

# *Subverting the Dominant Paradigm*



Codes, Relocalization and More...

September 6, 2008

David Eisenberg, Director  
Development Center for Appropriate Technology



I think we have a small window of opportunity to save ourselves as a species.

I believe that window is the size and shape of the human heart...



Most of the systems we have created are far beneath the dignity and magnificence of the human species.

These systems denature us.

They override our fundamental nature as a caring, creative, nurturing species.



In order to enable our survival we have to evolve as a species.

This will be the first time in history that evolution takes place as a conscious act.

© Cartoonbank.com



*"I was wondering when you'd notice there's lots more steps."*

In order to enable our survival we have to evolve as a species.

This will be the first time in history that evolution takes place as a conscious act.



For a dozen years I've been working towards an intention: that if we are to deal responsibly with the risks associated with building and development, we need to be able to see those risks...fully, clearly, and in context...

# Where We Are - Ecological Footprint

Ecological footprint is a concept based on carrying capacity. It's a way to calculate the amount of productive land required to supply resources and absorb wastes from a given activity - of an individual, organization, community, nation or population, including the world population.



## *The Picture that is Emerging...*



There's credible evidence that if each person on Earth used resources & generated wastes at the rate of the average American, Canadian, or member of the EU we would need several more Earths to sustain that level of human activity. And that's for Earth's current population.



# *The Big Picture - Living Planet Report*



WWF® *for a living planet®*



## LIVING PLANET REPORT 2006

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Download the Report:  
<http://www.footprintnetwork.org>



ZSL  
LIVING CONSERVATION

## THE ECOLOGICAL FOOTPRINT

The Ecological Footprint measures people's demand on nature. A country's footprint is the total area required to produce the food and fibre that it consumes, absorb its waste, and provide space for its infrastructure. People consume resources and ecological services from all over the world, so their footprint is the sum of these areas, wherever they are on the planet. The footprint can be compared with nature's ability to renew these resources.

The global Ecological Footprint was 13.5 billion global hectares in 2001, or 2.2 global hectares per person (a global hectare is a hectare whose biological productivity equals

the global average). This demand on nature can be compared with the Earth's biocapacity, based on its biologically productive area – approximately 11.3 billion global hectares, which is a quarter of the Earth's surface. The productive area of the biosphere translates into an average of 1.8 global hectares per person in 2001.

The global Ecological Footprint decreases with smaller population size, less consumption per person, and higher resource efficiency. The Earth's biocapacity increases with a larger biologically productive area and higher productivity per unit area.

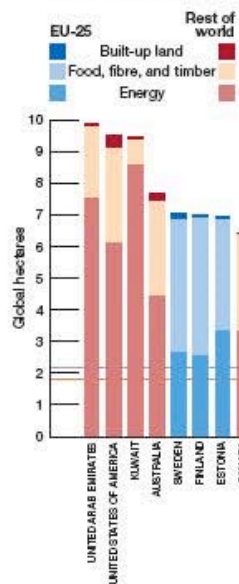
In 2001, humanity's Ecological Footprint exceeded global biocapacity by 0.4 global hectares per person, or 21 per cent. This global overshoot began in the 1980s and has been growing ever since (see Figure 1). In effect, overshoot means spending nature's capital faster than it is being regenerated. Overshoot may permanently reduce ecological capacity.

**Figure 3:** The Ecological Footprint per person for countries with populations over 1 million.

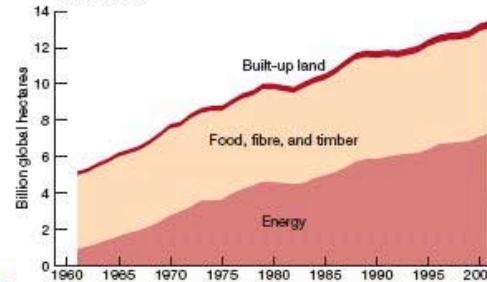
**Figure 4:** Humanity's Ecological Footprint grew by about 160 per cent from 1961 to 2001, somewhat faster than population which doubled over the same period.

