material things—his efforts and sacrifices result in changing the form or arrangement of matter to adapt it better for the satisfaction of his wants—as his production of material products is really nothing more than a rearrangement of matter which gives it new utilities, so his consumption of them is nothing more than a disarrangement of matter which diminishes or destroys its utilities [Marshall, 1961, pp. 63–64].

Marshall clearly stated the implications for economics of the first law of thermodynamics (matter-energy is neither created nor destroyed, only rearranged). If we stop here, as most economists do, without considering the implications of the second law of thermodynamics, then we get a very incomplete and misleading picture. We get the picture offered by Barnett and Morse in their classic *Scarcity and Growth*:

Advances in fundamental science have made it possible to take advantage of the uniformity of energy/matter—a uniformity that makes it feasible, without preassign-

able limit, to escape the quantitative constraints imposed by the character of the earth's crust. . . . Science, by making the resource base more homogenous, erases the restrictions once thought to reside in the lack of homogeneity. In a neo-Ricardian world, it seems, the particular resources with which one starts increasingly become a matter of indifference [Barnett and Morse, 1963, p. 11].

In sum, Barnett and Morse believe that "Nature imposes particular scarcities, not an inescapable general scarcity" (Barnett and Morse, 1963, p. 11). This picture is much like Marshall's: matter is rearranged in production, disarranged in consumption, rearranged in production again, etc. Matter consists of homogeneous, indestructible building blocks (atoms and electrons) that we just keep recycling and rearranging (Marshall, 1961, p. 238). Looking at the physical basis of the economic process from the perspective only of the first law of thermodynamics tends to reinforce the circular flow model and sanction its generalization to levels of abstraction involving physical dimensions in addition to the exchange value dimension.

But there is also a second law of thermodynamics, the entropy law, whose implications for economics modify this picture substantially (Georgescu-Roegen, 1971). The entropy law tells us that it is not the uniformity of matter-energy that makes for usefulness, but precisely the opposite. It is non-uniformity, differences in concentration and in temperature, that make for usefulness. If all materials and energy were uniformly distributed in thermodynamic equilibrium, the resulting homogeneous resource base would be no resource at all. The potential for ordered rearrangement would no longer exist.

Since the rearrangement of matter is the central physical fact about the economic process, we must ask what determines the capacity to rearrange matter. Is that capacity conserved, like matter itself, or does it get used up? Is all matter equally capable of being rearranged? Is all energy equally capable of effecting the rearrangement? The answers to these questions are given by the second law of thermodynamics. Free or available (low-entropy) energy is required for rearranging matter (doing work), and, in the process, its capacity or potential to rearrange matter is irrevocably used up. In doing work, free energy is degraded into bound or unavailable (high-entropy) energy. Structured (low-entropy) raw materials are easier to rearrange (use up less free energy) than are dissipated waste materials (slag, sludge, soot, ashes, tailings, rust, etc.).

The entropy law is a formal expression of what common sense has suggested for ages: that there is an important qualitative difference between equal quantities of raw material and waste material. Raw materials (resources) are characterized by low entropy, waste materials by high entropy. To deny the relevance of the entropy law to economics is to deny the relevance of the difference between a lump of coal and a pile of ashes. This difference is of immediate and continuous importance to economic life, indeed, to life of any kind, and this simple observation should put to rest the tiresome canard that the entropy law is relevant only on a billion year time scale.

Perpetrators of this fallacy include George Gilder (1981, p. 261) and Danish economist Mogens Boserup, who said:

I am told that [the sun] is huge enough to last for a few billion years which is far beyond the conceivable duration of the species *homo sapiens*. Therefore, the entropy story, entertaining or thrilling as it may be, is irrelevant, in the precise sense that nothing follows from it for human action and policy, today or in any future about which we can sensibly talk and plan [Boserup, 1980, p. 49].

There are three time frames worth distinguishing: first, the extremely long-run concept of entropy as the ultimate equilibrium state—the final “heat death” or chaos; second, the immediate moment to moment concept of entropy as a continuous directional process—a “time’s arrow” and a gradient down which all physical processes ride; third, the medium-run period of twenty-five to a hundred years over which solar low entropy remains essentially unchanged while sources of terrestrial low entropy can become significantly depleted.

Let us agree with Boserup that the first meaning is indeed irrelevant. The relevance of the second meaning to economics is as elementary and pervasive as the difference between raw material and waste material. Recognition of the third time frame would have kept Boserup from missing the point that our terrestrial stock of low entropy is what limits industrial growth, and that the enormous stock of low entropy in the sun is of limited relevance because its flow rate of arrival to earth in the form of radiant solar energy is constant. Nor would we be wise to increase that flow, even if we could, since the solar flux is the very basis of the fixed biophysical budget on which all species live and to which they have complexly adapted by coevolution over millions of years. Human beings also must ultimately live within that biophysical budget, even though it can temporarily be avoided by drawdown of geological capital and takeover of habitats of other species.

The capacity to rearrange matter (free energy), as well as the stock of matter partially prearranged by natural biogeochemical processes to suit our purposes (resources), are both irrevocably used up in the economic process. Degraded matter and energy must be expelled from the economic process back to the environment. New, useful, fresh matter and energy must be imported from the environment. Replenishment of the physical basis of economic life is not a circular affair. The ecosystem recycles many human and industrial wastes through biogeochemical cycles powered by the sun, so some waste materials eventually do get returned as fresh inputs. But this is an environmental service external to the economic process, not a part of the circular flow model of the economy.

Low entropy is extracted from environmental sources and high entropy is returned to environmental sinks. If the environmental sources and sinks were infinite, then the fact that the flow between them is linear and entropic, rather than circular and self-renewing, would not be very important. But the fact that both sources and sinks are finite means that the entropic nature of the throughput greatly increases the force of scarcity because finite sources run down and

finite sinks fill up, and the latter cannot replenish the former. In the process, other species get evicted from their niche as more and more of the finite environment is converted into a source or a sink for the economic system. As other species are displaced and eventually become extinct, human beings lose the life-support services formerly provided by those species.

Some Implications for Economic Theory That Arise When Throughput Is Emphasized and the Circular Flow Deemphasized

We will look at some questions under the general headings of macroeconomics, microeconomics, and distributive justice.

MACROECONOMICS

What is the proper physical scale of throughput relative to the ecosystem that supplies and reabsorbs it? How might national accounts be affected by a shift in emphasis from circular flow to throughput?

The Scale Issue. Scale questions have been discussed in economics mainly in terms of the firm. The physical scale of the whole economy relative to its environment, the ecosystem, is an issue that has only recently come to the attention of economists. The traditional faith among economists is that previously quoted from Barnett and Morse: “Nature imposes particular scarcities, not an inescapable general scarcity” (1963, p. 11).

But finitude and entropy imply a general, absolute dimension to scarcity, in addition to the particular, relative dimension measured by relative prices. How do relative prices reflect increasing absolute scarcity resulting from growth in the scale of the economy within a fixed environment? The answer is, very imperfectly. Most of the consequences of increasing scale are experienced as pervasive externalities, diminished ecosystem services. It is true that adjustments are made. Services that were free at the smaller scale become scarce at the larger scale. The adjustment is to price these newly scarce resources either by establishing new property rights or by shadow pricing. Once the growing scale has turned formerly free goods into scarce goods, it is certainly better to give them positive prices than to continue behaving as if their prices were zero. But there is a prior question that has been overlooked. How do we know that we were not better off at the smaller scale, before the free good became an economic good? How do we know that we are not just making the best of an increasingly bad situation? Turning free goods into economic goods will increase GNP, but it may reduce welfare.

There is an instructive parallel between the relation of scale to the price system and the more familiar relation of distribution to the price system. It is

well known in economic theory that the price system, in pure competition, will attain an efficient allocation of resources in the sense of a Pareto optimum. It is further known that Pareto optimality is independent of the distribution of ownership of physical resources—i.e., there is a Pareto-efficient allocation for any distribution, including unjust distributions. Therefore, the social goal of distributive justice must be pursued independently of, but not necessarily in conflict with, the price mechanism.

I suggest the same for the question of scale of throughput. At any stage of growth, at any scale of throughput, the price system can optimally allocate the given volume of throughput among alternative uses. But just as there is nothing in the price system that can identify the best distribution of ownership according to the criterion of justice, neither is there anything that allows the price system to determine the best scale of throughput according to the ecological criterion of sustainability. Just as a Pareto-optimal allocation may coexist with a socially unjust distribution, so may it coexist with an ecologically unsustainable scale. Indeed, there is a sense in which the unsustainable scale is simply an unjust distribution with respect to future generations.

Perhaps an analogy will clarify this important point. Suppose we want to maximize the load that a boat carries. If we place all the weight in one corner of the boat, it will quickly sink or capsize. We therefore spread the weight out evenly by using a price system. The heavier the load in one part of the boat, the higher the price of adding another pound in that place. We allocate the weight so as to equalize the price per additional pound in all parts of the boat. This is the internal, equimarginal rule for allocating space (resources) among heavy objects (alternative uses). This pricing rule is an allocative mechanism only; a useful, but dumb, computer algorithm that sees no reason not to keep on adding weight and allocating it optimally until the optimally loaded boat sinks—optimally, of course, to the bottom of the sea. What is lacking is an absolute limit on scale, a recognition that the boat can displace only so much water, a rule that says: "Stop when total weight is one ton or when the waterline reaches the Plimsoll mark." Price is only a tool for finding the optimal allocation. The optimal scale is something else. The market by itself has no criterion by which to limit its scale vis-a-vis its environment. Its basic thrust, amplified by Keynesian policies, is toward continuous growth in GNP, which, under present conventions of national accounting, implies a growing throughput.

