



THE PRESIDENT  
OF THE  
GENERAL ASSEMBLY

15 March 2012

Excellency,

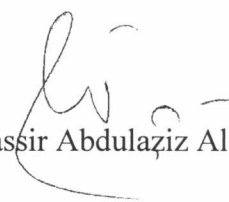
As mandated by General Assembly resolution 66/204, I have the pleasure to invite your delegation to participate in the interactive dialogue of the 66<sup>th</sup> General Assembly on Harmony with Nature, to be held on **18 April 2012**.

The interactive dialogue aims to examine *the scientific findings on the impacts of human activities on the functioning of the Earth System*. It will also explore how human activity has damaged the Earth System, especially by focusing on those areas where such damage has already affected the regenerative capacity of the planet. The dialogue is intended to promote an exchange of ideas and experiences from multiple perspectives, with particular attention to the contribution of science.

I am pleased to share with you the concept note and tentative programme of the informal interactive dialogue for your reference. Updated information about the event will be available on the website of the President of the General Assembly.

Please accept, Excellency, the assurances of my highest consideration.

*[Faint signature]*

  
Nassir Abdulaziz Al-Nasser

All Permanent Representatives and  
Permanent Observers to the United Nations  
New York

INTERACTIVE DIALOGUE OF THE 66<sup>TH</sup> SESSION OF THE UNITED NATIONS

GENERAL ASSEMBLY ON HARMONY WITH NATURE

Wednesday 18 April 2012 · New York

**Subject: Scientific findings on the impacts of human activities on the functioning of the Earth System**

**Venue: United Nations Headquarters, New York**

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At the launching of the Secretary General's report of the High Level Panel on Global Sustainability on 30<sup>th</sup> January 2012 in Addis Ababa, Ethiopia, UN Secretary-General Ban Ki-moon highlighted the importance of science as an essential tool for decision-making on sustainability issues. The report "Resilient People, Resilient Planet: A Future Worth Choosing" calls on the Secretary-General to lead efforts to integrate scientific knowledge across sectors and institutions, and to consider naming a chief scientific adviser or establishing a scientific advisory board with diverse knowledge and experience to advise him or her and other organs of the United Nations.<sup>1</sup>

Mr. Ban Ki-moon further stated that sustainable development is a top priority for his second term. "The signposts are clear: We need to change dramatically, beginning with how we think about our relationship with each other, to future generations, and to the ecosystems that support us". He further added "With seven billion of us now inhabiting our planet, it is time to reflect on our current path. Today we stand at a crossroads... Achieving sustainability requires us to transform the global economy... Citizens will no longer accept governments and corporations breaching their compact with them as custodians of a sustainable future for all".<sup>1</sup>

Science and Economics have already told us that our current path is unsustainable. If we are to enhance humankind well-being, further global justice, strengthen gender equality and preserve the Earth System, we must adopt a new paradigm. This could be the greatest challenge to be addressed by the UN Conference on Sustainable Development, known as Rio+20, to be held in June 2012. Scientists must guide this new chart and the UN System has to look forward to that direction.

The Secretary-General's intervention also built on his Report on Harmony with Nature submitted to the 66<sup>th</sup> Session of the General Assembly (A/66/302). The report addresses both the evolving relationship of humankind with nature as reflected in environmental legislation and the important role of science. One of the most important conclusions of the report is that humankind must accept that it is an intrinsic part of

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<sup>1</sup> Resilient People, Resilient Planet: A future worth choosing. The Report of the UN Secretary-General's High-Level Panel on Global Sustainability.

nature: "By contaminating and depleting Mother Earth, we are also contaminating and depleting ourselves... We are contributing to the forces and imbalances that cause the increasing natural disasters that are striking us...The more humans learned about nature, the more difficult it became to entertain the notion that the universe existed for humans. No longer were people considered as the masters of nature, but rather as members of the natural community". Such statements reaffirm the holistic approach that gave this document its unique identity.

On 22nd December 2011, the UN General Assembly, at its 66<sup>th</sup> session, adopted Resolution A/RES/66/204 on Harmony with Nature, requesting an interactive dialogue to discuss the scientific findings on how human activities are affecting the Earth's System.

Harmony with nature is an integral part of sustainable development that involves reconnecting humans with the world around them and forging a new consensus among countries of differing levels of development. Holism, which is embodied in the concept of sustainable development, implies that all things are interconnected and that nothing occurs in isolation. In order to reinforce the principles of sustainable development, we must work to render whole each one of its pillars: environmental, social and economic. As the three pillars integrate, they will reinforce the dynamics of sustainability that so far has eluded us. Indeed, the whole is more than the sum of the parts.

Sustainable development is premised on the worldview that nature and humans are inextricably intertwined in the same web of life. Formulating and implementing sustainable development policies that are truly in harmony with nature implies profound changes in current consumption and production patterns, and all that they yield: food, energy, water, material products and lifestyle aspirations. Such deep changes require letting go of the old worldviews that set humans apart from Nature and they can only be accomplished through major shifts in thinking, values, education and behavior. Changes in public policy and consensus building at all levels through inclusive processes that respect national sovereignty and the rights of individuals must also occur. Awareness must be raised on how human activities have damaged and continue to damage, in many cases irreversibly, the regenerative capacity of Nature.

Given the infinite interactions and reactions that occur in the web of life, the extent to which the Earth System is able to retain its regenerative capacity remains one of the greatest unanswered questions in the history of humankind. The paradox of the last hundred years is that we have accumulated significant knowledge and yet understood very little. Our relentless crises are constant reminders of our shortcomings. The knowledge so far gathered has been fragmented and our understanding is yet to be as holistic as the web of life.

The regeneration of Nature is a dynamic process by which life recovers spaces when Nature has been partially or totally destroyed. However, the regenerative process can be slowed, interrupted or brought to an end. Humankind is weakening and destroying this process upon which we depend for our survival. In this regard, climate change is

only one of the multiple facets of the environmental crisis. What measures must we take now to prevent more destruction? And, how long will “now” take?

The United Nations could help answer these questions during the Rio+20 Conference, setting the stage for more discussion and understanding of the scientific complexities that have so far eluded us, as well as on how Earth Science can further reveal our complex relationship with Nature. Despite our wealth of knowledge on our relationship with Nature, we have failed to demonstrate impacts of sustainable development.

The United Nations Conference on sustainable development (Rio+20) is an opportunity to assess our relationship with nature over the last 20 years to reaffirm commitments made in Rio and Johannesburg and to inject new impetus and to chart a sustainable way forward. The contribution of science and innovation in achieving sustainable development should not be underestimated.

For humankind to thrive with equity and equality on its journey towards sustainable development, we must keep the Earth in full view when we are making decisions and taking action. We need a major shift from a Self-centered to an Earth-centered approach, and science can guide us in this regard. The interactive dialogue can contribute to a better understanding of the holistic construct that lies at the core of sustainable development.

### **Objective and Expected Outcomes**

As expressed in UN resolution A/RES/66/204, the interactive dialogue of the General Assembly on Harmony with Nature aims to examine how human activity has damaged the Earth System, especially by focusing on those areas where such damage has already affected the regenerative capacity of the planet. The dialogue is intended to promote an exchange of ideas and experiences from multiple perspectives, with particular attention to the contribution of science.

The dialogue is expected to yield the following outcomes:

- A precise and accurate diagnosis of the negative impacts of human activity on the Earth System, in particular its regenerative capacity; and,
- Institutional responses to catalyze science for sustainable development.

### **Programme**

The interactive dialogue will take place on Wednesday, 18 April 2012, during the commemoration of International Mother Earth Day, at UN Headquarters in New York. The dialogue will consist of one moderated panel discussion with eminent scientific experts. The floor will be opened to delegates and other participants for questions to the panelists, as well as brief interventions to share their experiences and other perspectives.

18 April 2012

**Statement of H.E. Mr. Nassir Abdulaziz Al-Nasser,  
President of the 66<sup>th</sup> Session of the General Assembly,  
at the Interactive Dialogue on Harmony with Nature to  
Commemorate International Mother Earth Day**

Under-Secretary-General Mr. Sha Zukang, and Secretary-General of the United Nations Conference on Sustainable Development,

Your Excellency Mr. Rafael Archondo, Deputy Permanent Representative, Permanent Mission of the Plurinational State of Bolivia to the United Nations,

Eminent Professors,

Excellencies,

Ladies and gentleman,

On behalf of the President of the General Assembly, His Excellency Mr. Nassir Abdulaziz Al-Nasser, I am pleased to make the following remarks.

Let me welcome each of you to this Interactive Dialogue on Harmony with Nature, in commemoration of International Mother Earth Day.

The theme of this year's International Day is "Scientific findings on the impacts of human activities on the functioning of the Earth System".

This apt theme was selected by Member States in General Assembly resolution 66/204, and is an implicit recognition of the importance of ensuring harmony with nature through science and multilateral action.

I would like to take this opportunity to thank Bolivia for initiating this important resolution.

Ladies and gentlemen,

Recent advances in Earth system science confirm that humanity is facing severe risks - risks that negatively impact human development and our existence on Earth.

During the past century, human activities on Earth have resulted in a significant increase of Green House Gas concentrations in the atmosphere, land degradation, the destruction of ecosystems and the depletion of Earth's biodiversity.

Climate change, desertification and loss of biodiversity pose an unequivocal challenge for human development.

Economic growth associated with unsustainable patterns of consumption and production is hindering our quest for harmony, both within and between societies, as well as between humankind and the natural environment.

I would submit that the world today is deeply engaged in two of the greatest existential questions:

First, how can we sustain life while protecting the planet?

And second, what does that Earth require in order to support seven - soon to be nine - billion people?

We are, for the first time, acknowledging worldwide that the sustainability of life on earth is a serious question that will drive fundamental decisions in our societies and the world at large.

In making such decisions, academic research plays an important role in clarifying these global issues.

The contribution of science and innovation in achieving sustainable development cannot be underestimated.

The effective implementation of the results of scientific research can support, among other things, efficient resource utilization, environmental protection and poverty eradication.

I firmly believe that scientists must guide this new paradigm, and that the UN System should work together towards supporting a stronger science based on sustainable development.

I would encourage Member States to continue to support the academic sector as it explores and explains these profound issues.

Ladies and gentlemen,

It is clear that we have to do more to address the issue of unsustainability.

As a human race, we have the resources, the scientific knowledge and the know-how to save our planet.

I believe that future work on this new paradigm should be supported by a globally recognized and coherent science base, that is capable of creating a strong science-policy interface for sustainable development.

This model would provide practical tools for utilizing natural resources in a more sustainable way, and safeguarding ecosystems by promoting social and economic development at all levels.

Our efforts for achieving sustainable development should be viewed as an investment in the future of humankind.

The United Nations Conference on Sustainable Development (Rio+20) is an opportunity to assess our relationship with nature over the last 20 years; to affirm commitments made in Rio and Johannesburg; and to inject new impetus and genuine innovation towards fostering a sustainable way forward.

The commemoration of the International Day of Mother Earth is therefore both timely and relevant, as we aim to have a successful outcome in Rio next June.

Thank you.



## **BRAZIL**

### **Statement on the occasion of the Interactive Dialogue of the General Assembly on Harmony with Nature April 18, 2012**

First of all, allow me to thank the Plurinational State of Bolivia for the timeliness of this debate and the President of the General Assembly for making it possible. It provides us the opportunity to listen to the voices of civil society and academia. We are reminded that Nature is not just a provider of services but a repository of functions which are essential for the survival of the Earth system, including humans and other sentient beings.

I would like to recall Principle 1 of the Rio Declaration, which lays the foundation for our discussions today. The Principle states that “Human beings are at the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature”.

The concept of sustainable development provides the basis for action at all levels to bring about concrete changes in development paths, making equity and harmony with nature possible. Yet we are far from fulfilling the goals we have set for ourselves twenty years ago. Many people on Earth still live in poverty and do not have access to basic social services.



The international consensus that arose from UNCED in 1992 enhanced political commitment to sustainable development at many levels. WSSD in 2002 reinforced these key messages and provided elements for improved implementation.

Progress in moving towards sustainable models of development has been made. But, at the same time, it has been uneven globally, regionally and even nationally. The thorough integration of the three pillars of sustainable development by public and private actors is still to be fully achieved and sustained.

The multiple crises that the world has been going through in these recent years have made evident the flaws of deregulated global markets, in particular, and of our paths of development, in general. In that context, the need for a renewed and strengthened focus on sustainable development is central for enabling sustained and widespread recovery that will balance social equity, decent employment and the protection of the natural environment.

Moving forward, we must focus on finding ways to ensure that the basic development needs of our peoples are met, while ensuring the protection of the environment that hosts us in this planet. Solutions exist, both from traditional knowledge and from modern technology. The role of national governments in promoting sustainable development and equity is paramount, but international cooperation is also essential in promoting an enabling environment for sustainable development to unfold.

The Rio+20 Conference should provide stimulus for action, by identifying areas where further adjustments have to be made and secure conditions for concerted efforts to be effective.

Thank you.



**BOLIVARIAN REPUBLIC OF VENEZUELA**  
**PERMANENT MISSION TO THE UNITED NATIONS**

**STATEMENT BY AMBASSADOR JORGE VALERO**  
**DEPUTY FOREIGN AFFAIRS MINISTER TO NORTH AMERICA**  
**AND PERMANENT REPRESENTATIVE TO THE UNITED NATIONS**

**INTERACTIVE DIALOGUE ON HARMONY WITH NATURE**

**“SCIENTIFIC FINDINGS ON THE IMPACTS OF HUMAN**  
**ACTIVITIES ON THE FUNCTIONING OF THE EARTH SYSTEM”**

**66° SESSION OF THE GENERAL**  
**ASSEMBLY OF THE UNITED NATIONS**

*Please check upon delivery*

**NEW YORK, APRIL 18<sup>TH</sup>, 2012**

**Mr. President,**

We endorse the statement of the distinguished Ambassador from Chile, on behalf of the CELAC, and we thank you for convening this important Interactive Dialogue, within the framework of the International Mother Earth Day, in accordance with the mandate of Resolution A/RES/66/204, approved by the General Assembly on December 22<sup>nd</sup>, 2011.

We commend the outstanding contribution of the Government of the Plurinational State of Bolivia, led by President Evo Morales, and the Bolivian delegation, for the discussion on this topic.

This meeting becomes relevant when we are in the process of negotiating the outcome document of the United Nations Conference on Sustainable Development.

The worshipers of savage, speculative and financial capitalism intend to continue promoting an irrational exploitation of natural resources, through the use of unsustainable patterns of consumption and production. They promote a supposed “adjustment” that would integrate nature and human beings as scarce goods, in the field of use values, capitalizing the conditions of production to renew the operator’s financial capital sustainability.

**Mr. President,**

Once again, the narrow economic and financial interests of global capitalism intend to deify the markets, with formulations and methodologies that promote a supposed optimal sustainable growth but, instead, it destroys nature, and benefits only the holders of technologies and financial resources; a tiny private sector and a small group of developed countries.

It is intended to put to the same level the businesses and markets to the States, when the latter respond to public interests, while multilateral companies and private investments respond to particulars’ benefits.

Today, billions of people on earth, especially in the countries of the South, remain locked in poverty, while the elite of wealthy societies continue maintaining their obscene, unsustainable and irrational pattern of production and consumption.

**Mr. President,**

Within the framework of the Rio+20 process, a false premise is promoted, according to which the live styles of the poor have a disruptive impact on the ecosystems of the earth, but they obviate the effects that the predator model of unbridled capitalism has on human beings and ecosystems. Therefore, it concerns that this approach is present in the draft outcome document of Rio+20, and that it is contained in the Report of the High Level Panel on Global Sustainability, entitled “Resilient People in a Resilient Planet: A Future Worth Choosing”.

This Report speaks of the “negative polarity of the current division of the world between the North and the South”, as if this polarity was a fictional story, invented by theorists who have focused on studying the causes and consequences of underdevelopment, and not an undeniable historical reality that projects into the present day, from colonial times, and – under the new and sophisticated forms of global capitalism – reproduces, day by day, poverty, inequality and injustice in the world.

The Report, on the other hand, does not take into account the negative impact of speculative financial markets on the quality of life of the peoples, nor the abusive management of the external debt of developing countries, by the centers of the financial capitalism. It advises to assume an environmental “management” or “administration”, from financial mechanisms, implementing a supposedly green economy, which legitimize the market as the main mechanism to respond to the challenges of environmental degradation.

The goal of the financial and speculative capitalism is to strengthen the dependence of the countries of the South to the technology of the North, and to strengthen its production and consumption pattern, through transnational investments that recognize the issuance of environmental certificates or environmental projects,

developed by multinational companies that do not help to compensate or repair the impact of their activities on the planet's ecosystems.

In short, it intends to consolidate a strategy in which capital responds to the current systemic crisis of global capitalism, from its own logic of accumulation and destruction of nature.

**Mr. President,**

We allow ourselves to draw attention to the disruptive impact that can have the consumer and mercantilist strategy described in the principle of the sovereignty of the States over their wealth and natural resources, and to exercise it according to the interests of national development and the welfare of their people.

In that order, it must be reasserted the right of countries to regulate and exercise its authority, within its national jurisdiction, over foreign investment, in accordance with its laws and national priorities.

Likewise, it must be recognized the right of sovereign States to regulate and supervise the activities of transnational corporations that operate within national jurisdiction and to take the necessary steps to ensure that such activities comply with the legal provisions.

**Mr. President,**

As inhabitants of this planet, we have ethical obligations with nature. Mother earth has rights as well. The intrinsic value of this and the need to maintain its capacity of regeneration must be key objectives of a new international order, based on equity, sovereign equality, and the interdependence and cooperation among the States.

**Mr. President,**

States should pay particular attention to indigenous and native cultures, which, for centuries, have maintained, in their ancestral knowledge, the principles for the

protection of natural resources and the environment. They have helped to preserve the regenerative capacity of Mother Earth, while respecting the principle that human life and its environment should have a mutually beneficial relationship.

Venezuela and the countries of ALBA promote the philosophy of Living Well/Good Life, with new paradigms for life, from the peoples who emancipate and contribute to establish a new humanist world order. The society of the good life is one in which human beings, and their collective diversity, live equitably and in harmony with Mother Earth and the ecosystems that sustain life on earth.

We propose that, en route to Rio+20, the excellent presentations that we have had today, by the distinguished panelists, would be taken into account, so that the Outcome Document reflects the new approaches and paradigms from the scientific community.

In this regard, we consider relevant the words of Dr. Owen Gingerich, who has invited us to save the world and try that the “cosmic ship does not sink”.

The challenge before us is, as stated by Dr. Mark Lawrence, to give up the “unsustainable patterns of production and consumption”, in order “to accomplish a global society that lives in harmony with nature”.

Similarly, and as said by Professor Joshua Farley, nature is an essential part of human life. He noted that one should not rely on the efficiency of the markets or exacerbate earnings to maximize the monetary value. It is pertinent his warning that the “obsession for competitiveness” should be abandoned and that “the key to create a safe world is the cooperation and not the competition”. We share his warning that “if technology remains in the hands of private companies, nature will continue to be destroyed”.

For his part, Dr. Brian Czech reflected on economic growth. With irrefutable statistics he told us that the economy is still in a primitive and animalistic stage. He warned that “insofar as it increases the GDP, endangered species increase”. He affirmed that “growth *per se* and perpetual rescission are not sustainable. He told us that that

optimal GDP level depends on the characteristics of each country, and called to seek an “optimal balance through cooperation”.

If we take into account those humanist approaches, which we have listened today from the panelists, the results to be obtained at the Rio+20 Conference could contribute to building societies reconciled with Mother Earth. .

I thank you, Mr. President.

## The Harmony of Nature

Owen Gingerich

Harvard-Smithsonian Center for Astrophysics

Presented at the United Nations Harmony of Nature Conference

New York, 18 April 2014

I'm holding in my hands two ball bearings, each about 2 centimeters in diameter. I propose to build a model of our cosmic environment. I'll let the first sphere represent the sun. On this scale the earth will be 2 meters away, and much too small for you to see it. Mars, even smaller will be another meter farther from the sun. On this scale, where shall we place the second sphere, representing the closest star to our own solar system? On top of the Empire State Building? At the JFK Airport? Much too close! It should be placed some distance beyond Toronto.

The sun and its neighbor are but two among the two hundred billion stars in our Milky Way Galaxy. That's some thirty stars apiece for every man, woman and child on earth. On the scale of our ball-bearing model our Milky Way Galaxy would extend beyond the moon! So now let's collapse our model by ten billion times, so that our disk-shaped pin-wheel galaxy would be the size of a two euro coin. Now where should I place this two pound coin to represent the next closest major spiral galaxy? In London? Be surprised! [holding coins about two feet apart] Collisions between stars are fantastically rare because stars are so far apart, whereas collisions between galaxies are common, though they take ages to happen, but what I'm here to talk about is the long history of the universe in contrast to the swift pace of our technological knowledge.

A most curious and interesting fact about the distant galaxies is that they are rushing away from each other, and the farther they are from us, the faster they are going. It's as if an immense explosion took place, and the faster fragments are now the farthest away. We can calculate from the speeds and distance when that explosion took place, 13.7 billion years ago, the creation of the universe, and the creation of time itself. This means we live in a universe with a history, a universe that has been changing throughout time. It is the history of the universe and our place within it, that I want to sketch briefly.

It was in the first three minutes of that fiery Big Bang that the two lightest elements were created, hydrogen and helium. Fire of sorts, yes, but no earth or air, and no water because there was no oxygen for H<sub>2</sub>O. The Big Bang was over before the heavier elements had a chance to form.

The oxygen for our air and water and the carbon for our bodies was made very slowly over the next billions of years in the hellish cauldrons in the cores of evolving giant stars.



Occasionally they would explode as supernovae, throwing into interstellar space the heavier elements including carbon and oxygen for our proteins, phosphorous for our DNA, iron for our blood, gold to plate our satellites, and uranium for our reactors. We are all born of the stars, our bodies are recycled star stuff. In time there were enough heavy elements for our sun and planetary system to form. That was just short of five billion years ago. At first the earth was a barren, volcanic place, battered by impacts of assorted asteroids, without permanent oceans or atmosphere. As the environment settled down, water vapor spewed forth from the volcanoes and condensed to fill the oceans. An atmosphere laced with carbon dioxide began to form. In those early days in the history of our solar system the sun was not so bright as it is now, and it took as much greenhouse effect as the carbon dioxide could provide to keep the oceans from freezing solid.

Happily the early atmosphere did not have too much oxygen — oxygen is a very active element, rusting any unprotected iron, and quite poisonous to the original living material. Early single-celled organisms slowly converted carbon dioxide into free oxygen, and the oxygen content of the atmosphere rose to around 20% just in time to provide more efficient fuel for the more complex life forming on earth in the Cambrian period, about 500 million years ago. So then planet Earth had water and air, and gradually it began to form the agricultural element earth—that is, soil—so the greening of the continents could take place. As I indicated our planet Earth has a history, and a complex one that took hundreds of millions of years to form the habitable surroundings we have today.

In the past five centuries, ever since Copernicus invented the idea of a solar system in which Earth was just one of a family of planets cycling around the sun, human beings have wondered if there are other habitable planets cycling around other stars, and whether habitable planets might indeed be inhabited by other sentient beings. In the past two decades astronomers have in fact started finding other planetary systems. Currently the so-called Kepler mission, a space-borne observatory, is continuously monitoring the magnitudes of 100,000 stars to find the small dimming caused when a planet passes in front of a star. The project now has just over 2000 candidate stars where a temporary change in brightness has indicated that a planet might be present. The goal of the project is to find earth-sized planets cool enough to provide a habitable environment where life might have arisen.

But is a habitable environment enough to guarantee that life will form there? That is a giant question that scientists would like to answer, but first they would simply love to know if life has formed in at least one other place in our galaxy. Or are we alone? Now for Earth itself, for about two billion years the life on our planet was so primitive that we have no clues as to

how it could have been detected from afar. Not until our atmosphere had gained enough oxygen would there have been a potential signal that something special was happening here. As I have mentioned, oxygen is a very active element, and unless it is continuously replenished, it will rust away, so astronomers hope eventually to find a planet where an oxygen atmosphere can be detected spectrographically. The discovery of such a signal will be a truly exciting event, because the presence of oxygen would suggest that there was some chemical activity, most probably some sort of life, to continually replenish it. But such a discovery would leave more questions unanswered than answered, because that signal would not reveal what kind of life is out there.

Many years ago I heard a fascinating lecture by the late Philip Morrison, an institute professor at MIT. It was entitled “Termites and Telescopes.” He began his lecture by stating that human beings were supposedly the only creatures technologically advanced enough to construct arches, something discovered by the Romans for building bridges. But, he pointed out, termites had discovered this long ago and these insects use arches in constructing their impressive nest structures. Morrison then asked the provocative question, could termites ever discover how to build telescopes? Building nests is a quintessential example of instinct, some inheritable chemistry in the termites, poorly understood, but something that took eons to become embedded in their genetic structures. Presumably, if the termites were ever to build telescopes, it would take hundreds of millions of years to code the instructions into their genetic chemistry.

Early in the 19th century the French botanist Pierre Lamarck proposed an evolutionary system whereby acquired knowledge could be inherited, compared to Darwin’s later theory of variations being chosen by natural selection, a very slow process indeed. Morrison chose his apparently ridiculous example of termites and telescopes to paint the contrast between the slow trial and error learning process of biological evolution and the rapid cultural evolution where newly acquired knowledge can be passed on from one generation to another in other ways than genetic coding — books, for example. Biological evolution has brought *Homo sapiens* to the Lamarckian divide, to the stage of cultural evolution where more information can be carried in our brains than in our DNA. Termites are still unimaginably far from building telescopes, whereas for us telescopes were invented a mere 500 years ago, and are now universal.

The almost incredible speed of scientific discovery and technological development is transforming the world at a dizzying rate. Our great great grandparents would be far more at home in the world of Christopher Columbus and Nicolaus Copernicus than in our world of today. 125 years ago no one knew about X-rays or radioactivity or the inner structure of atoms.

