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Ecosystem Services: The Making of a Metaphor We Live (?) By

Richard B. Norgaard
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The Making of A Metaphor We Live (?) by

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Where am I coming from?

1. I have a PhD in economics from the University of Chicago; I understand and am not opposed to markets;
2. I am a participant observer within the profession of economics;
3. I was also a participant (observer) in the Millennium Ecosystem Assessment and have been and continue to be a participant (observer) in the IPCC and related scientific efforts;
4. I am a methodological pluralist who understands that different patterns of thinking help us "see" different things in a complex world;
5. I am concerned with how we collectively understand complex problems given the distribution of specialized framings/knowledges across scientists; and
6. I am concerned with the dominance of economic thinking and its influence on social structure, human relations, and the richness of society, culture, and nature.

What are “ecosystem services”?

They are many, and overlapping, depending on how you “slice” them

- moderate weather extremes and their impacts
- mitigate floods and droughts
- disperse seeds
- protect people from the sun’s harmful ultraviolet rays
- cycle and move nutrients
- protect stream and river channels and coastal shores from erosion
- detoxify and decompose wastes
- control agricultural pests
- maintain biodiversity
- generate and preserve soils and renew their fertility
- contribute to climate stability
- purify the air and water
- regulate disease carrying organisms
- pollinate crops and natural vegetation

What were they before they became ecosystem services?

- "God's Grace" (historically)
- "nature's bounty" (popular utilitarian terminology)
- "ecosystem functions" (scientific terminology)

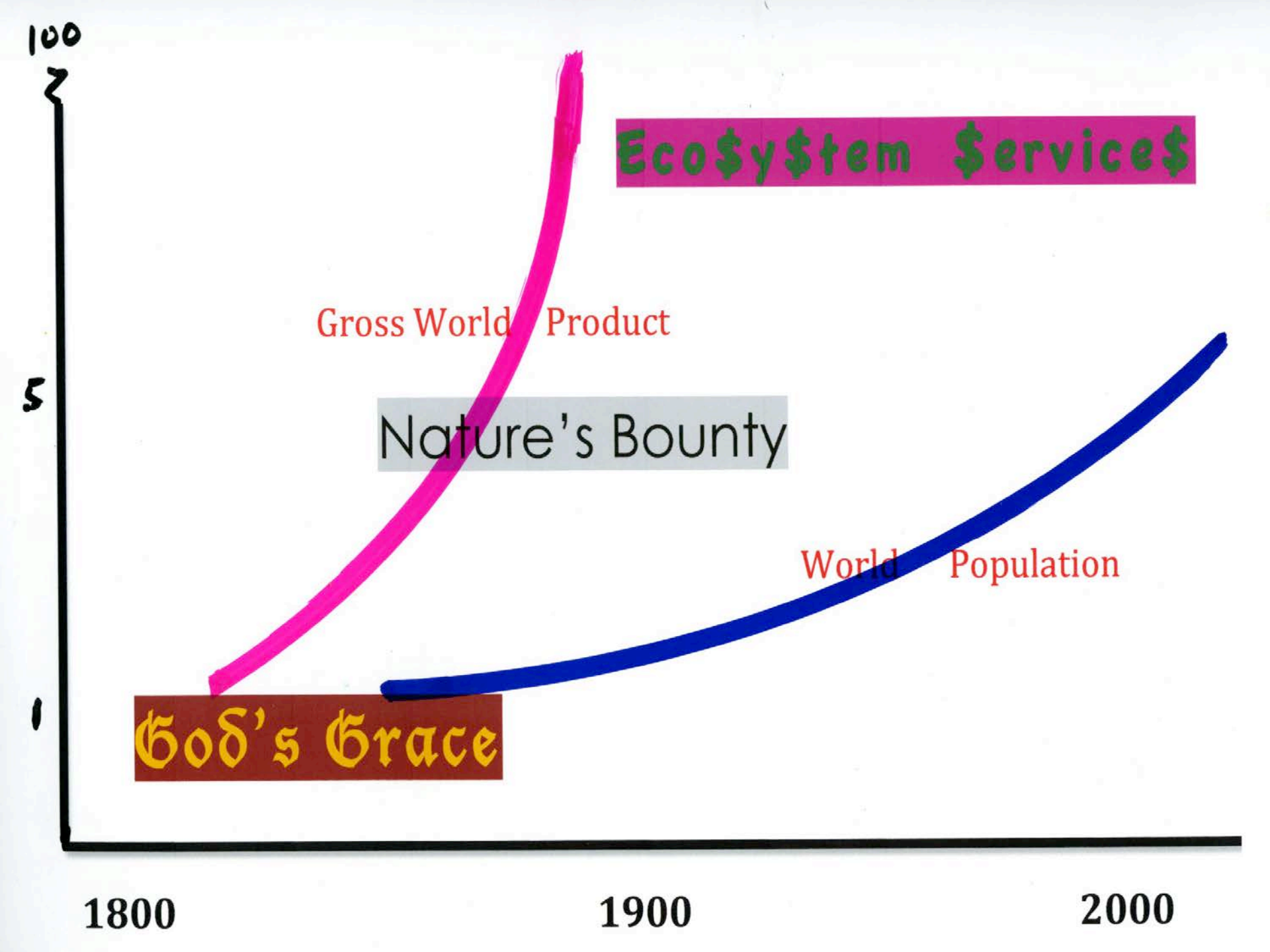
Ecosystem service metaphor survives and thrives

Google Scholar Citations for "ecosystem services"

1970-1980	20
1980-1990	200
1990-2000	3,670
2000-2010	23,100

The Hope (or Expectation or Conviction): we can (only) save nature by using metaphors from economics.

- everyone understands economics
- economic “interests” and stakeholders can be “created”
- value is implied, or can be calculated, or can arise through markets
- by understanding / valuing ecosystem services, we (local communities to global society) will protect the natural capital that produces the services (goal is more systemic than the “separate” services)
- bringing everything into markets perfects the market system
- sustainable development will be achieved (false)


100
5
1
Eco$y$tem $ervice$
Gross World Product
Nature's Bounty
World Population
God's Grace
1800
1900
2000

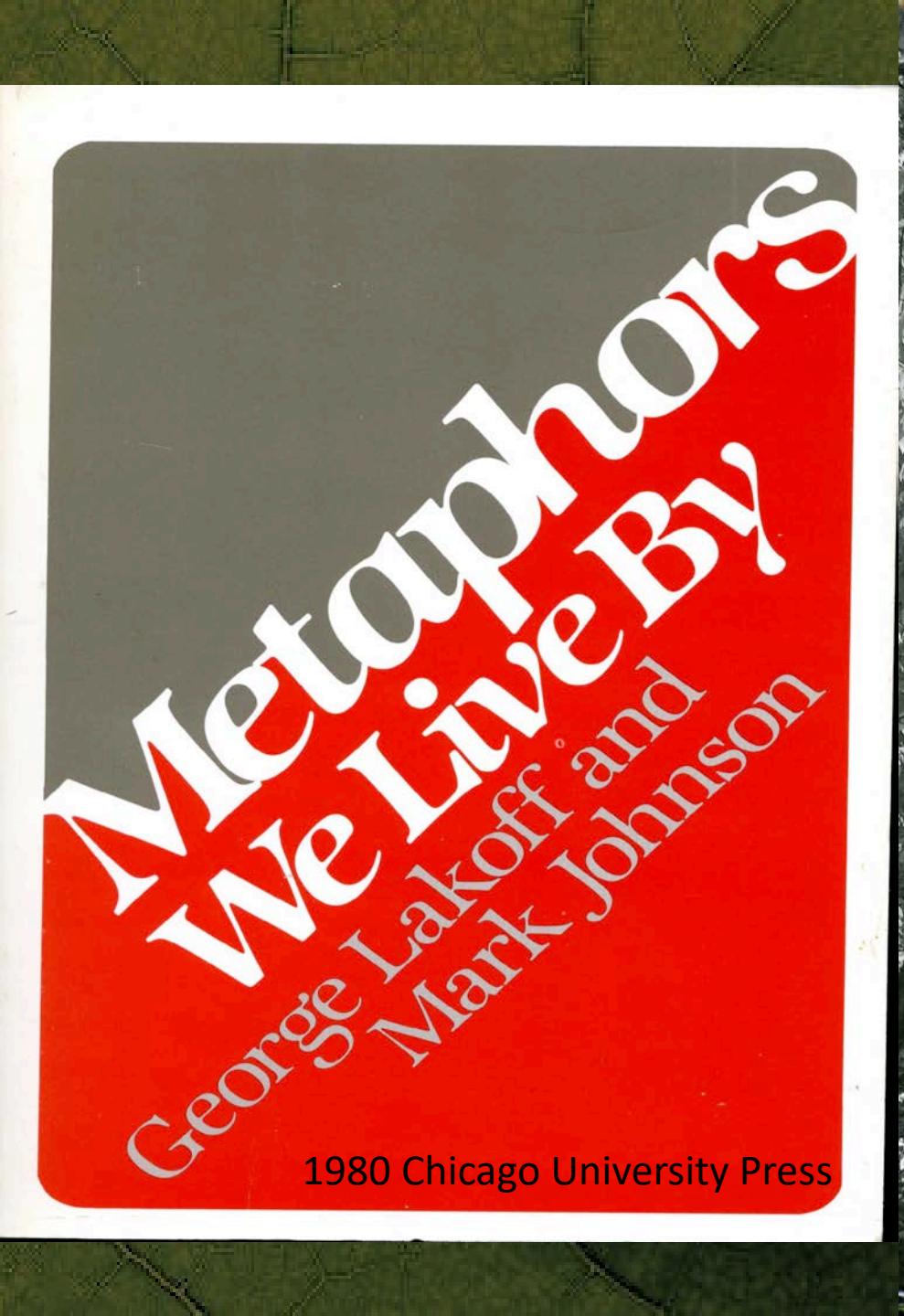
A short history of the use of natural capital and ecosystem service metaphors :