**Figure 5:** Ecological Footprint by region in 2001. The height of each bar is proportional to each region's average footprint per person, the width is proportional to its population, and the area of the bar is proportional to its total footprint.

**Fig. 3: ECOLOGICAL FOOTPRINT PER PERSON, by country, 2001**



**Fig. 4: HUMANITY'S ECOLOGICAL FOOTPRINT, 1961-2001**



**Fig. 5: ECOLOGICAL FOOTPRINT BY REGION, 2001**

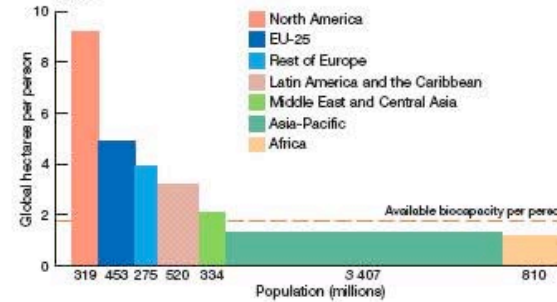
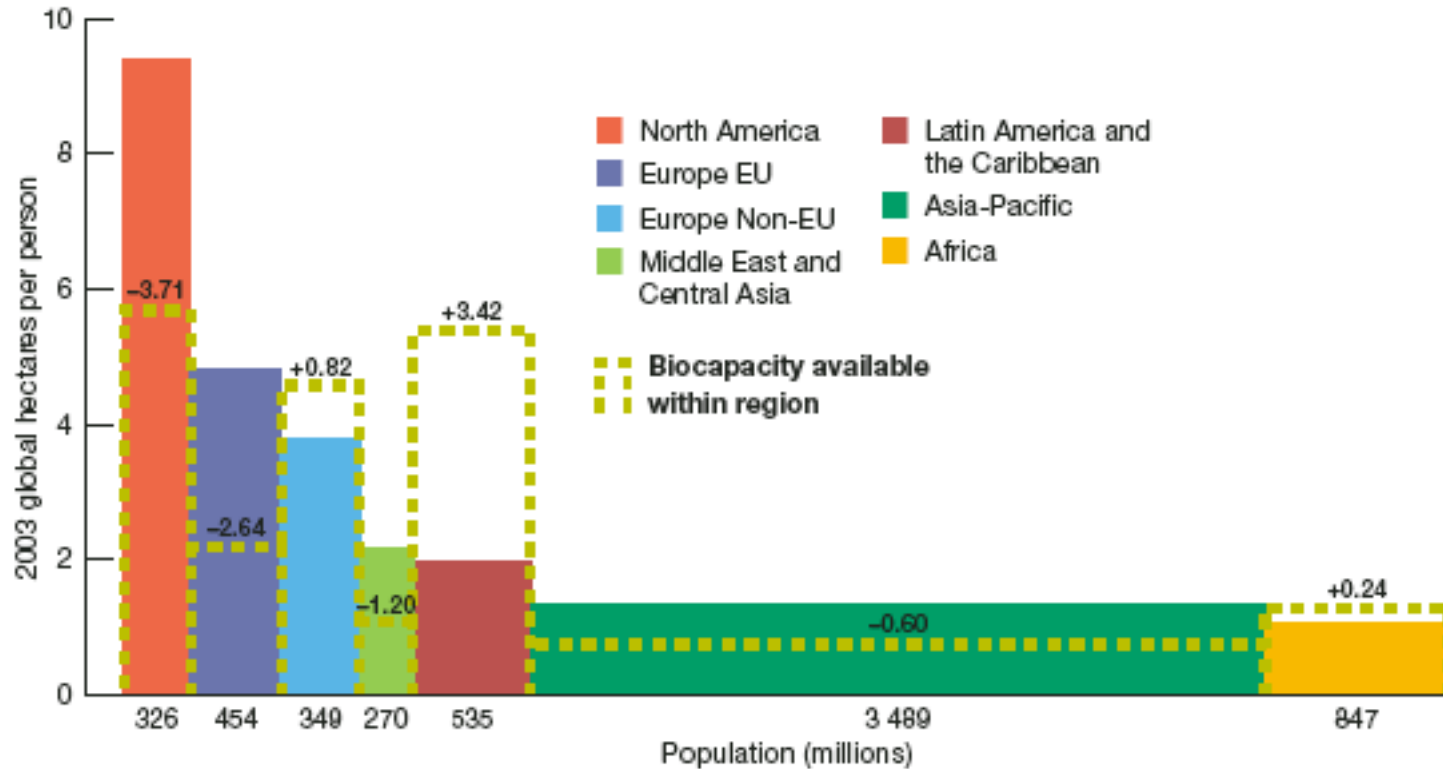