Automobiles, communication by radio, and airplanes still lay in the future. Sixty years ago, when I was a graduate student, biochemists and anatomists did not yet know precisely how many chromosomes were found in human cells. Mobile phones were something for comic strips and science fiction. Lasers were unknown. Today I have a dozen in my house.

In 1955 I had a wonderful opportunity to participate in an expedition to observe a total solar eclipse in Ceylon. Thirty-two years later, in 1987, I was able to return to the eclipse site, and I was asked what did I notice that was different. I mused that Sri Lanka seemed much more crowded than Ceylon had been. That's right, our tour guide responded. The population had doubled in those three decades. Since 1900 the entire world population has tripled. The physical mass of human beings and domesticated animals now makes up 90% of the vertebrate mass, up from 0.1% 10,000 years ago.

The accelerating expansion of technological power, combined with the explosive growth of the world population together with unsustainable consumption and production patterns, brings unparalleled challenges for the unity of nations. Already some centuries ago the expanding human population began to change the environment. Today nearly 80% of Earth's land surface has been modified by humans.

The passenger pigeon, a bird whose giant flocks once darkened the skies of the American Midwest, is no longer alive. Neither are the giant moa or the Irish elk. A few days ago I met a palaeontologist who works on recent vertebrate fossils. She informed me that sixty vertebrate species just in Hawaii have gone extinct since the human population arrived in the islands (with their associated rats).

Around the world numerous species, some we don't yet know about, are being threatened by deforestation and other major environmental changes. This is the competition between human population growth and older environments. Recently I visited the Lemur Conservation Reserve in Florida. These endangered primates from Madagascar are our distant cousins. Madagascar is a particularly fascinating place for studying the antecedents of *Homo sapiens*, because it was isolated from Africa and uniquely preserves early species from the primate family. Today space pressures from the human population in their native land may well doom the future of many lemur species, though the Conservation Reserve may slow this catastrophe.

I have in my hand a shell of the green Manus tree snail. These attractive shells cannot be sold in the United States because they are listed as an endangered species. Although abundant in New Guinea, the snail is threatened by loss of environment because increasing numbers of people need to be employed and housed. Since the shell cannot be sold, there is no profit in letting it survive. I mention this in passing as a miniature case to show how ambiguous many of

the situations facing this body are.

Our planet works as a biophysical system that creates soil and its fertility. As Thomas Lovejoy recently pointed out, ecosystems provide a variety of services, not least of which is provision of clean and reliable water. Biological diversity is the essential living library for sustainability. Perhaps if we ourselves survive, in the distant future our age will be known for the greatest loss of biological species since the extinction of the dinosaurs.

The expanding human population has the power to alter the environment not only on land, but also in the sea through the run-off of pollutants such as nitrogen fertilizers. And we have as well begun to modify and poison our atmosphere. A case in point, though now a rare success story, was the discovery in the 1970s and early '80s that the ozone layer in the stratosphere was being depleted in large part because of the release into the atmosphere of chlorofluorocarbons used in refrigerants and aerosols. It is the ozone layer that filters out ultraviolet radiation that can cause skin cancer and cataracts. Despite one leading industry spokesman saying that all this was “a science fiction tale, a load of rubbish, and utter nonsense,” the scientific evidence soon established the ozone depletion as a genuine man-made threat, and this led to the 1987 Montreal Protocol to phase out the manufacture of these halogenic chemicals. Eventually Kofi Annan stated that this UN-backed treaty was “perhaps the single most successful international agreement to date.”

*Homo sapiens*, having crossed the Lamarckian divide, has now brought with astonishing speed many scientific and technological advances, including color television, the polio vaccine, and the internet. But, for the first time in history, humankind has stolen the secrets of the stars, and has brought to earth the power to wipe out all the higher forms of life. A nuclear disaster is not just science fantasy. The Chernobyl and Fukushima accidents give hints of the unintended devastation that can occur. Consider what destruction could be wrought by a delusional madman or a deliberate anarchist. A hair trigger response by a paranoid society could bring an unplanned Armageddon to all the cultures of this world.

We do not know if there are other cultures and civilizations out there among the 200 billion stars in our galaxy. But if there are and if they blow themselves to bits within a century or two after getting the technology to communicate across space, then two or three hundred years is only a speck in the billions of years it takes to evolve a civilization. Then it would be featherbrained to think of finding such an alien outpost still alive in the ocean of time.

Three days ago was the hundredth anniversary of one of history's greatest maritime tragedies, the sinking of the Titanic. And just a few weeks ago a menu for the last first class

dinner aboard that ill-fated ship was auctioned for £76,000. Imagine the hundreds of guests sitting in that luxurious dining room, with a wide choice of courses, never dreaming that in a few hours many of them would be drowning in the icy waters of the North Atlantic as that great ship went down to the bottom of the sea.

Today we are on a great ship, planet Earth, cruising through mostly empty space, little dreaming that humankind now has the means, in a split second, to destroy this entire city, to render this entire region radioactively uninhabitable for generations to come, and to destroy civilization as we know it. It may not happen here. Perhaps it will happen to Jerusalem and the much-competed-over Holy Land, which would become radioactively quarantined for every faith.

Or it may be something more subtle, that our climate will reach a tipping point, where within just a decade irreversible changes will heat our fields and forests beyond recognition. We are at a perilous point where our knowledge, our powers, and our masses have the newly acquired capability to irredeemably wreck our environment. Never has more been asked of diplomacy, and never has so much hard and dedicated work been required from men and women like you. Our world hangs in the balance. Don't let this unique cosmic ship carelessly sink to the bottom of the sea.



**REPÚBLICA BOLIVARIANA DE VENEZUELA**  
**MISIÓN PERMANENTE ANTE LAS NACIONES UNIDAS**

**INTERVENCIÓN DEL EMBAJADOR JORGE VALERO**  
**VICEMINISTRO DEL PODER POPULAR PARA LAS RELACIONES EXTERIORES**  
**PARA AMÉRICA DEL NORTE Y REPRESENTANTE PERMANENTE ANTE LA**  
**ORGANIZACIÓN DE LAS NACIONES UNIDAS**

**DIÁLOGO INTERACTIVO PARA EXAMINAR LOS RESULTADOS**  
**DE LOS ESTUDIOS CIENTÍFICOS SOBRE LOS EFECTOS DE LAS ACTIVIDADES**  
**HUMANAS EN EL ECOSISTEMA DE LA TIERRA**

*Favor cotejar palabras del orador*

NUEVA YORK, 18 DE ABRIL 2012

**Señor Presidente,**

Respaldamos lo expresado por el distinguido Embajador de Chile, en nombre de la CELAC, y agradecemos la convocatoria de este importante diálogo interactivo, en el marco de la conmemoración del Día Internacional de la Madre Tierra, en cumplimiento del mandato emanado de la resolución A/RES/66/204, aprobada por la Asamblea General el 22 de diciembre de 2011.

Felicitamos el extraordinario aporte que han dado el Gobierno del Estado Plurinacional de Bolivia, liderado por el Presidente Evo Morales, y la delegación boliviana para que se debata este tema.

Esta convocatoria adquiere relevancia cuando nos encontramos en proceso de negociación del documento final de la Conferencia de las Naciones Unidas sobre Desarrollo Sostenible.

Los adoradores del capitalismo salvaje, especulativo y financiero pretenden seguir impulsando una irracional explotación de los recursos naturales, mediante la utilización de patrones de consumo y producción insostenibles. Impulsan un supuesto “ajuste” que consistiría en integrar la naturaleza y los seres humanos, como bienes escasos, en el campo de los valores de uso, capitalizando las condiciones de producción para renovar la sostenibilidad explotadora del capital financiero.

**Señor Presidente,**

Una vez más los mezquinos intereses económicos y financieros del capitalismo global pretenden endiosar los mercados, con formulaciones y metodologías que promueven un supuesto óptimo crecimiento sostenible pero que, por el contrario, destruyen a la naturaleza, y benefician sólo a los poseedores de tecnologías y recursos financieros, a un ínfimo sector privado y a un pequeño grupo de países desarrollados.

Se pretende poner al mismo nivel a las empresas y a los mercados que a los Estados, cuando éstos últimos responden a los intereses públicos, mientras que las

empresas multilaterales y las inversiones privadas responden a los beneficios de particulares.

Hoy, miles de millones de habitantes de la tierra, especialmente de los países del Sur, siguen inmersos en la pobreza, mientras que las élites de las sociedades ricas, continúan manteniendo su obscuro, insostenible e irracional patrón de producción y consumo.

**Señor Presidente,**

En el marco del proceso de Río+20 se promueve una falsa premisa, según la cual el modo de vida de los pobres tiene un impacto perturbador sobre los ecosistemas de la tierra, pero se obvian los efectos que el depredador modelo del capitalismo salvaje produce sobre los seres humanos y los ecosistemas. Preocupa, por lo tanto, que este enfoque esté presente en el Informe del Grupo de Alto Nivel sobre la Sostenibilidad Mundial, intitulado “Gente Resiliente en un Planeta Resiliente: Un Futuro que Valga la Pena”.

En este Informe se habla de la “polaridad negativa de la actual división del mundo entre el Norte y el Sur”, como si ésta polaridad fuese un relato de ficción, inventado por teóricos que se han ocupado de estudiar las causas y consecuencias del subdesarrollo, y no una realidad histórica incontestable que se proyecta hacia nuestros días desde los tiempos coloniales y que – bajo las nuevas y sofisticadas formas del capitalismo global – reproduce día a día pobreza, desigualdad, e injusticia en el mundo.

El Informe, por otra parte, no toma en consideración el negativo impacto de los mercados financieros especulativos sobre la calidad de la vida de los pueblos, ni tampoco el abusivo manejo de la deuda externa de los países en desarrollo, por los centros del capitalismo financiero. Y recomienda asumir una “gestión” o “manejo” ambiental, a partir de mecanismos financieros, implementando una economía, supuestamente verde, que legitima el mercado como principal mecanismo para responder a los retos de la degradación ambiental.



El objetivo que busca el capitalismo financiero y especulativo es fortalecer la dependencia de los países del Sur, a la tecnología del Norte, y reforzar su modelo de producción y consumo, mediante inversiones transnacionales que reconozcan la expedición de certificados ambientales, o proyectos de carácter ambiental, adelantados por empresas multinacionales que en nada ayudan a compensar ni reparar el impacto de sus actividades sobre los ecosistemas del planeta.

En síntesis, se pretende consolidar una estrategia en la cual el capital responde a la actual crisis sistémica del capitalismo global, desde su propia lógica de acumulación y destrucción de la naturaleza.

**Señor Presidente,**

Nos permitimos llamar la atención sobre el impacto perturbador que pueda tener la estrategia consumista y mercantilista descrita, en el principio de la soberanía de los Estados sobre sus riquezas y recursos naturales, y de ejercerlo de acuerdo a los intereses de desarrollo nacional y del bienestar de sus pueblos.

En ese orden, debe reafirmarse el derecho que tienen los países a reglamentar y ejercer su autoridad dentro de su jurisdicción nacional sobre las inversiones extranjeras, con arreglo a sus leyes y de conformidad con sus prioridades nacionales.

Igualmente, se debe reconocer el derecho que tienen los Estados soberanos de reglamentar y supervisar las actividades de empresas transnacionales que operen dentro de la jurisdicción nacional, y de adoptar las medidas necesarias para que esas actividades se ajusten a las disposiciones legales.

**Señor Presidente,**

Como habitantes de este planeta tenemos obligaciones éticas con la naturaleza. La madre tierra también tiene derechos. El valor intrínseco de ésta y la necesidad de mantener su capacidad de regeneración, deben ser objetivos fundamentales de un nuevo orden internacional, basado en la equidad, la igualdad soberana, la interdependencia y la cooperación entre los Estados.

**Señor Presidente,**

Los Estados deben prestar especial atención a las culturas indígenas y autóctonas que, por siglos, han mantenido en sus conocimientos ancestrales los principios de la tutela de los recursos naturales y la protección del medio ambiente. Han contribuido, así, a preservar la capacidad regenerativa de la madre tierra, al respetar el principio según el cual la vida humana y su entorno deben tener una relación mutuamente beneficiosa.

Venezuela y los países del ALBA promueven la filosofía del Vivir Bien/Buen Vivir, con nuevos paradigmas para la vida, desde los pueblos que se emancipan y contribuyen a crear un nuevo orden mundial humanista. La sociedad del buen vivir es aquella en la que el ser humano y su diversidad colectiva viven de forma equitativa y armónica con la Madre Tierra y los ecosistemas que sostienen la vida del planeta.

Proponemos que rumbo a Río+20 se tomen en cuenta las excelentes presentaciones que nos han hecho hoy los distinguidos panelistas, con el objeto de que el Documento Final refleje los nuevos enfoques y nuevos paradigmas que emanan de la comunidad científica.

En ese sentido, nos parecen relevantes las palabras del Dr. Owen Gingerich, quien nos ha invitado a salvar el mundo y a tratar de que el “buque cósmico no se hunda”.

El reto que tenemos frente a nosotros es, como ha planteado el Dr. Mark Lawrence, abandonar las “pautas de producción y de consumo insostenibles”, con el objeto de “conseguir una sociedad global que viva en armonía con la naturaleza”.

De igual manera, y así lo ha expresado el Profesor Joshua Farley, la naturaleza es parte esencial de la vida humana. Señaló que no se debe confiar en la eficiencia de los mercados, ni exacerbar las ganancias para aprovechar al máximo el valor monetario. Pertinente su advertencia de que se debe abandonar “la obsesión por la competitividad” y que “la clave para crear un mundo seguro es la cooperación y no la

competencia". Compartimos su advertencia de que "si la tecnología sigue en manos de compañías privadas se seguirá destruyendo la naturaleza".

El Dr. Brian Czech reflexionó sobre el crecimiento económico. Con estadísticas irrefutables nos dijo que la economía sigue en una fase primitiva y animalizada. Advirtió que "en la medida en que aumenta el PIB aumentan las especies en extinción". Afirmó que "el crecimiento per se y la recesión perpetua no son sostenibles". Nos dijo que el nivel de PIB óptimo depende de las características de cada país, e hizo un llamado a que busquemos un "equilibrio óptimo a través de la cooperación".

Si tomamos en cuenta esos enfoques humanistas, que hemos escuchado hoy de los panelistas, los resultados que se obtendrán en la Conferencia de Río+20 podrían contribuir a la edificación de sociedades reconciliadas con la Madre Tierra.

Muchas gracias.

# Steady State Economics For Harmonizing with Nature

Brian Czech,  
Center for the Advancement of the  
Steady State Economy



# Economic Growth

- Increase in the production and consumption of goods and services in the aggregate
- Typically expressed in terms of GDP
- Entails increasing population and/or per capita consumption

# Economic Growth

- Increase in the production and consumption of goods and services *in the aggregate.*

# Economy as 800- Pound Gorilla



# Coming out of the Corner and Growing

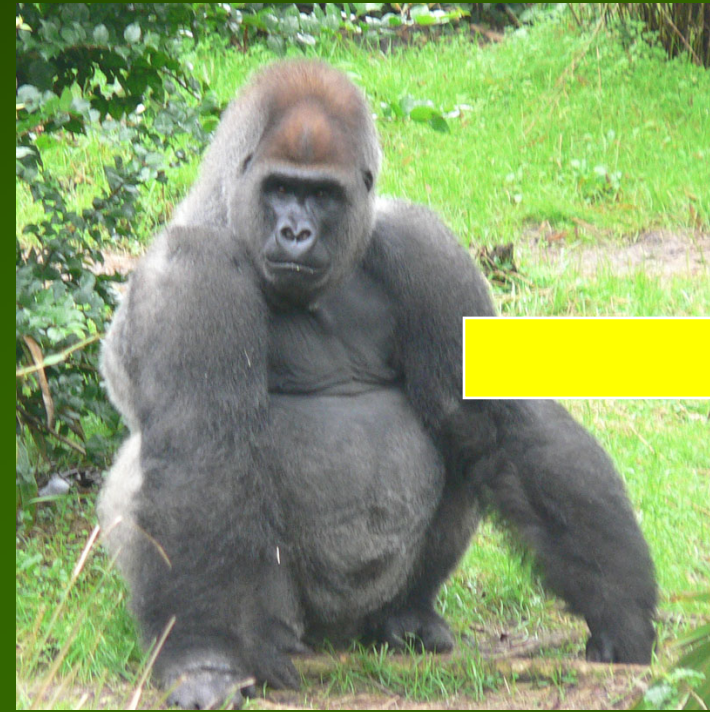
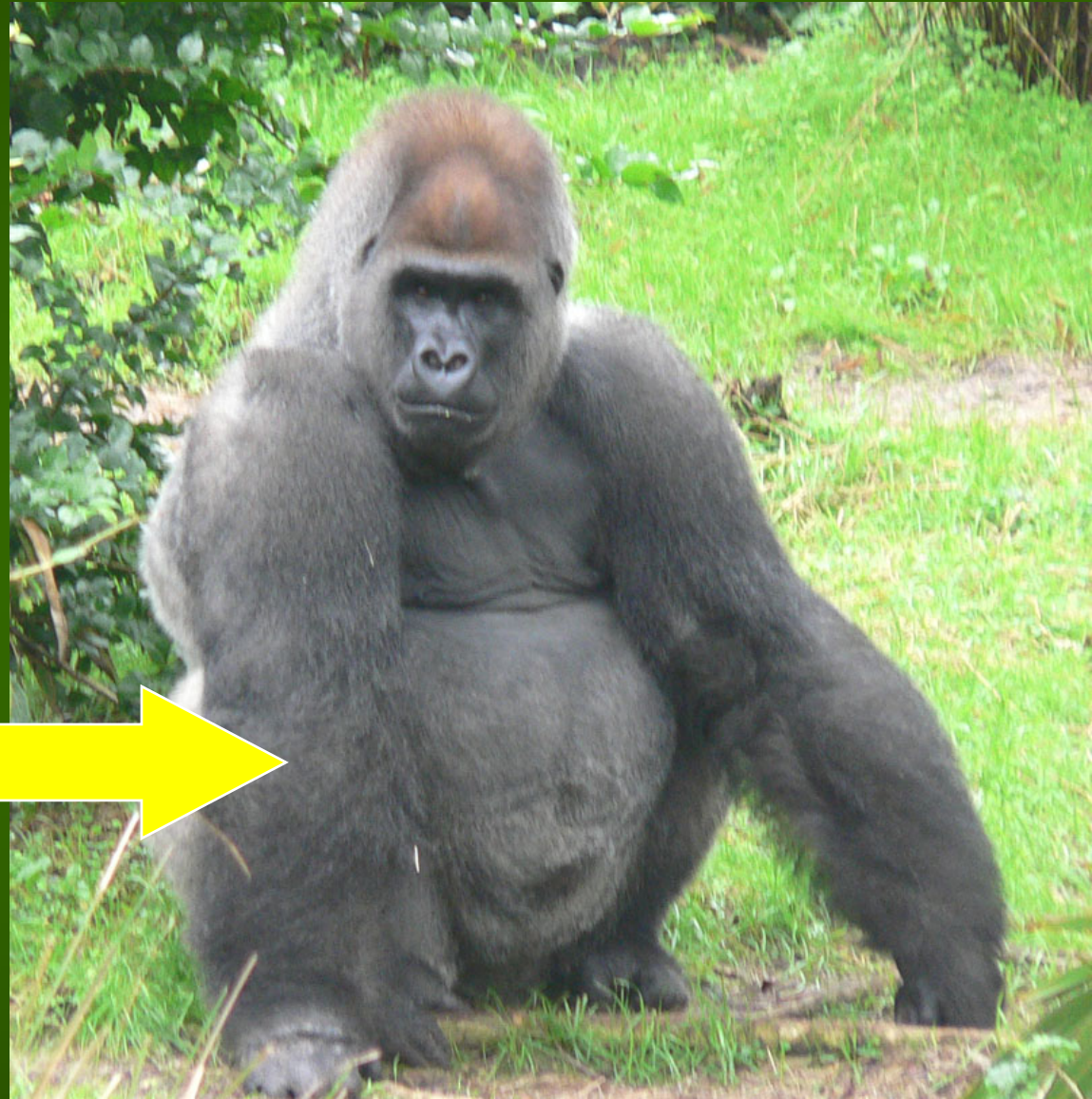




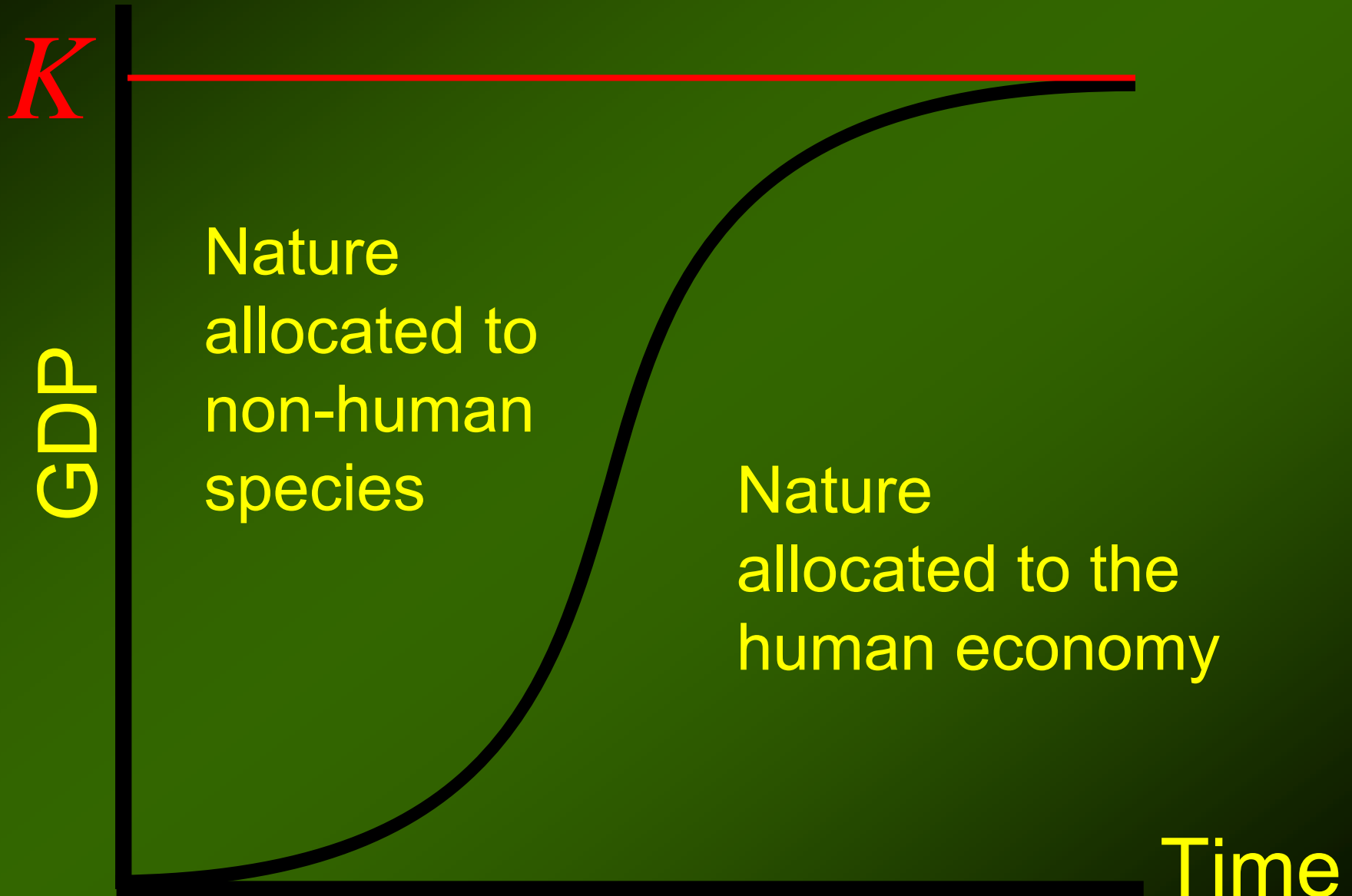
# Not Economic Growth



# Economic Growth



# Allocation



# Wildlife Society Bulletin

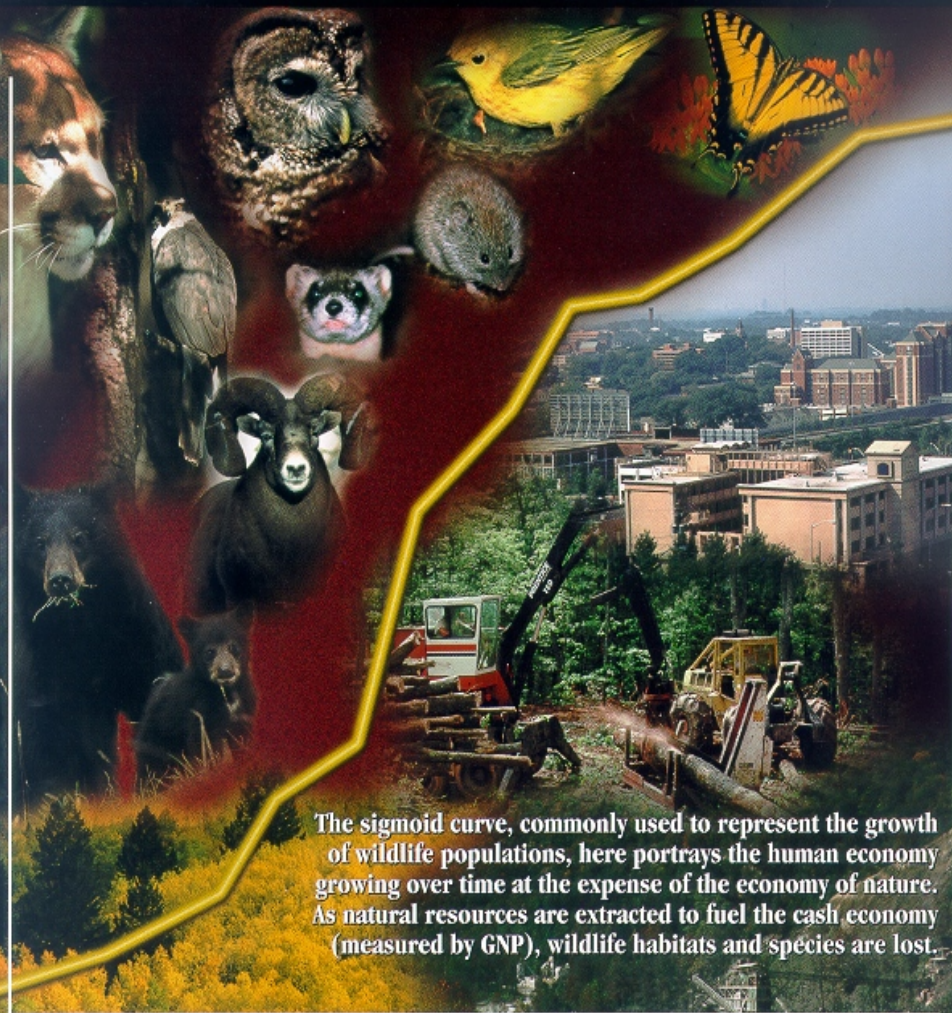
Perspectives on wildlife conservation and sustainable use

Volume 28, Number 1

Published by The Wildlife Society (ISSN-0091-7648)

Spring 2000

Gross National Product



The sigmoid curve, commonly used to represent the growth of wildlife populations, here portrays the human economy growing over time at the expense of the economy of nature. As natural resources are extracted to fuel the cash economy (measured by GNP), wildlife habitats and species are lost.