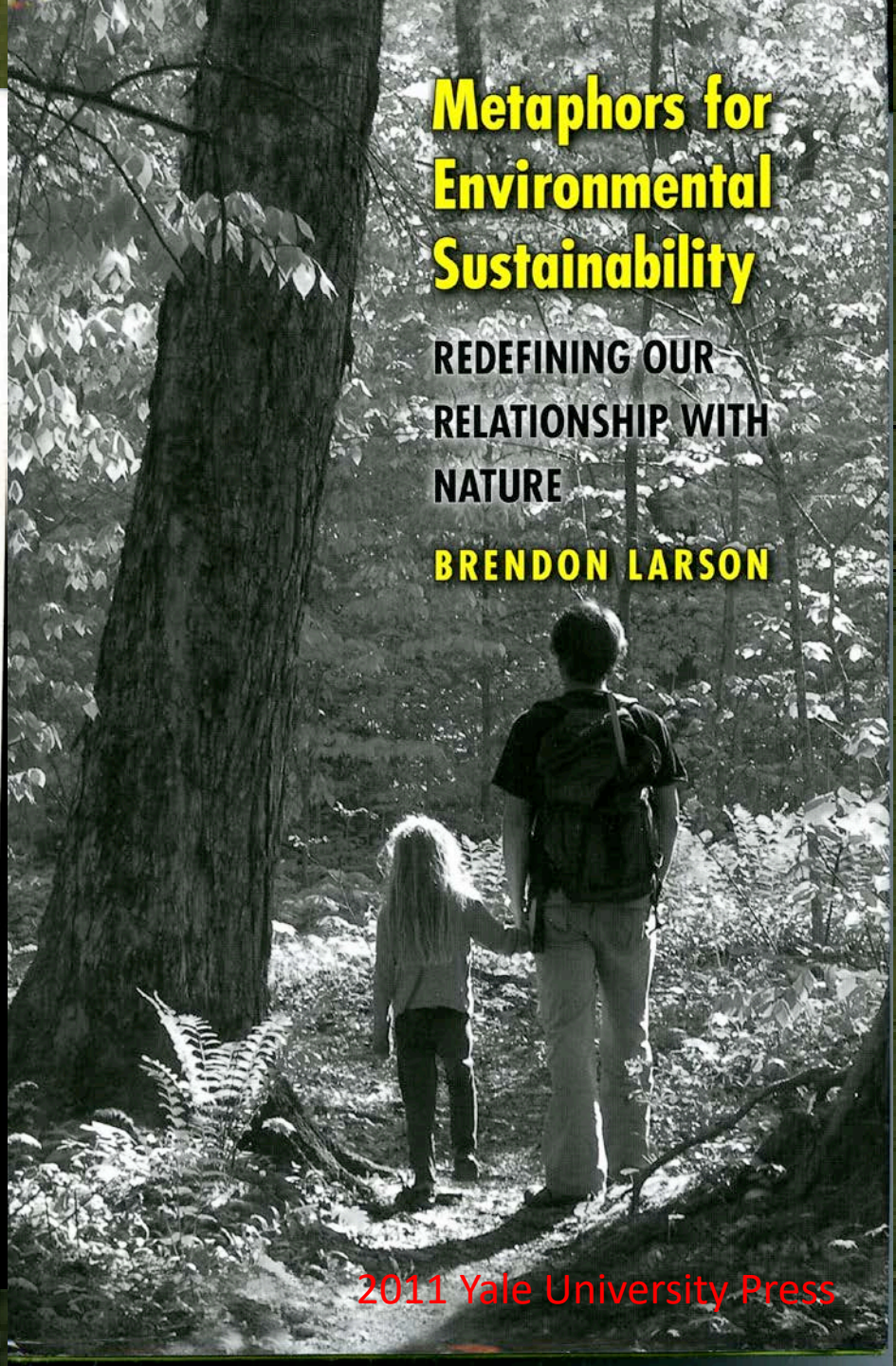
- Early use of natural capital metaphor,
- deliberate introduction of ecosystem service metaphor by ecological economists and conservation biologists, mostly in the late 1980s,
- metaphor proved fit and coevolved with the neoliberal and World Bank Agenda,
- now pervasive in scientific, professional, and popular discourse, and
- now practicing conservation biologists and ecological theorists argue their science needs to fit the metaphor.

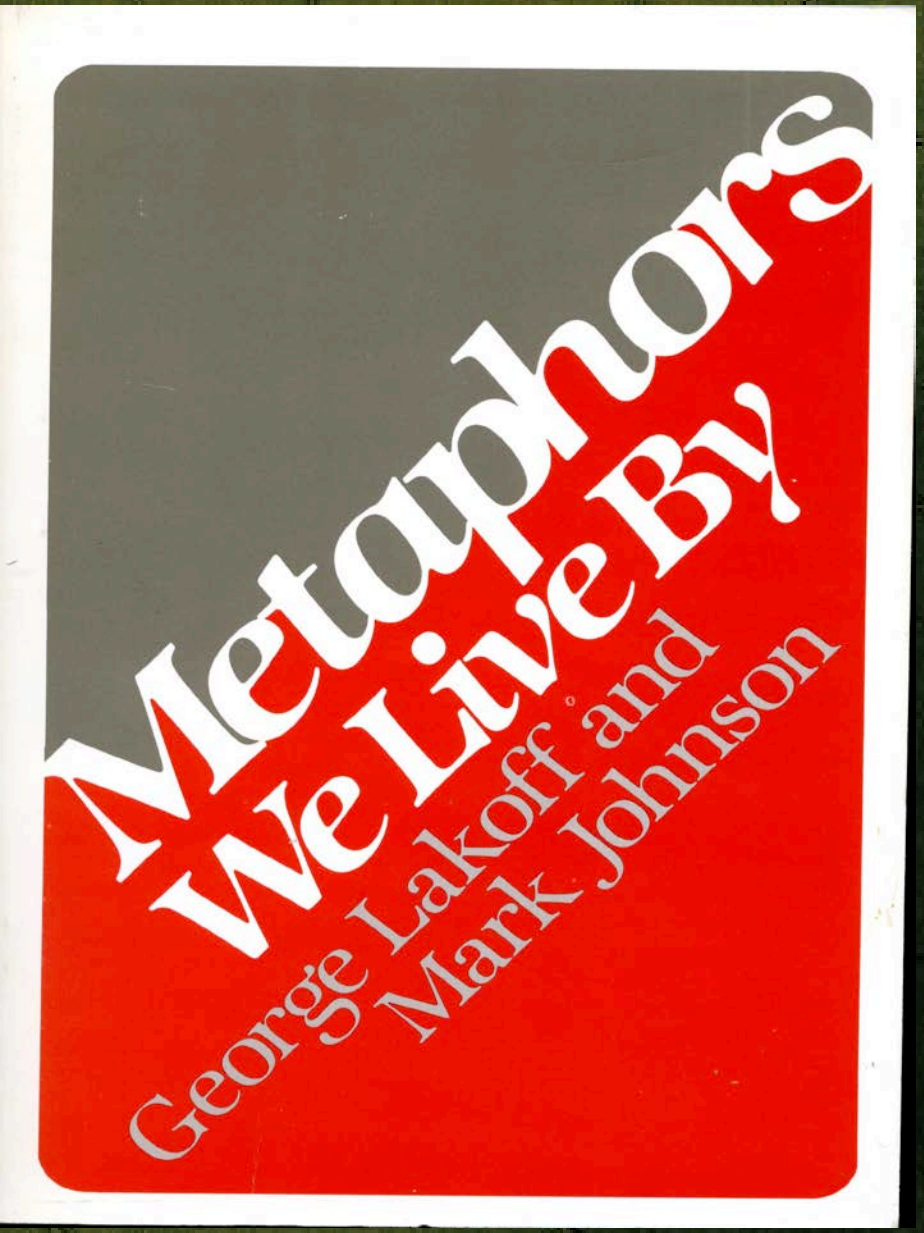
And natural scientists, economists, and applied /positivist social scientists are oblivious to or in denial of any problems with the use of the metaphor.

Ecosystem services as a way of thinking is now widely accepted as the best way to “apply” ecological knowledge in the world in which we live.

I am concerned because I am keenly aware of how economics became distorted and eventually a part of the problem in response to the demand for its application.


Metaphors We Live By
George Lakoff and Mark Johnson
1980 Chicago University Press


Metaphors for Environmental Sustainability
REDEFINING OUR RELATIONSHIP WITH NATURE
BRENDON LARSON
2011 Yale University Press



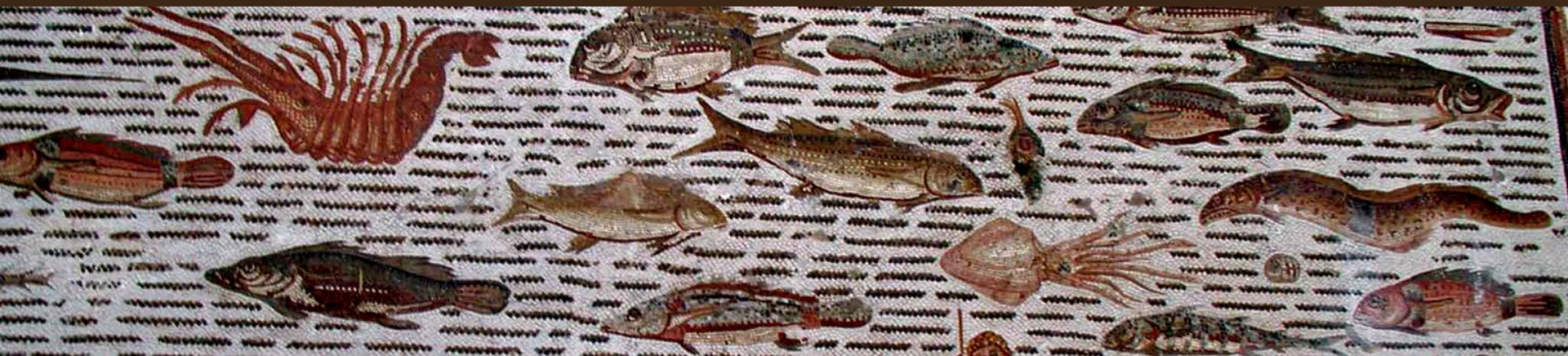
And Die By

Richard B. Norgaard

Early uses of natural capital metaphor

… all of the political economists of England have overlooked the fact that man is a mere borrower of the earth, and that when he does not pay his debts, she does as do all other creditors, that is, she expels him from his holding.

Henry C. Carey The Slave Trade, Domestic and Foreign 1853 page 199
American economist and economic advisor to President Abraham Lincoln



Labor employed in robbing the earth of its capital stock of fertilizing matter is worse than labor thrown away. In the latter case, it is a loss to the present generation; in the former it becomes an inheritance of poverty for our ancestors.

George Waring
Speech to the
New York State Geographical Society 1857
American agronomist and conservationist

… within a comparatively short space, there will be an accumulation of well established constant and historical facts, from which we can safely reason upon all the relations of action and reaction between man and external nature…

But we are, even now, breaking up the floor and wainscoting and doors and window frames of our dwelling, for fuel to warm our bodies and seethe our pottage, and the world cannot afford to wait til the slow and sure progress of exact science has taught it a better economy.

George Perkins Marsh Man and Nature 1864 (page 52)
American diplomat, linguist, and historian

Capitalist production… disturbs the circulation of matter between man and soil, *i.e.*, prevents the return to the soil of its elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil.

Karl Marx, Capital vol 1 page 474 1867

Marx stressed how economies of scale in industry, urbanization, and trade at greater distances all lead to a breakdown in the metabolic cycle of natural systems. Marx used concepts from the natural sciences, from “forces” to “metabolic cycles”, to give weight to his arguments as a social theorist. Why are biologists now borrowing from economics?