Fig. 20: ECOLOGICAL FOOTPRINT AND BIOCAPACITY BY REGION, 2003



From the 2006 Living Planet Report

# THE FOOTPRINT AND HUMAN DEVELOPMENT

Sustainable development is a commitment to "improving the quality of human life while living within the carrying capacity of supporting ecosystems" (IUCN *et al.*, 1991).

Countries' progress towards sustainable development can be assessed using the United Nations Development Programme's (UNDP) Human Development Index (HDI) as an indicator of well-being, and the footprint as a measure of demand on the biosphere. The HDI is calculated from life expectancy, literacy and education, and per capita GDP. UNDP considers an HDI value of more than 0.8 to be "high human development". Meanwhile, a footprint lower than 1.8 global hectares per person, the average biocapacity available per person on the planet, could denote sustainability at the global level.

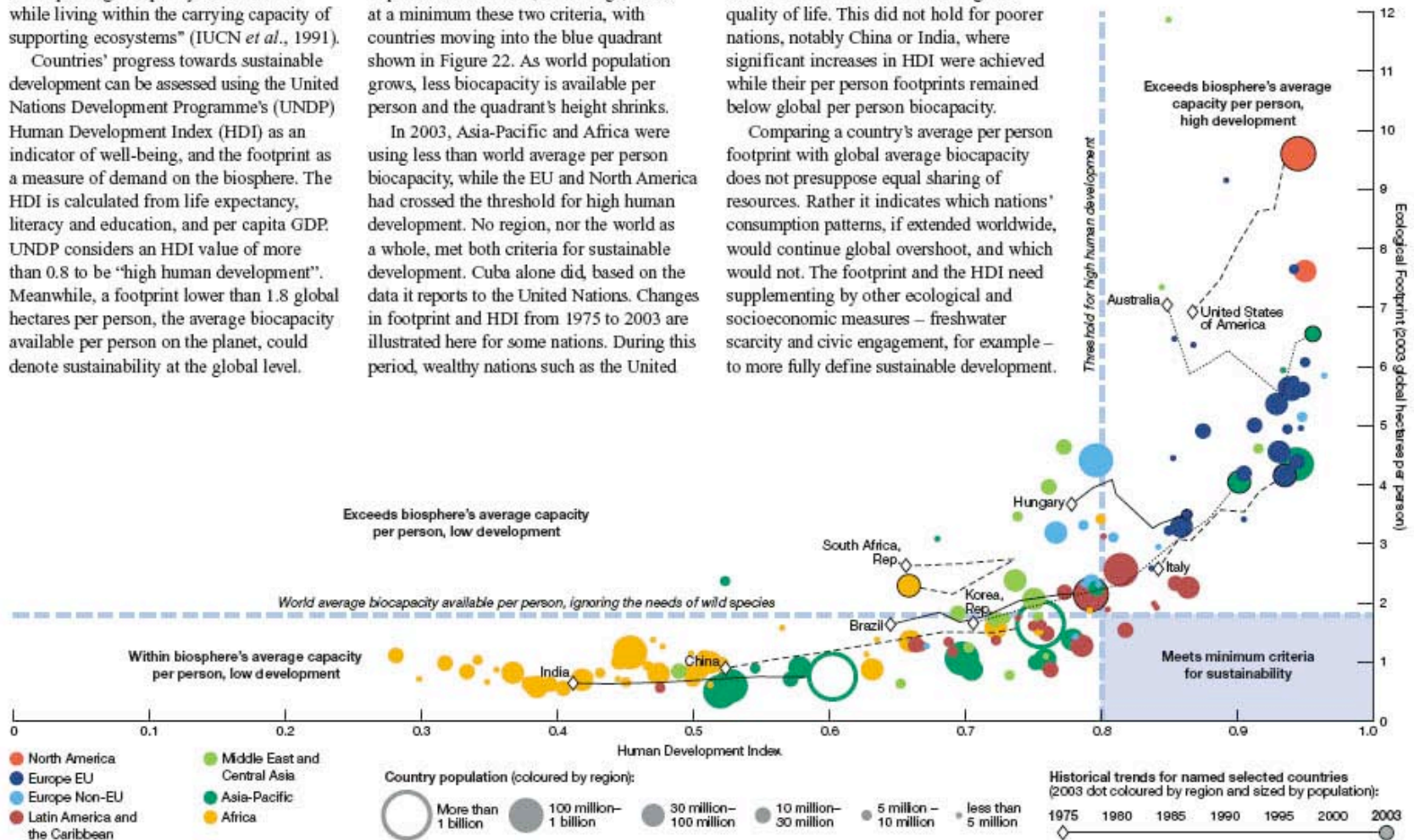
Successful sustainable development requires that the world, on average, meets at a minimum these two criteria, with countries moving into the blue quadrant shown in Figure 22. As world population grows, less biocapacity is available per person and the quadrant's height shrinks.