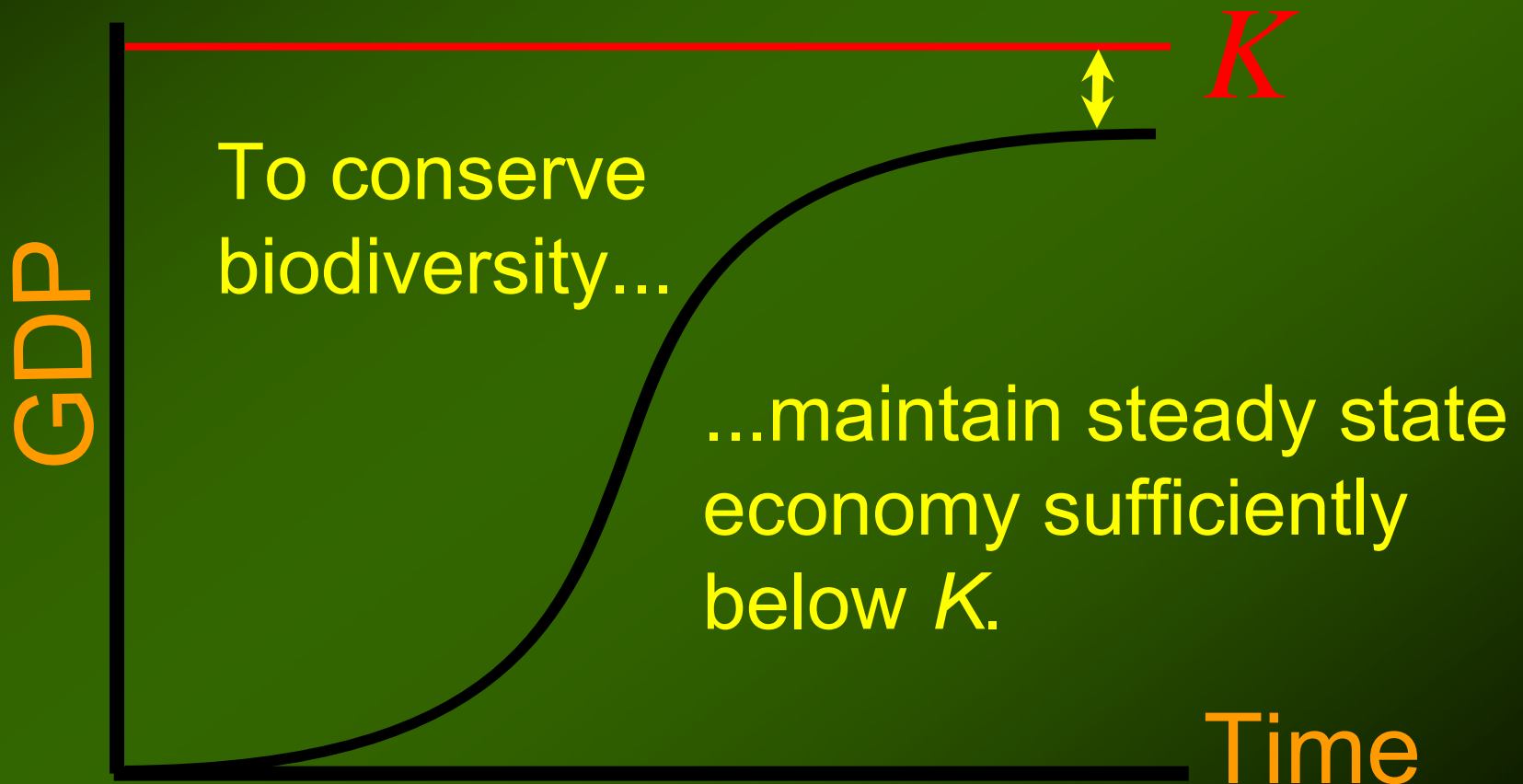
Time

# Fisheries

## Volume 30 Series Logo



# Therefore



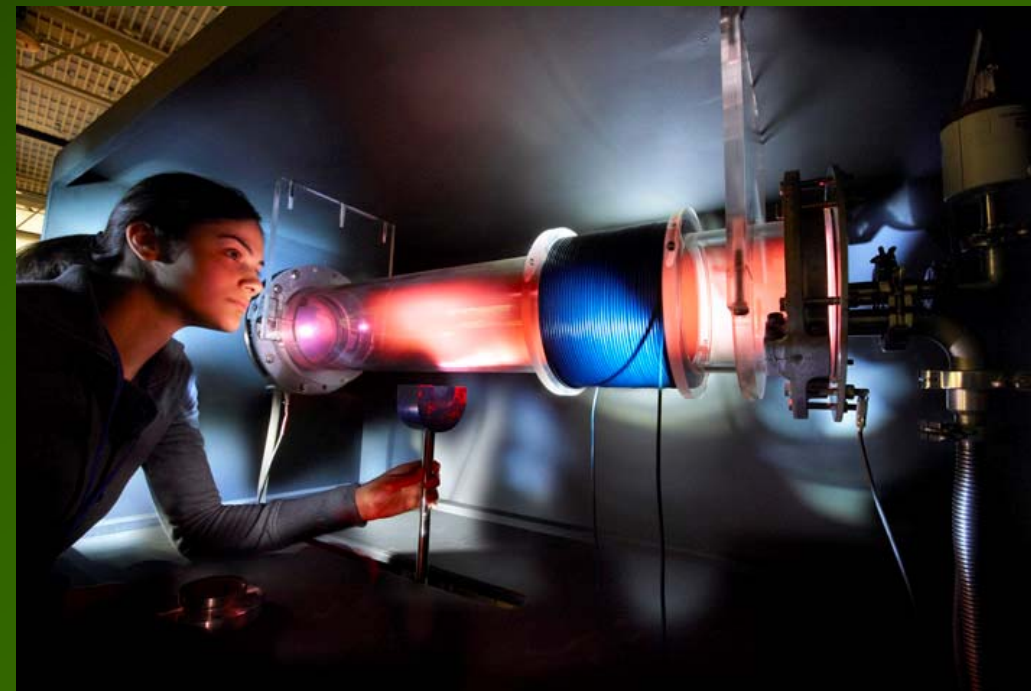
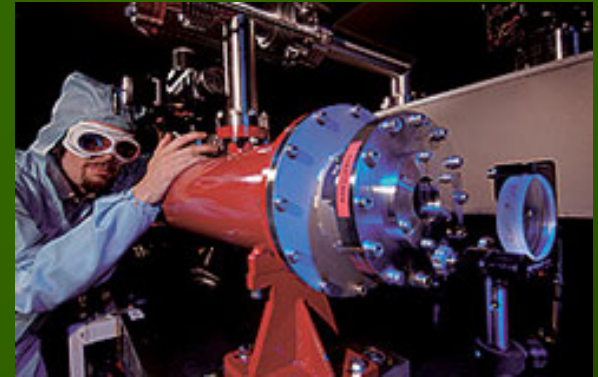
“But what about  
technological progress?”

# Thermodynamics

1. Fixed amount of energy, matter ( $E = mc^2$ )
2. Entropy; i.e. limits to efficiency in the economic production process

# Source of Technological Progress

- R&D





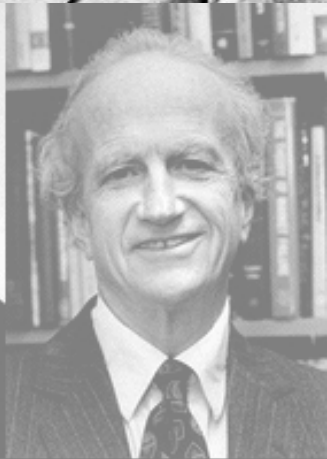
# Sources of Technological Progress



# Sources of Technological Progress



# Profits



# Sources of Technological Progress



**Catch-22?**

# Sources of Technological Progress



# Sources of Technological Progress



# Economies of Scale



# So, “What about technological progress?”

- Economic growth requires technological progress.
- Technological progress requires economic growth.
- No reconciling the trade-off between economic growth and biodiversity.



# Why We Need the Natural Sciences for Steady State Economics

“Natural resources originate from the mind, not the ground, and therefore are not depletable.”



Robert L. Bradley, Jr., 2002 Julian Simon Award Acceptance Speech

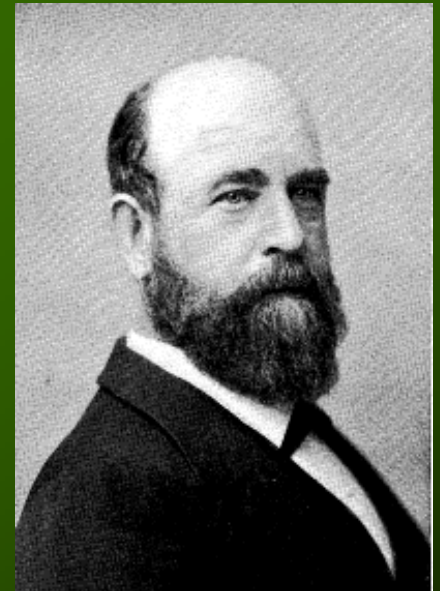
How did this happen?

History and political economy...

# *The Corruption of Economics*

(Mason Gaffney, 1994)

- Henry George
- *Progress and Poverty*, 1879
- George vs. land barons
- Incipient tax code at stake
- Establishment of neoclassical economics
- $Y = f(K, L)$