“Let us not, however, flatter ourselves overmuch on account of our human conquest over nature. For each such conquest takes its revenge on us. Each of them, it is true, has in the first place the consequences on which we counted, but in the second and third places it has quite different, unforeseen effects which only too often cancel out the first.

We, with flesh, blood, and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to know and correctly apply its laws.”

Friedrich Engels, Dialectics of Nature, 1876

Ecologist Walter E. Westman explored the controversies and insights of the economic metaphor very deliberately in:

How Much Are Nature's Services Worth?

Science, New Series, Vol. 197, No. 4307 (Sep. 2, 1977), pp. 960-964.

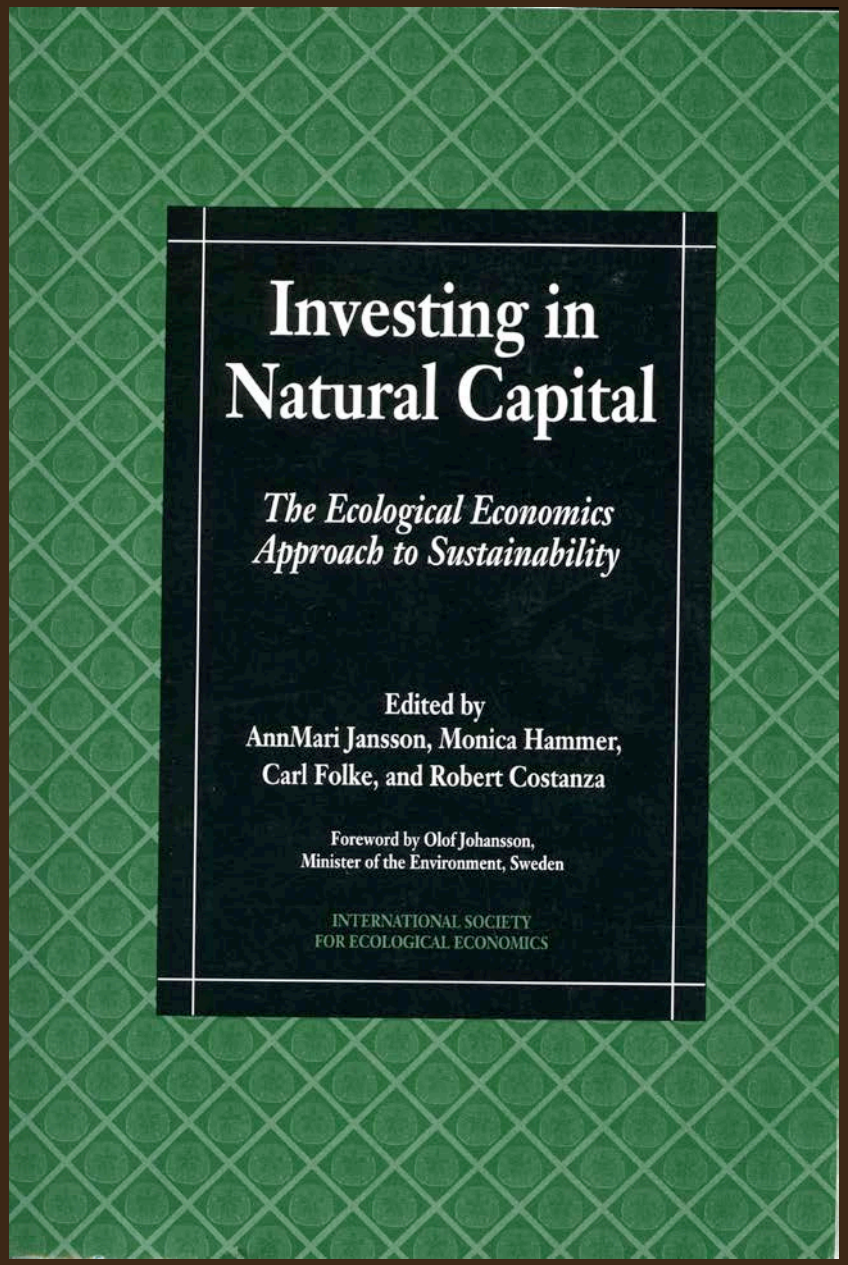
With a quote from William Wordsworth at the very beginning:

“To me the meanest flower that blows can give Thoughts that do often lie too deep for tears.”

1980 -- John Holdren is cautious about being able to understand, predict the behavior of, and manage ecosystem services.

1990 -- 100 matches to “ecosystem services” in first, ecological economics book coming out of the 1st meeting of the International Society of Ecological Economics (Columbia University Press,1991).

1992 -- special issue on ecosystem services in *Ecological Economics*



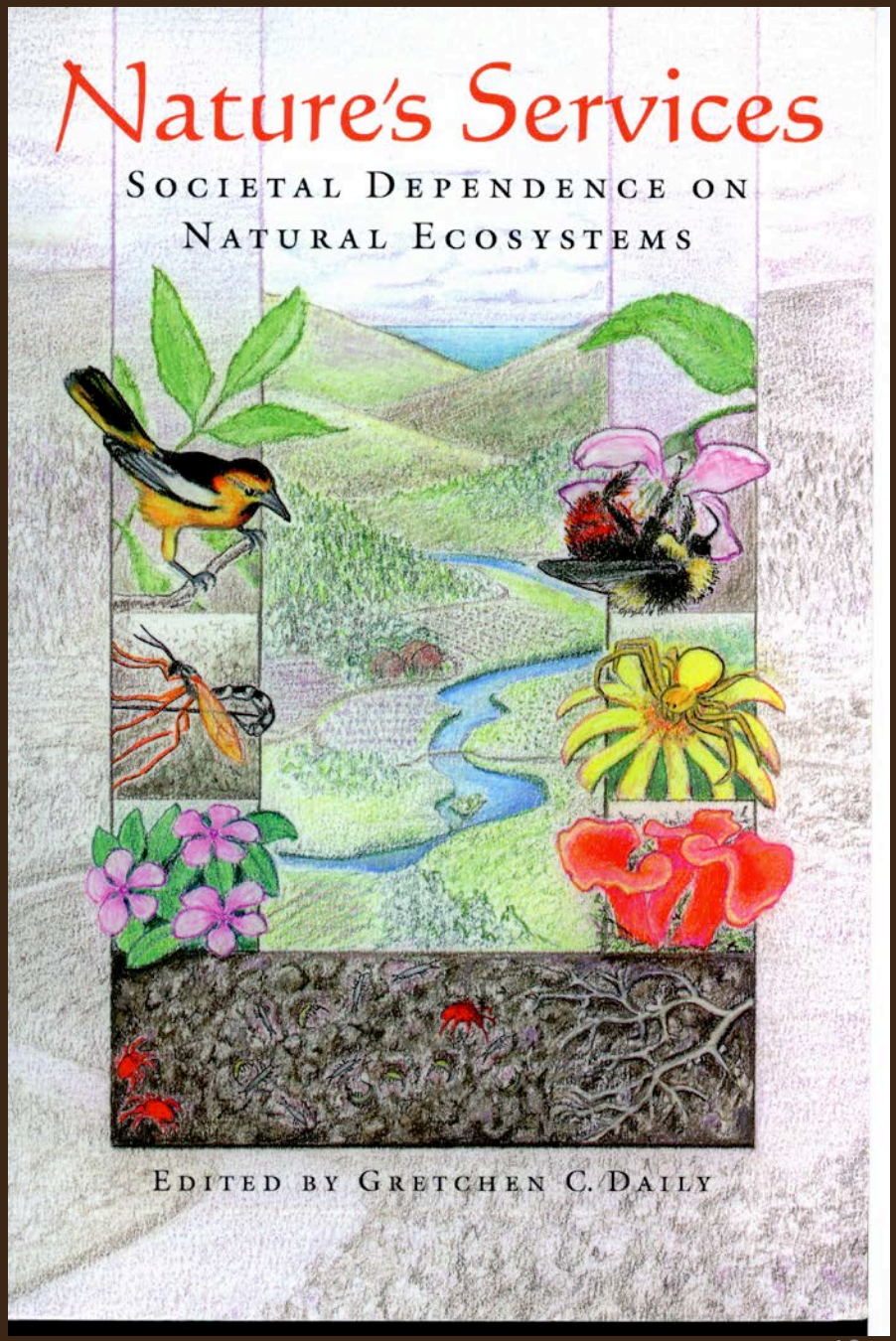
…the most valuable natural capital that humanity possesses is the capacity of the environment … to deliver the ecosystem services that are essential to civilization.

Paul Ehrlich

1992 conference in Stockholm
1994 publication

1995 workshop
1997 publication

The term *ecosystem services* is largely being used as a metaphor to help explain how dependent we are on nature's services in order to encourage conservation policies, some chapters argue for multiple ways of valuing, but early chapters and the concluding chapter by Daily also stress valuation in monetary terms.



1997 *Nature*

Surely one of the most controversial articles ever written, for the total value of ecosystem services is infinite, not $33 trillion.

Yet this is still a very important analysis relating the values of flows (services) to the values of stocks (nature).

The value of the world's ecosystem services and natural capital

Robert Costanza*†, Ralph d'Arge‡, Rudolf de Groot§, Stephen Farber‖, Monica Grasso†, Bruce Hannon¶, Karin Limburg#⁰, Shahid Naeem, Robert V. O'Neill††, Jose Paruelo‡‡, Robert G. Raskin§§, Paul Sutton‖‖ & Marjan van den Belt¶¶**

** Center for Environmental and Estuarine Studies, Zoology Department, and † Insitute for Ecological Economics, University of Maryland, Box 38, Solomons, Maryland 20688, USA*
‡ Economics Department (emeritus), University of Wyoming, Laramie, Wyoming 82070, USA
§ Center for Environment and Climate Studies, Wageningen Agricultural University, PO Box 9101, 6700 HB Wageninengen, The Netherlands
‖ Graduate School of Public and International Affairs, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA
¶ Geography Department and NCSA, University of Illinois, Urbana, Illinois 61801, USA
 # Institute of Ecosystem Studies, Millbrook, New York, USA
*** Department of Ecology, Evolution and Behavior, University of Minnesota, St Paul, Minnesota 55108, USA*
†† Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA
‡‡ Department of Ecology, Faculty of Agronomy, University of Buenos Aires, Av. San Martin 4453, 1417 Buenos Aires, Argentina
§§ Jet Propulsion Laboratory, Pasadena, California 91109, USA
‖‖ National Center for Geographic Information and Analysis, Department of Geography, University of California at Santa Barbara, Santa Barbara, California 93106, USA
¶¶ Ecological Economics Research and Applications Inc., PO Box 1589, Solomons, Maryland 20688, USA

The services of ecological systems and the natural capital stocks that produce them are critical to the functioning of the Earth's life-support system. They contribute to human welfare, both directly and indirectly, and therefore represent part of the total economic value of the planet. We have estimated the current economic value of 17 ecosystem services for 16 biomes, based on published studies and a few original calculations. For the entire biosphere, the value (most of which is outside the market) is estimated to be in the range of US$16–54 trillion ($10^{12}$) per year, with an average of US$33 trillion per year. Because of the nature of the uncertainties, this must be considered a minimum estimate. Global gross national product total is around US$18 trillion per year.