Implications for National Accounts. It is worth asking whether our commitment to the circular flow and GNP perhaps had its origin in A. C. Pigou's decision not to follow Irving Fisher's definition of the national dividend. Pigou reasoned as follows:

Professor Fisher himself takes the position that the national dividend, or income, consists solely of *services* as received by ultimate consumers whether from their material or from their human environment. Thus a piano or an overcoat made for me

this year is not a part of this year's income, but an addition to capital. Only the services rendered to me during this year by these things are income . . . This way of looking at the matter is obviously very attractive from a mathematical point of view [Pigou, 1920, p. 35].

Fisher's view is attractive mathematically because it does not add up unlike things; only the values of current services (psychic income) are added. We do not conflate income with capital; we do not add up the value of the service itself with the value of the item that renders the service. In his concept of capital, Fisher included the material and human environment. Human beings render services to other human beings, but we count only those services; we do not add in the capital value of the human being in the year he was born or graduated. For the material environment, Fisher had in mind mainly artifacts, not the natural material environment. Conceptually, it would be easy to extend his view to cover natural ecosystem services as well, although problems of valuation are great. But in both cases we should treat services from the material environment consistently with services from the human environment. We should count only service as income and that which renders service as capital. In so doing, we recognize that physical capital always depreciates (due to entropy) and that its continual maintenance and replacement is a cost. The cost of maintaining capital intact must not be counted as a part of the net national dividend, and all physical production (except net investment) is a cost of keeping capital intact. Fisher's basic magnitudes, the capital stock, the service it renders, and the throughput it requires for maintenance, involve no circular flows. Stock, by definition, does not flow; service is a nontransferrable psychic experience and cannot flow; throughput is a flow, but is unidirectional, not circular.

But national income accounting did not develop along the lines outlined above. Pigou rejected Fisher's approach because "the wide departure which it makes from the ordinary use of language involves disadvantages which seem to outweigh the gain in logical clarity" (Pigou, 1920, p. 35).

Kenneth Boulding, however, has been arguing the logic of Fisher's view since 1949.

I shall argue that it is the capital stock from which we derive satisfactions, not from the additions to it (production) or the subtractions from it (consumption): that consumption, far from being a desideratum, is a deplorable property of the capital stock which necessitates the equally deplorable activities of production; and that the objective of economic policy should not be to maximize consumption or production, but rather to minimize it, i.e., to enable us to maintain our capital stock with as little consumption or production as possible [Boulding, 1949, p. 79].

A large part of production is really the maintenance cost of the capital stock; a measure of the regrettably necessary activities of depletion, pollution, and labor that are required to maintain the capital stock against the ravages of physical depreciation that inevitably occur as the capital is used to satisfy wants. Wants are satisfied by the existing capital stock, not by the regrettable

but unavoidable characteristic of the stock to become worn out or used up. The service yielded annually by the stock is a benefit, the throughput required annually to maintain the stock imposes costs. Benefits and costs should be compared, not added up or conflated into a circular flow.

SOME MICROECONOMIC IMPLICATIONS OF THE CONCEPT OF THROUGHPUT

In the theory of production, resources are frequently omitted as variables in the production function. Output is represented as a function of labor and capital only. Even when resources are included, the function is usually multiplicative (e.g., Cobb-Douglas) so that, on paper at least, resources can approach zero while output remains constant if capital and labor increase in a compensatory fashion. In the words of William Nordhaus and James Tobin, neoclassical theory holds that "there are no limits on the feasibility of expanding the supplies of nonhuman agents of production," and, further, that "reproducible capital is a near perfect substitute for land and other exhaustible resources" (Nordhaus and Tobin, 1973, p. 522).

Substitutability among factors presupposes that the factors are, to a considerable degree, independent. This assumption is strained past reasonable bounds when asserting that reproducible capital is a near perfect substitute for resources. Capital, in the sense of the term relevant to its being a variable in a production function, requires matter and energy (resources) for its production. So, of course, does labor. To the extent that capital is substitutable for resources in a specific production process, it simply implies an increased need for resources in those processes that produce the capital equipment. The net result for all sectors together need not be a reduction in total resource throughput.

The most fundamental objection to the emphasis placed on extensive capital-for-resources substitution comes from Georgescu-Roegen's fund-flow model of production (1971, pp. 228–253). In this view, capital and labor are agents that transform the resource flow from raw material input into product output. These transforming agents are *funds*—structures that are maintained intact as a part of the process of production. Part of the *flow* of resources is transformed into products and part is fed back to maintain and replace the agents of production. There can be considerable substitution between labor and capital (the agent-funds), but the relation between funds and the flow (that which is doing the transforming and that which is being transformed) is overwhelmingly one of complementarity. Whatever substitutability exists is strictly marginal, limited to reducing waste of materials in process. For example, one carpenter with a power saw may substitute for three carpenters with hand saws, but no amount of power saws and carpenters will enable one to build a given house with one-third the wood. Of course, the house could be built with brick instead of wood, but that is the substitution of one resource flow for another, not the substitution of a capital fund for a resource flow. The usual reason for adding to the accumulation of the capital fund is to be able to transform a larger, not a smaller, flow of resources.

At the risk of belaboring the obvious, it should be pointed out that possibilities of substitution of capital for resources are constrained by the necessity of a materials balance between product output and resource input. A ton of iron output will never require less than a ton of iron ore input, regardless of technological advances. This much follows only from the first law of thermodynamics (Kneese, Ayres, and d'Arge, 1970).

In light of these elementary observations, the statement that "reproducible capital is a near perfect substitute for land and other exhaustible resources" rings hollow indeed. How, then, did such deservedly respected economists ever come to believe it and to ignore to such an extent the role of the throughput of resources in production? It is hard to place blame directly on the circular flow model because in microeconomics we do not think of production as circular. Yet I suspect that the circular flow model is indirectly at fault since this issue arose in the context of *aggregate* production functions in which "output," being an aggregate, is less well-defined and is measured in terms of circular flow-based GNP.

The plausibility of the extensive substitution hypothesis is enhanced by the fact that an aggregate measure of output permits product substitution as well as factor substitution. But the extra scope for substitution is bought at the price of ambiguity in the meaning of output that unavoidably arises in moving from a definite single product to a vague aggregate.

If we are ever to build macroeconomics on microeconomic foundations, we must face up to the limits on factor substitution at the micro level without hiding behind the extra dimension of product substitutability introduced by aggregation. At the extreme, product substitution can lead to the quest for "angelized GNP," which results when the circular flow of purchasing power continues to grow while throughput declines (so that the materials and energy intensity of an average dollar's worth of GNP forever declines, approaching zero). We will all eat high-tech sandwiches consisting of ever thicker slices of information (much of it indigestible) between increasingly thin slices of silicon.

IMPLICATIONS FOR DISTRIBUTIVE JUSTICE

The circular flow of exchange value encounters no limit to its growth. Concrete goods and services are limited by the throughput, which in turn is limited by the capacity of the environment to sustain further increases in depletion and pollution. Exchange value is measured in money, which is essentially debt. A dollar is a kind of non-interest-bearing IOU issued by the government and accepted by the citizenry as a medium of exchange. If I own a dollar, then somebody "owes" me a dollar's worth of wealth. Wealth has a physical dimension, debt does not. Wealth has use value as well as exchange value, debt has only exchange value. Two positive pigs are tangible, concrete items of wealth, while two negative pigs (debt) are purely abstract mathematical entities that do not take up space or need to be fed. There are no limits to the number of

negative pigs that one can own. Debt has no physical limit—only the repayment of debt in terms of positive wealth faces the limits imposed by the throughput.

The circular flow of exchange value (debt) grows, and concrete wealth grows, too, until it encounters limits. Debt grows forever by the law of compound interest, but wealth can grow exponentially only for a finite period. Yet we have acquired the habit of extrapolating the process of compound interest into the indefinite future. Add to that the fact that evidence of physical or social limits to growth can always be disputed or interpreted as a temporary bottleneck or a phase of transition to a "backstop technology," and the conclusion is that there is really no reason why the circular flow cannot continue to grow.

Furthermore, we still have poverty, and the only acceptable cure for poverty is more growth because redistribution is politically unthinkable. Even a radical redistribution would not make the modal income high enough to meet the presumed aspirations of the average citizen. The upshot is that growth must remain the top priority and that the circular flow must continually expand, not only to make us all richer in the future but also to keep us all fully employed in the present. If the throughput lags behind the circular flow, then we get inflation, and if inflation becomes too onerous, then we must either slow down the circular flow (giving rise to unemployment) or find some technological way to break the bottleneck that is putting a drag on growth in throughput. A third way out is to adopt the Gilder-Simon conjecture that wealth has only mental origins (Gilder, 1981, p. 232) or that mind is the only limiting factor because the physical roots of wealth are infinitely abundant (Simon, 1981, p. 47). In this view, the only limit to growth is arbitrary governmental restriction on the infinite productivity of free minds, free wills, and free markets.