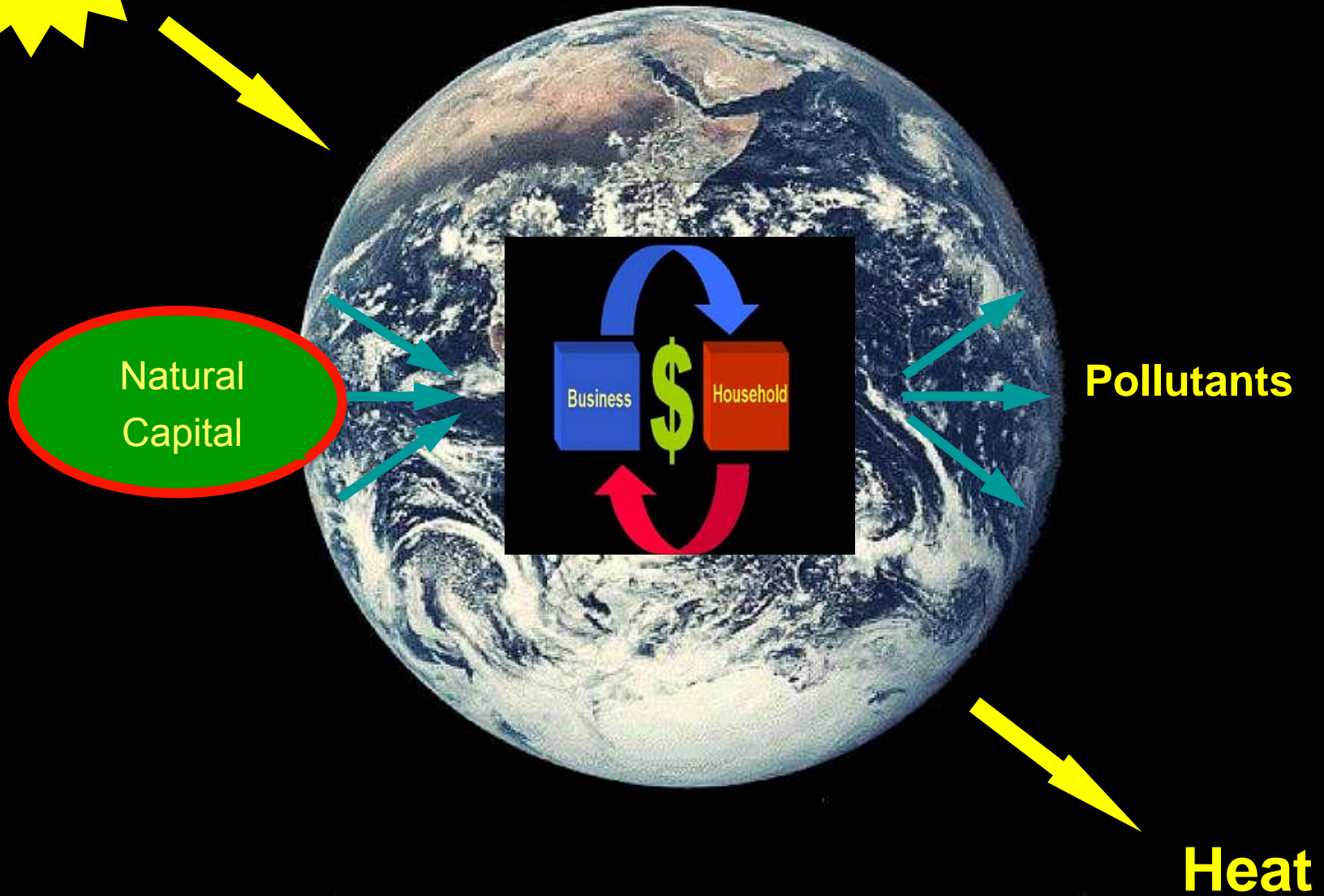
# Ecological Economics

- Ecological economics movement
- Laws of thermodynamics
- Principles of ecology

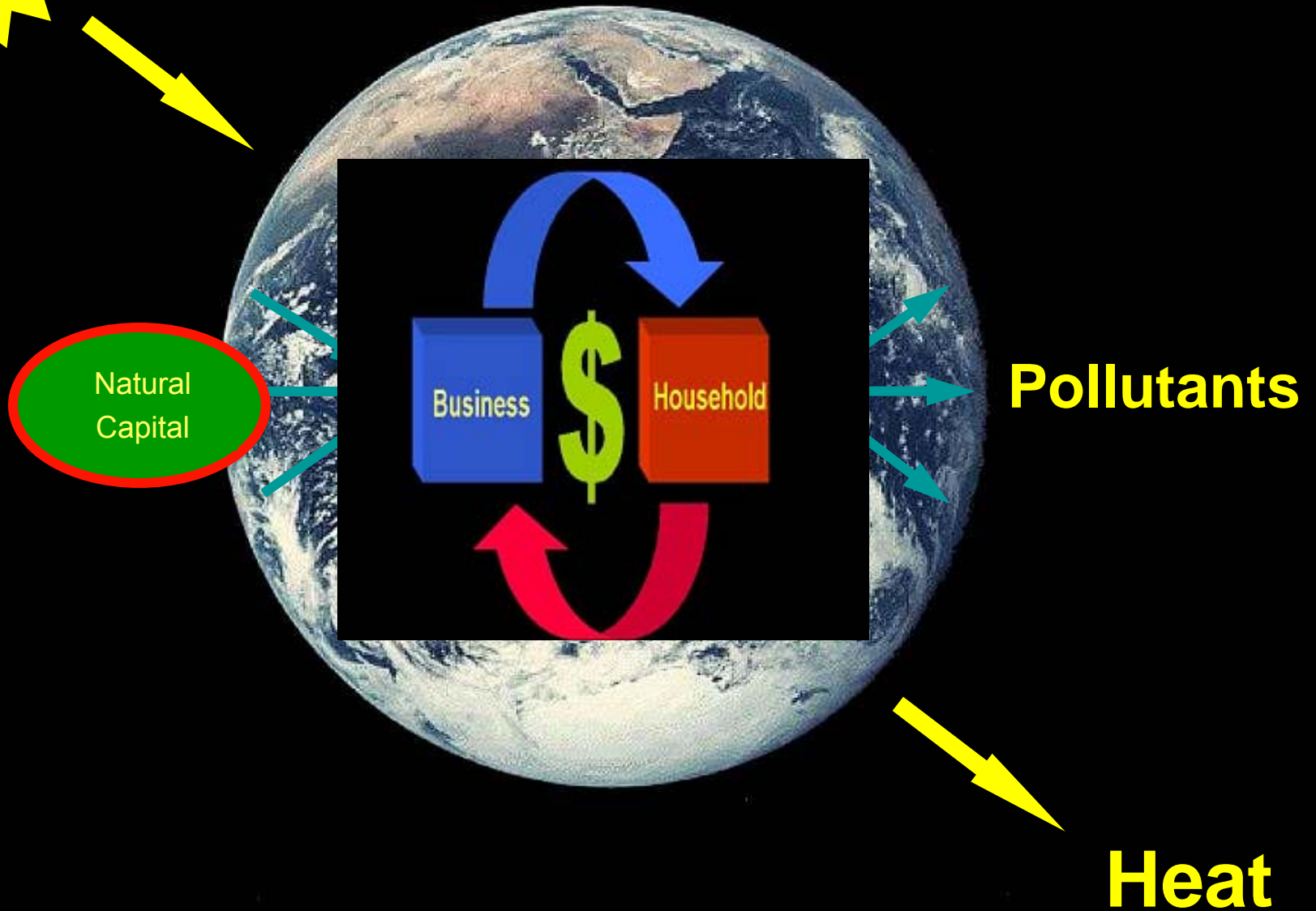
Herman Daly



# Ecological Economy

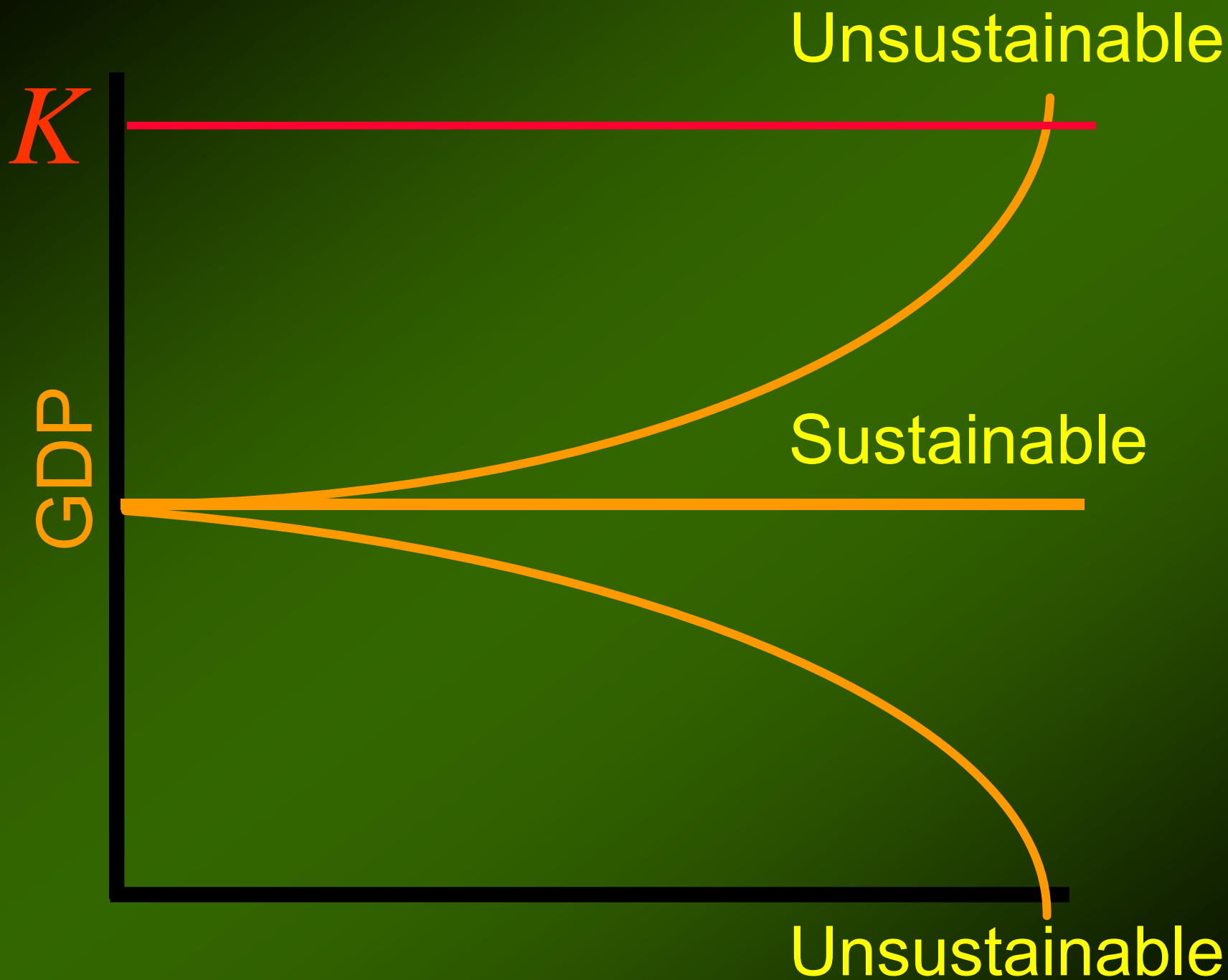


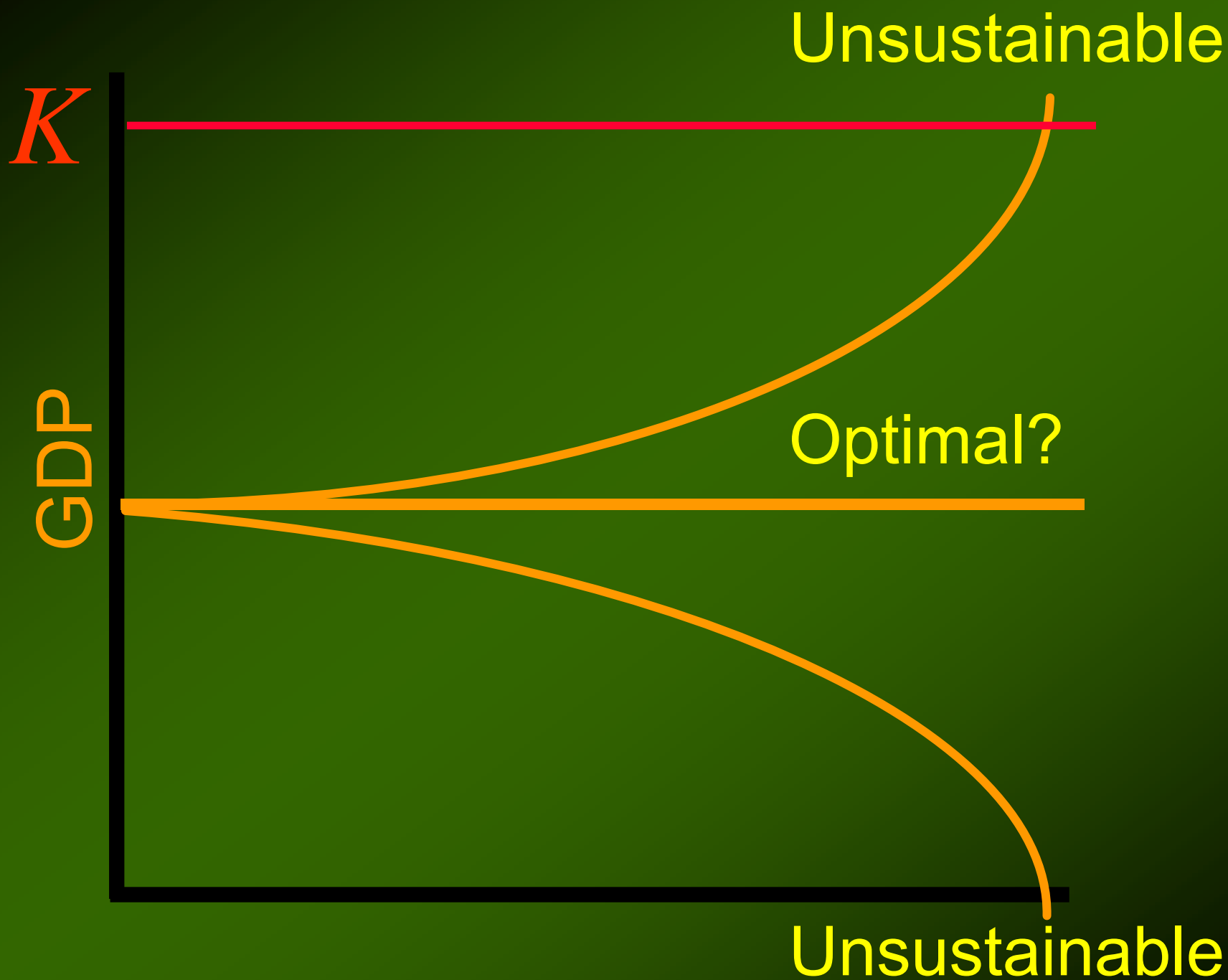
# With Economic Growth

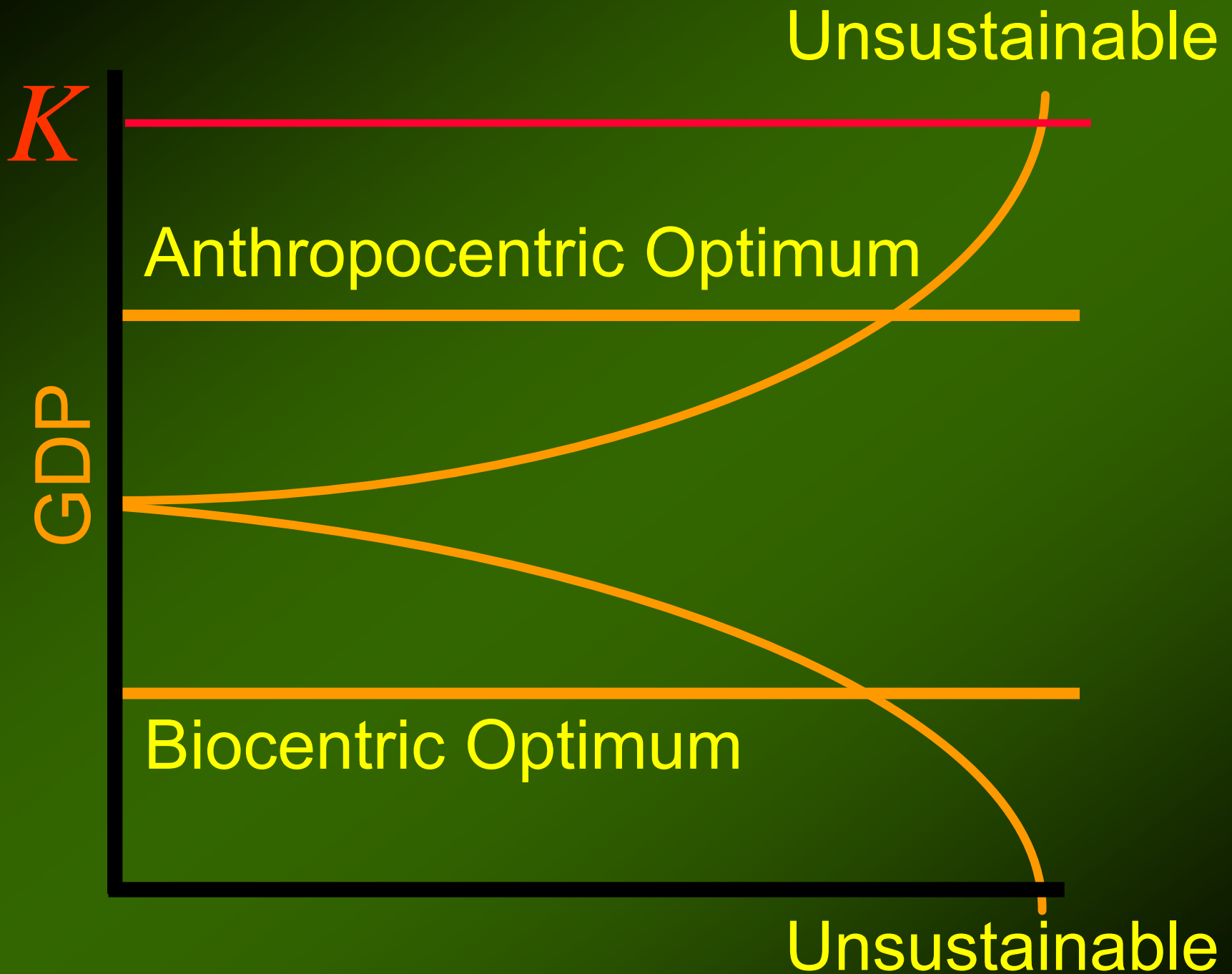


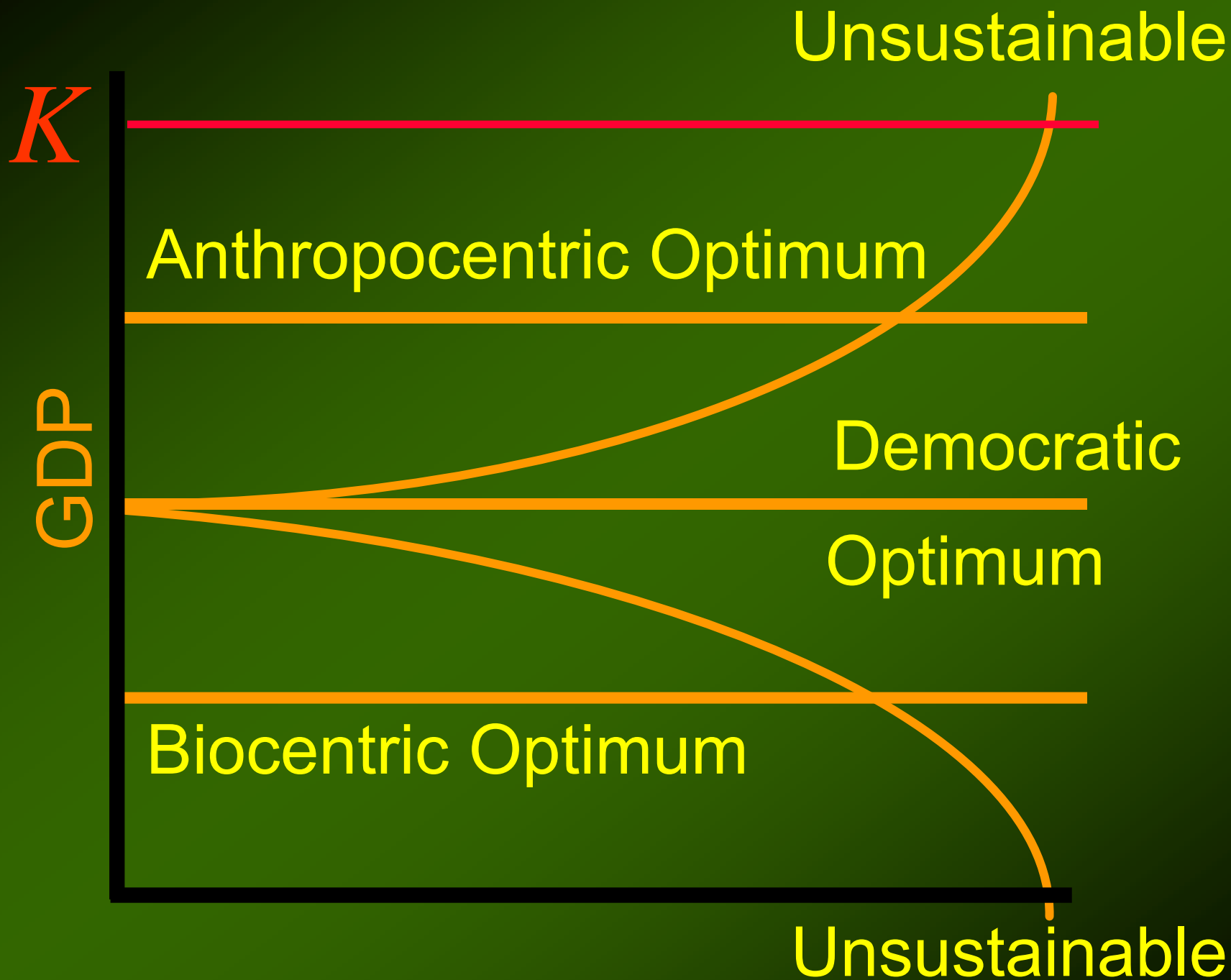
# A Few Words About Optimum Scale



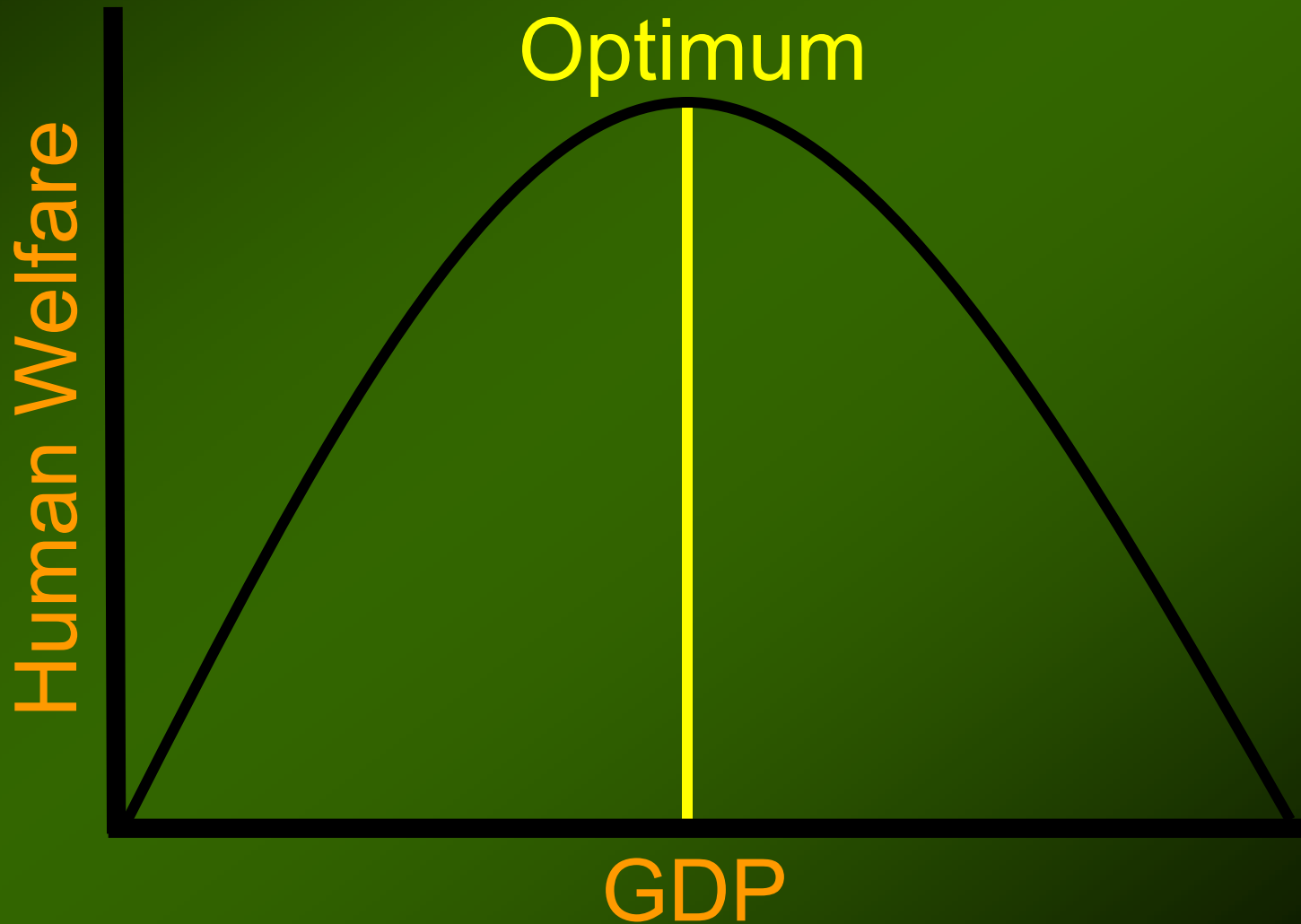




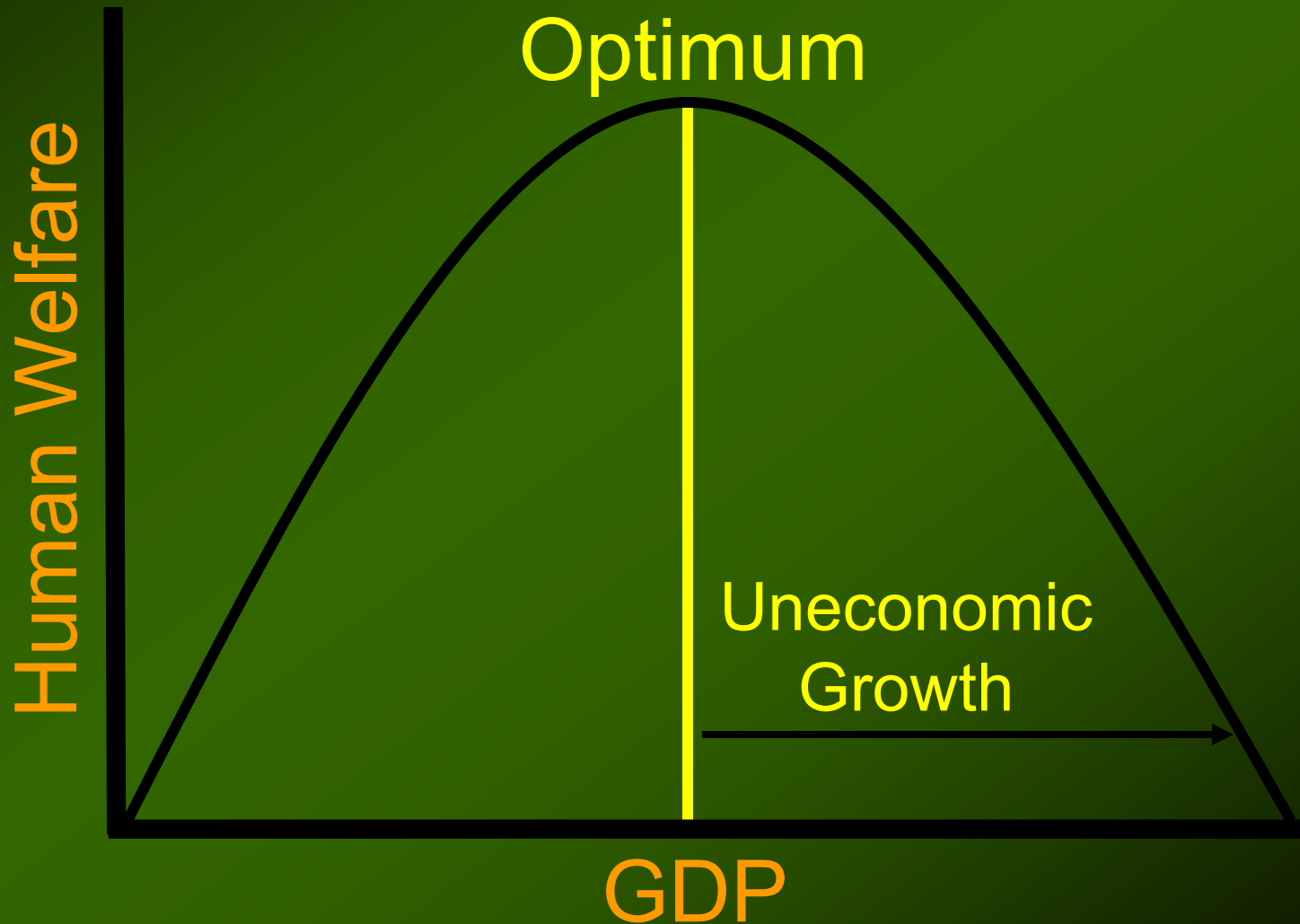




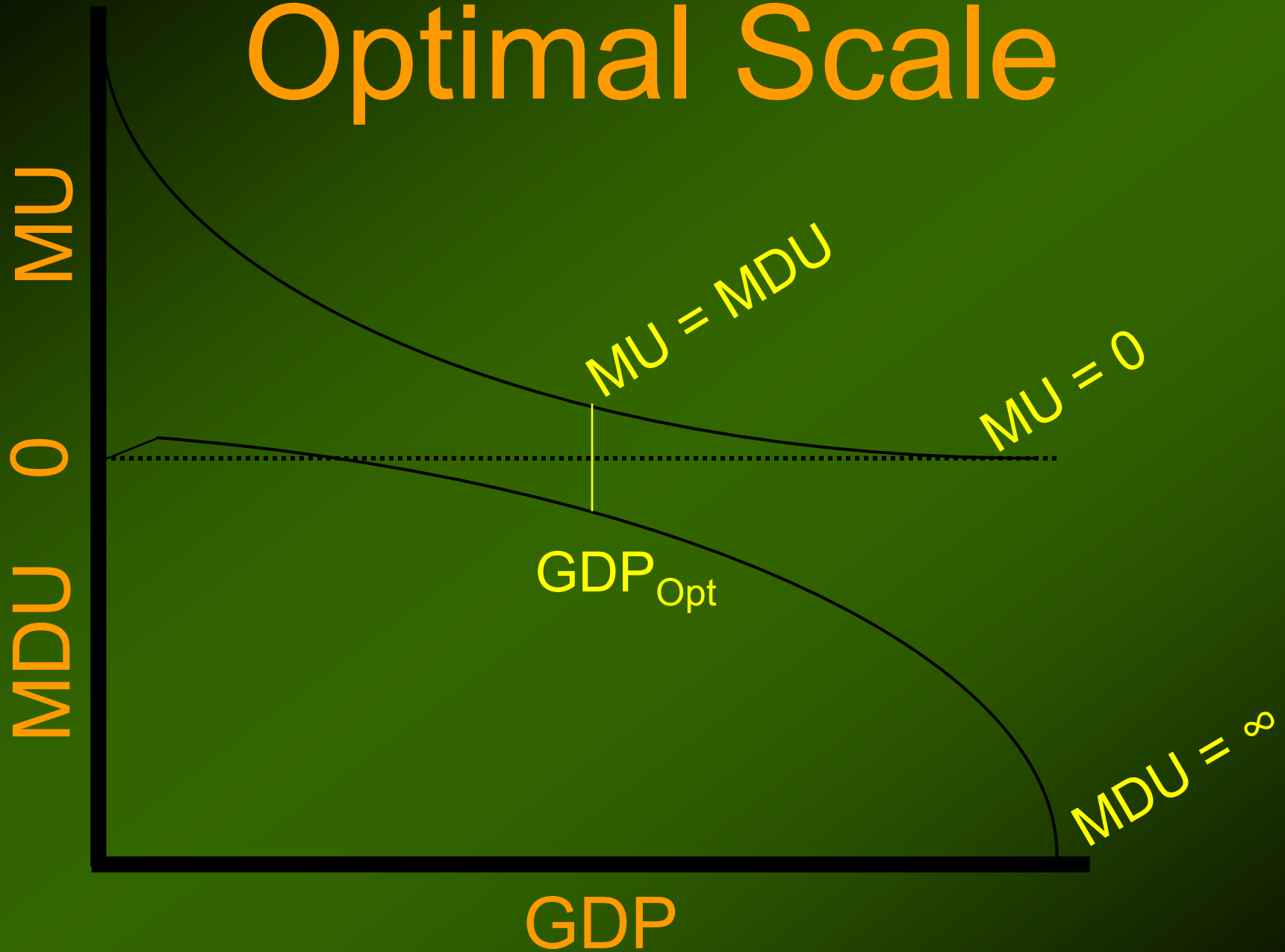
# All Things Considered

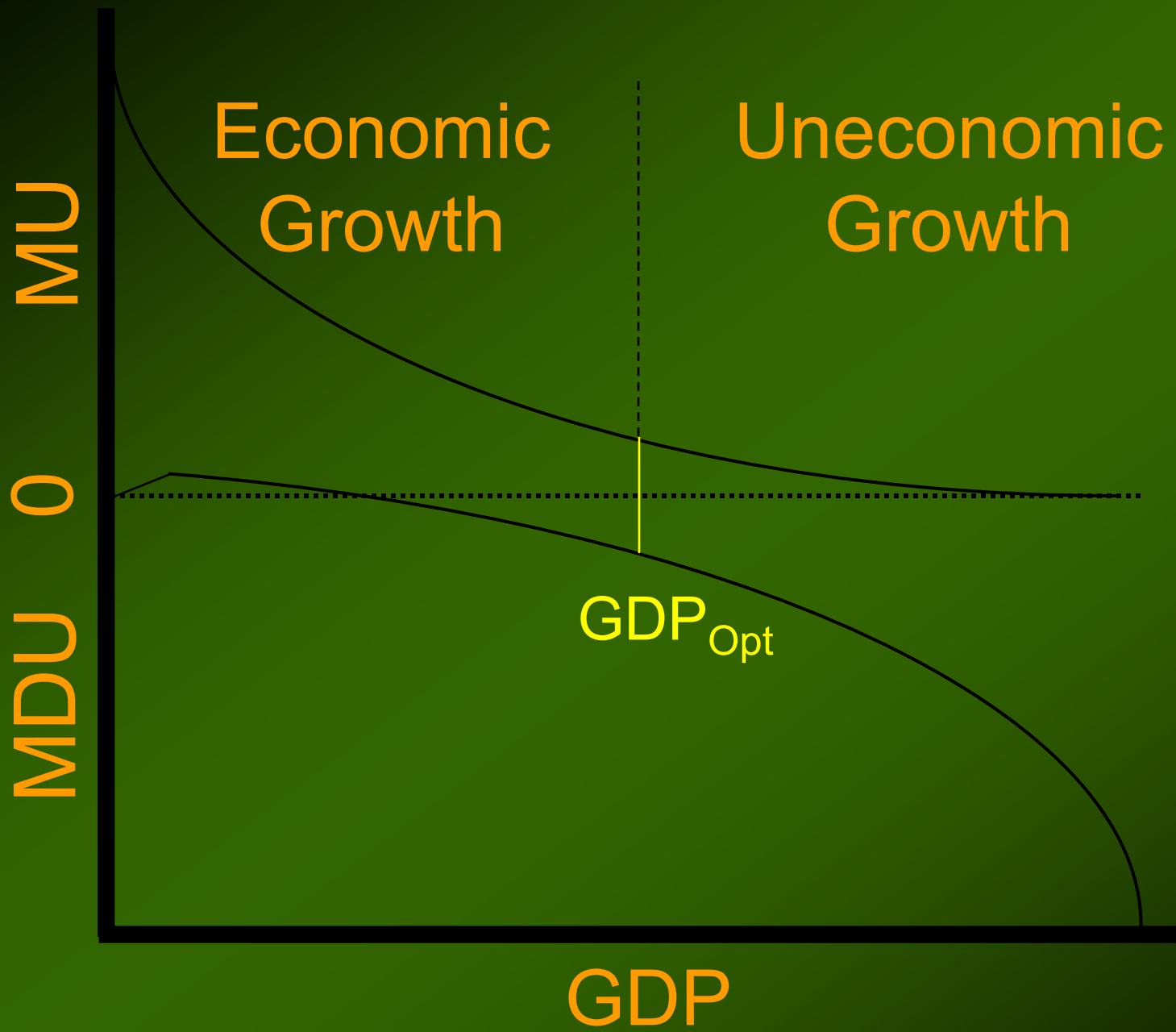


# All Things Considered



# Optimal Scale







# Some Useful Metrics

- GDP (as indicator of scale, not welfare)
- “Greened” (less-gray) GDPs
- Ecological Footprint
- Genuine Savings
- Living Planet Index
- Millennium Assessment Accounts
- Measure of Economic Welfare
- Human Development Index
- Index of Sustainable Economic Welfare
- Genuine Progress Indicator
- Gross National Happiness

# Some Useful Metrics

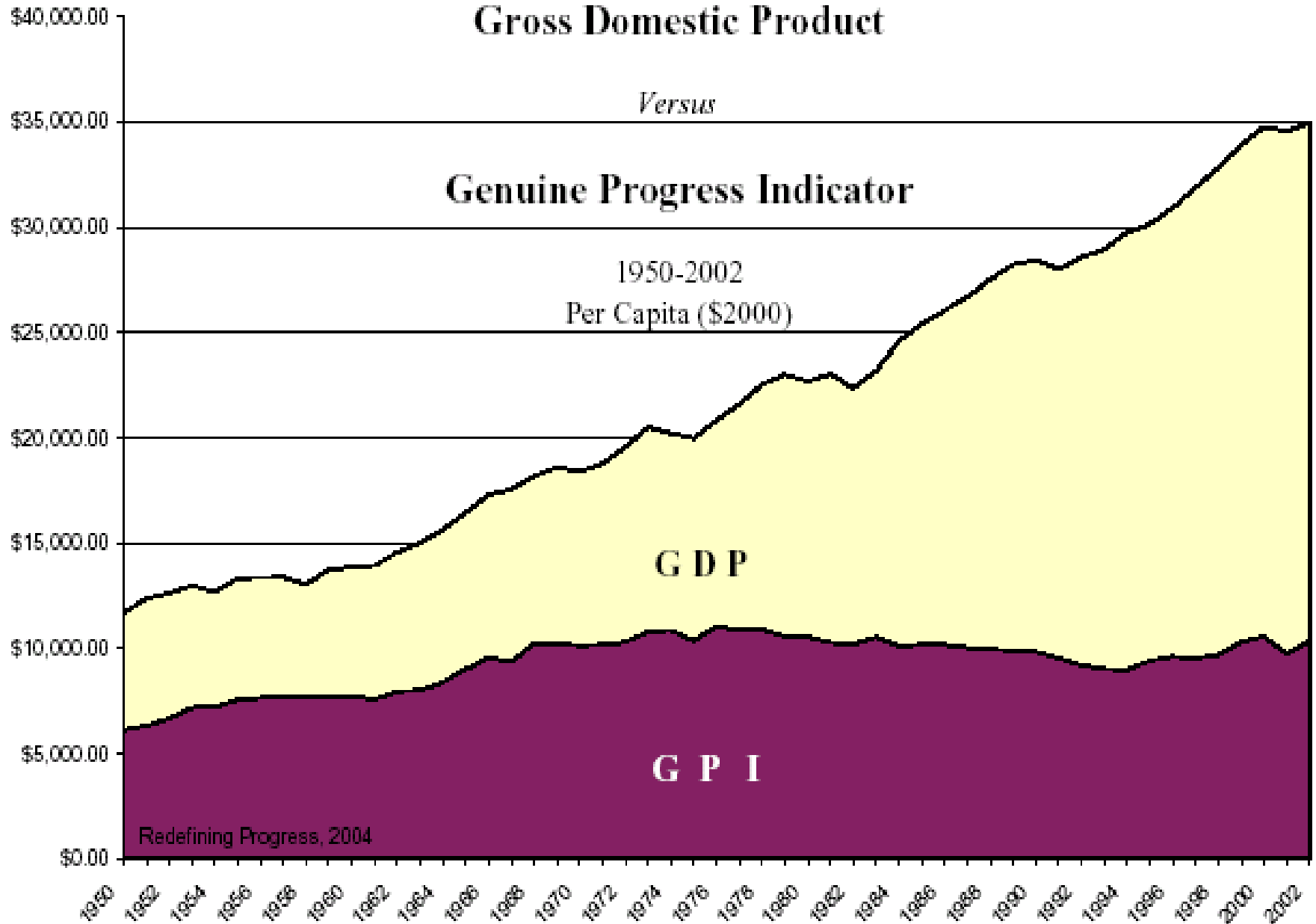
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- Genuine Progress Indicator
- Gross National Happiness