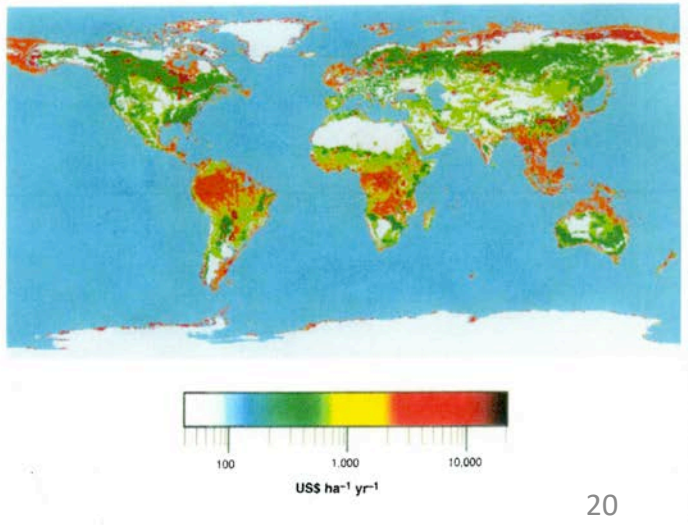
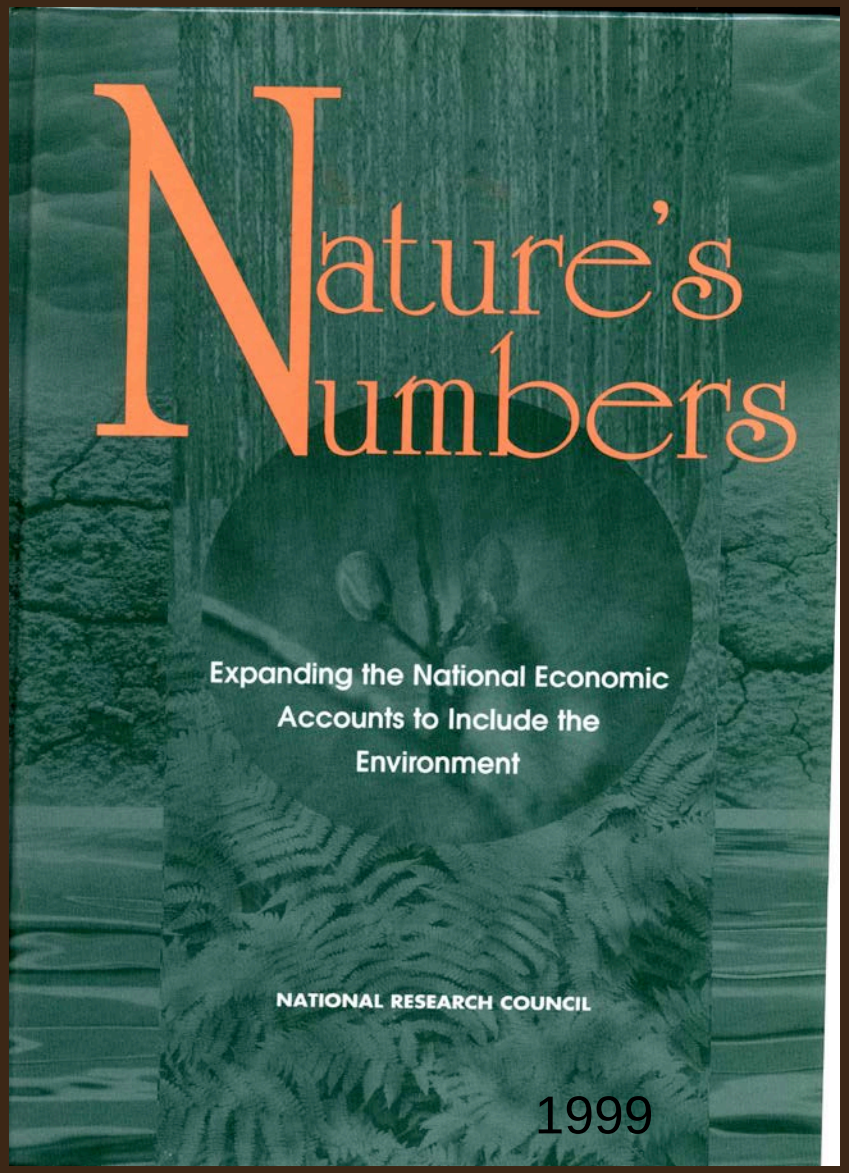
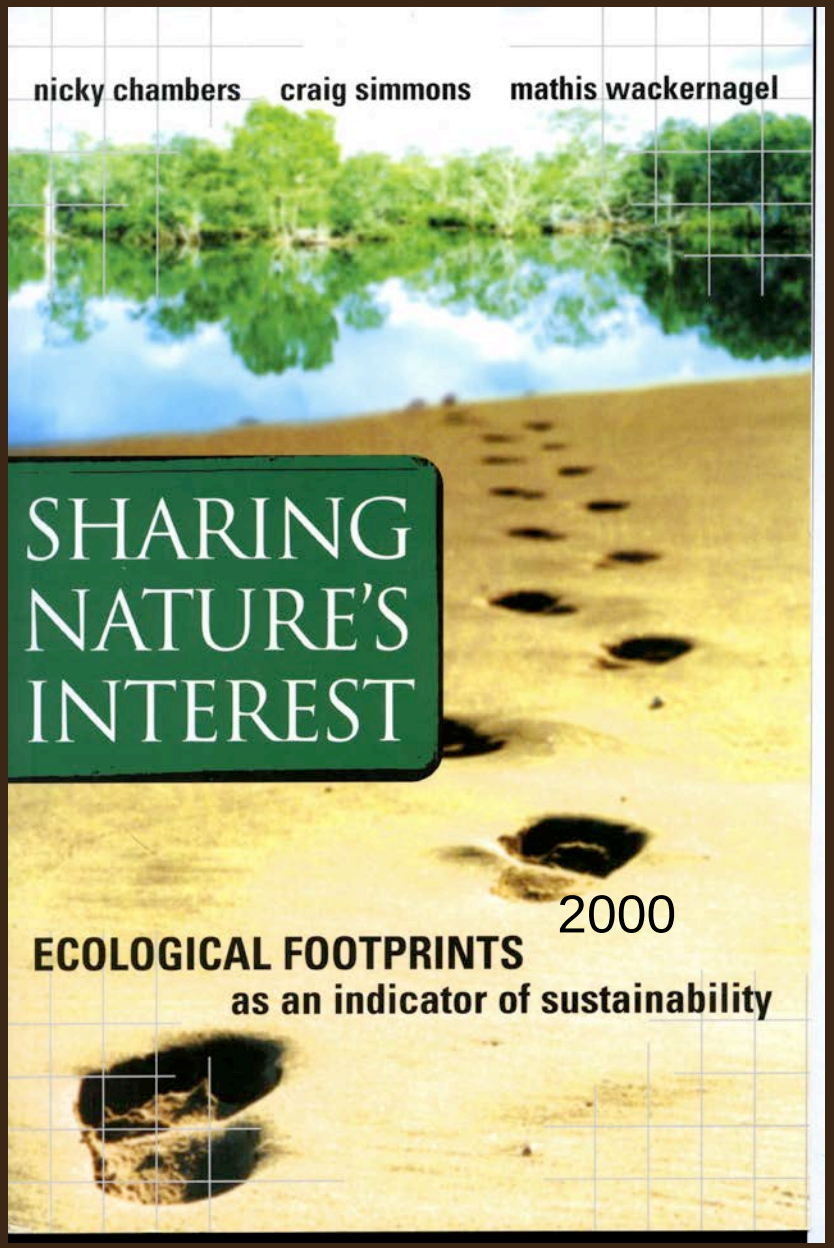


Figure 2 Global map of the value of ecosystem services. See Supplementary Information and Table 2 for details.


Nature's Numbers
Expanding the National Economic Accounts to Include the Environment
NATIONAL RESEARCH COUNCIL
1999


nicky chambers
craig simmons
mathis wackernagel
SHARING NATURE'S INTEREST
2000
ECOLOGICAL FOOTPRINTS
as an indicator of sustainability

Millennium Ecosystem Assessment

Ecosystems and Human Well-being

A FRAMEWORK FOR ASSESSMENT

2003

ECOSYSTEMS AND HUMAN WELL-BEING

VOLUME 1

CURRENT STATE AND TRENDS

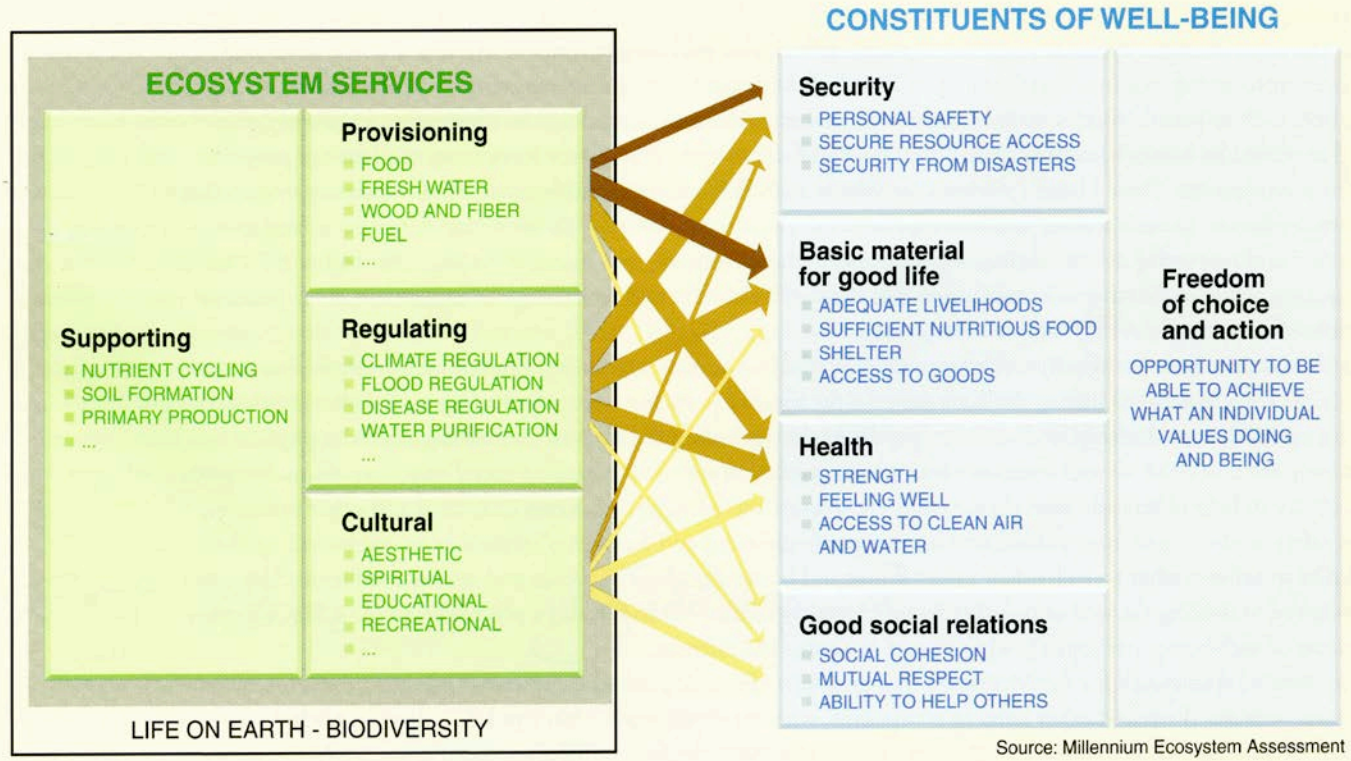
Findings of the Condition and Trends Working Group