In 2003, Asia-Pacific and Africa were using less than world average per person biocapacity, while the EU and North America had crossed the threshold for high human development. No region, nor the world as a whole, met both criteria for sustainable development. Cuba alone did, based on the data it reports to the United Nations. Changes in footprint and HDI from 1975 to 2003 are illustrated here for some nations. During this period, wealthy nations such as the United

States of America significantly increased their resource use while increasing their quality of life. This did not hold for poorer nations, notably China or India, where significant increases in HDI were achieved while their per person footprints remained below global per person biocapacity.

Comparing a country's average per person footprint with global average biocapacity does not presuppose equal sharing of resources. Rather it indicates which nations' consumption patterns, if extended worldwide, would continue global overshoot, and which would not. The footprint and the HDI need supplementing by other ecological and socioeconomic measures – freshwater scarcity and civic engagement, for example – to more fully define sustainable development.

Fig. 22: HUMAN DEVELOPMENT AND ECOLOGICAL FOOTPRINTS, 2003



ECOLOGICAL FOOTPRINT

## *Where We Are...*

REALITY - We're maintaining our high standard of living by *importing* resources, cheap labor and ecological capacity from the developing world.

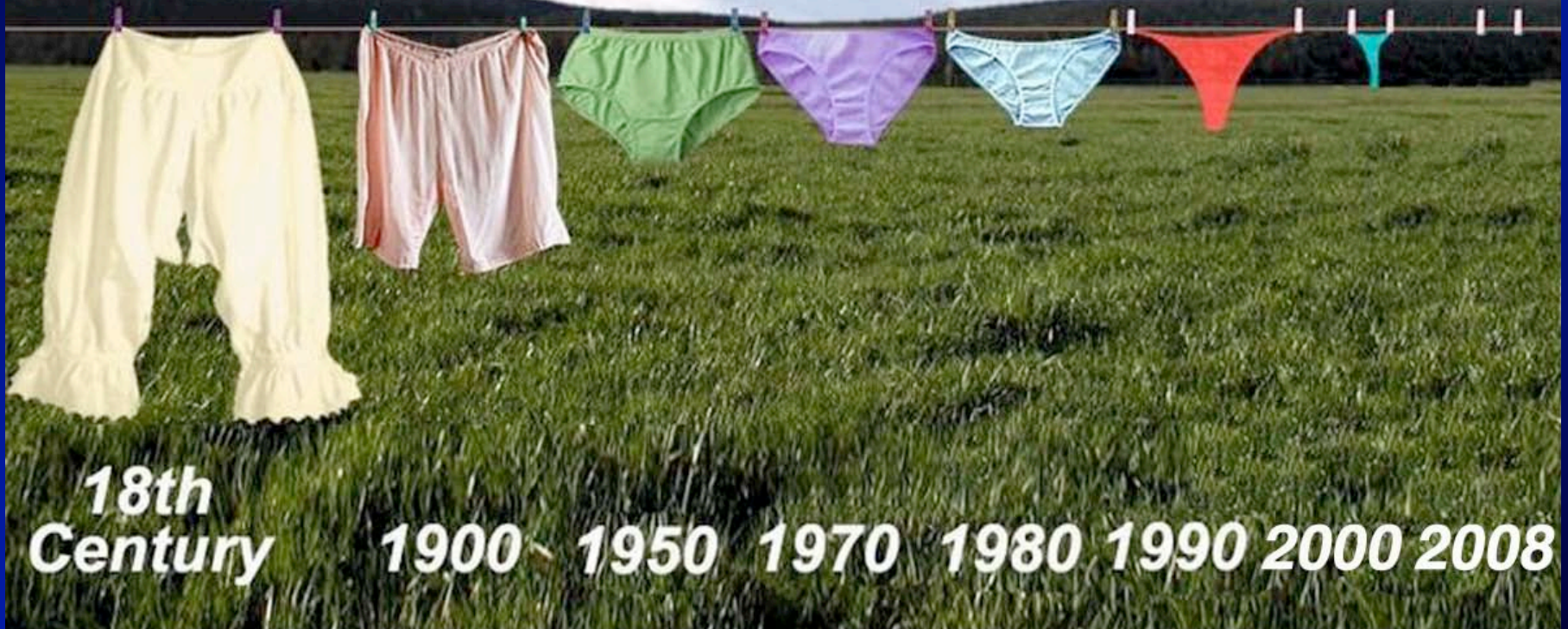
Surplus global ecological capacity no longer exists.

Ecological footprint is increasing in both the developed and developing world and world population is growing.

Buildings account for a majority of this footprint and energy accounts for much of that.