# Gross Domestic Product

*Versus*

# Genuine Progress Indicator

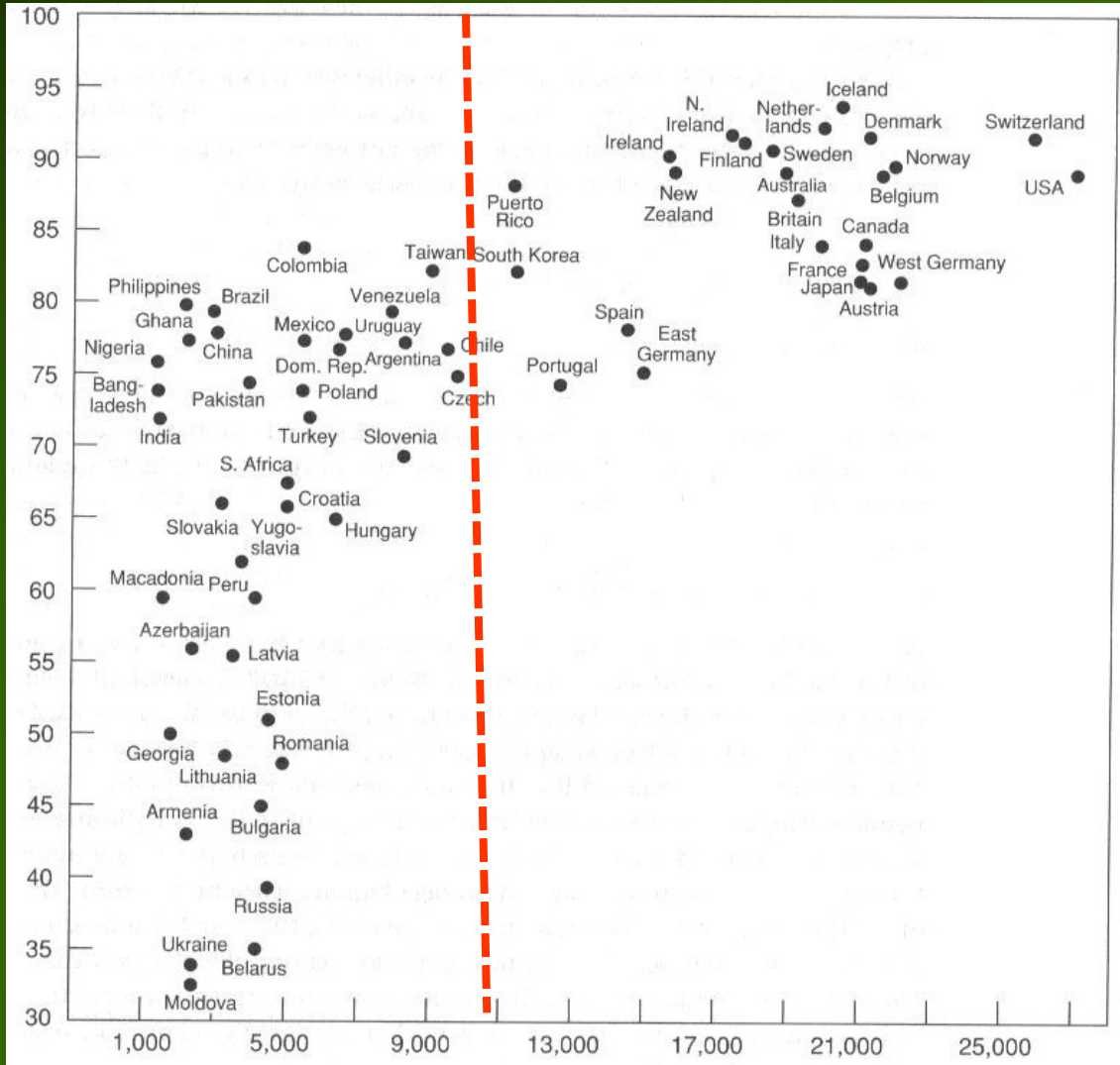
1950-2002  
Per Capita (\$2000)



Redefining Progress, 2004

# Psychic Welfare

Happiness/Satisfaction



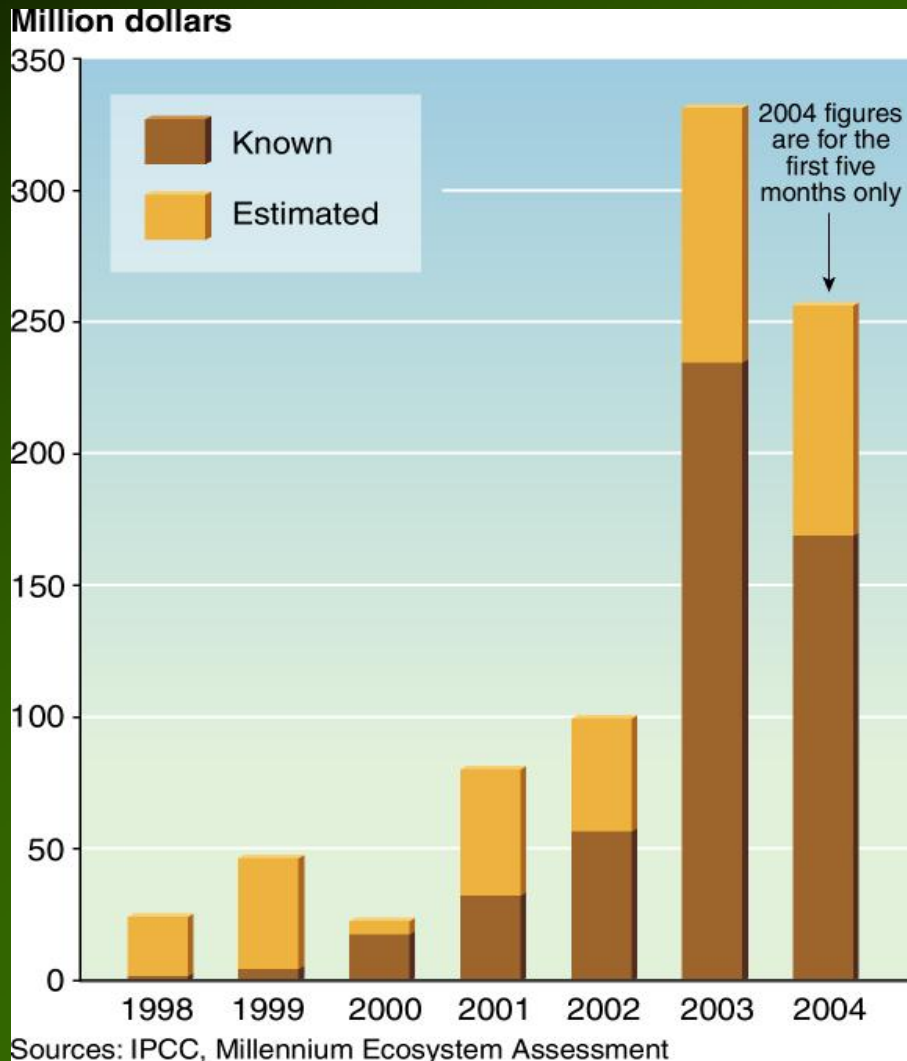
GDP/capita

Inglehart and Klingemann (2000)

# What About Valuing Ecosystem Services?

- Carbon sequestration
- Water purification
- Hurricane buffering
- Pollination
- Etc.

# Ecological Microeconomics



“One of the most rapidly growing markets related to ecosystem services is the carbon market... It is speculated that this market may grow to some \$44 billion by 2010.”

# Supply

P

S

Ecosystem Services



# Supply and Demand



Ecosystem Services



# Supply

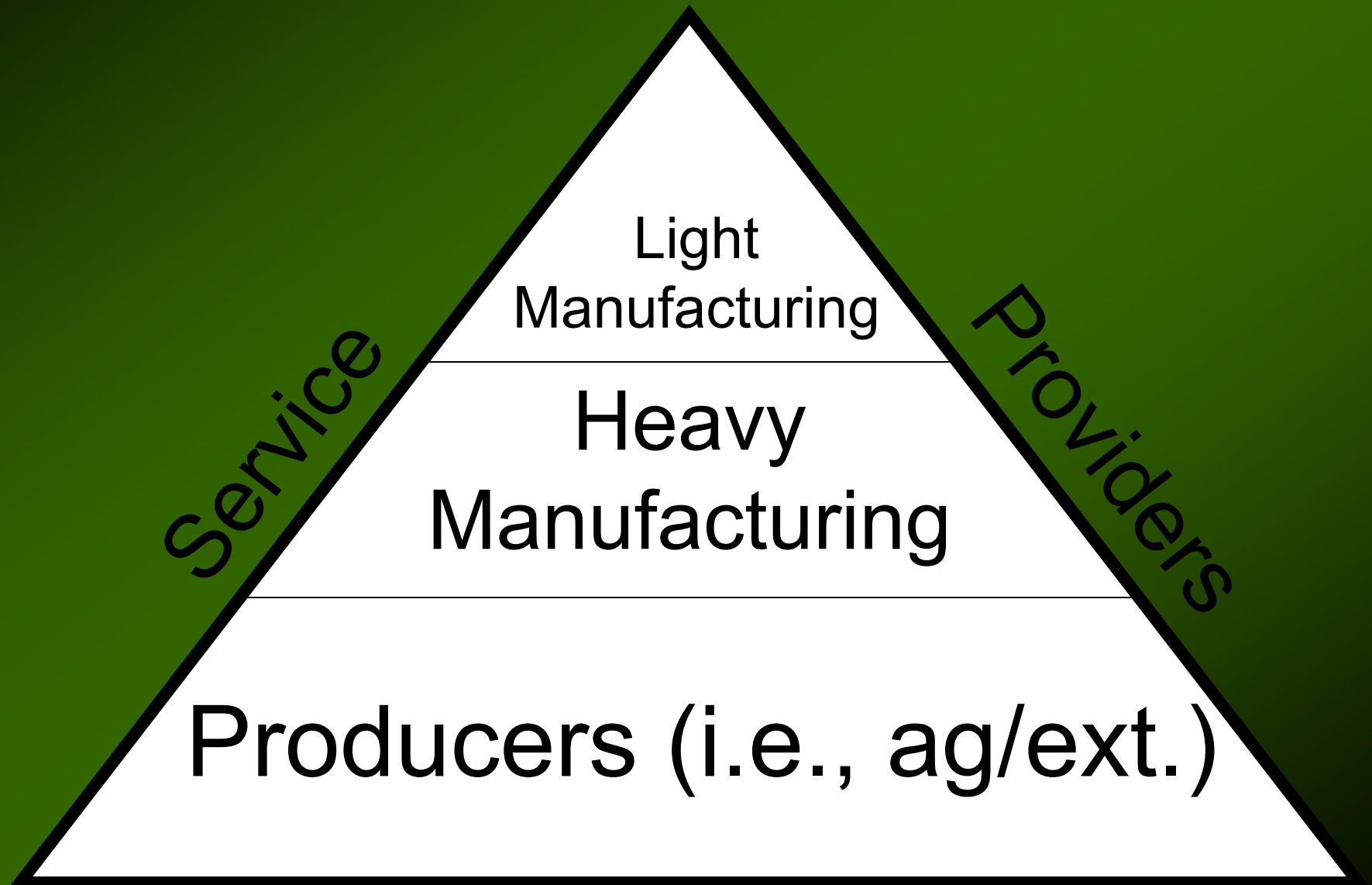
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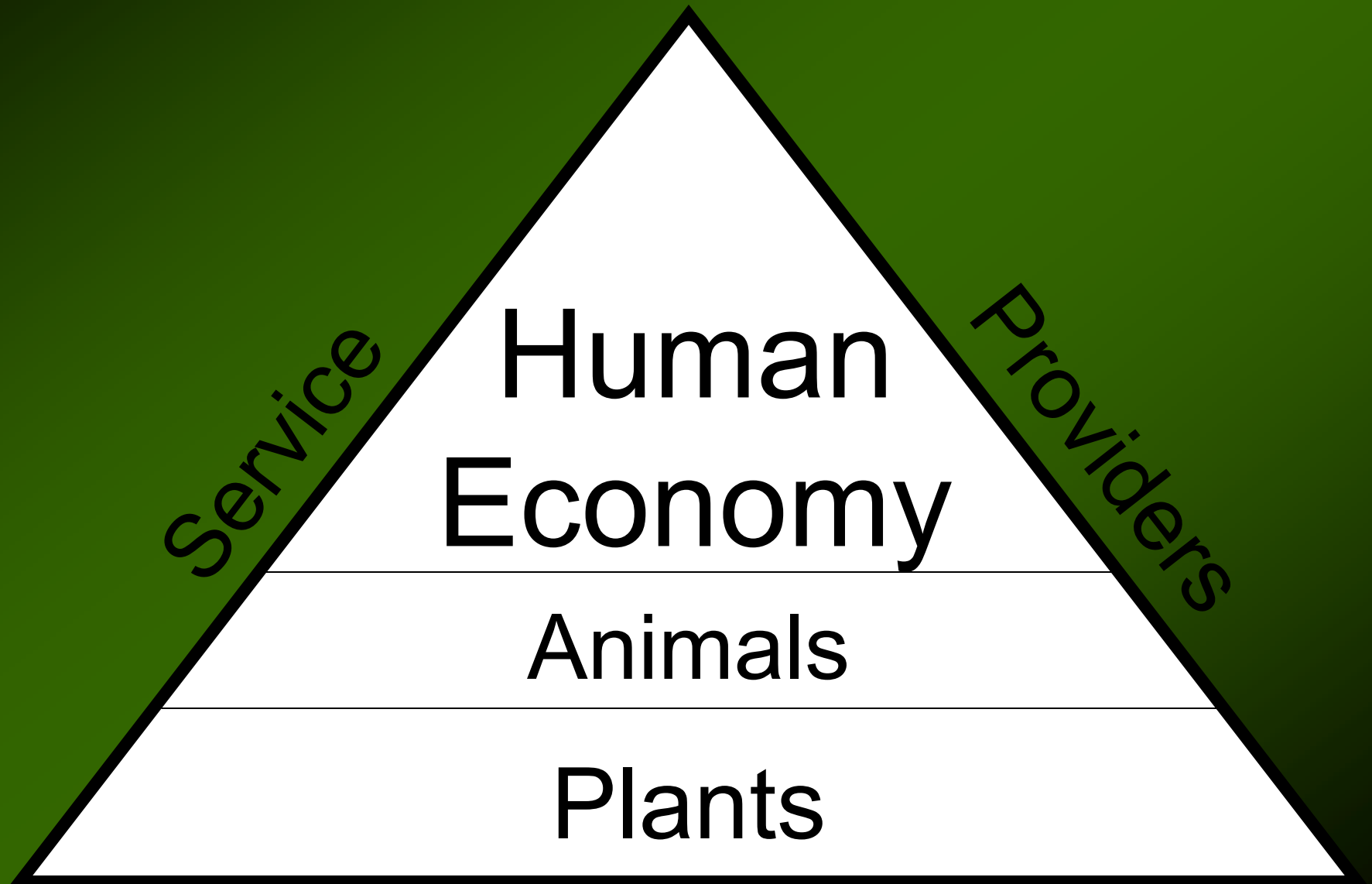
Ecosystem Services



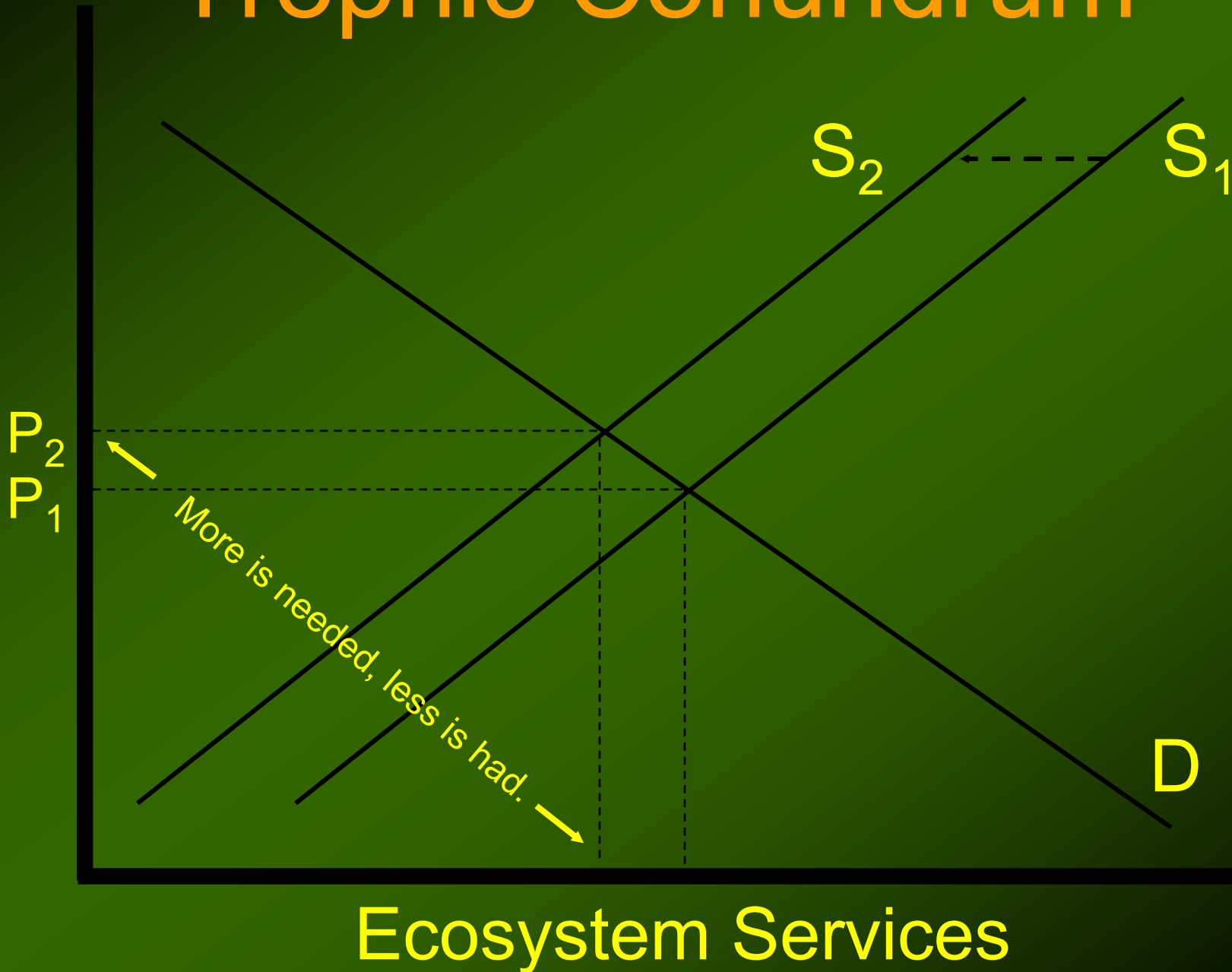
# Trophics of Money



# Limits to Real Money



# Trophic Conundrum

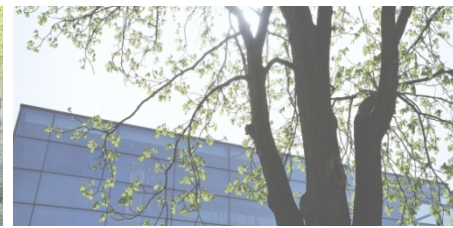


# Ecological Micro and Macro

- Micro alone leads to the trophic conundrum.
- Macro alone is tough political sledding.
- Micro and macro: two tracks for the sustainable train.

# Implications for Diplomacy: “Steady Statesmanship” for Harmony with Nature





# The “Anthropocene” – Humans in the Earth System

Mark Lawrence

Scientific Director

SIWA – Sustainable Interactions with the Atmosphere

Institute for Advanced Sustainability Studies e.V. (IASS)

[www.iass-potsdam.de](http://www.iass-potsdam.de)

Interactive Dialogue of the UN General Assembly on Harmony with Nature

UN Headquarters, New York City

18 April 2012



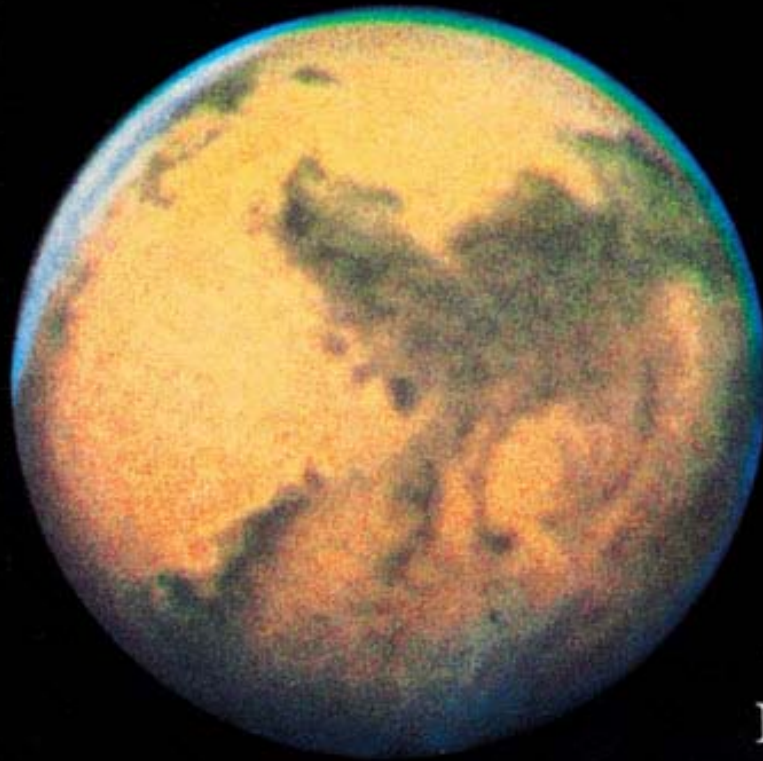
MAY 1991/\$2.95

# LIFE



The 200-  
Year War  
to Liberate  
the Military

# OUR NEXT HOME ???

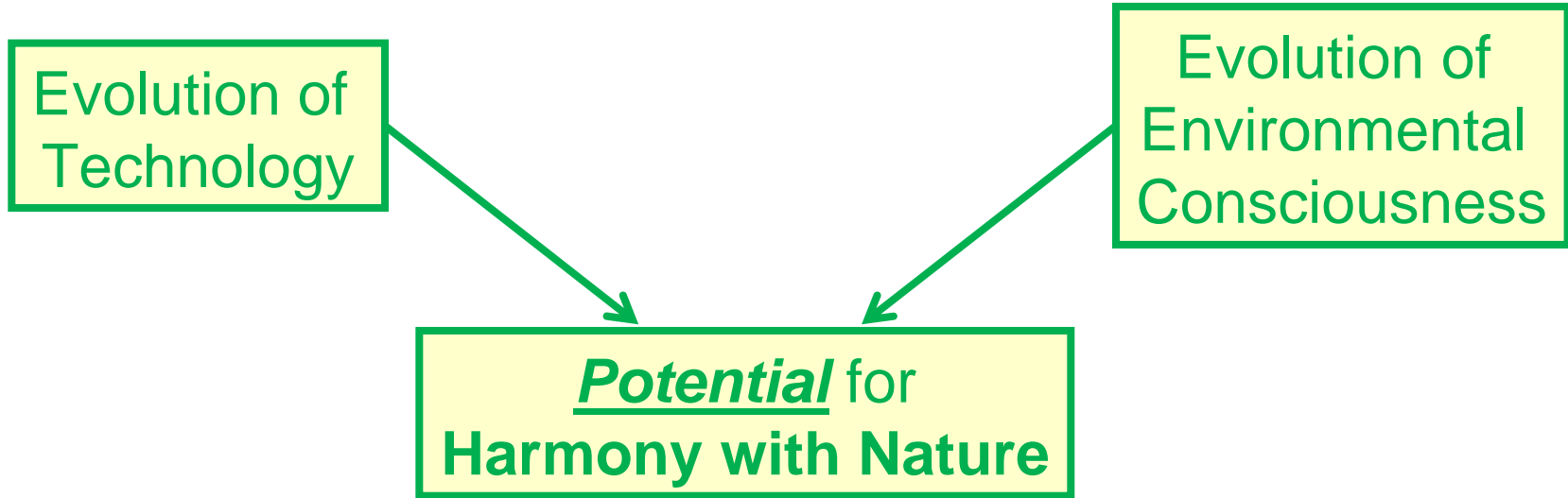


**MARS:**  
Bringing a dead  
world to life





# Harmony with Nature



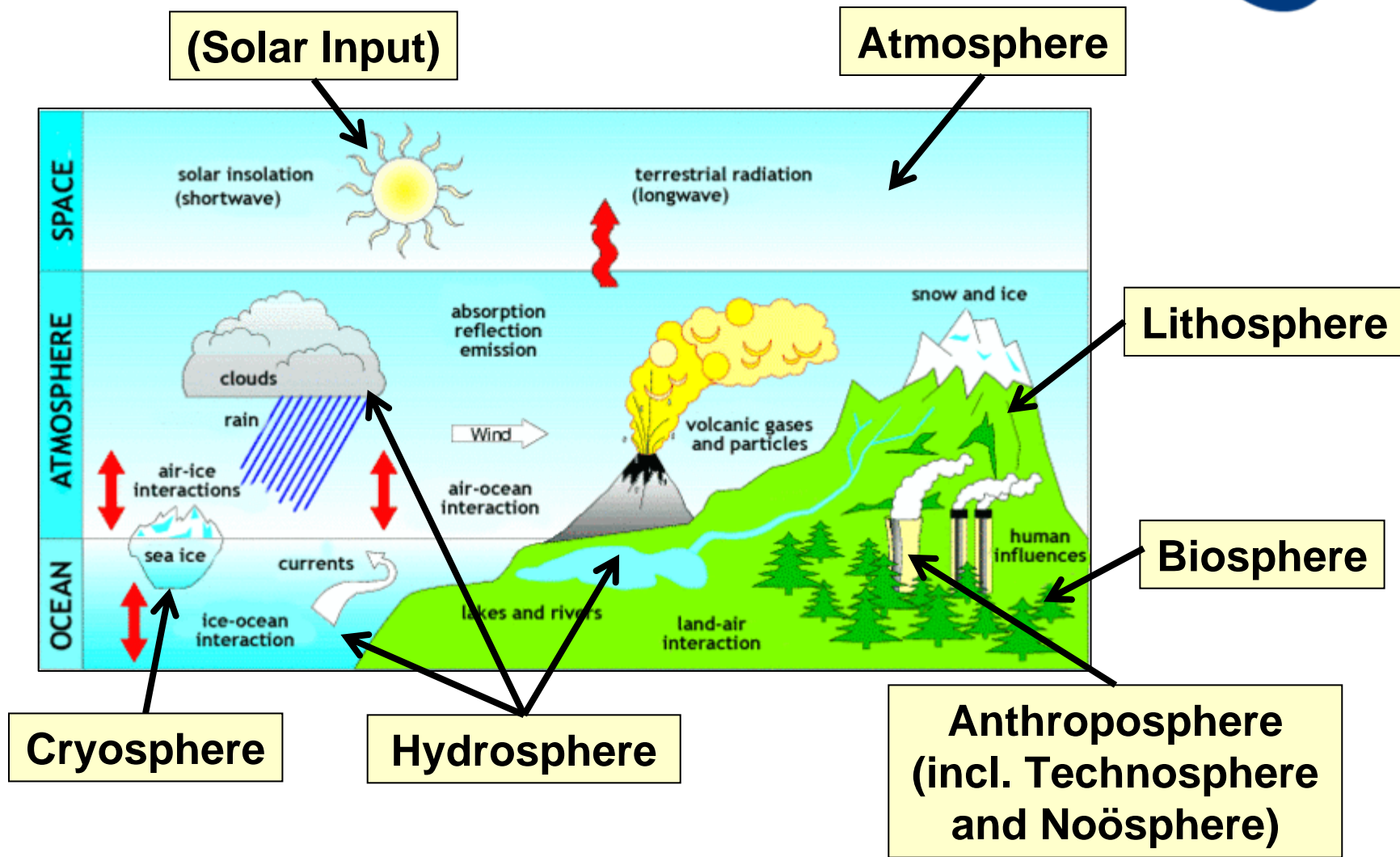
...Why doesn't this simply work? What's in the way? → Many factors!