MILLENNIUM ECOSYSTEM ASSESSMENT

2005

Figure A. Linkages between Ecosystem Services and Human Well-being

This Figure depicts the strength of linkages between categories of ecosystem services and components of human well-being that are commonly encountered, and includes indications of the extent to which it is possible for socioeconomic factors to mediate the linkage. (For example, if it is possible to purchase a substitute for a degraded ecosystem service, then there is a high potential for mediation.) The strength of the linkages and the potential for mediation differ in different ecosystems and regions. In addition to the influence of ecosystem services on human well-being depicted here, other factors—including other environmental factors as well as economic, social, technological, and cultural factors—influence human well-being, and ecosystems are in turn affected by changes in human well-being. (See Figure B.)



Source: Millennium Ecosystem Assessment

ARROW'S COLOR
Potential for mediation by socioeconomic factors

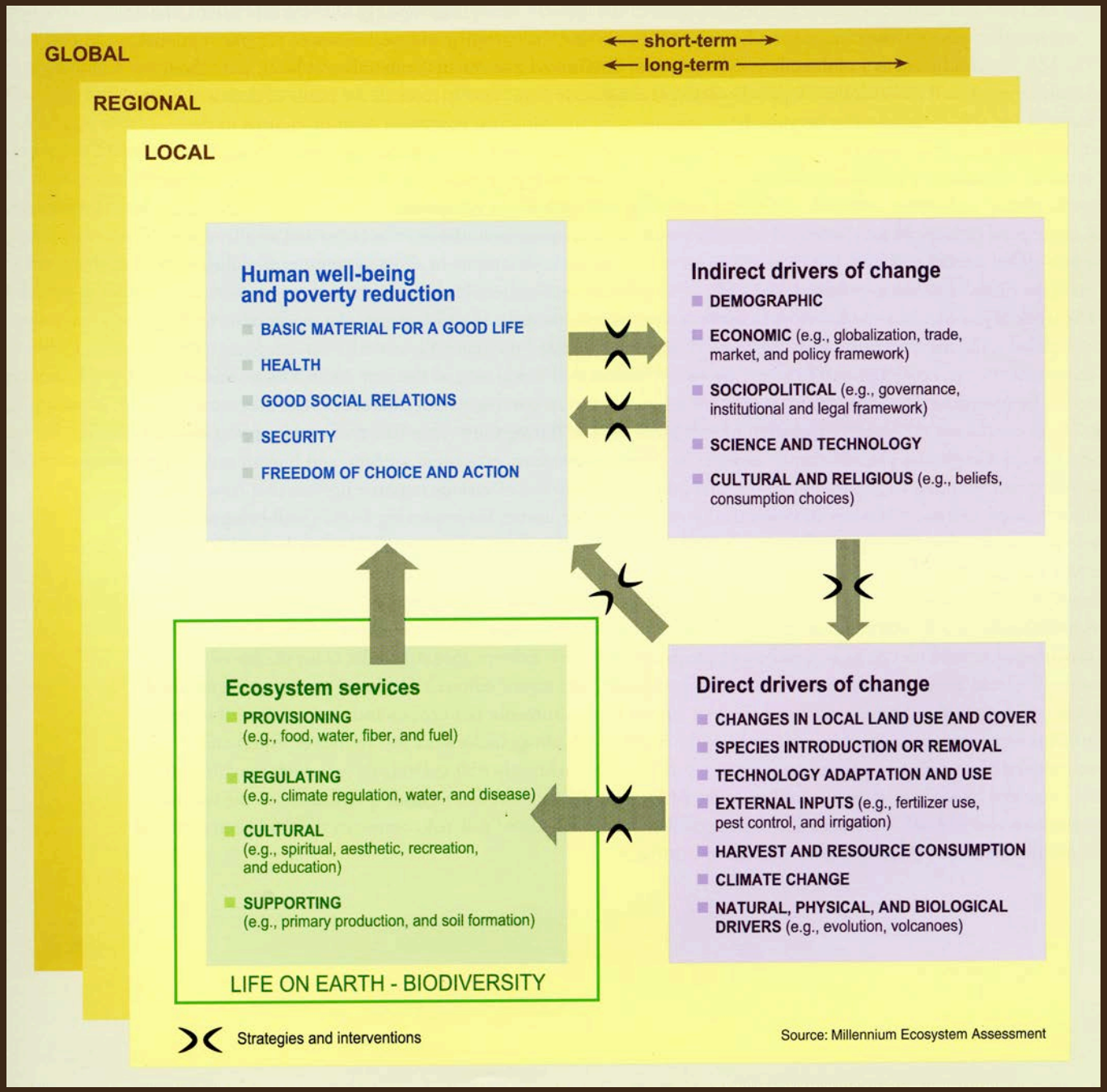
- Low
- Medium
- High

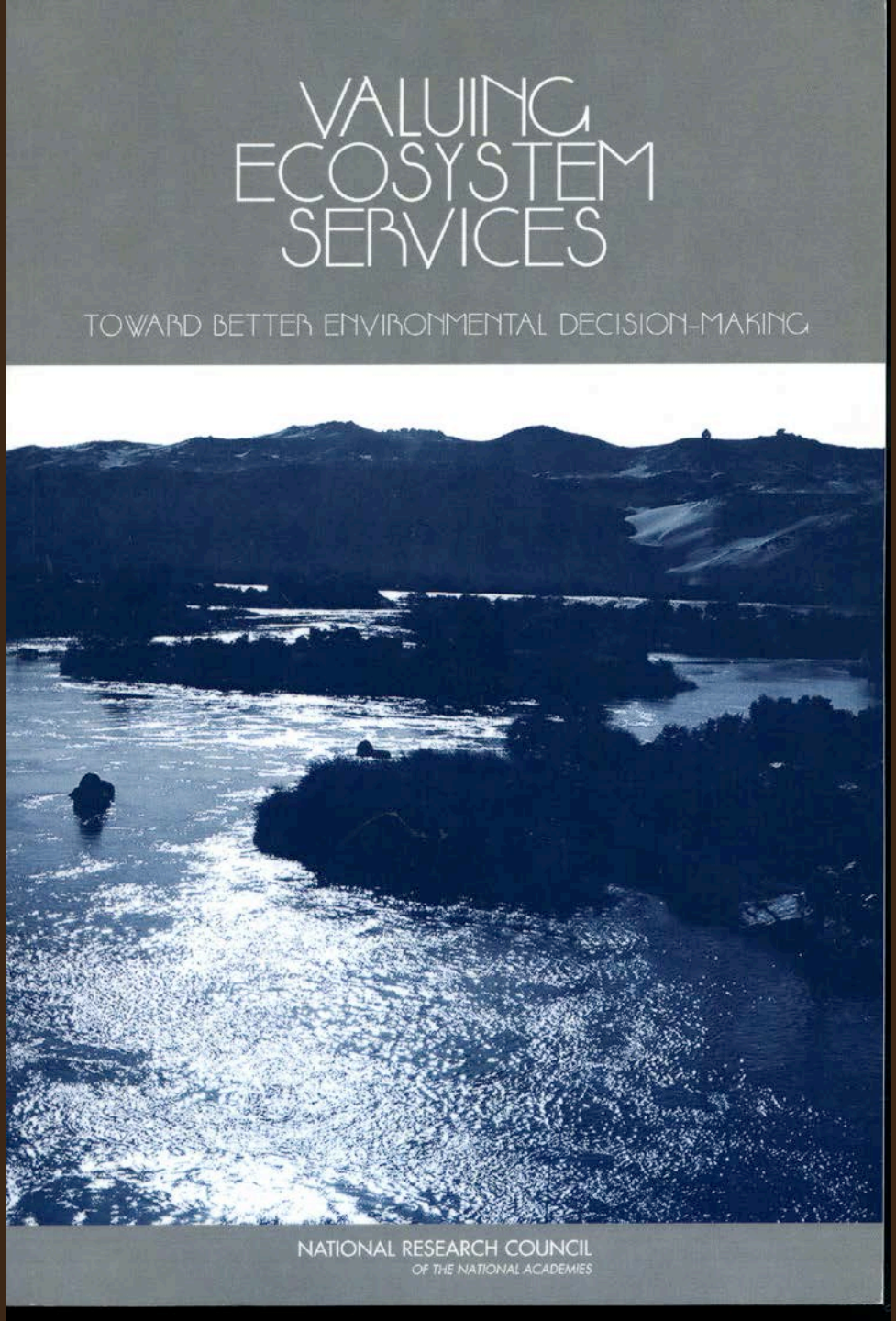
ARROW'S WIDTH
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong

Millennium Ecosystem Assessment Framework 2003 and Report 2005

Millennium Ecosystem Assessment Framework 2003 and Report 2005





2005 publication

The NRC committee argues:

Valuations of ecosystem services should be case specific, with the framing and scale depending on the particular policy question being asked.

Many judgments are necessary in the process of valuing ecosystem services.

Hence transferring a valuation of an ecosystem service from one situation to another will probably not be appropriate.