# Climate change

**Positive proof of global warming.**



**18th  
Century**

**1900 -**

**1950**

**1970**

**1980**

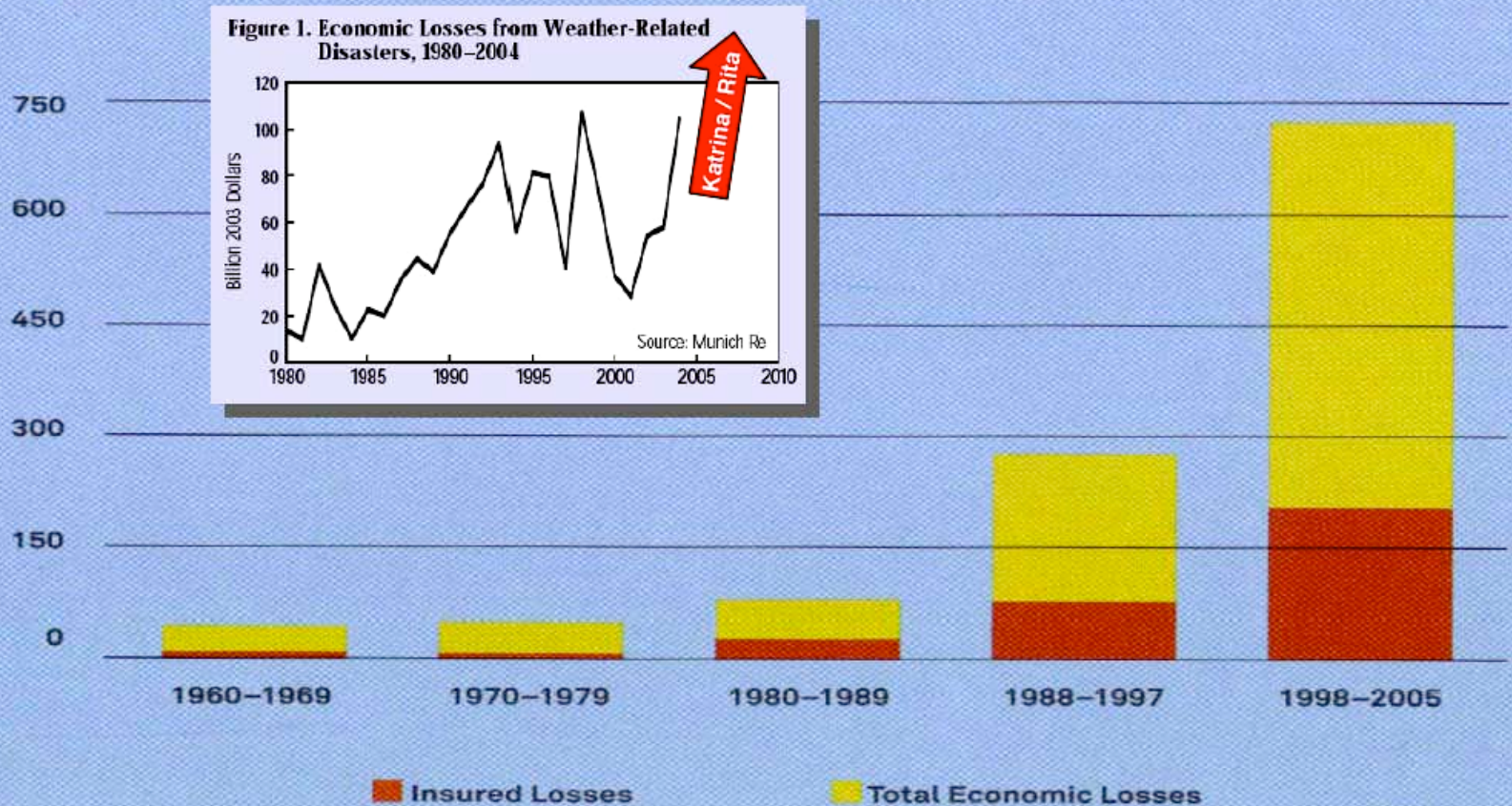
**1990**

**2000**

**2008**

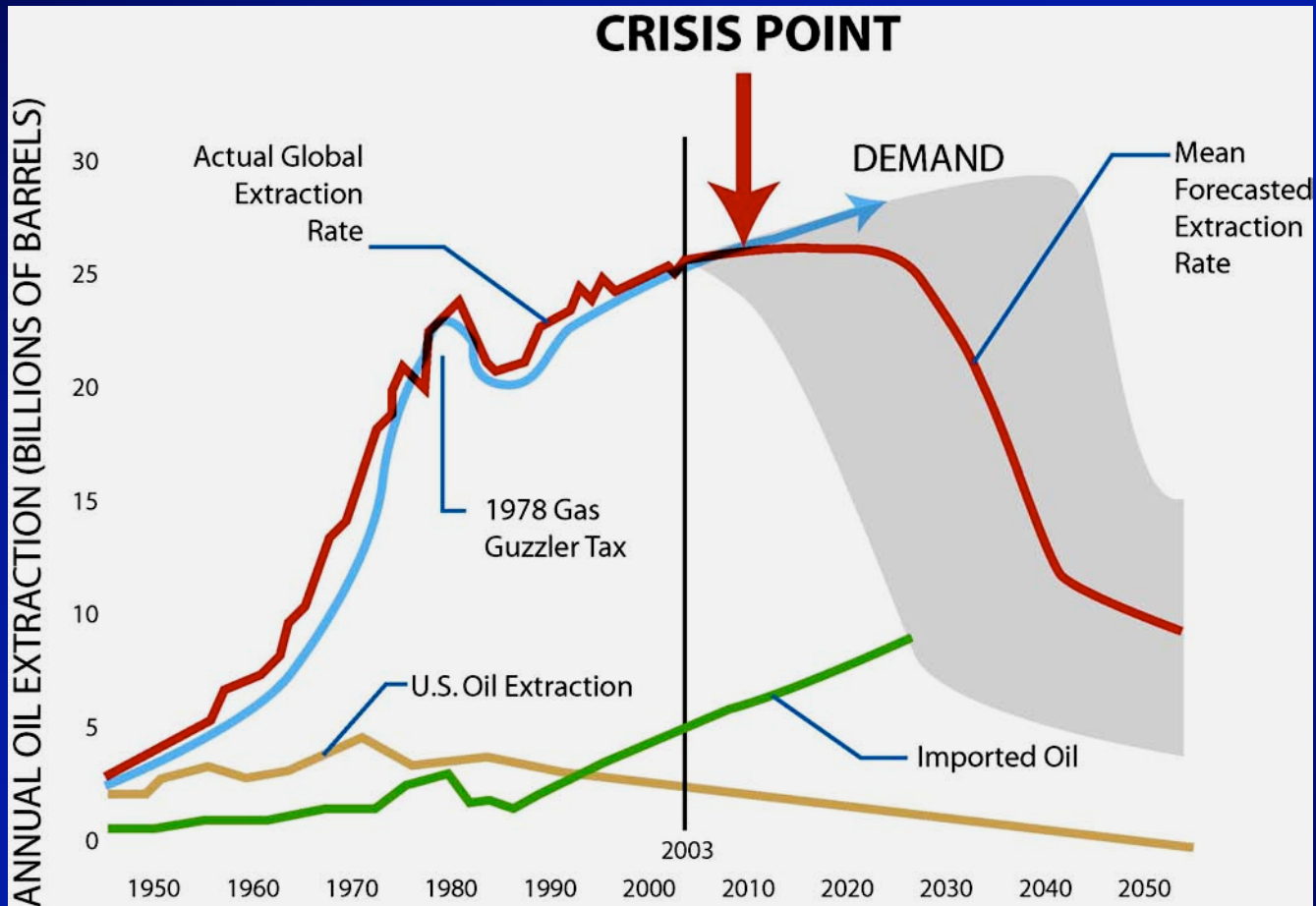
# Don't Trust Scientists? ...How About Insurers?

## GREAT WEATHER AND FLOOD CATASTROPHES: LOSSES IN BILLIONS OF U.S. DOLLARS



SOURCE: MUNICH RE, SWISS RE, 2005, SIGMA FIGURES AS OF 12/20/05

# Where We Are - Peak Oil



Source: Dr. Donald Aitken, ISES/ASES World Solar Congress 2005



Excerpted from,  
and a Sign of  
"The Times..."

And I didn't  
have to make  
this up...

From **The Times**

June 14, 2008