- Old "habits" and cultural patterns
- Unsustainable consumption and production patterns
- Cognitive dissonance (individual and collective)
- Enormous and growing global population
- Complexity of the Earth System



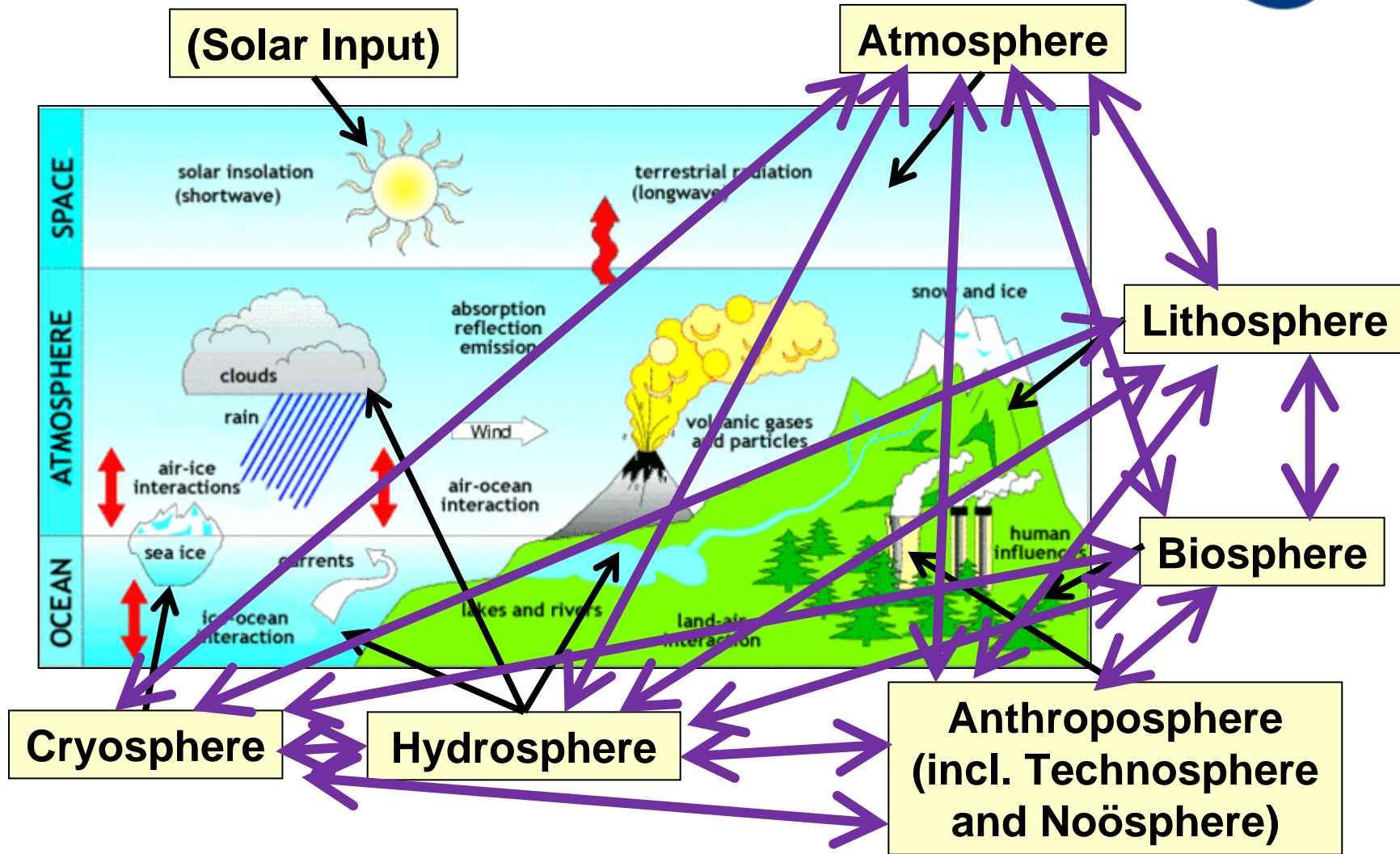


# Main Components of the Earth System





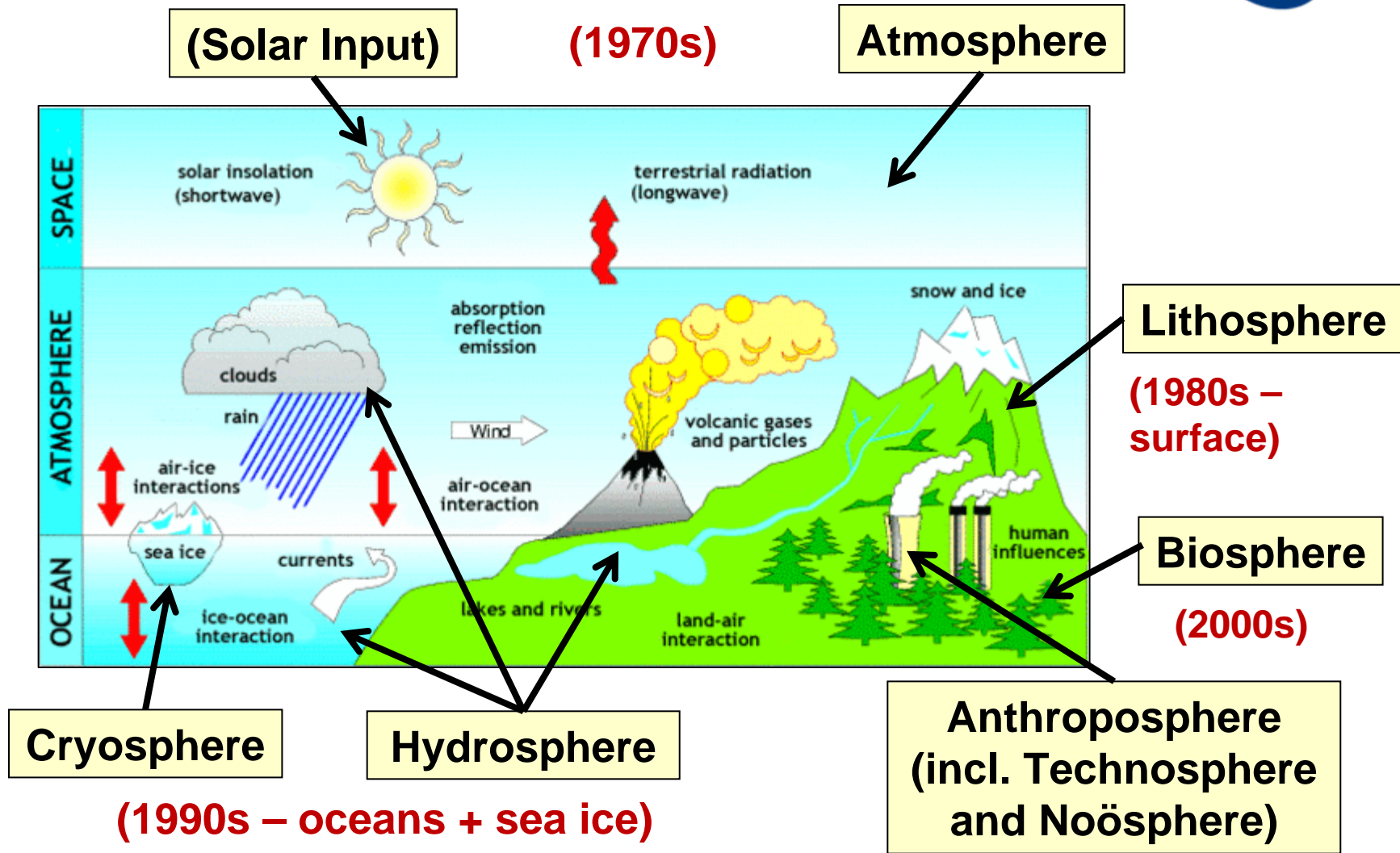
# Main Components of the Earth System





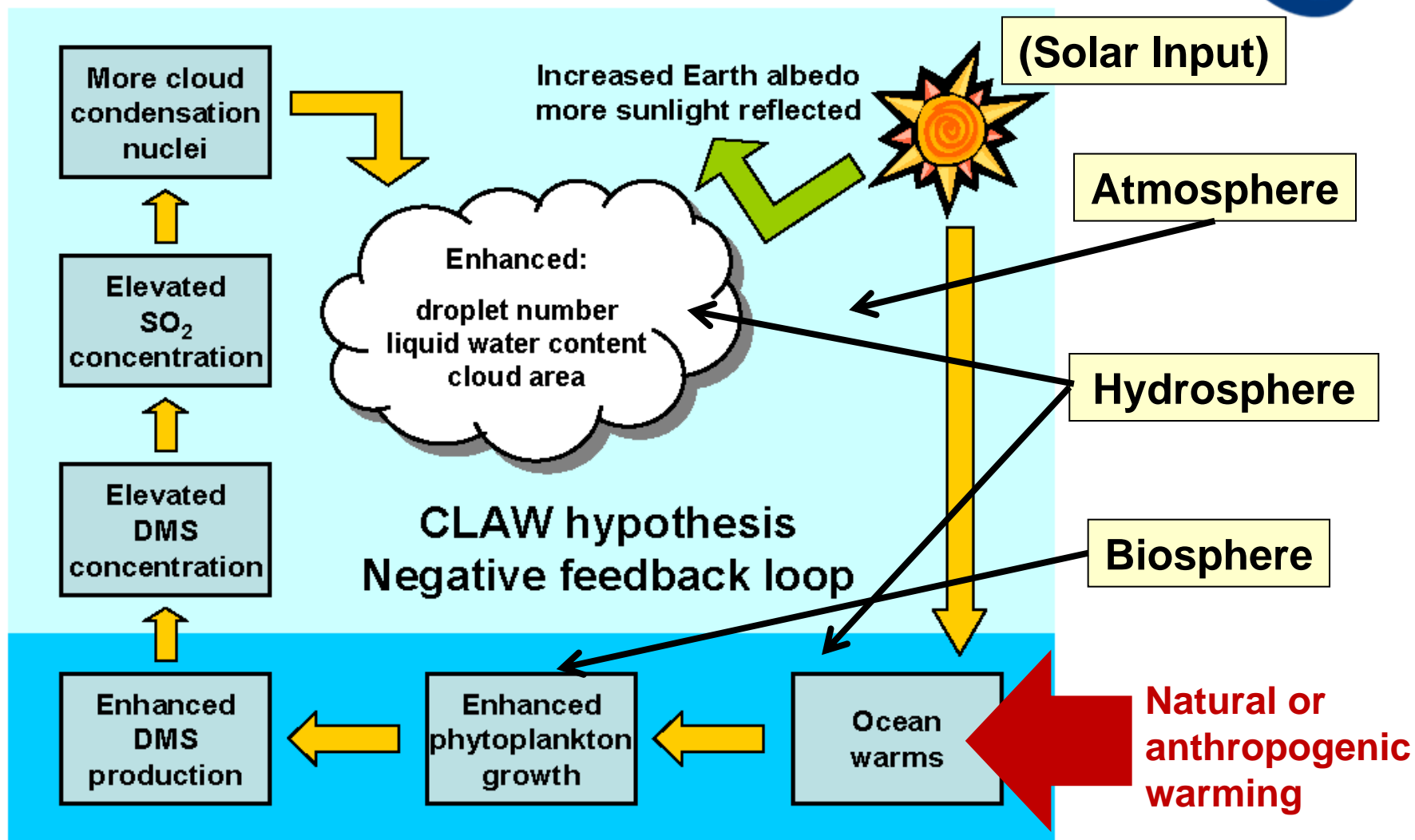
**(in global models)**

# Main Components of the Earth System





# Natural Earth System Cycle Example





# Role of Humans?

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## Unintentional

→ side effects (of which we may be aware) on the environment due to activities done for other purposes (e.g., energy production, manufacturing, etc.)

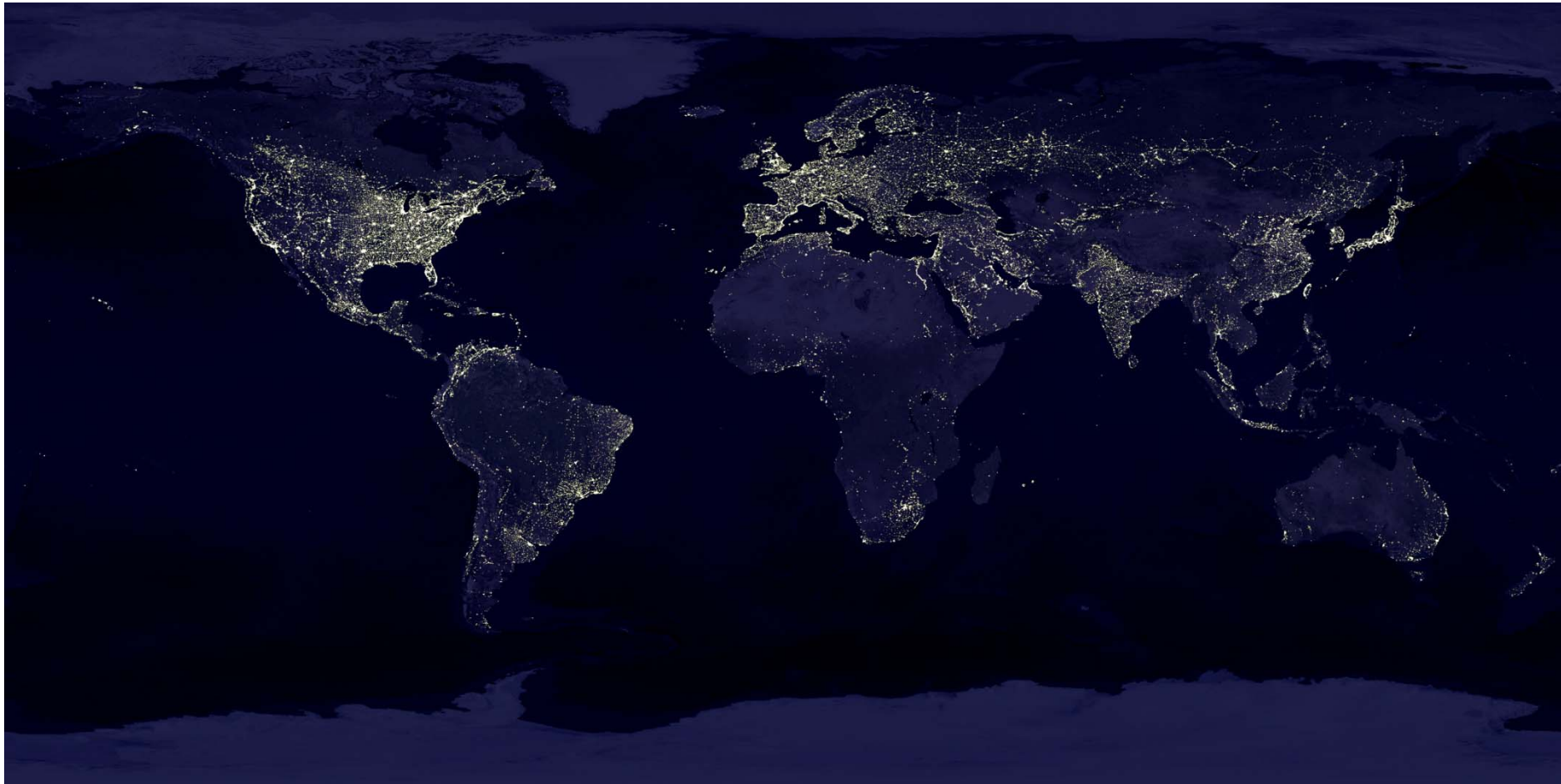
- Air pollution, climate change (including “SLCPs”)
- Water pollution
- Soil degradation
- Noise and electromagnetic pollution
- Etc.

## Intentional

→ “Targeted Environmental Modification”

- Buildings
- Urban development
- Landscaping
- Large-scale agriculture
- Deforestation
- Canals, straightening rivers
- Damming rivers
- ...and even larger endeavors

# "Shedding Light" on The Human Legacy



# The “Anthropocene”

---



→ Humans have become a planetary scale force in shaping the face of the Earth and its atmosphere on geological time scales

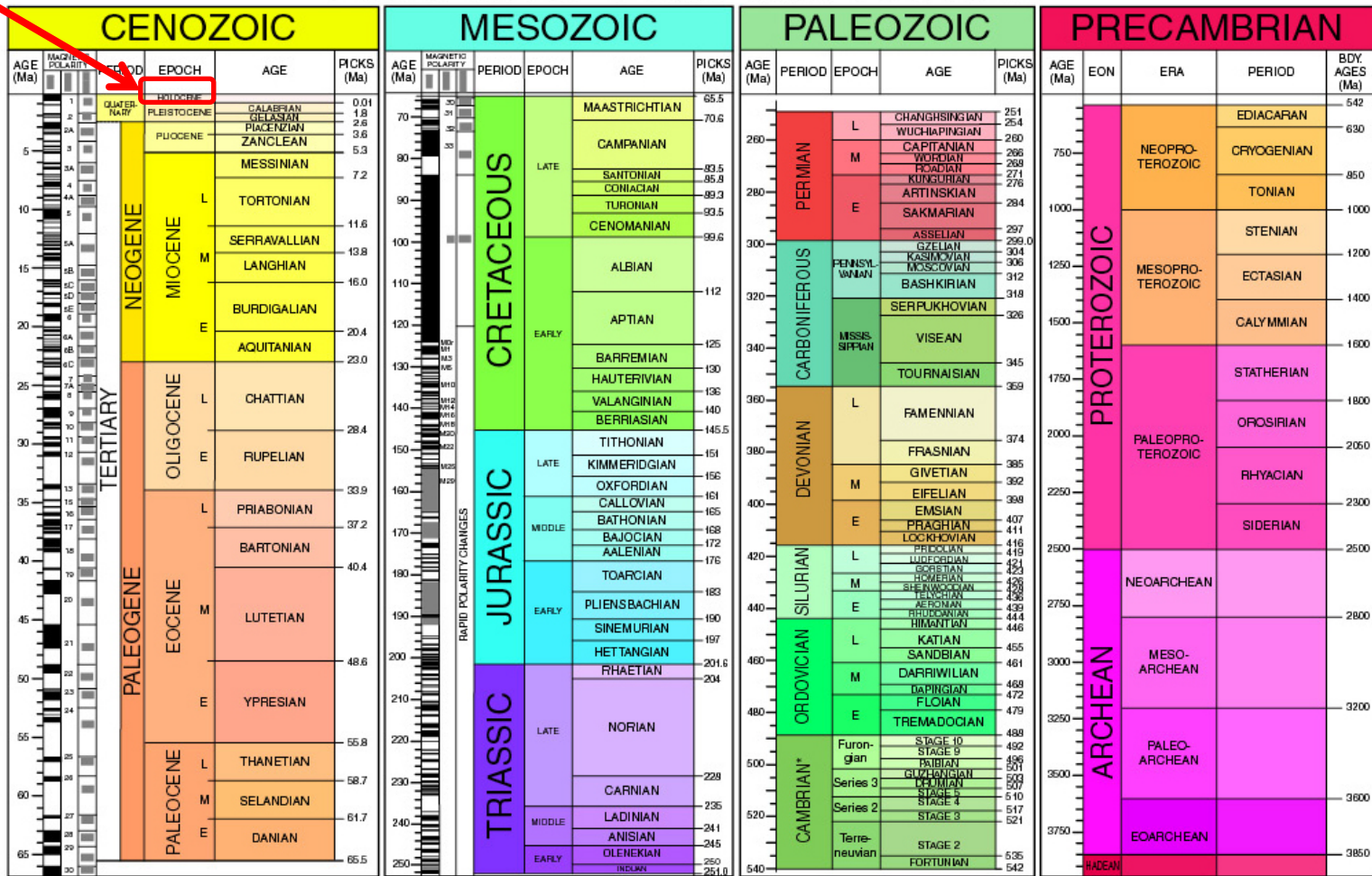
- New Epoch following the Holocene (last 10,000 years)
- Coined by ecologist Eugene F. Stoemer (1980s)
- Popularized by Paul Crutzen (Crutzen and Stroemer, 2000)
- Widely (but not universally) accepted
- Starting date widely debated; main candidates:
  - 8000 years ago (clear-cutting forests for agriculture)
  - 1750-1800 (Industrial Revolution)
  - 1950 (sometimes called “stage 2”, radical reorganization of society, explosion of technological evolution, unsustainable consumption and production after WWII)