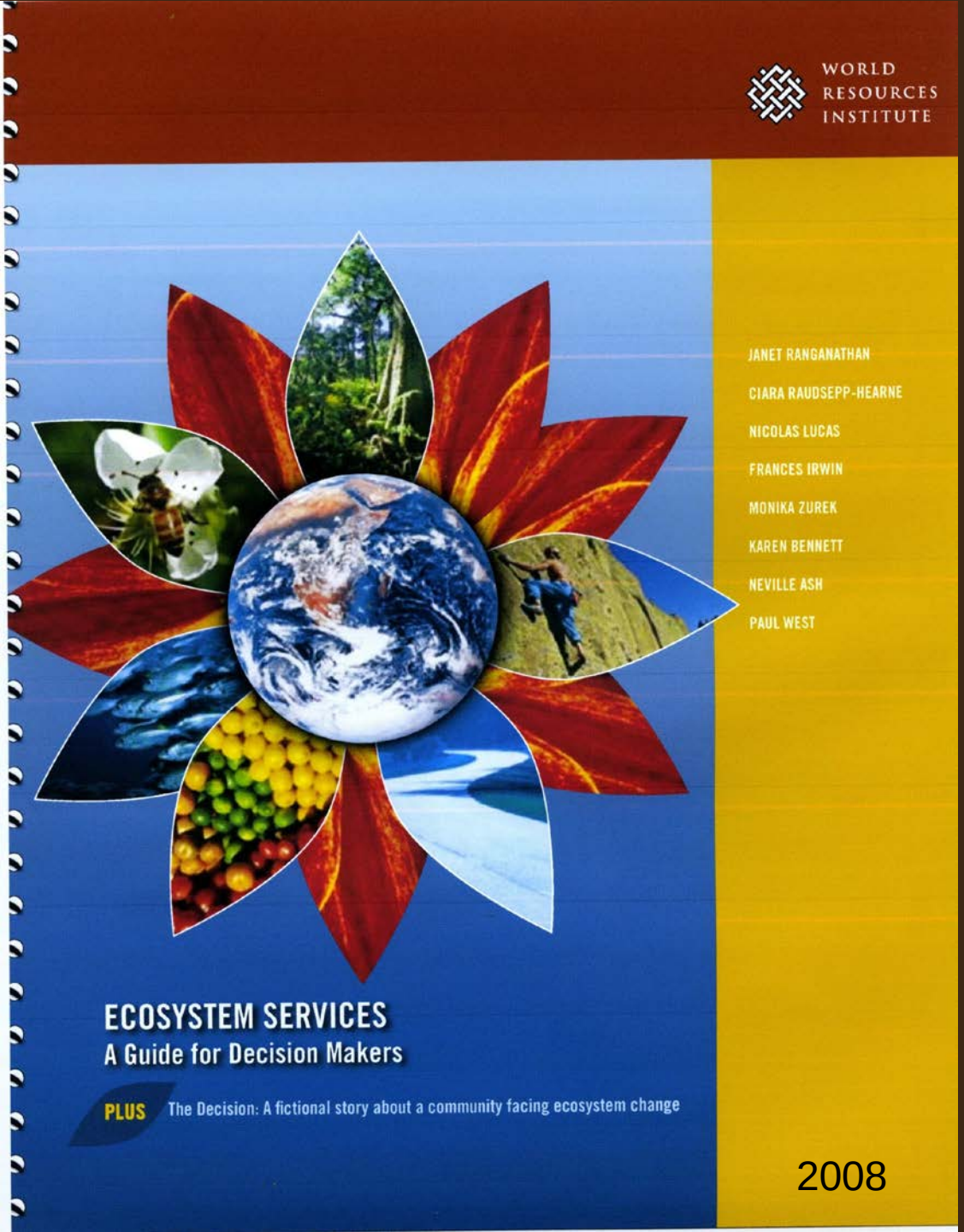
SOCIETY FOR ECOLOGICAL RESTORATION INTERNATIONAL

RESTORING NATURAL CAPITAL

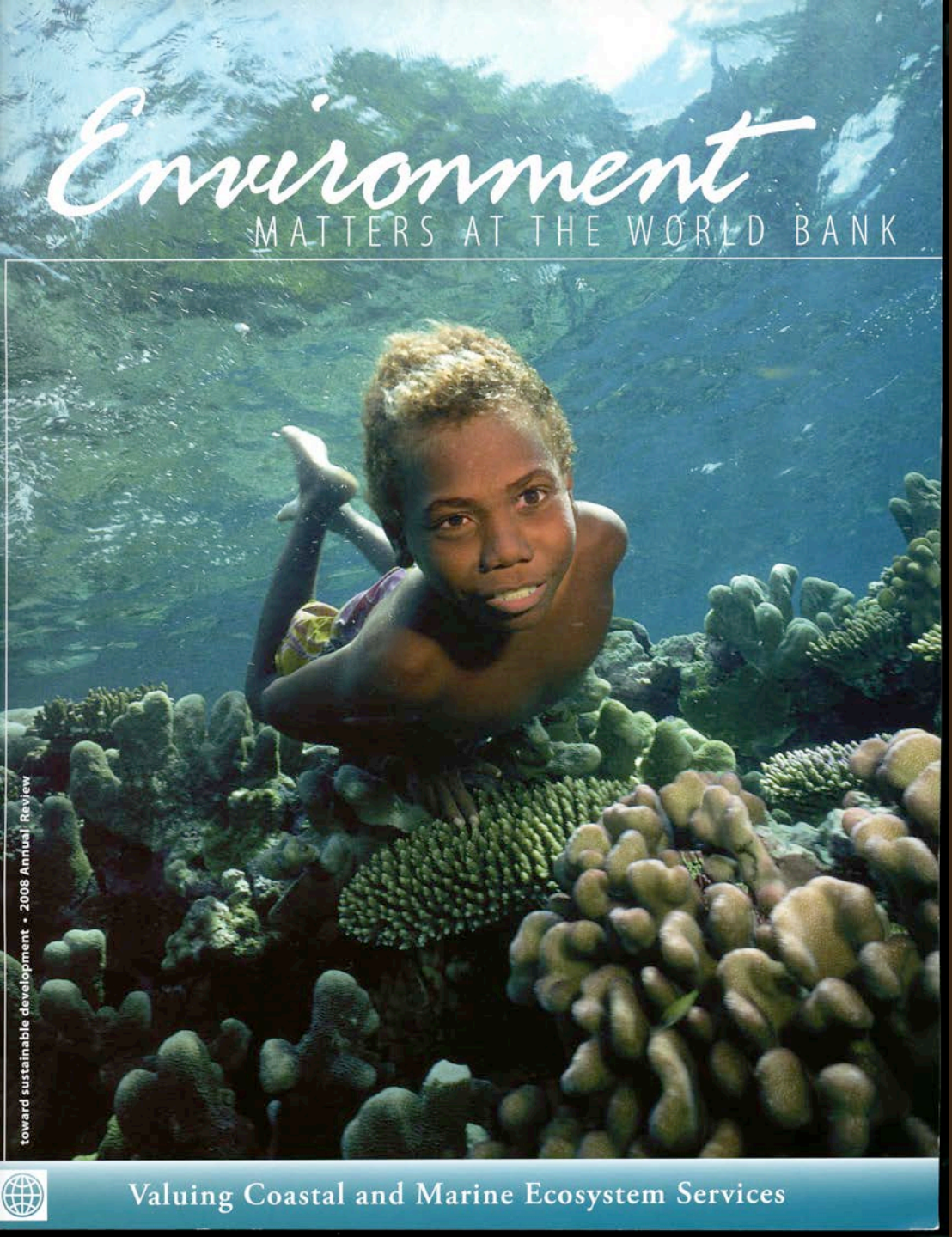
Science, Business, and Practice




Edited by
James Aronson, Suzanne J. Milton, and James N. Blignaut
Foreword by Peter H. Raven

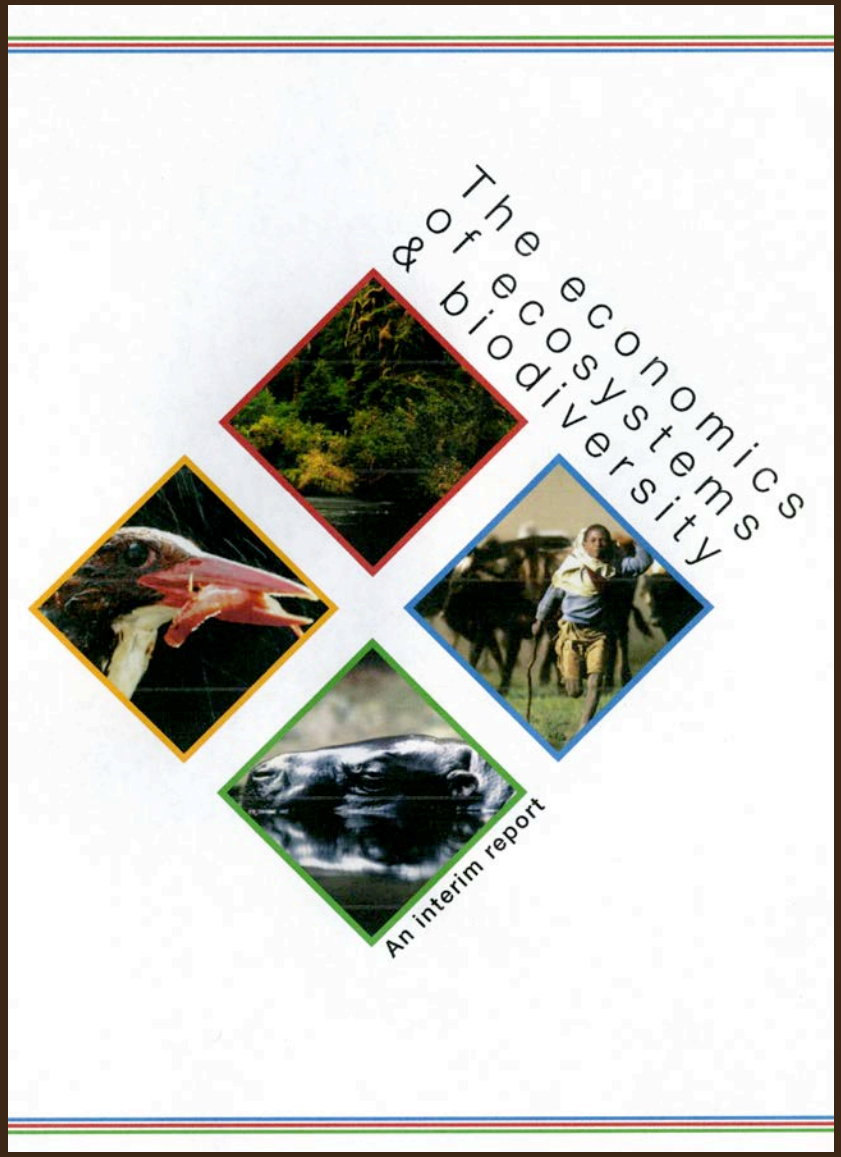


Following the Millennium Ecosystem Assessment, the World Resources Institute prepared a sophisticated guide to how the concept of ecosystem services could be incorporated into development thinking. It takes institutions quite seriously, but not ecology.



The World Bank has been a major player in the promotion of payments for ecosystem services to support ecosystem management.