Let us for a moment entertain the possibility that the Gilder-Simon conjecture is simply wrong—a thought that should not appear unreasonable in light of the discussion at the beginning of this chapter. Imagine, instead, that there really is an optimum scale of throughput relative to the ecosystem and that economic growth beyond that scale is in reality antieconomic growth. As pointed out earlier, our national accounts, as currently conceived, are incapable of signaling the point at which traditional economic growth becomes antieconomic. We cannot be sure that this has already happened, nor can we prove that it has not. But suppose that it has happened or soon will. The implication of such a state of affairs is that growth could no longer be appealed to as a cure for poverty, as a politically palatable substitute for the unacceptable discipline of sharing and population control. Sharing and population control each have moral and technical dimensions, as does a policy of continuous growth. However, sharing and population control are fundamentally moral, not technical, solutions to poverty. Continued growth by overcoming a series of allegedly temporary bottlenecks is a technical, not a moral, solution. We have an inordinate faith in solutions by technical improvement and practically no faith in solutions by moral improvement. Growth seems to absolve us from the duty to control population and to share the earth's resources more equitably among

members of the present generation and between the present and future generations.

Recognition of the true role of throughput and the limits that it implies for economic growth revokes this comfortable moral absolution. It means the abandonment of Barnett and Morse's intergenerational invisible hand.

By devoting itself to improving the lot of the living, therefore, each generation, whether recognizing a future-oriented obligation to do so or not, transmits a more productive world to those who follow [Barnett and Morse, 1963, p. 249].

Contrast that with Georgescu-Roegen's intergenerational wealth versus lives tradeoff:

Every time we produce a Cadillac, we irrevocably destroy an amount of low entropy that could otherwise be used for producing a plow or a spade. In other words, every time we produce a Cadillac, we do it at the cost of decreasing the number of human lives in the future. Economic development through industrial abundance may be a blessing for us now and for those who will enjoy it in the near future, but it is definitely against the interests of the human species as a whole, if its interest is to have a lifespan as long as it is compatible with its dowry of low entropy [Georgescu-Roegen, 1980, p. 58].

The difference could hardly be greater. The Barnett and Morse view reinforces, and is reinforced by, a concentration on the circular flow of exchange value and the first law of thermodynamics, in which the cycle keeps turning and nothing is ever used up. Abundant, homogeneous building blocks are arranged, disarranged, and rearranged *ad infinitum*. Georgescu-Roegen's view stems from a primary focus on the throughput and the second law of thermodynamics, in which something essential (low entropy) is used up. The opportunity cost of using it up for nonvital needs in the present is its nonavailability for meeting vital needs later and, hence, fewer lives in the distant future. The second law of thermodynamics does not, of course, contradict the first law, but it does contradict the circular flow model whenever the latter is applied to anything more concrete than abstract exchange value.

Georgescu-Roegen suggests as a possible ethical principle that the human species should have a lifespan as long as is compatible with its dowry of low entropy. At the extreme, this would require a subsistence standard of living for all generations, and from the context we can be sure that this is not what he advocates. Rather, the maximization of longevity should be constrained by a per-capita standard sufficient for a good life.

Another approach leading to the same ethical norm is to begin with Bentham's "greatest good for the greatest number" and correct its deficiencies. One deficiency is the impossible double maximization. One of the "greatests" must be changed to "sufficient." Another problem is the definition of "good." Let us adopt a minimal definition in terms of some amount of resources necessary for a good life. Finally, let us interpret "number" as cumulative number, all those ever to live over time, rather than number alive now or number simultaneously alive at any future time. The modified utilitarian norm

then reads: "Sufficient per-capita resource use for a good life for the greatest number over time." The notion of sufficiency is normative and dialectical and, consequently, difficult to define. But if some definition of sufficiency is accepted, the consequence is an ethically based argument for limiting growth, which dovetails with the biophysically based argument.

There are two ways to justify growth for the sake of extravagant luxury in the present. The soft-hearted, soft-headed way is to deny that there is any trade-off, to affirm the intergenerational invisible hand. The hard-hearted, hard-headed way is to admit the existence of a tradeoff but simply assign very little value to the future. The first evasion is at variance with the facts of finitude and entropy, and the second is a value judgment that is at variance with the ultimate biological value of survival.

Putting throughput in the spotlight raises not only difficult ethical questions of distribution between generations but also highlights the issue of distribution among nations. It points toward a kind of "impossibility theorem"; namely, that it is impossible for 100 percent of the world's population to attain the per-capita resource usage rate currently enjoyed by the 5.6 percent of us who live in the United States. In other words, the U.S. economy cannot be generalized to cover the entire world, and to the extent that the goal of developing nations is to have per-capita production and consumption standards equal to those in the United States, their goal is, in the aggregate, unobtainable. Therefore, we must either rethink the meaning of development and base it on increasing total factor productivity, population control, and redistribution, rather than on increasing throughput, or we must accept the fact that development is not for everyone.

It is worth quoting at length an attempted refutation of this impossibility thesis by a well-known economist, Professor Lester C. Thurow, because it so clearly illustrates the iron grip of the circular flow model.

In the context of zero economic growth and other countries, a fallacious "impossibility argument" is often made to demonstrate the need for zero economic growth. The argument starts with a question. How many tons of this or that non-renewable resource would the world need if everyone in the world now had the consumption standards enjoyed by those in the U.S.? The answer is designed to be a mind-boggling number in comparison with current supplies of such resources. The problem with both the question and the answer is that it assumes that the rest of the world is going to achieve the consumption standards of the average American without at the same time achieving the productivity standards of the average American. This is, of course, algebraically impossible. The world can consume only what it can produce. When the rest of the world has consumption standards equal to those of the U.S., it will be producing at the same rate and providing as much of an increment to the world-wide supplies of goods and services as it does to the demands for goods and services [Thurow, 1976, p. 46].

Professor Thurow thought well enough of this argument that he reproduced it in Chapter 5 of his otherwise admirable book, *The Zero-Sum Society* (1980, p. 118). Thurow appeals to the accounting conventions of the circular flow in

order to show that throughput of resources can never be a constraint. He tells us that it is not only possible for the U.S. economy to be generalized to the entire world, it is "algebraically impossible" that it should be otherwise. Never mind about tons of nonrenewable resources and all those numbers that are "designed" to be mind-boggling. Aggregate supply equals aggregate demand, and that is all there is to it. Unfortunately for Thurow's argument, the algebra of circular flow accounting identities tells us absolutely nothing about the adequacy of biophysical resources to sustain a worldwide per capita throughput equal to that of the United States.

Some Concluding Remarks

The fallacy of misplaced concreteness, the evasion of ethical issues, and the apotheosis of economic growth have become a way of life within the regnant Keynesian-neoclassical synthesis. The role played by the dominance of the circular flow over the linear throughput in fostering this illusory way of life has been discussed. In illustrating the ease with which conclusions valid at one level of abstraction (flow of exchange value) are transferred to an entirely different level of abstraction (flow of matter-energy), I have quoted from a number of deservedly respected economists. My intention is not to belittle their accomplishments but to remove any possible suspicion that I am attacking a straw man and to add an *a fortiori* punch to the case I am making. It is only the errors of the most competent that tell us something about the shortcomings of the conventional body of thought itself. The shortcoming to which I am calling attention is an extreme overemphasis on the circular flow and a correlative underemphasis on the throughput. Some specific consequences of this basic distortion have been discussed.

How long can we economists think of ourselves as scientists, and how long will others think of us as scientists, if we persist in building, perpetuating, and prescribing on the basis of models that violate the most basic laws of physical science? Let us ponder the words of Sir Arthur Eddington.

The law that entropy increases—the Second Law of Thermodynamics—holds, I think, the supreme position among laws of nature. If someone points out to you that your pet theory of the universe is in disagreement with Maxwell's equations—then so much the worse for Maxwell's equations. If it is found to be contradicted by observation—well, these experimentalists do bungle things sometimes. But if your theory is found to be against the Second Law of Thermodynamics, I can give you no hope; there is nothing for it but to collapse in deepest humiliation [Eddington, 1953, p. 74].

NOTE: This chapter appeared originally in *Review of Social Economy*, December 1985. Helpful comments on earlier drafts were received from Talbot Page, Richard Norgaard, and Earl Cook, as well as from participants at a session of the Southwestern Economic Association and at a World Bank seminar. Responsibility for all points of view, as well as any errors, rests with the author.

NOTES

1. When the elementary texts speak of "leakages" or "injections," they are referring to purchasing power, not matter-energy. Furthermore, the whole point of Keynesian policy is to close the circular flow again, channeling the sum of leakages ($S + T + M$) back into an equal sum of injections ($I + G + X$).
2. A. N. Whitehead (1929, p. 11) defined the fallacy of misplaced concreteness as "neglecting the degree of abstraction involved when an actual entity is considered merely so far as it exemplifies certain categories of thought."
3. See also, for example: Edwin Mansfield, *Economics*, New York, 1983, p. 63; Cambell McConnell, *Economics*, New York, 1978, p. 54; Anderson, Putallaz, and Shepherd, *Economics*, Englewood Cliffs, N.J., 1983, p. 23.