# The Anthropocene in Perspective



**“You are Here”**: Holocene and Anthropocene



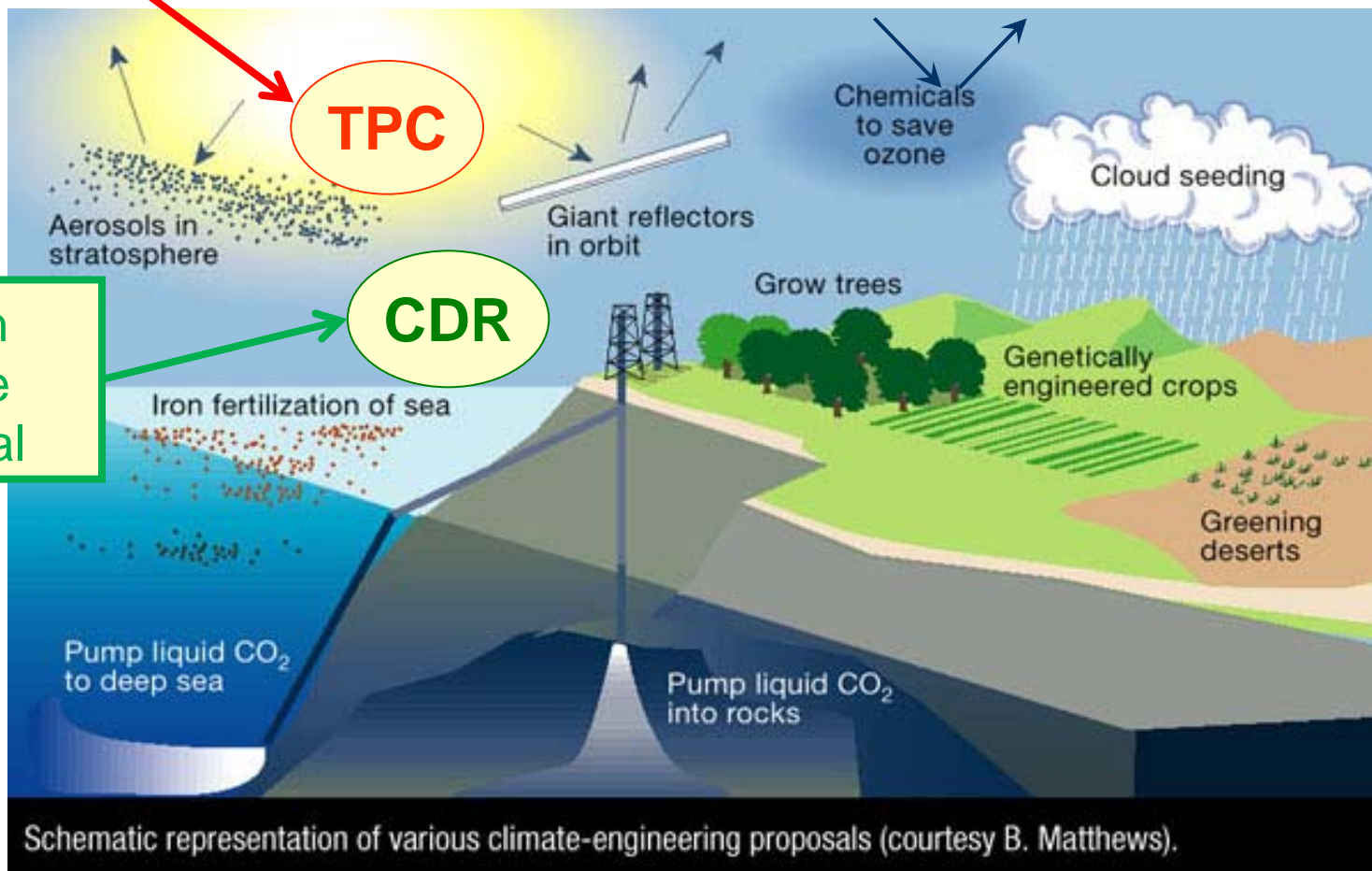


# The Anthropocene...and Beyond...

→ “Climate Engineering” (“Geoengineering”)



## Targeted Planetary Cooling



Carbon Dioxide Removal

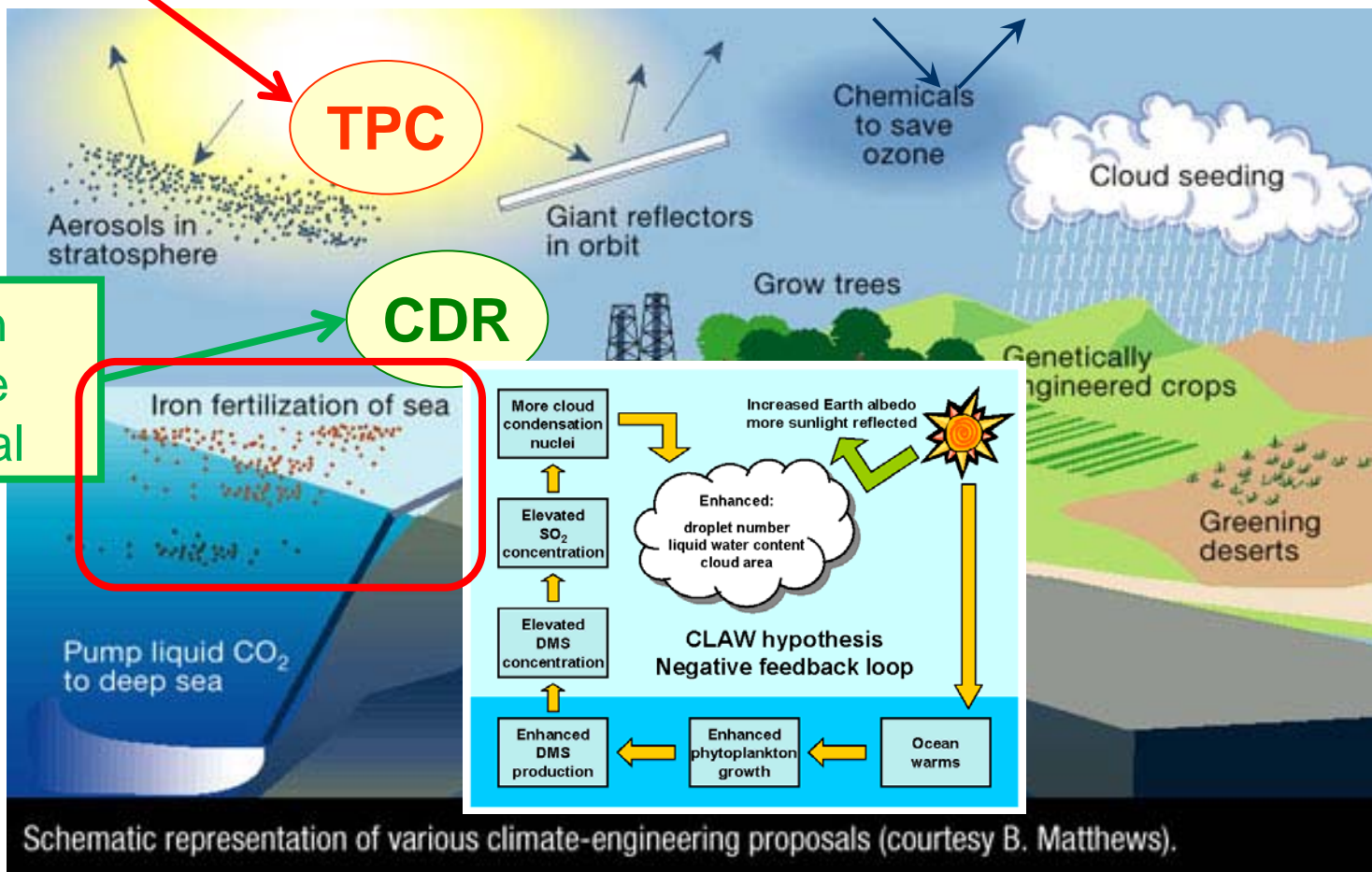


# The Anthropocene...and Beyond...

## → "Climate Engineering" ("Geoengineering")



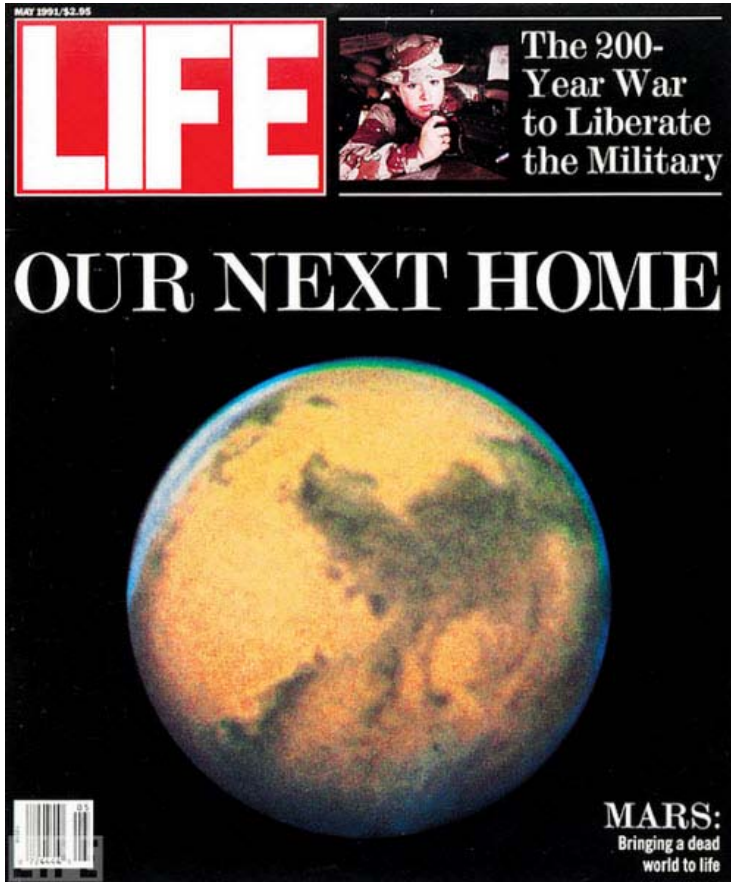
### Targeted Planetary Cooling



Schematic representation of various climate-engineering proposals (courtesy B. Matthews).



# Which would you choose?



(Happy Mother Earth Day!)





# Conclusions / Take-Home Messages



- The Earth System is complex – already prior to human intervention
- Human impacts – as a conscious *part* of the Earth System:
  - Unintentional: especially related to unsustainable consumption + production patterns
  - Intentional: small scale widespread, planetary scale being considered widely
  - Various and Planetary – no single indicator is sufficient
- We are in the Anthropocene, and this realization has to be part of framing what “Harmony with Nature” even means
- Cascade of Harmony:

Nature ← between societies ← within societies ← neighbors, colleagues ← family, friends ← self (should we perhaps start here?)

## Science and Society:

Transdisciplinary production of knowledge of the Earth System, Energy, Economics, Ethics, Law, Policy, ...

## United Nations:

Harmony among humans, between nations, cultures, classes, ...

**Potential for Harmony with Nature**

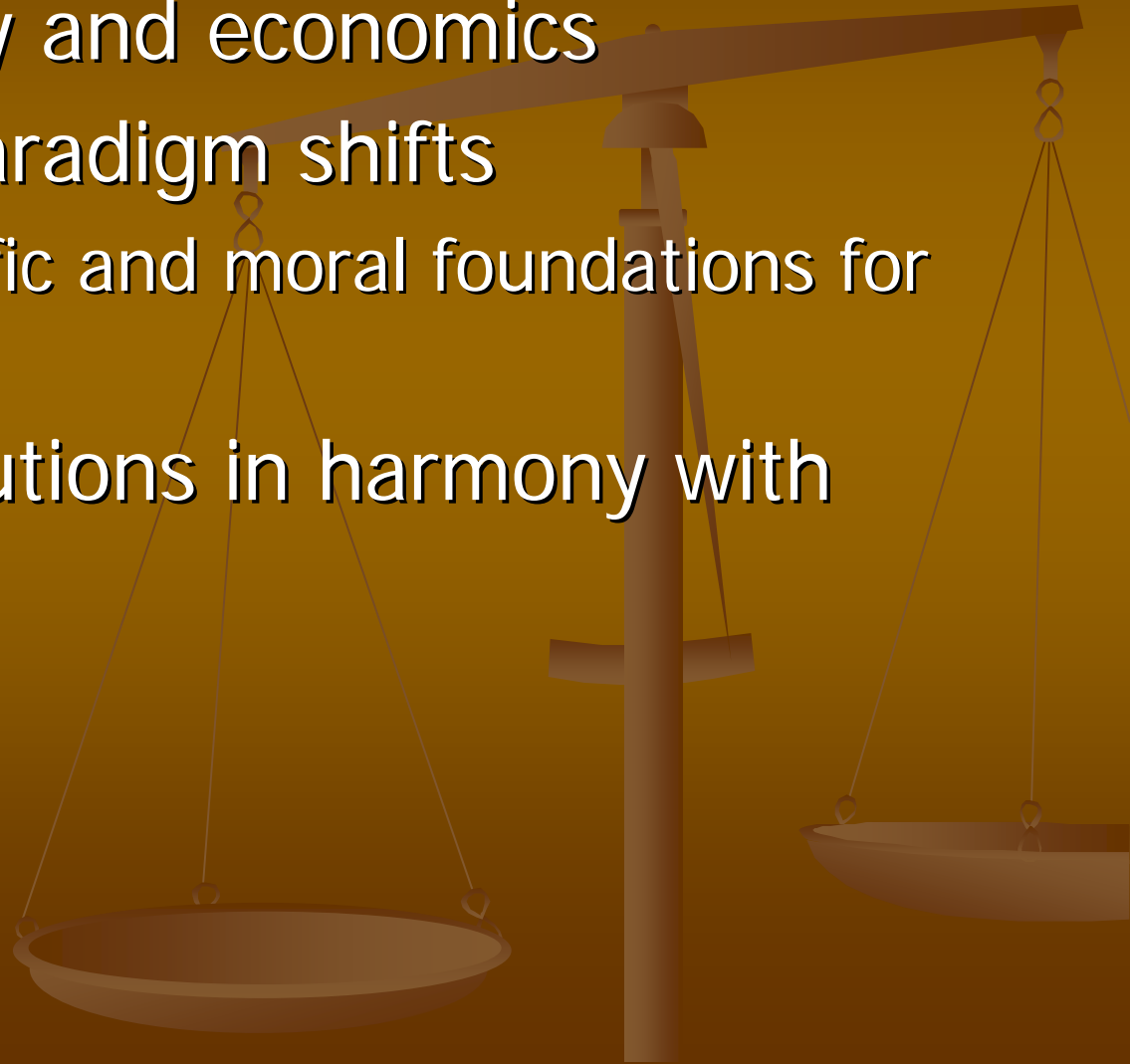


# Economics in Harmony with Nature and Science

Joshua Farley  
Community Development and Applied Economics  
Gund Institute for Ecological Economics  
University of Vermont

# Outline of Presentation

- Physics, ecology and economics
- Fundamental paradigm shifts
  - Building scientific and moral foundations for economics
- Economic institutions in harmony with nature



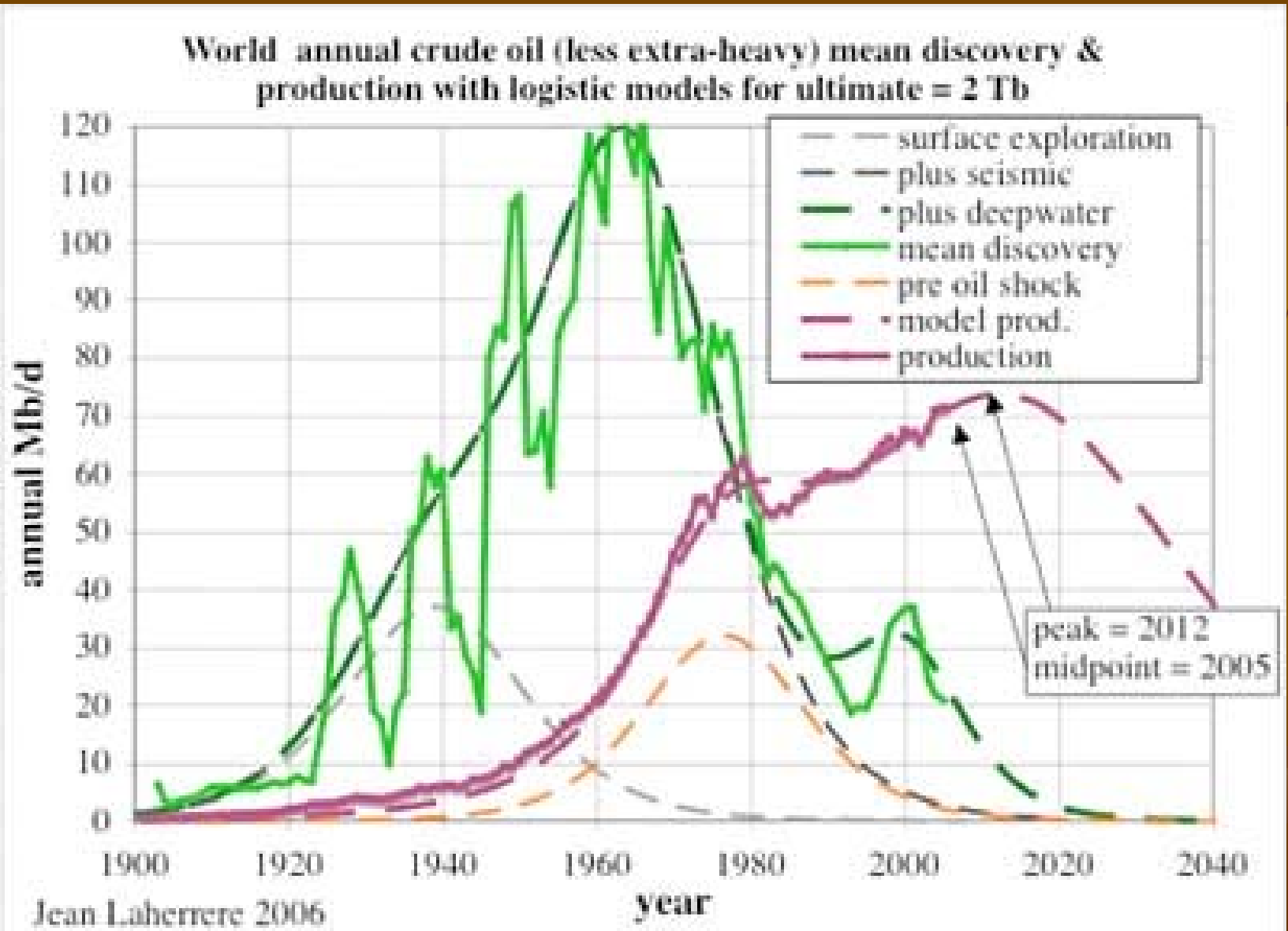
# Laws of Physics

- Can't make something from nothing or vice versa
- Can't do work without energy
- Disorder increases

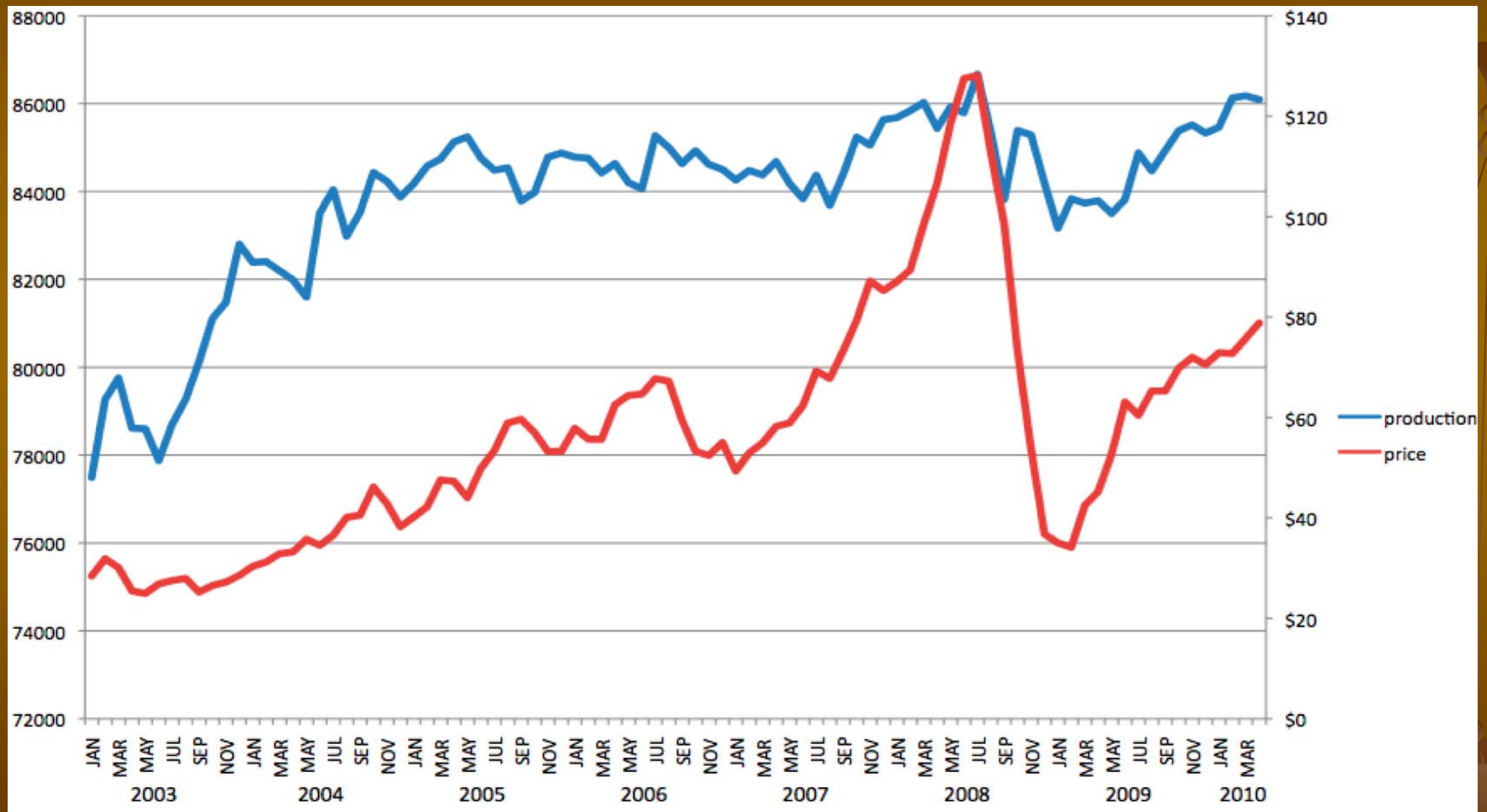




# Oil Discovery and Production



# Oil production and oil prices from 2003 to 2010



# Laws of ecology

- Conversion of ecosystem structure into economic products and waste degrades and destroys ecosystem services
  - Services rarely fit market model
- Both essential to civilization
- Unavoidable tradeoffs



# Laws of Economics

- Diminishing marginal benefits
- Rising marginal costs
- When marginal ecological costs exceed marginal economic benefits, growth is uneconomic

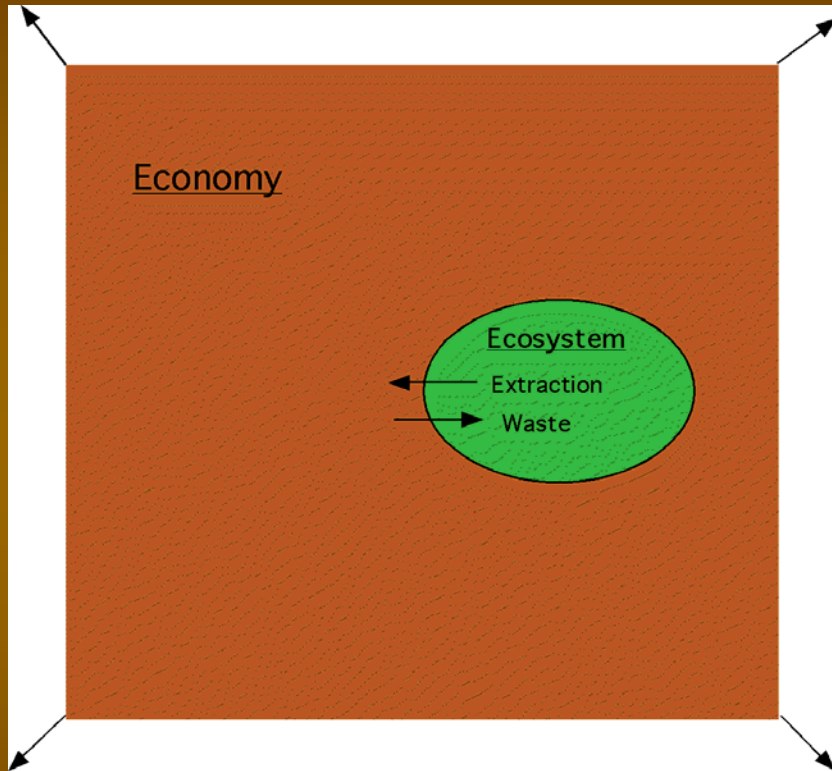




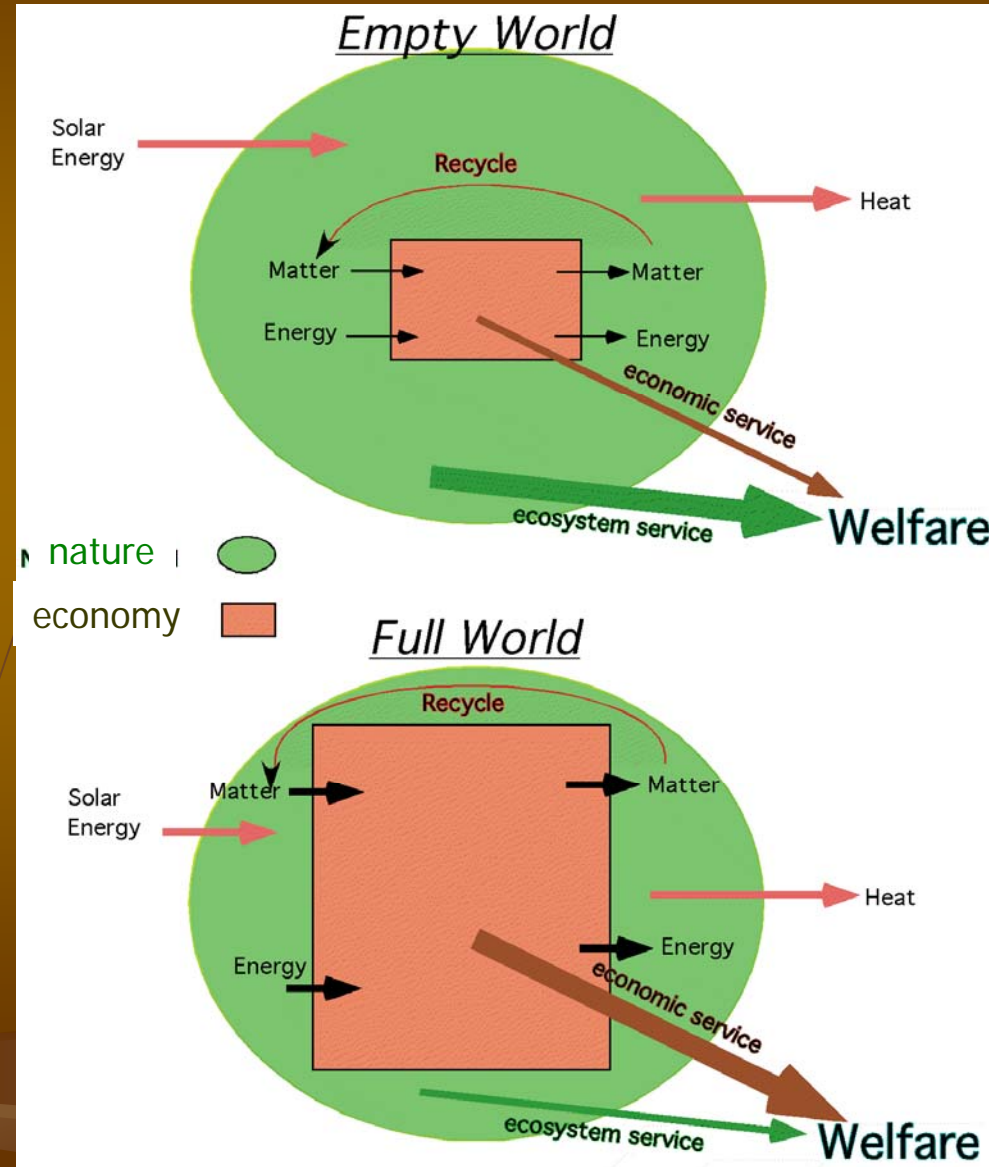
# Fundamental Paradigm Shifts



# Nature: From Part to Whole



"internalizing externalities"