2009 publication

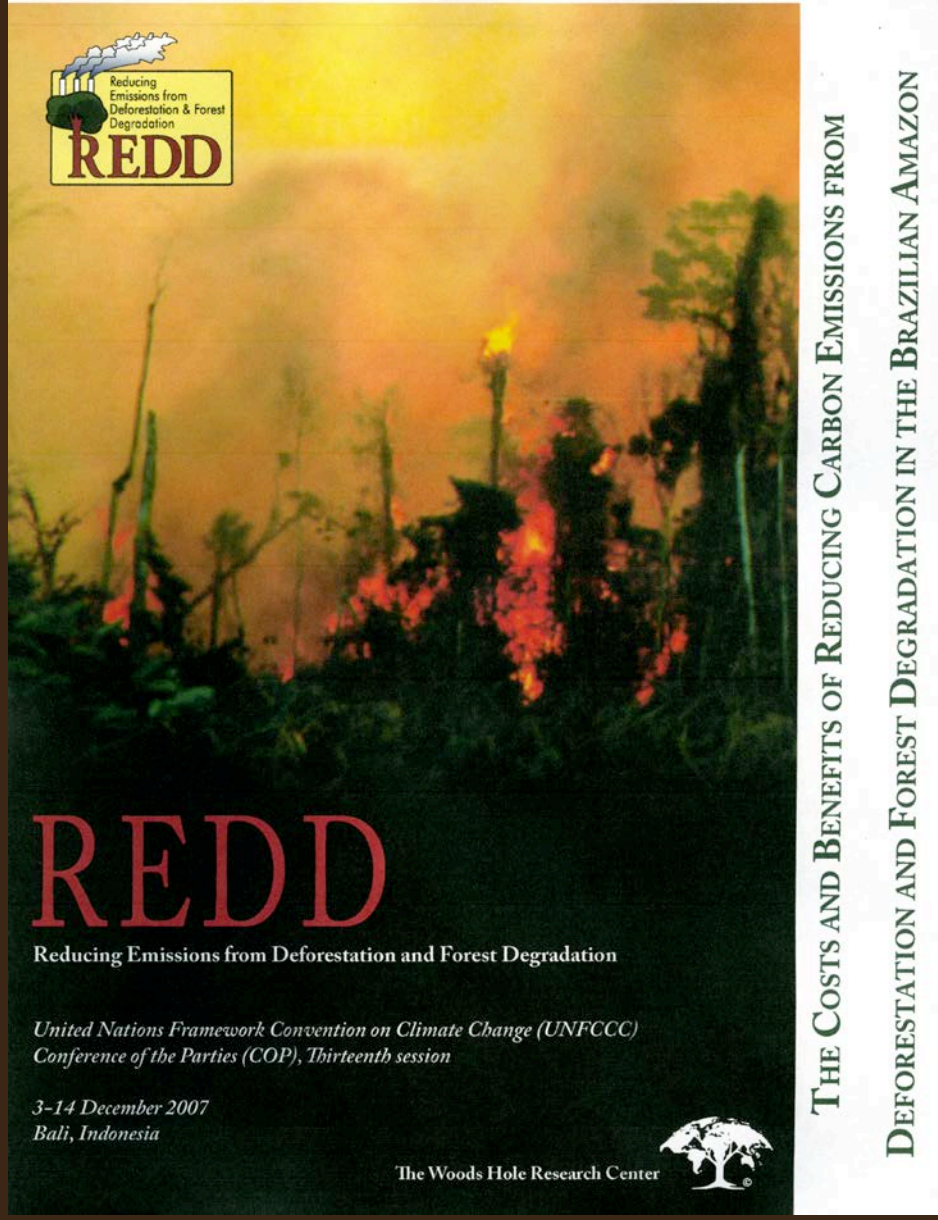


2010 An integrated assessment led by Pavan Sukhdev of Deutsche Bank and sponsored by the Green Economy Initiative (EU-UNEP)

Reducing Emissions from Deforestation and Forest Degradation is a multi-UN agency effort to provide payments to nations who develop viable conservation programs (policy, monitoring, and enforcement) to sustain forest stocks and reduce CO2 emissions.

REDD is necessary to establish a "playing field" or baseline so that payments for carbon sequestration services can occur.

REDD needs major funding and very strong monitoring, accounting, and enforcing institutions.



There is now a significant ecosystem service advisory and consulting industry.

There are now professionals with a vested interest in the perpetuation of the metaphor.

The term is institutionalized in the structure of agencies and international agreements.

There are now students who have never thought about environment and development in any other way.

Ecologists are now trying to develop their science to support the metaphor.

Clearly, the ecosystem service metaphor has been very widely adopted and successful in a very productive way. We now think of ecosystems and their services as the primary way to plan and implement sustainable development.

Surely the term “ecosystem services” has been as persuasive and effective as its early promoters had ever hoped it might become.

But let’s think about the situation a little more critically.

Norgaard, Richard B. 2010. Ecosystem Services: From Eye-Opening Metaphor to Complexity Blinder. 2010. Special issue on Payments for Ecosystem Services. *Ecological Economics* **69**(6):1219–1227.

Key Arguments

1. "Just" a Metaphor
   - To stimulate discussion, get lay people to think
   - Conservation Biologists' desperate to portray value
   - But metaphor also fit and coevolved with neoliberal and World Bank Agenda
2. Metaphor does not fit existing ecological theory and diminishes prior metaphors
3. Widespread adoption in development practice is at micro level, ignoring macro / global problems of poor distribution of "rights" and "access" that leads to poverty
4. Not even good neoclassical economics
5. Surely the metaphor will only prolong the disaster.

Ecosystem service metaphor does not fit existing ecological theory and diminishes prior metaphorical richness

Ecology is methodologically pluralistic

- Population biology (predators, prey, symbiosis, population cycles)
- Energetics (energy flows, laws of thermodynamics)
- Evolutionary ecology (diversity, change, emergent properties, speciation, extinction)
- Food webs (interdependence, trophic levels)
- Hierarchy theory (temporal change at different rates)
- Landscape ecology (spatial scale, boundaries, boundary effects, corridors, but also human role in nature)

Nature's Capital and Ecosystem Services assumes nature can be thought of as a stock of capital that provides flows of separate services.

Only some ecological models are consistent with these assumptions, and only then because of their particular foci.

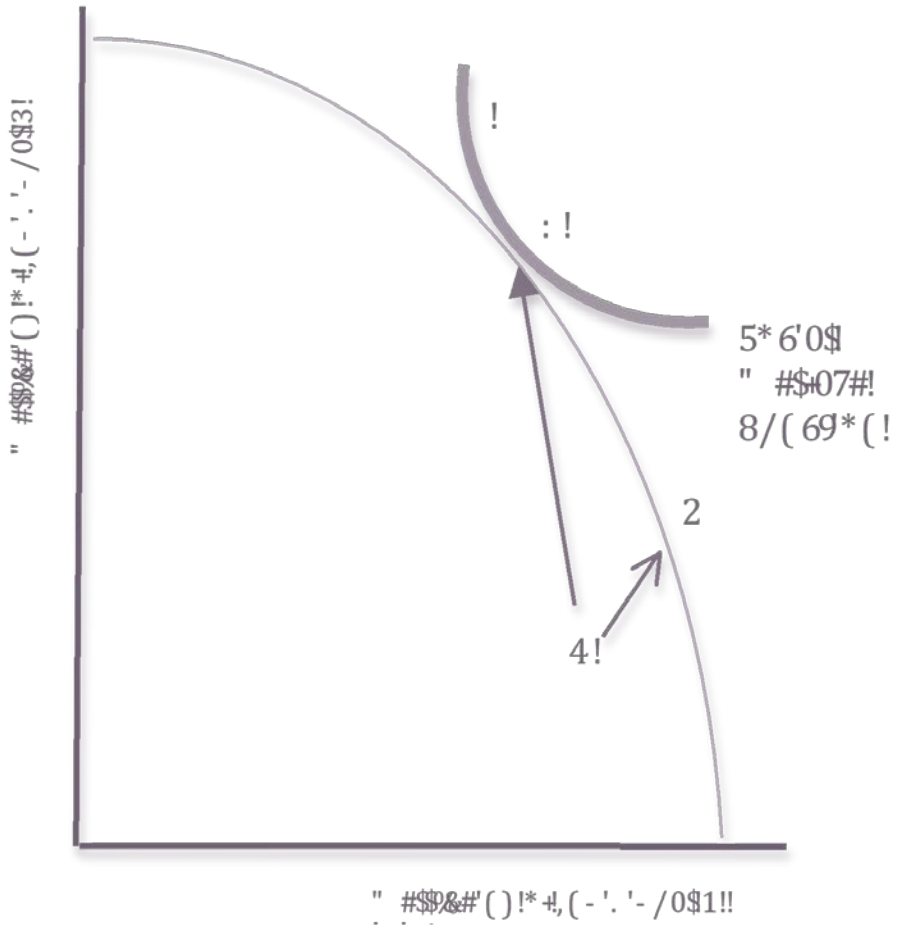
The application of ecosystem service metaphor presumes that the services can be managed separately without one affecting the other, or that the tradeoffs between them are known … neither of which is true to existing ecological understanding.

The economic rationality: bring connections that are outside the market into the market (internalizing externalities), but …

- Markets require separable rights to property that can be exchanged
- Markets entail transactions costs
- Transactions costs are greater when rights are vague and when that which is being exchanged is vague.
- Strong institutional backup is needed, but ecosystem service approach is touted as a market alternative to governments that do not work.
- Markets, information, and enforcement: think mortgages and financial crisis, or Euro crisis.