## Scientists find bugs that eat waste and excrete petrol

Silicon Valley is experimenting with bacteria that have been genetically altered to provide 'renewable petroleum'



Some diesel fuel produced by genetically modified bugs

### TIMES RECOMMENDS

- > Prince Philip attacks big families
- > Take a dip in Dubai-on-Thames
- > Eco Worrier: How can I persuade my husband to use a push mower?

### BLOG: GREEN CENTRAL

He means bugs. To be more precise: the genetic alteration of bugs – very, very small ones – so that when they feed on agricultural waste such as woodchips or wheat straw, they do something extraordinary. They excrete crude oil.

Unbelievably, this is not science fiction. Mr Pal holds up a small beaker of bug excretion that could, theoretically, be poured into the tank of the giant Lexus SUV next to us. Not that Mr Pal is willing to risk it just yet. He gives it a month before the first vehicle is filled up on what he calls "renewable petroleum". After that, he grins, "it's a brave new world".

Mr Pal is a senior director of LS9, one of several companies in or near Silicon Valley that have spurned traditional high-tech activities such as software and networking and

Barrier Reef?

### US WEATHER



Iowa Governor Chet Culver warns of "a 500-year type of event" after record flooding

[Slide Show](#)

It may not be  
Science Fiction  
but it surely is a  
Brave New World!