# From Perfect Substitution...

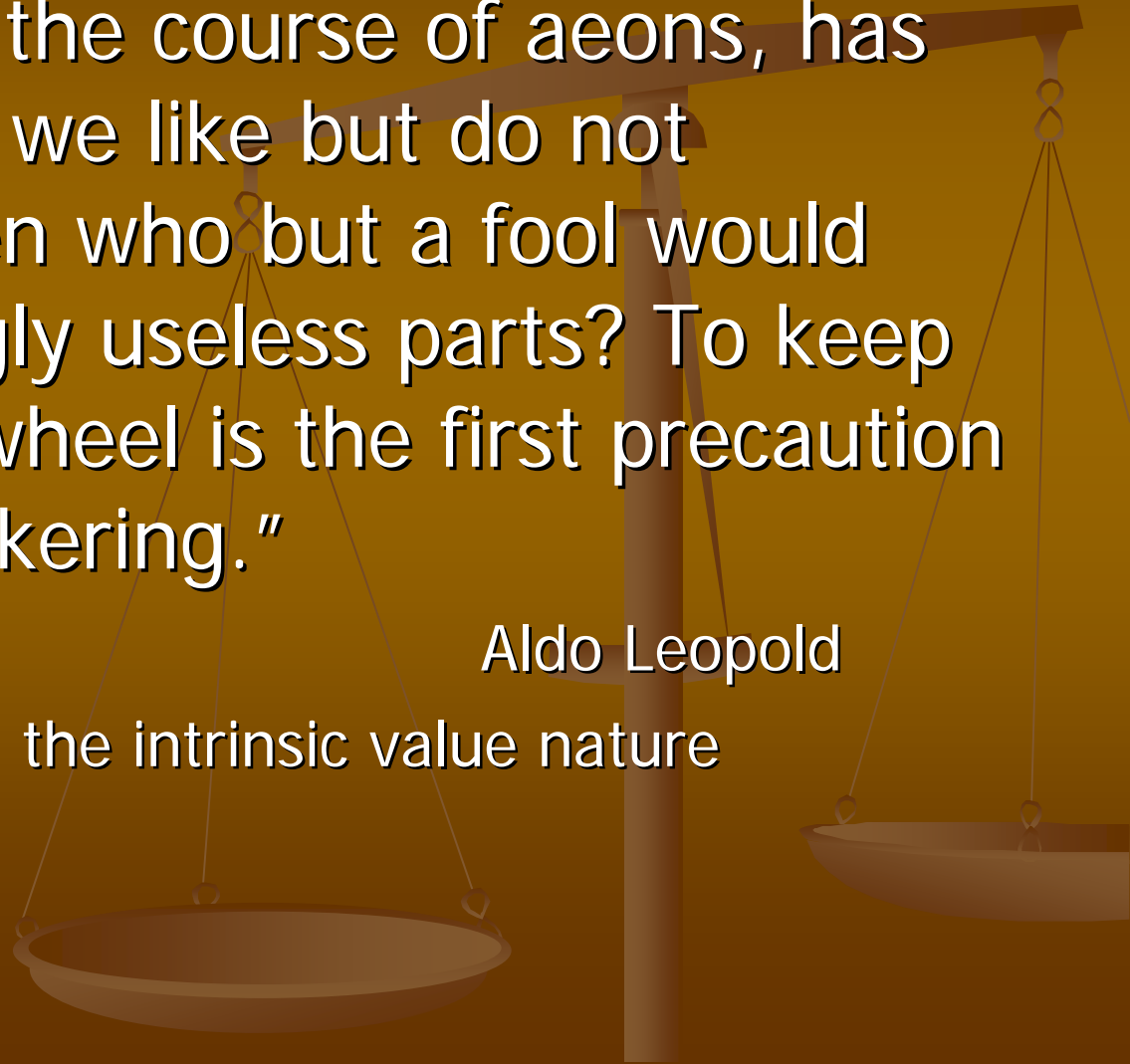
- Schelling (Nobel Memorial Prize in 2005):  
"Agriculture and Forestry are less than 3% of total output, and little else is much affected. Even if agricultural productivity declined by a third over the next half century, the per capita GNP we might have achieved by 2050 we would still achieve in 2051."

# To nature as essential and non-substitutable

- “If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.”

Aldo Leopold

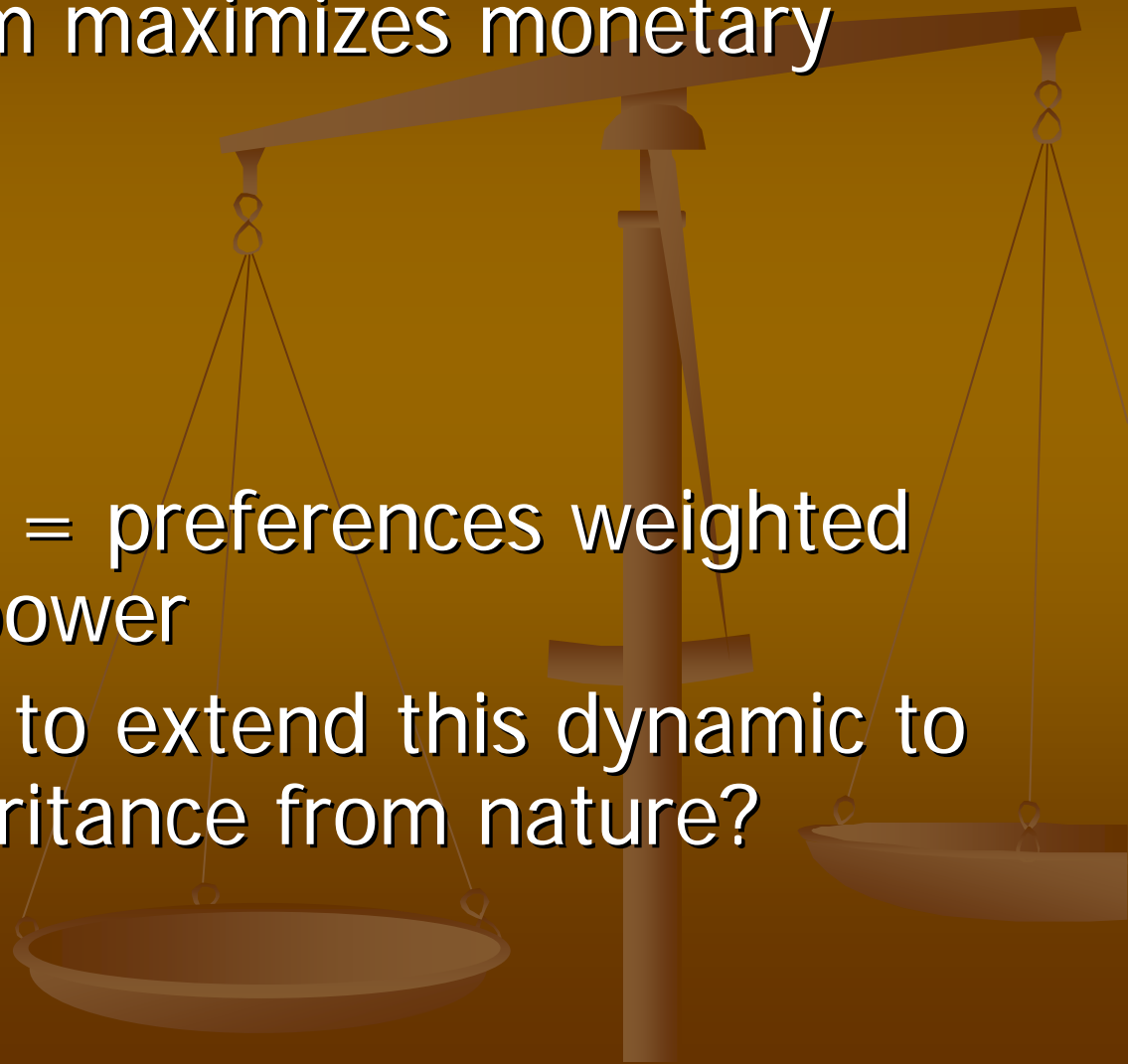
- Anthropocentrism vs. the intrinsic value nature



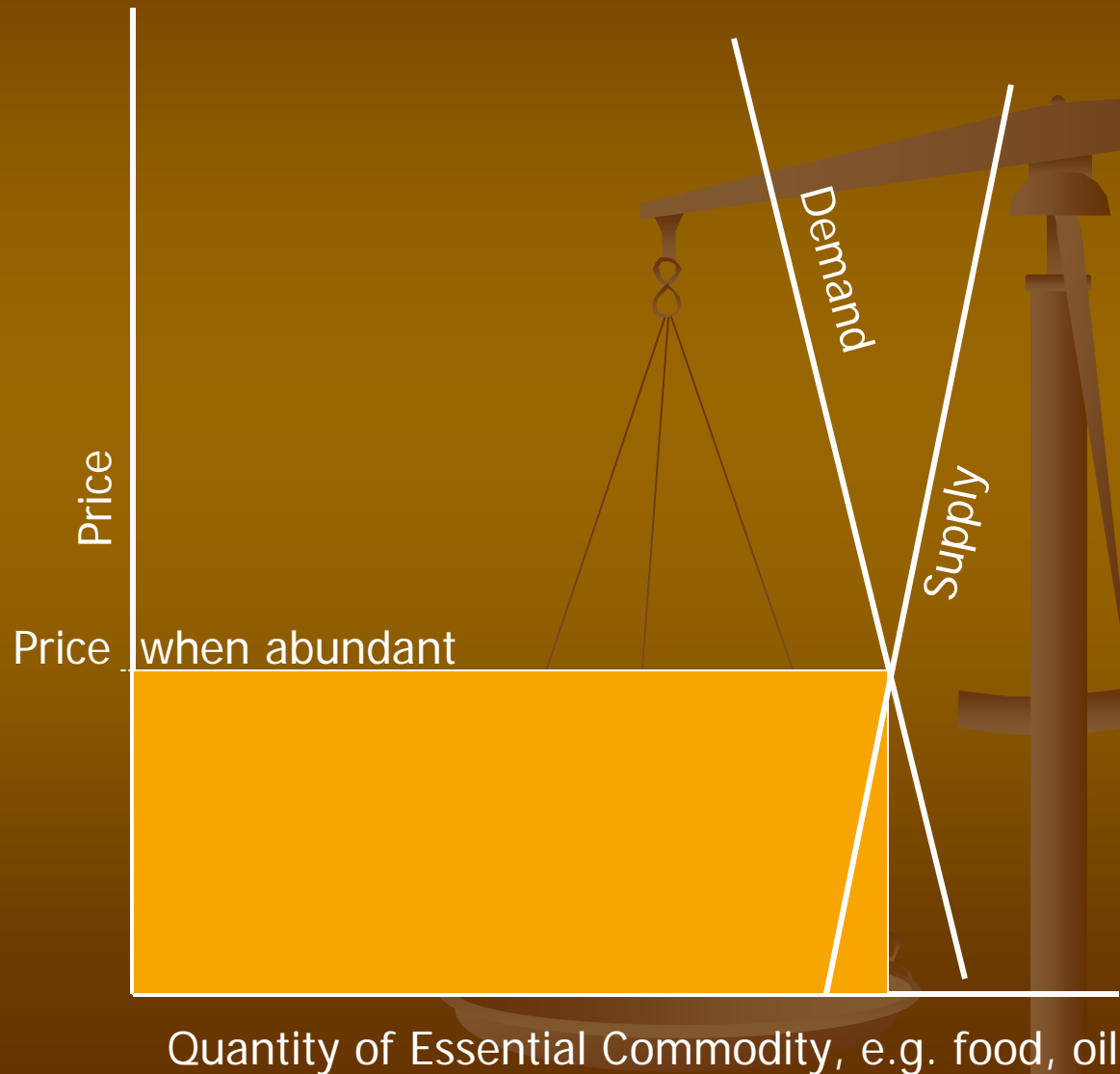


# From 'Efficiency' to Ethics

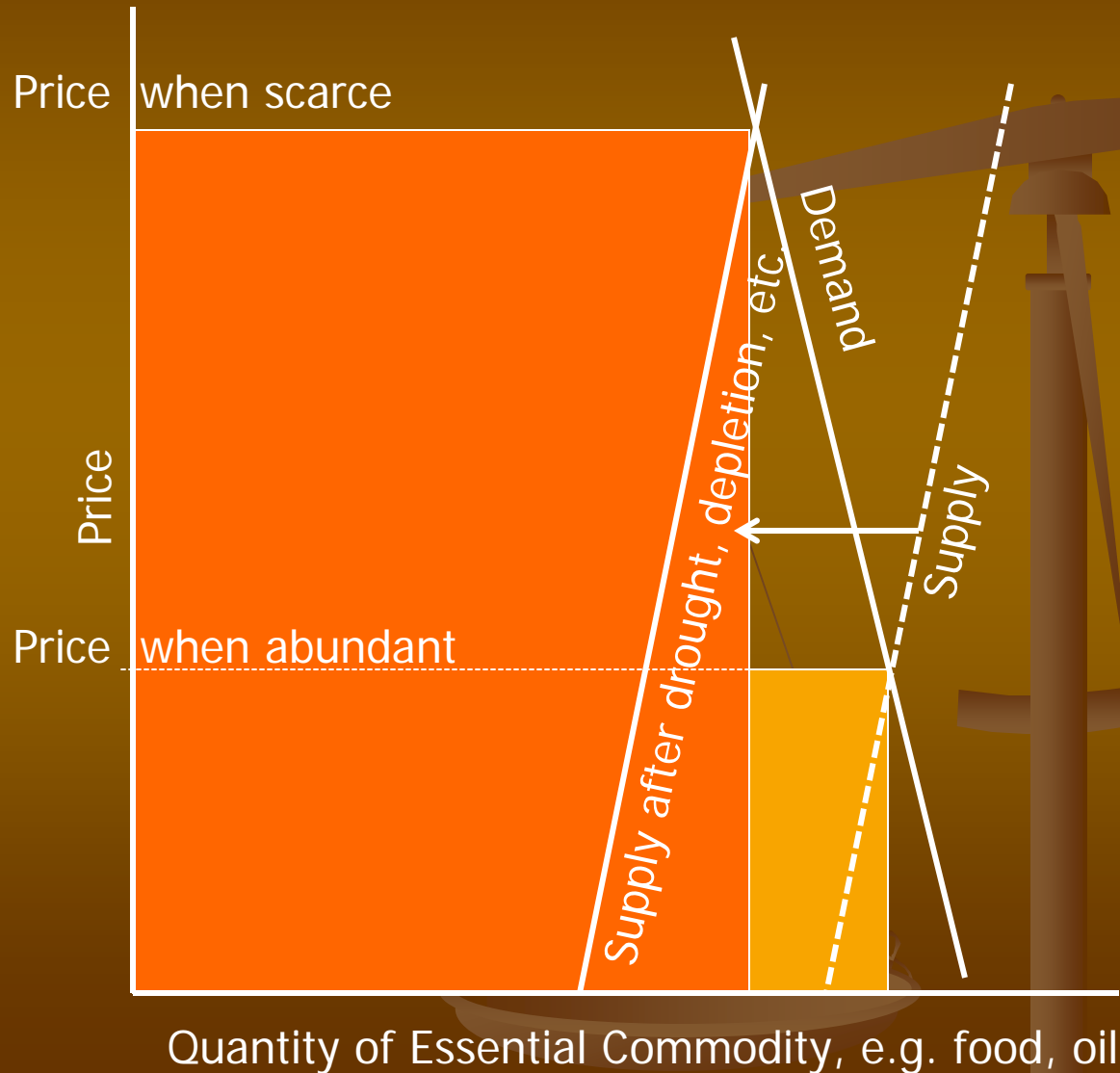
- Price mechanism maximizes monetary value
  - Eflornithine
  - Water markets
  - Food markets
- Market demand = preferences weighted by purchasing power
- Would we want to extend this dynamic to our shared inheritance from nature?



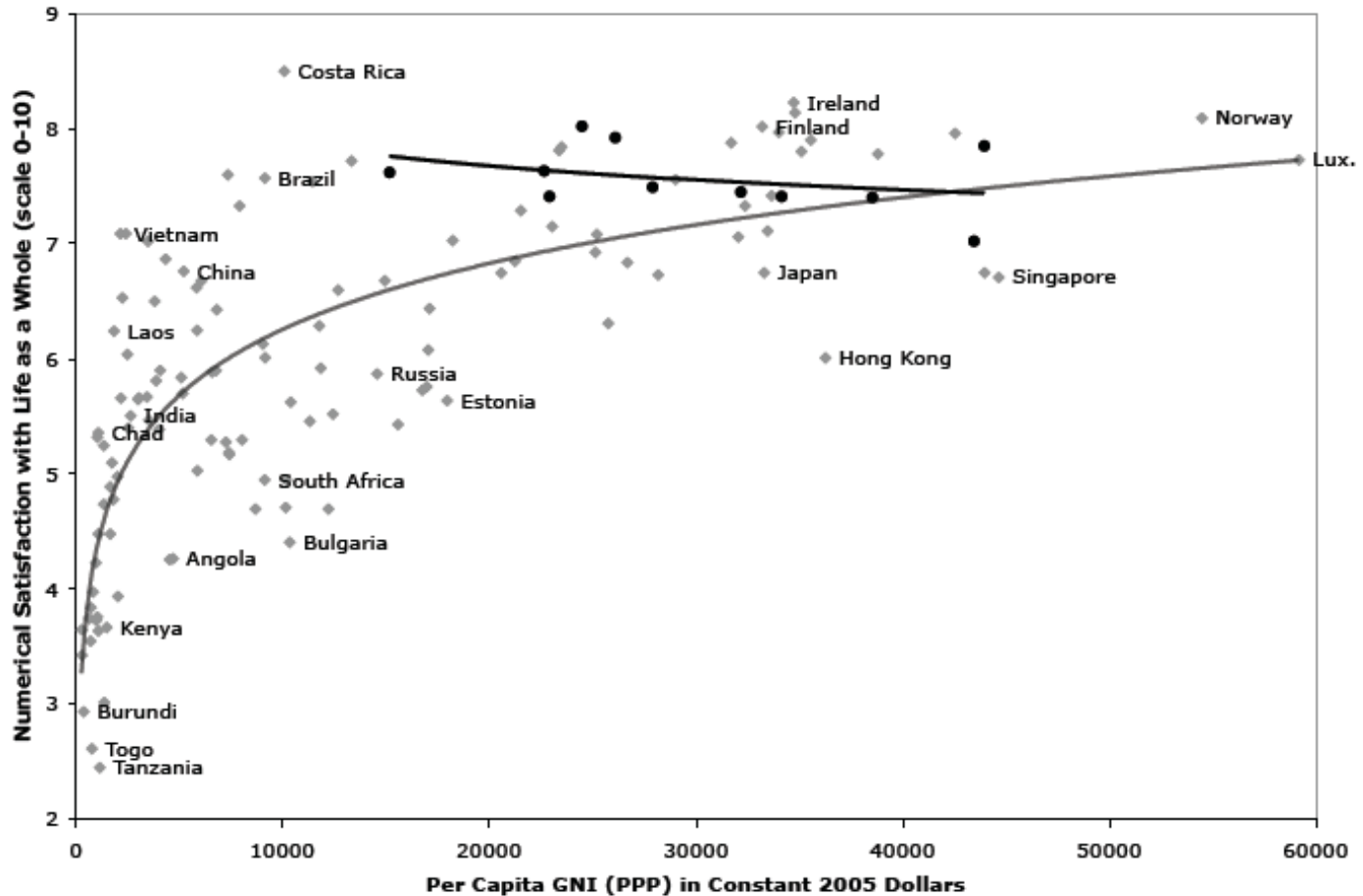
# GDP: From Benefits to Costs



# GDP: From Benefits to Costs



# From Growth...

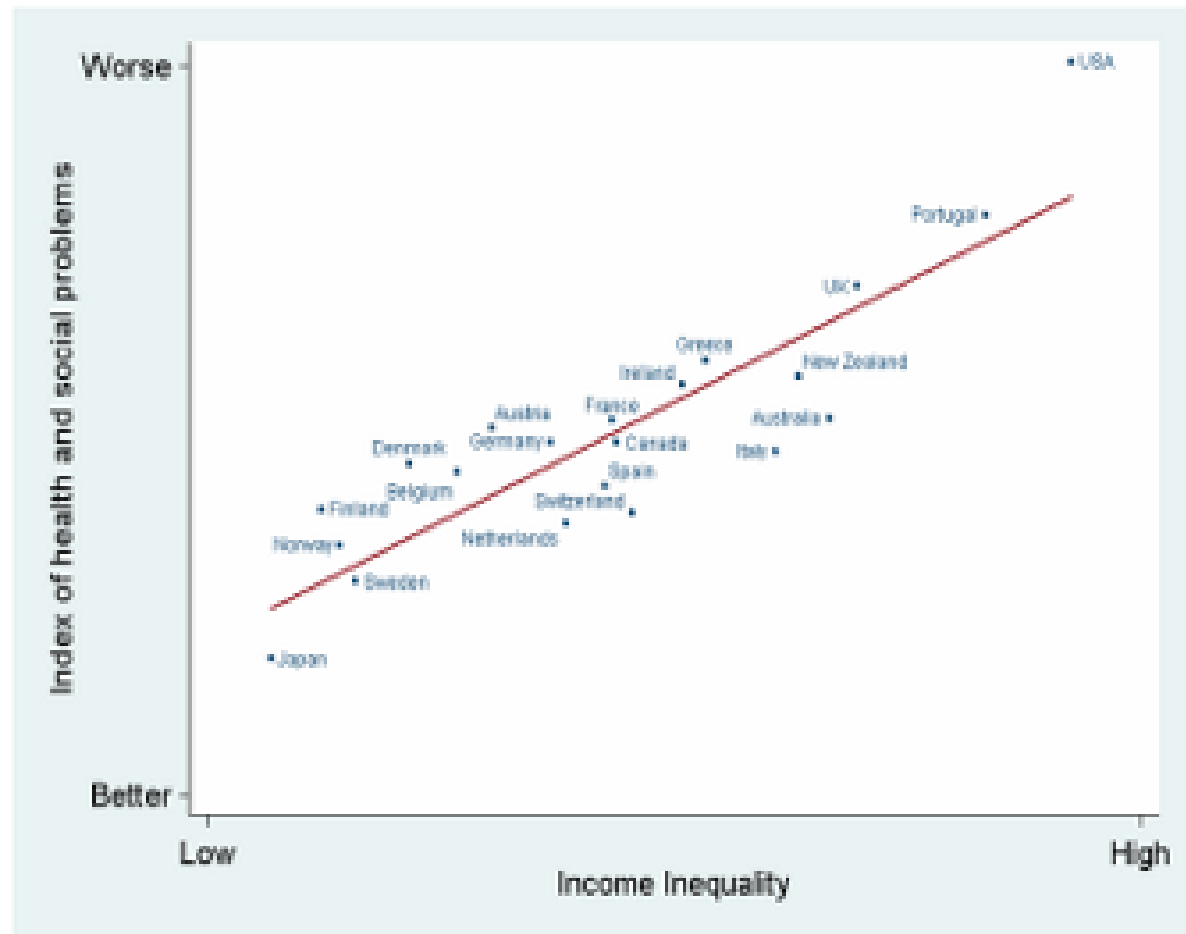


# To Equality

## Health and Social Problems are Worse in More Unequal Countries

### Index of:

- Life expectancy
- Math & Literacy
- Infant mortality
- Homicides
- Imprisonment
- Teenage births
- Trust
- Obesity
- Mental illness – incl. drug & alcohol addiction
- Social mobility





# Economic Institutions in Harmony with Nature



# Rules for Sustainability



- Inalienable right to healthy, resilient ecosystems
  - Requires sustainable flows and healthy stocks
- Renewable resource extraction cannot exceed regeneration rate
- Pollution outflows cannot exceed absorption capacity
- Neither extraction nor pollution can threaten essential ecosystem functions
- Essential non-renewables cannot be depleted faster than we develop substitutes

# Common Ownership



- Stocks and available flows are shared inheritance from nature
  - Benefits/revenues should be shared
- Knowledge required to develop renewable substitutes created by society as a whole
  - "Standing on the shoulder of giants"
- Shared ownership just and efficient
  - 'internalizes' externalities



# Transition to Post Carbon Economy

- Fossil fuels
  - Competition for use: One country's use leaves less for others
  - Private ownership possible
- Alternative energy (e.g. solar)
  - No competition for use: One country's use has no effect on others
  - Knowledge underlying technologies improves through use
  - Market provision of green technology is inefficient, unjust, and unsustainable
- From competition to cooperation