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11

ALTERNATIVE STRATEGIES FOR INTEGRATING ECONOMICS AND ECOLOGY

Introduction

Three alternative strategies for integrating economics and ecology will be considered: (1) economic "imperialism," (2) ecological reductionism, and (3) the economy as a quasi-steady-state subsystem of the ecosystem. As these terms may suggest, the plan of this article is to criticize the first two strategies and to extol the virtues of the third. The first two approaches contain important insights as well as, in my opinion, important errors. I see them roughly as thesis and antithesis, with the third view as synthesis.

All three views have in common that they initially see the economy as a subset of the ecosystem. The first two strategies integrate by getting rid of the subsystem boundary. Economic imperialism seeks to expand the economic subsystem until its boundaries coincide with those of the total ecosystem, thus bringing all matter and energy flows under the regulating influence of prices. Ecological reductionism seeks to contract or erase the boundaries of the economic subsystem on the supposition that the matter and energy flows within the subsystem are entirely governed by the same principles that reign in the rest of the ecosystem. Furthermore, these universal principles can be stated in terms of energy alone. The third or steady-state view, unlike the first two, integrates by insisting on maintaining a boundary and on (1) drawing it in the right place and (2) putting constraints on the physical flows crossing that boundary in both directions.

These distinctions are visually represented below (Figure 8).

process officials, and Anderson were off their jackets, rolled up their sleeves, and helped with the arrangement, to help the program for North America quickly on this issue.

Later that year, they set up a CFC task force. Three subcommittee committees were being moving quickly in the hope we could reduce CFCs through conservation. The second was chaired by the longer-term solutions and the third subcommittee on 'external international relationships with other solvents coming in at revising the regulations [on circuit board cleaning]. Nations Environmental subcommittee on the issue. The idea here was to take advantage of knowledge that was developed

In the task force, and his colleagues, they explained the principles, asking them to explain why they used clean circuit board cleaning. They needed to clean the first place. Then Northern Telecom customers said that the company's cleaning would be acceptable. A full gamut of alternative cleaning techniques: aqueous cleaning, cleaning, alcohol, others, the task force for Northern Telecom. "no-clean" low-temperature technology. There was concern that the process would be risky — that the boards are cleaned because they leave a residue that can block the lines and components and temperature and timing. But when it was formed long-term (which Fitzgerald said with "all our customers and all of the

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Focus Report

From a Million Kilograms to 113 in Three Years: How Northern Telecom Cut the Cord on CFCs

On 30 November, Northern Telecom Inc. (NORTEL) announced that it had become 113-free. The \$6.8 billion Canadian-based communications systems supplier began its CFC phaseout program in mid-1988, when its factories were using one million kilograms of CFC chemicals annually. Three years later, the company was down to virtually zero, having eliminated 999,887 kilograms and greatly reduced its consumption of CFCs to 113 kilograms. At the recent International Chemicals Conference in Baltimore, Maryland, Northern Telecom received the US Environmental Protection Agency's (EPA) Stratospheric Ozone Achievement Award.

How did the company do it? *GECR* asked Northern Telecom's assistant vice president for environmental affairs, to outline the phaseout program and why the corporation decided to move away from CFCs. Fitzgerald, who has been working in the environmental field for 22 years, says he has found that environmental issues can represent opportunities rather than problems, and he applied this case in the same way.

"When the Montreal Protocol was signed in September 1987," Fitzgerald told *GECR*, "I was invited to the Canadian environment ministerial conference. 'What do we have to do to get this going?' 'What does it mean to a company like Northern Telecom? Who do I have to speak with at the EPA?' I had a meeting with Steve Anderson at the EPA. I had a meeting in December 1987 and told him that I was interested in about kickstarting the phaseout and in January 1988, Fitzgerald performed a workshop, where he learned that Northern Telecom was using about a million kilograms a year, 97% of which was CFC-113. In March, Fitzgerald had a workshop with 70 Northern Telecom

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Fitzgerald says his company has produced a 15-minute video documenting the phaseout process, and it has contracted with California artist Tom Van Sant to produce 60,000 posters and 70 hologram wall hangings portraying his composite satellite image of the Earth without cloud cover — a picture that Northern Telecom is calling "A Clear Day." The posters will go to Northern Telecom staff, and the wall hangings will go in the front lobbies of Northern Telecom manufacturing sites.

With the CFC issue resolved, Fitzgerald is setting his sights on

product lifecycle management. He's taking other initiatives as well: Northern Telecom has already issued internal guidelines on waste minimization, and will unveil energy management guidelines next month to begin reducing its CO₂ emissions.

Northern Telecom's ability to switch to no-clean technology was a major factor in its speedy phaseout of CFC-113. Not all circuit-board manufacturers have the luxury of this option, particularly if they are supplying equipment to the military. But Fitzgerald believes that others can follow his company's example. The

secret behind Northern Telecom's success in environmental matters, Fitzgerald says, is a combination of management commitment and a willingness among its employees to participate. "There was management commitment from the earliest part of the CFC program. We even published quarterly reports on all our locations. There became almost an internal competition between locations to see who could move up the ladder fastest. And then we had a handful of people who took it on as a challenge." Any company, Fitzgerald says, can do the same thing if it has those ingredients.

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GROWTH VS. ENVIRONMENT

The Push For Sustainable Development

In Rio next month, world leaders will seek a route to prosperity without environmental degradation.



It's called "sustainable development." The concept is certain to generate plenty of controversy.

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In 1972, Donella and Dennis Meadows set off a furor with their book *Limits to Growth*. They argued that the earth's resources and its ability to absorb pollution and regenerate are finite. Using computer models, they also predicted that population and growth would bump up against these constraints within a century. "Scientists warn of global catastrophe," screamed headlines. Parliaments and scientific societies debated the issue while economists attacked the authors' assumptions, methods, and conclusions. The book sold 9 million copies. But the subject was quickly eclipsed by more pressing concerns and derision of their Malthusian alarms.

Now, the Meadowses are back, with a sequel called *Beyond the Limits*. This time, they argue that human activity already has overshot earth's ecological limits, and that unless corrective steps are taken soon, their

original scenario is more certain. "It's a much harder message to hear," says Donella Meadows, now adjunct professor of environmental studies at Dartmouth College.

In 1992, however, such views provoke more worry than ridicule. In only 20 years, global population has leaped 66%, to 5.3 billion, while world economic output has nearly doubled. In vast areas, the decline of nature is disturbingly evident. The Baltic Sea is dying from sewage and other pollution. Every year, 25 billion tons of topsoil are lost. In places such as Mexico City and Eastern Europe, millions breathe toxic air. China soon will have cut all its harvestable forests. The ozone layer is thinning, the globe may be warming, and more devastation lies in store.

Left unchecked, world population will double by 2030, the U. N. predicts. By then, some 84% of earth's citizens

ECONOMIC COST

Environmental and related damage now costs industrial countries the equivalent of 1% to 5% of their GNP. In Western Europe, forest damage is estimated to penalize GNP by \$30 billion a year.

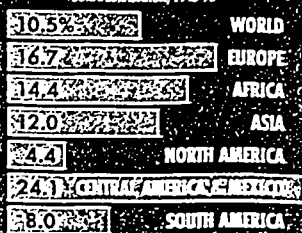
ECOLOGICAL DECLINE

Increased human activities are destroying the earth's inventories of soils, forests, wetlands, and grasslands.

Each year 42.5 million acres of tropical forests are destroyed. The ozone layer is thinning, and the potential for global warming exists.

EXTENSIVE LAND DAMAGE

SHARE OF VEGETATED LAND WITH MODERATE TO SEVERE SOIL DEGRADATION, 1945-90



DATA: INTERNATIONAL SOIL RESEARCH & INFORMATION CENTER

This image was produced by data taken from satellites and other sources. The technique used data taken over several years to produce a cloud-free image.

A PROPOSED SOLUTION

BOOST EFFICIENCY

Adopt innovations that slash the resources used and pollution emitted per unit of output. These include clean technology such as electric cars, energy efficiency, recycling, 'closed loop' production, less destructive agriculture, and designing products with less packaging, fewer materials, and longer lives



BUILD A FRAMEWORK FOR CHANGE

Account for environmental costs and benefits in economic transactions and revise GNP calculation. Forge international compacts to protect common resources and address global problems. Enact taxes and other incentives to curtail destructive actions. Boost international aid for poverty alleviation, family planning, sound agriculture, resource protection in developing nations. Liberalize trade and promote industry investment in developing nations

will live in developing nations, where just giving them the basics might mean quintupling world output. That is the catch-22. "We must renew economic growth in developing nations to address poverty and population increases," says John Sewell, president of the Overseas Development Council. "But if we do it on the same pattern as industrialized countries, the environment will be irretrievably damaged."

'CUTTING EDGE.' Now, in sanctums of power the world over, this escalating conflict between growth and environment has catapulted a notion called "sustainable development" into the limelight. This emotionally charged idea holds that future prosperity depends on preserving "natural capital"—air, water, and other ecological treasures—and that doing so will require balancing human activity with nature's ability to renew itself. It also recognizes that growth is necessary to eliminate poverty, which leads to the plunder of resources. "Sustainable development is what environmental protection should be about," says William D. Ruckelshaus, chairman of waste-hauler Browning-Ferris Industries Inc.

Although still more a vision than a strategy, the concept is emerging from U.N. agencies and think tanks to become "the cutting edge of social and economic reform," says Thomas N. Gladwin, professor of management and international business at New York University. In the past year, government, business, and academic leaders have scrutinized the idea in 80 meetings in a dozen countries. More than 75 books have examined the subject, and dozens of companies are looking at what it would mean for them (page 74).