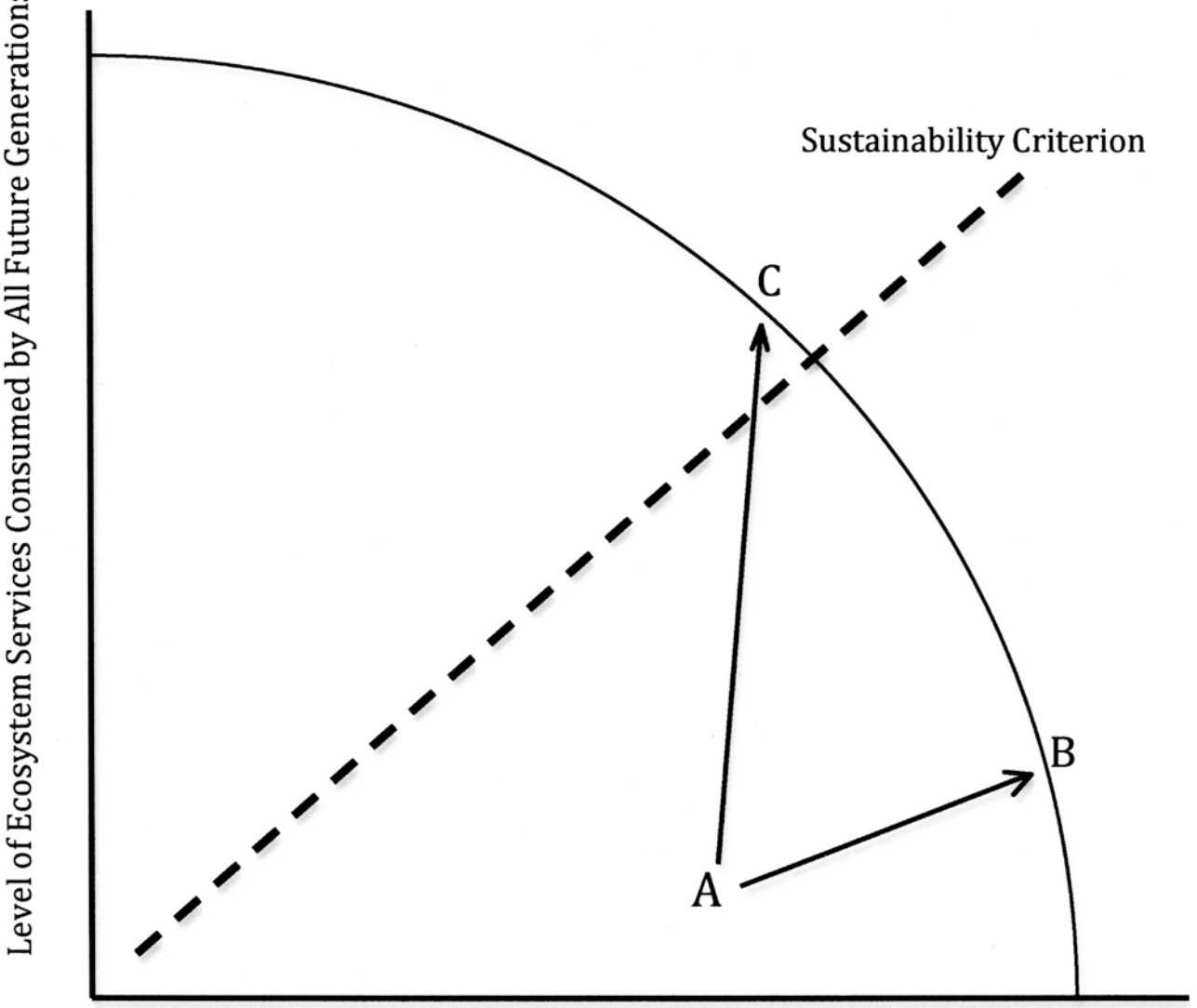
But our economies drive our environmental problems

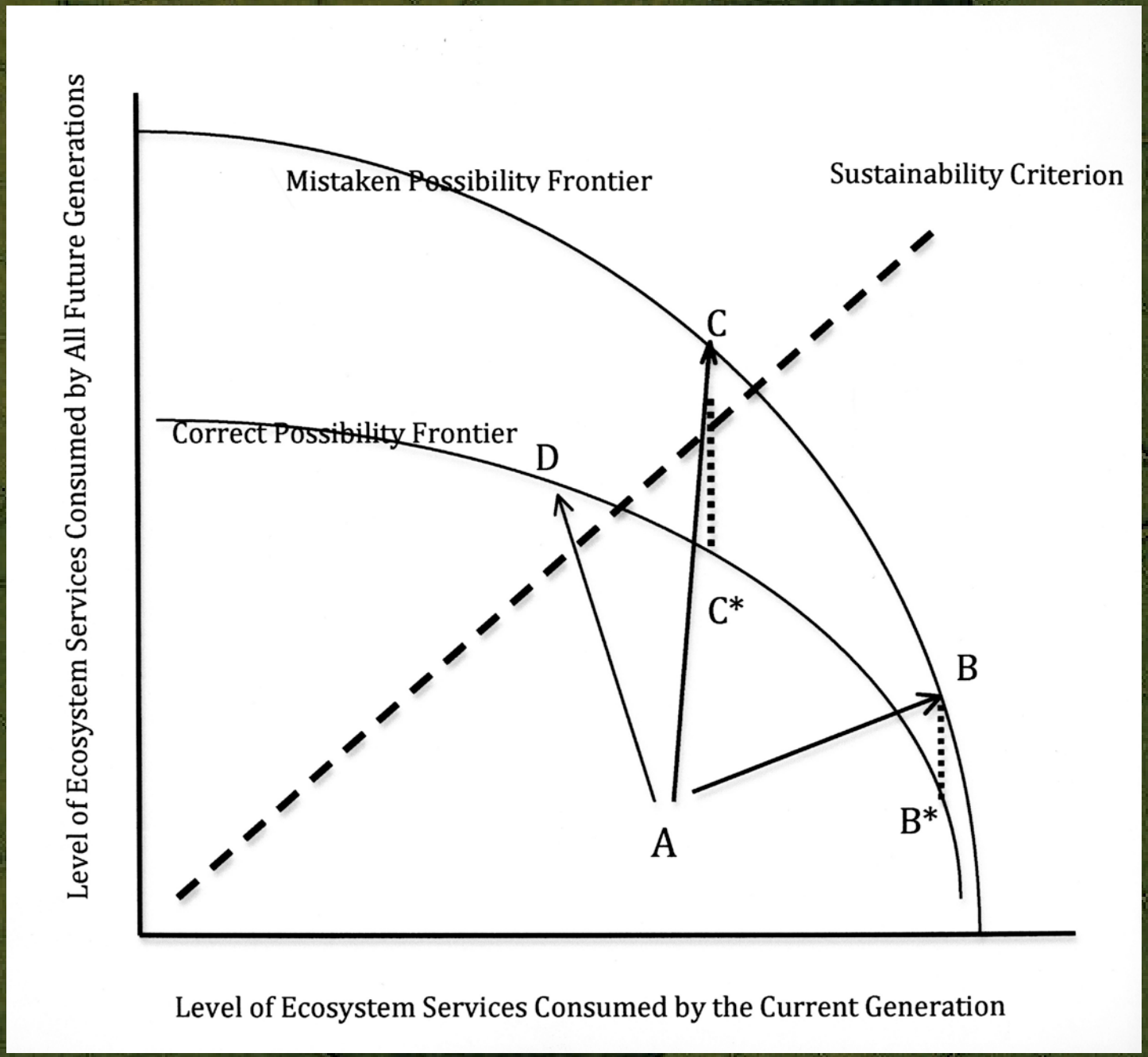
Can economics get us out of the mess that economic social organization and growth have created?



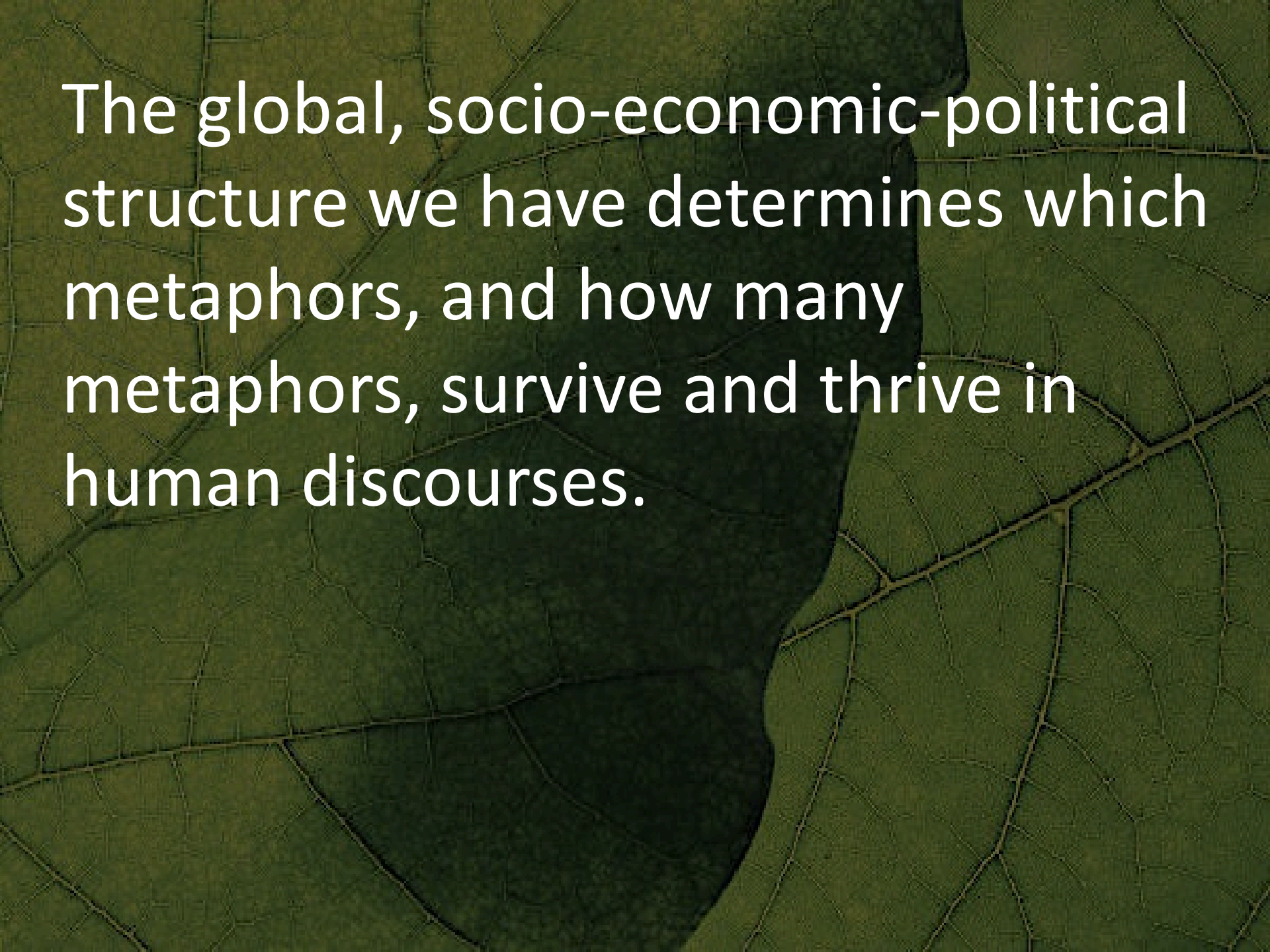
A social welfare function is needed to determine the best of many efficient possibilities, and this must be based on an expression of values apart from the economy and economic values.

Known since Cournot in 1837


Level of Ecosystem Services Consumed by All Future Generations
Sustainability Criterion
C
B
A
Level of Ecosystem Services Consumed by the Current Generation


Level of Ecosystem Services Consumed by All Future Generations
Mistaken Possibility Frontier
Sustainability Criterion
C
Correct Possibility Frontier
D
C*
B
B*
A
Level of Ecosystem Services Consumed by the Current Generation

The metaphors we use for nature eventually define our relationship with nature through the science we construct, the institutions we build, and thereby the ways in which we behave.


The global, socio-economic-political structure we have determines which metaphors, and how many metaphors, survive and thrive in human discourses.

To sustain a “thick” and “diverse” mix of discourses that support a diverse, culturally rich human future probably (surely?) requires diverse, smaller scale, less interconnected socio-economic-political structures in which different languages can thrive.


YEP, SON, WE HAVE MET THE ENEMY AND HE IS US.