This frenzy grows out of a two-year buildup for the U.N. Conference on Environment & Development (UNCED), to be held in June. Heads of state and negotiators from 170 countries will converge on Rio de Janeiro to consider a controversial agenda to protect the earth's atmosphere and species, attack poverty, and foster less destructive industrialization. This could be the first step toward what

Lester R. Brown, president of the WorldWatch Institute, calls a "fundamental restructuring of economies," that would require sweeping revisions in regulatory and economic policies, plus a new global compact between rich and poor nations.

The implications make a volatile brew. Industrial nations would have to shift from resource-intensive production systems and lifestyles to ones that consume vastly fewer resources and dramatically cut pollution. Developing nations would have to practice less destructive agriculture, industrialize with unprecedented care, and cut birth rates, with all that implies for improving women's rights. They couldn't do it alone: Rich nations would have to give billions in aid, while their industries shared the latest technology. The total impact "would be comparable to that of the Industrial Revolution," says Hardin Tibbs, a consultant at Global Business Network.

Not everyone agrees a revolution is

necessary. Some scientists argue that environmental problems aren't as serious as the doomsayers insist. Other experts, such as David Pearce, an economist at University College in London, insist that market forces, plus doses of new technology, would be enough to curtail pollution so that if population stabilizes growth can go on. Others disagree—and say that given the ecological limits, the only way to provide for all of earth's people and avoid ecological disaster is to redistribute wealth.

FEARFUL CONSEQUENCES. Either way, the obstacle at Rio and long after, says one U.S. official, is that "almost anyone can find something to hate or fear in the idea." Sustainable development threatens entrenched interests, and so faces high political hurdles. In April, Brazilian President Fernando Collor de Mello fired his Environment Minister, Jose Lutzenberger, who had angered business interests by opposing logging in the Amazon. In the U.S., critics fear the

AUTO ASPHYXIATION SIX OF THE LEADING INDUSTRIALIZED NATIONS ARE RESPONSIBLE FOR PRODUCING 45% OF GREENHOUSE GASES



STABILIZE POPULATION

Improve standards of living and the status of women and make family planning widely available to help lower birth rates in developing nations

RESTRAIN CONSUMPTION

Foster lifestyles that lower the burden on the environment, especially in industrial nations: Depend more on public transportation, less on gas-guzzling cars; consume more information-based goods and services, husband consumer goods more carefully; encourage 'green consumerism'

SUSTAINABLE DEVELOPMENT

With the cooperation of industrial nations and developing nations alike, worldwide development might proceed without risking constraint from overpopulation, resource depletion, and ecological breakdown

concept will boost regulation and government spending. This concern has prompted some Republican senators to urge the President not to go to Rio (page 71). Other resistance reflects the fact that "[Americans] don't like changes in lifestyle," says a top Administration official. Sustainable development "questions the purpose of society, the relationships between humans and nature, and demands social justice and equity," adds John D. Sterman, associate professor at MIT's Sloan School of Management. "This is why it's so controversial."

The reason it even gets a hearing is that "life as we know it is at stake," argues Maurice Strong, a Canadian businessman and secretary-general of the UNCED meeting. With the end of the cold war, population pressures plus environmental decay may lead to conflict among nations over food, water, land—and resulting migration. In fact, populations in 40 developing nations grew so fast in the

1980s that their per capita income fell. Though food output is rising in the developing world, food per person isn't. In the past 45 years, a variety of forces has degraded 11% of the world's land, an area larger than India and China, says the U.N. Environment Program. The status quo hurts rich countries, too. Pearce estimates that resource degradation plus the health effects of pollution cost them 1% to 5% of their GNPs.

'A BREAKTHROUGH.' These are radically different concerns than the worries over health that initially drove environmental protection in affluent nations. The idea that prosperity is at stake began to take hold in 1987 with the release of the book *Our Common Future* by the U.N.-appointed World Commission on Environment & Development. It found that environmental rules in industrial nations had a small effect on inflation, a neutral impact on trade, spurred innovation—and didn't necessarily impede growth. It also called poverty as destructive of nature

as industrialization. The conclusions "were a breakthrough," says James W. McNeill, a member of the commission. Out of them came the Rio summit.

Since then, bridging the gulf between rich and poor nations has become the gospel of sustainable development. "In the destitution" of developing countries "and the overconsumption of industrial countries lie the seeds of all environmental problems," says Sir Shridath Ramphal, president of the World Conservation Union. The richest 20% of the world's people have 150 times the income of the poorest 20%. And industrial nations, with 25% of global population, consume 70% of all resources and spew out the most pollution. Just seven, including the U.S. and Japan, produce 45% of greenhouse gases, says the Intergovernmental Panel on Climate Change.

At the same time, limited access to global markets costs developing nations \$500 billion in revenue annually, says the U.N. Development Program (UNDP). As growth struggles to catch up with population in these countries, more people push onto fragile lands. In tropical regions, some 380 million people, a number expected to double within 50 years, live by clearing land for farming that will be worn out in just a few years. Millions more flood already polluted cities.

Crushing debt exacerbates matters. As of 1989, developing nations owed \$1.2 trillion, 44% of their collective GNP. To pay off these borrowings, they have exported about \$50 billion in resources annually since 1983. This sell-off promises to be increasingly devastating, since farming, fishing, forestry, and mining account for more than two-thirds of employment and 50% of export earnings of these nations. Of 33 countries that exported tropical timber in 1985, some 23 are likely to run out within a decade. Yet in that time frame, developing countries will need to create 1 billion new jobs. If they industrialize without clean technology, as China, Brazil, and India are doing, they'll greatly boost global pollution and resource destruction.

Given these trends, "technology be-

RAZING THE AMAZON POPULATION PRESSURES ARE DRIVING THE POOR TO CLEAR RAIN FORESTS FOR FARMING



comes the chief engine of sustainability," says Robert W. Fri, president of Resources for the Future, in Washington, D.C. Indeed, "eco-efficiencies"—slashing the resources used and pollution emitted per unit of output—is the way for industrial countries to curtail environmental damage. Advanced technologies could slash hazardous industrial waste in the U.S. by 75%, says the U.S. Office of Technology Assessment (OTA). With the proper infrastructure, industrial countries could recycle more than 50% of their paper, glass, plastics, and metals, according to studies by U.N. agencies.

New technologies also could head off the 75% increase in global energy de-

Biotechnology promises to create non-polluting pesticides, crops that need less water, and pollution-fighting microbes. Less wasteful, less energy-intensive biological processes could increasingly replace chemical-based systems. Already, bacteria are used to produce 30% of U.S. copper. They release the metal from minerals—and avoid the sulphur dioxide emissions of smelting.

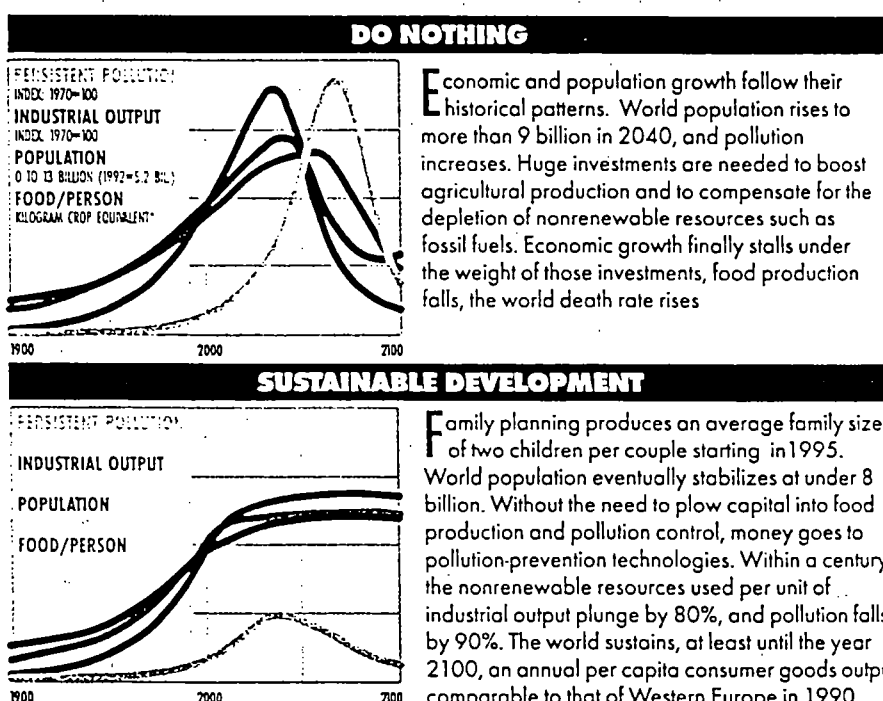
Even ecosystems could be harnessed for industrial chores. Instead of spending \$30 million on a chemical-treatment plant for wastewater and sewage, the city of Arcata, on Humboldt Bay in Northern California, has laid out \$5 million to create 95 acres of marshes. Their plants and organisms absorb heavy met-

structive agriculture had denuded its steep hills, causing erosion that polluted nearby rivers and lowered harvests. In 1988, the Guinean Agriculture Dept. and the UNDP enlisted 100,000 people in 20 villages to plant trees to conserve and enrich the soil and sow a hardy, high-yield corn. They drilled new wells and gave villagers efficient stoves. Today, crop yields are up 50%, villagers trim trees for fuel rather than felling them, and erosion is declining. So is infant mortality.

The bigger challenge is conserving tropical forests, which house 50% of the world's species and soak up the greenhouse gas carbon dioxide (CO₂). They are being destroyed at the rate of 42.5 mil-

REKINDLING THE CONTROVERSY OVER THE LIMITS TO GROWTH

Donella and Dennis Meadows touched off a furor in 1972 with *Limits to Growth*, a study that warned of widespread hunger and economic dislocations as a result of population growth and resource depletion. The college professors have updated their analysis to show (1) what might happen if historical trends continue and (2) if policies shift toward controlling population growth and stemming resource depletion and environmental degradation. The new analysis is already controversial, and many economists dispute its methods, assumptions, and conclusions



Note: The graphs are extracted from a computer model that calculates the interactions among 225 variables every six months. Each key variable is plotted on its own scale. Pollution, for example, tracks the accumulation of persistent toxic materials relative to 1970

* FACTORS IN THE DIFFERING AMOUNTS OF LAND REQUIRED TO PROVIDE A GRAIN- OR MEAT-BASED DIET
DATA: DONELLA H. MEADOWS AND DENNIS L. MEADOWS, FROM *BEYOND THE LIMITS*, CHELSEA GREEN PUBLISHING, 1992

mand the Worldwide Energy Conference projects by 2020. The newest air conditioners, furnaces, refrigerators, and lighting fixtures are from 50% to several times more efficient than their predecessors. At current rates of economic growth, installing cost-effective equipment alone could cut electricity demand in industrial countries 20% by 2000, says the International Energy Agency in Paris. And solar power could eventually provide 30% of the energy used in most countries, according to estimates.

BACTERIAL POWER. The possibilities go far beyond that. In the U.S. and parts of Europe, conservation, new tilling practices, crop rotation, and more efficient irrigation are stemming erosion, water waste, and agricultural pollution.

als and pollutants in the wastewater. The wetland is a bird sanctuary now, and fish in the bay are edible.

Along with better technology, less developed nations need a new model for growth, says Brazil's Lutzenberger. In the past, this has been geared toward dam and road projects, ranches and commodity agriculture, and mining—all of which destroy ecosystems and do little to help the poor. The emphasis needs to shift, he says, to creating small businesses and sustainable farming, forestry, and wildlife management.

The techniques and knowhow also exist to make farming less destructive. There's a good example in Guinea, West Africa, on a high plateau called Fouta Djallon. Five years ago, decades of de-

struction across a year, up 50% since the late 1970s. As a result, some biologists estimate, up to 20% of the world's species will disappear within 50 years, with undetermined effects on the environment. Already, atmospheric CO₂ has risen 20% in a century. The irony is that forests are often worth more standing than cut. In Brazil, converting them to pasture produces about 220 pounds of meat per acre a year. Standing, the forest can produce 2,750 pounds of food. And the value of fruits, nuts, and other products harvested each year can reach twice the one-time logging revenue.

To reap that value, says Robert Goodlund, an economist with the World Bank, developing countries need to "create local economies with an interest in

THE ROAD TO RIO: PLENTY OF GOOD INTENTIONS, BUT...

With two months to go before the June 3 start of the U.N. Conference on Environment & Development (UNCED), Maurice Strong, secretary-general of the Rio de Janeiro summit, already looked exhausted. The two-year preparatory process, including a final, five-week spring meeting in New York, had been highly contentious. Delegates from 170 countries had finally O.K.'d an agenda for what Strong calls the most comprehensive international program ever proposed on environmental protection. Yet "many critical issues remain," he says. "We will need a great deal more political will [at Rio] to resolve them."

It's easy to see why. A proposed Declaration on Environment & Development, for example, would commit governments around the world to principles they have never before accepted. The draft approved in New York makes eradicating poverty a global goal and adopts the notion that those who pollute—rich nations, mostly—should pay for the cleanup, then help poor countries improve their standards of living in environmentally sound ways. Developing nations would pledge to curb birth rates. And the declaration would commit everyone to fight environmental threats even before they're scientifically proven to be dangerous. **'WEASEL WORDS.'** Beyond that, the game plan gets specific. Agenda 21, an 800-page-plus document, envisions some 120 initiatives between now and 2000. These include steps to cut energy use, protect ocean resources, promote sustainable agricultural practices, and control toxic wastes. Strong, who directed the first global environmental summit in 1972, says some proposals were weakened in the current draft, which has more "weasel words than I'd like to see." For instance, an effort to get multinationals to meet worldwide environmental standards, among other requirements, fell apart. But there will be plenty else to argue over at the 10-day Rio meeting.

The centerpiece is supposed to be the signing of a treaty on climate change. So far, the U.S. has refused to agree to targets for cutting back emissions of carbon dioxide (CO₂), a greenhouse gas. Developing nations won't agree, either, without assurances of aid that will help them buy energy-efficient technology. But by the end of April, a compromise was taking shape, sources say. Industrial nations would stabilize CO₂ emissions at current levels by the

year 2000. That wouldn't be too difficult for the U.S., since a new study from the Energy Dept. and the Environmental Protection Agency indicates that programs already on the table, such as the National Energy Strategy, would take America to within 4% of that goal. Still, Administration sources insist that the U.S. will agree to stabilization only if the goal is non-binding and includes other greenhouse gases on which the U.S. is already cutting back.

Less visible, and closer to consensus, is a proposed convention on keeping plant, animal, insect, and other species from disappearing. The key question is: Who owns the rights to these? More

THE AGENDA FOR RIO'S SUMMIT

THE RIO DECLARATION Principles for sustainable development—from eradicating poverty to making polluters pay for excesses

AGENDA 21 An 800-page action plan for sustainable development

CLIMATE CHANGE A treaty to head off global warming

FOREST PRINCIPLES Guidelines for managing forests

BIODIVERSITY An agreement to protect the world's species of plants and animals

MANAGING SUSTAINABLE DEVELOPMENT Commit funds from rich nations to poor. Set up ways to monitor agreements. Agree on terms to transfer environmentally sound technology to developing nations

SOURCE: UNITED NATIONS, R/W

than 50% of them live in tropical forests. But only industrial countries have the knowhow to harness their genes through biotechnology and create new drugs, chemicals, and food. Typically, companies have used such species without compensating developing nations. A possible solution lies in proposals that would grant forest access for scientific research—but require companies to share profits through joint ventures, royalties, and the like.

Any deals at Rio will be mostly talk unless billions in aid are earmarked to help poor countries comply. So far, industrial nations have made no commitments of funds to implement Agenda 21. Some UNCED officials expect

wealthy nations to pledge \$3 billion to \$6 billion a year, a fraction of the \$125 billion the U.N. has suggested.

An equally pressing question is how to administer and monitor the agenda. The U.S. and other industrial nations oppose creating new institutions with requisite bureaucracies. They would prefer that an existing unit of the U.N. be reorganized to take on the monitoring, although just what powers it would have remains to be seen: The U.S., for one, opposes mandated progress reports. Most industrial countries also favor disbursing aid through the Global Environmental Facility at the World Bank, which already funnels money to the developing world. These potential recipients, however, want a separate entity that gives them more say on which projects get funding.

BLASTING BUSH. The failure to resolve such disputes before Rio has incensed other interested parties, including environmentalists and women's groups. "The governments are not living up to their promises about UNCED," says Barbara Bramble of the National Wildlife Federation. Indeed, environmentalists and politicians in other nations have blasted the Bush Administration, accusing it of endangering the conference. Officially, the President hasn't decided to join 60 other heads of state at UNCED. But some Administration officials predict that he will.

The criticism may be a bit exaggerated. One high-level U.N. official says other industrial nations that also oppose large funding commitments, plus developing nations that don't want limits on CO₂, are "hiding behind the U.S." Still, Bush has also made a shrewd judgment. "We've never had a strong constituency in the U.S. for foreign assistance," says a top Administration official. He's betting that it won't materialize now.

UNCED supporters hope this official is wrong—and that the glare of publicity plus political one-upmanship will shame the U.S. and other major countries into pledging the aid, creating the institutions, and negotiating the compromises required to forge a global partnership for sustainable development. In any event, they say, the UNCED discussions are bound to have an effect. "Rio will be the turning point," predicts Strong, "where we will realize that the future is at risk."

By Emily T. Smith in New York and John Carey and Peter Hong in Washington

maintaining the forests." Colombia and Brazil have ceded control of some forest land to Indians because, he says, "jungle dwellers know how to use the forest sustainably." Costa Rica, meanwhile, has launched INBIO, a nonprofit group that collects forest samples to see if they have commercial value. Last year, drugmaker Merck & Co. paid \$1 million to look at INBIO's store, and will pay royalties if it develops a product.

Making such changes on a large scale is another matter, however. "Sharing well-being between present and future people is something markets, governments, and societies don't do well," says Nobel laureate Robert M. Solow, an economist at Massachusetts Institute of Technology. Indeed, NYU's Gladwin has tallied some 60 social, political, regulatory, and fiscal changes that would be needed for sustainable development. "This would have to be driven by a coherent set of local, regional, national, and international policies, and the best foresight science can provide," adds Ruckelshaus.

A key would be treaties and agreements, such as those on the table at Rio, to protect common resources and ecosystems. One example is the 1987 Montreal Protocol, a global treaty with timetables to phase out chlorofluorocarbons (CFCs), the chemicals that destroy the ozone layer. It was in no one's interest to ban the chemicals—nor would it have made much difference—unless most nations did it. To make that happen, industrialized countries set up a fund to help poorer ones switch to costlier substitutes.

MISSING FACTORS. Far-reaching changes in national regulatory and economic policies also are part of the prescription. Every nation has a web of subsidies, government policies, and taxes that undervalue natural resources, encourage pollution and waste, and deter environmentally sound behavior. To boot, the economic benefits of ecosystems—a forest that protects soil from erosion, for instance—and the costs to society of pollution aren't reflected in the prices of goods and services. Few of the tools economists or investors use consider such factors, either. And resources don't count as assets—or debts, if they're destroyed—in calculating national wealth.

Increasingly, policymakers and economists think the best answer lies in changing the economic ground rules. Phasing out pernicious subsidies is one key. So is revising the calculation of GNP. Norway and France already keep separate accounts for some resources. Similarly, the U.N. Statistical Commission is looking at revising the System of National Accounts, the basis for GNP.

A more fundamental change would be

a system of market incentives to pollute less—a tax on fertilizer, for instance. OECD countries have some 50 such taxes. And recently, EC countries agreed in principle to a tax on the carbon content of fossil fuels. Eventually, says economist Robert L. Stavins at the Kennedy School of Government at Harvard, these could replace existing tax systems.

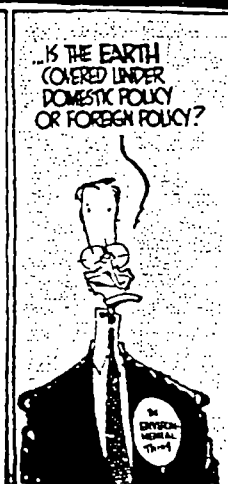
Economic and policy changes alone won't turn the tide in developing nations, though. Just as crucial, says the U.N., would be massive aid and debt relief from industrial countries, plus investment by multinational companies. Agenda 21, the action plan to be considered at Rio, would cost \$125 billion or more a year until the turn of the century—vs. the \$54 billion rich nations give in aid now. Much of that could be raised if rich countries doubled their contribu-

earth's production on land, according to biologist Peter Vitousek of Stanford University. That leaves 60% and dropping for land-based plant and animal species and ecosystems, which need enough to support their own functions and to purify air and water and regulate climate. This might not be alarming if pollution-control equipment or other lavish technologies could create clean air or control the atmosphere and climate.

'NO NET LOSS.' They can't, Daly argues, so it's better to make sure development doesn't exceed the rate at which nature regenerates. At some point, that means setting limits to the "the scale of human presence and the use of resources, according to some optimal scale," he adds, then letting markets allocate resources within them. In theory, that would be the point where the marginal costs of

ON THE COVER

ASK THE CANDIDATES: SHOULD THE U.S. GO TO THE EARTH SUMMIT?



tions to 0.7% of their GNPs—by diverting less than 3% of defense spending.

Proponents say, too, that aid should be redirected. Instead of dams and roads, they add, it should largely fund soil conservation, reforestation, family planning, improved agriculture, technology transfer, and poverty reduction. Debt-for-nature swaps, where debt is forgiven if the borrower invests in conservation, could become major incentives. So far, only \$100 million in such deals have been arranged worldwide.

Whether even these changes would lead to sustainable development isn't clear. The limits-to-growth argument is that it won't. "The real issue is the scale of the overall economy relative to ecosystems," says Herman E. Daly, senior economist at the environment department at the World Bank. Directly or indirectly, humans now consume 40% of

growth just equal the marginal benefits after all environmental costs and benefits are tallied. Society has already set the scale with CFCs, by deciding their benefits don't outweigh such costs as skin cancer and crop damage that occur as ozone disappears. The same type of trade-off is being discussed in negotiations to cap CO₂ emissions.

For the most part, however, the optimal levels for pollution or resource use aren't clear. Until that's known, Daly and others propose a few simple rules. One is "no net loss" of natural capital. That would preclude projects that destroy forests, drain wetlands, dam rivers, or pave over croplands unless a compensating resource is replenished. Another is to err on the side of caution. Since irreversible damage to ecosystems may not be evident until it's too late, "you have to anticipate problems, as-

sume the worst, and start making adjustments," says Robert Costanza, president of the International Society for Ecological Economics.

Daly contends that eventually, societies will have to "develop" instead of grow, like a library that keeps the same number of volumes but improves by replacing worn-out books. Such an economy would improve the quality of life—educational levels, the stock of buildings, human health—without constantly increasing the flow of materials, resources, and energy through the world economy.

The Meadowses have a view of what this would mean. Their latest scenarios show that with hefty investments in technology, the resources used and pollution emitted per unit of output could fall 80% and 90%, respectively, within a century, and the earth could support 8 billion people without irreversible damage. The catch? World output of consumer goods per capita would stabilize at a level comparable to that of Western Europe in 1990—and below that of the U.S. UNCED's Strong describes it as a lifestyle of "sophisticated modesty," more dependent on public transportation, smaller houses, fewer gadgets, and less conspicuous consumption.

Mainstream economists still dispute these ideas—but some don't totally reject the underlying arguments. MIT's Solow, a stern critic of the limits-to-growth idea, concedes that right now environmental issues and waste disposal rank high as potential limits to long-run growth. But until more is known about the carrying capacity of ecosystems and the extent to which technology can substitute for resources, "you can't equate sustainable development with no growth," he says.

If sustainable development ever does take off, it could offer huge opportunities—and pose big challenges—for industry. Demand for environmentally sound technology could unleash innovation, open new markets, create jobs, and give companies opportunities not only to save resources but to lower costs and boost profits in the process. The Business Council for Sustainable Development, a U.N. affiliate chaired by Swiss entrepreneur Stephan Schmidheiny, will deliver a report at Rio that endorses sustainable development.

HUNDRED-YEAR PLAN. Japan and some European nations see that potential. They have made commitments to limit CO₂ emissions, in part because "they are using environmental policy to force their industries to invent new technologies," says McNeil. In 1990, Tokyo unveiled a 100-year game plan for sustainable development and launched the Research Institute of Innovative Technology for the Earth, backed this year by a \$37.5

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Cover Story

million budget. "In the future, access to international markets will depend on who has the most environmentally sound technologies," says Tsukasa Sakai, senior managing director of JGC Corp. "If U.S. companies don't move aggressively, we will see the same conflict in environmental technology that we see today between GM and Honda."

Japan already has one edge, in fact. Its gains in efficiency during the '70s and '80s were so great that it now uses just 50% of the resources—materials and energy—that the U.S. does to produce one unit of GNP. On many products, says consultant John Elkington, director of Sustainability Ltd., a London-based con-

sulting firm, that translates into a 5% cost advantage on many products.

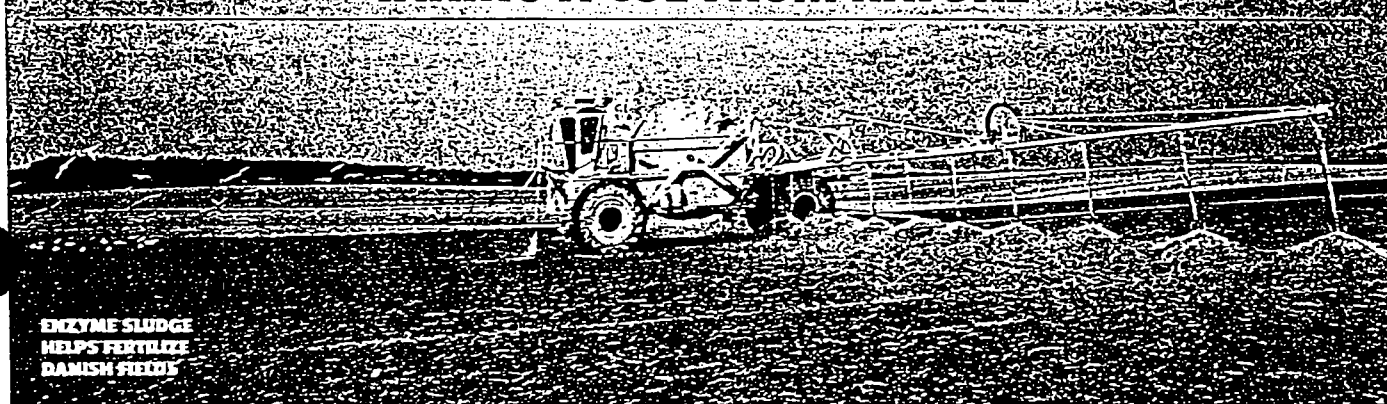
What everyone is shy of bringing up, however, especially the delegates to UNCED, is how sustainable development might change the dynamics of world growth. One study by Royal Dutch/Shell Group indicates that ending government subsidies for everything from agriculture to oil drilling would free up capital for other investments. And developing countries could save \$1.4 trillion over the next 20 years by using energy more efficiently, according to the Council for Energy Efficiency in Washington. Still, one-third of the activities that contribute to about 75% of current world

growth—including logging, mining, and energy use—are polluting. If these were no longer ascendant, industrial economies would feel some pain.

One study by the Electric Power Research Institute forecasts that the U.S. economy in 2020 would be 2.2% smaller, a reduction of \$230 billion in 1990 dollars, if the U.S. cut CO₂ emissions by 20% from 1988 levels. Under those circumstances, tax relief and other compensation schemes would become essential to overcome the political opposition of the groups, industries, or regions that might be most affected.

Trade poses other kinds of conflicts. Free trade is essential so that develop-

THE NEXT TRICK FOR BUSINESS: TAKING A CUE FROM NATURE



ENZYME SLUDGE HELPS FERTILIZE DANISH FIELDS

Three years ago, top managers at Royal Dutch/Shell Group came up with two scenarios on which to base their long-term planning. In one, reflecting existing trends, regional conflicts plague the world, environmental problems are attacked piecemeal, and low prices shape energy use. In the other, sustainable development takes hold. International cooperation blossoms to combat environmental damage and global warming. Governments discourage fossil-fuel use and promote renewable energy. Both futures are equally probable, says Peter Hatfield, Shell's coordinator of group planning, who tries to prepare managers in 100 countries for any eventuality. "We want to make sure," he adds, "that the decisions our businesses make can exist in both worlds to the greatest degree possible."

Shell is one of a growing minority of companies that are forming task forces, mounting experiments, or revising their planning based on the idea of balancing growth and the environment. "The most innovative thinking on sustainable development is evolving in the business com-

munity," declares John Elkington, director of Sustainability Ltd., a London consulting firm. The leaders are tiptoeing toward a new "approach to management that drives a different set of design and cost considerations," says Braden R. Allenby, American Telephone & Telegraph Co.'s senior environmental attorney.

Companies that make this shift will do more than clean up or prevent their own pollution. They'll make and distribute a product more efficiently than ever, worry about its lifelong environmental impact, plan for its recycling, and get their suppliers on the bandwagon. Such efforts will "demand a new mind-set, new tools, and adjustments throughout the organization," says Thomas N. Gladwin, professor of management and international business at New York University. But there will be a reward—what Monsanto Co. Chairman Richard J. Mahoney calls a chance to "reengineer cost structures." If 3M achieves its 1995 goal of reducing air and water emissions 90% and solid waste 50% from the levels of 1990, it will "cut the inflation-adjusted cost per unit of most products by 10%,"

declares L. D. Desimone, 3M's chairman.

Hearing such talk, some companies are making an ambitious start. Monsanto, Du Pont, and AT&T, like 3M, plan to sharply cut air emissions and waste. Using recycling and less toxic materials, they'll creep toward a stunning goal: "closed loop" manufacturing that emits no discharges. Dow Chemical Co.'s new ethylene plant in Fort Saskatchewan, Alberta, will release just 10 gallons of cleaned-up wastewater per minute into the North Saskatchewan River, vs. 360 gallons for such plants today. The plant also will use 40% less energy. It will cost 8% more than usual, but Dow expects to recoup that in lower maintenance costs.

TRICKY JOB. Dow also is taking cradle-to-grave responsibility for the chlorinated solvents used to clean industrial equipment. For now, it is teaching customers to get by with less. That hurts sales, but cuts emissions. Soon, Dow may take back used solution, reclaim the solvent, and incinerate what's left. Ultimately, it plans water-based substitutes. These will be harder to use, so Dow will design the bath-like cleaning equipment to make

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ing nations can export more value-added products to spur development. But it also has the potential to push environmental standards to the least common denominator or encourage industries to migrate to countries with lax environmental laws. And freer trade, which sends buyers to where goods are cheapest, could spur more commodity agriculture in developing countries at further environmental cost. Resolving such conflicts would pose huge challenges for sustainable development.

BLAME-SHIFTING. Another barrier is the radically different perspective of nations. Developing nations blame wealthy ones for excessive consumption and pollution—and bristle at the idea that they should do otherwise unless the rich want

to help pay. Officials of wealthy countries insist that corruption and poor management are often to blame for lack of capital and poverty in developing nations. They add that developing nations must show proof of the changes they'll make before they can expect an influx of aid. Nor are industrialized countries united on the urgency for sustainable development. Compared with the U.S., "the Europeans are further along in their understanding of the idea," says Elkington.

It's no wonder, then, that as the final preconference meeting broke up in April, many key issues were unresolved. Nevertheless, supporters of sustainable development believe that their vision will eventually win out. "We are all partners

in the same boat," says Brazil's President Collor. Rio, Strong adds, is proof that "we are inexorably moving ahead." Already, Holland, Norway, Germany, and Sweden have approved long-term plans for integrating economic activity and environmental protection. Denmark expects to cut its CO₂ emissions 20% from 1988 levels by 2000.

It may take generations before development is reconciled with nature, if ever. "We're at the foot of a steep and rocky path," says Schmidheiny. Still, poisoned rivers, lost forests, fouled skies, and the poor will be constant reminders that sustainable development, by whatever name, may be a life-saving quest.

By Emily T. Smith in New York, with bureau reports

sure it works. This setup will cost up to \$1 million, twice what customers pay now. But it will use 90% less cleaning solution, says Gregory R. Keeley, Dow's marketing manager for advanced cleaning systems, and so be cheaper to run.

One of the trickiest tasks in all such efforts is assessing a product's environmental impact. One tool for the task is life-cycle analysis, an inventory of materials and energy consumed—and pollution emitted—during a product's manufacture, use, and disposal. It can cost up to \$80,000 a product. And it isn't easy. In

assessing paper, do you include the gas that runs the saw that cuts the timber used for pulp? And how do you weigh the relative impact and cost, say, of releasing carbon dioxide instead of using more water? Even so, life-cycle analysis is helping such companies as Procter & Gamble and Dow pick raw materials and set research-and-development priorities. Dow has decided that, in general, reducing the materials content of products is better than recycling.

The next step is getting engineers and designers on board. AT&T, among others, is adding Design for Environment (DFE) software to its computer-aided-design systems. These contain guidelines and options for making products easily recyclable, choosing the least harmful materials, and minimizing hazardous waste and energy use in manufacturing. Neil Sbar, head of environmental materials and technology at AT&T Bell Laboratories, says his group is developing a rating system for DFE products. First out, in 1993, will be a business phone that's easier to disassemble for recycling and uses conductive plastic interconnections to minimize use of lead solder.

Ultimately, the roadmap to sustainable development may be "industrial ecology." Here, the idea is to use the waste of

one process or company as raw material for another, much the way biological systems work. Several companies and the city of Kalundborg, Denmark, are making a pioneering stab at this.

SURPLUS HEAT. They want to conserve water, which is pumped from Lake Tisso seven miles away. So instead of condensing process steam and dumping it into a fjord, the coal-fired Asnaes power station sells it to a nearby Novo Nordisk enzyme plant and a Statoil refinery. The power plant also sells fly ash to a cement company and surplus heat to the city for

mean longer-term planning than companies do now, says Elkington. It would also depend on ways of measuring how a company's actions affect ecological systems. Among the most crucial will be accounting methods that assign to a product its environmental costs. The U.N. is working on this with the International Standards Accounting Board.

Another key would be a new mix of regulations, tax credits, and economic incentives—plus smoother relations between government and industry. Typically, the Environmental Protection Agency aims to control pollution. Sustainable development would stress prevention. The EPA is experimenting with this. Last year, it launched a program that will let more than 700 volunteer companies determine how to best cut emissions of 17 toxic chemicals—as long as the reduction is 50% by 1995.

The breadth of the sustainable-development agenda makes many CEOs squirm. At a meeting last January in Laguna Niguel, Calif., the consensus among 39 top executives was that only 10% of the world's chief executives accept the notion. U.S. companies in particular "are very nervous," says one American chief executive. That's

because at its core, sustainable development implies slowing population growth and fighting world poverty—issues "most CEOs don't see as their concern or problem."

But then, attitudes change with time. And industry is at least getting started. "The question isn't, 'Have you achieved sustainable development?' The answer is always no," says David T. Buzzelli, vice-president for environment at Dow. "The question is, 'Are you moving toward it continuously?'"

By Emily T. Smith in New York, with David Woodruff in Detroit, Fleur Templeton in New York, and bureau reports

CORPORATE STEPS TOWARD SUSTAINABLE DEVELOPMENT

DOW CHEMICAL Within two years, the company may replace chlorinated solvents used for cleaning industrial equipment with less-polluting, water-based systems

AT&T It's developing systems to help its product developers design environmentally sound products

THE KALUNDBORG FOUR In this Danish town, a power plant, enzyme plant, refinery, and wallboard plant use one another's leavings or byproducts as raw materials, which cuts down on waste and pollution

BMW Using design for disassembly, it has a pilot project to build cars so they can eventually be taken apart and recycled more easily

heating. Statoil in turn supplies Asnaes with treated wastewater for cooling. Statoil also sells the power plant desulfurized gas to burn, saving 30,000 tons of coal a year. And it ships high-sulphur gas to a sulfuric-acid plant. Asnaes, which removes pollutants from its smokestack by a process that yields limestone gunk, sells that to Gyproc, a wallboard maker that can now cut imports of mined gypsum. Surplus heat from Asnaes warms a fishery that produces 200 tons of trout and turbot a year. Local farms use waste from the fishery and from Novo's enzyme plant as fertilizer.

Such a shift on any wide scale would