# *Not Just Energy - Water and Energy are Linked*

There is a large energy component to water,  
and a large water component to energy...



## *Where we are - at a Crossroads*



## *Life After Cheap Energy & a Stable Climate*

We would provide a lot of information about energy security issues, climate change, ecological footprint, population, impacts of various materials and processes.

It's not hard any more to make the case that we have a constellation of extremely difficult challenges facing us and the built environment is a significant part of the problem.

Then we'd talk about how we think about these things...

## *Life After Cheap Energy & a Stable Climate*

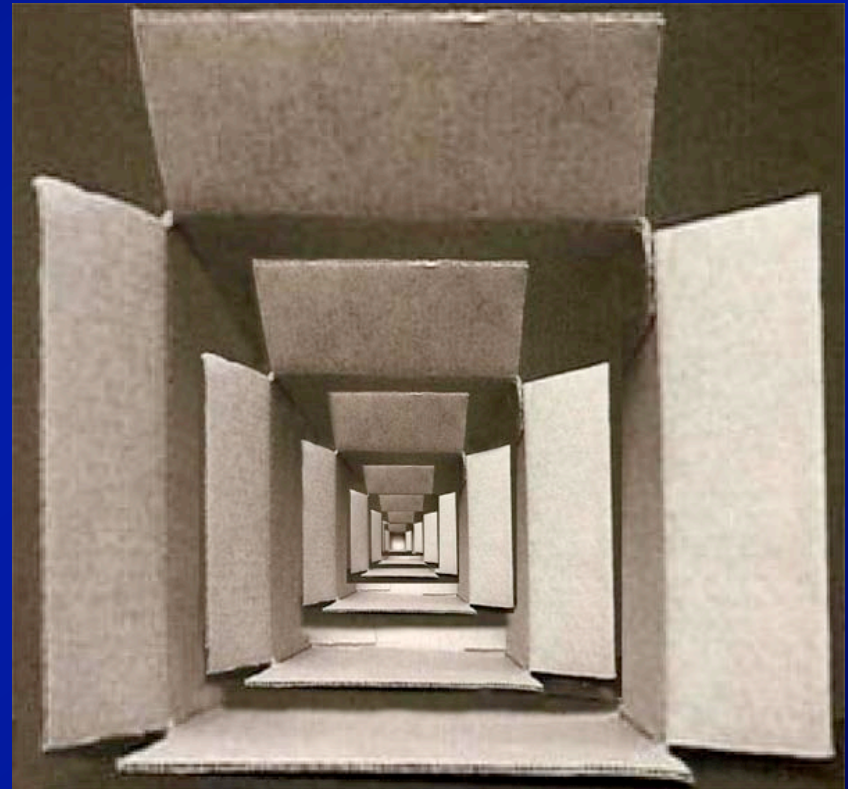
We can't rely on our past assumptions about progress, technology, risk, standard of living, national security, global security, trade, or economics. It is all changing.

Today's energy and climate realities are stunning and stark. We have crucial choices to make and not much time to make them. We have what we need to find a safer path forward but to choose it, we have to ***change our minds*** and ***then change our behaviors...***

## *Get Out of the Box*

We often hear that we need to think "outside the box" to deal with our problems today.

But it's a process -  
expand your field of view,  
get out of the box you're in  
...into the next bigger box.



# *A Focus Shifting Template - The Usual Stuff*



The list of things  
that always hold  
your attention

# A Focus Shifting Template - ~~What's Missing~~

Things you used to think about

Linkages to related realms

Linkages to unrelated realms

Internalized risks

Externalized risks

Unintended  
Consequences

The list of things  
that always hold  
your attention

Delayed impacts

Internalized benefits

Externalized benefits

Important stuff you  
don't yet know

Important stuff you  
know that isn't true

Things you never thought about but should



## *See the Details AND the Big Picture...*

To get out of boxes requires knowing if you're working in the details or the big picture, in the past, present or future, and constantly shifting your focus back and forth.

That helps keep things in perspective and proportion, enabling us to see the *things* as well as the *relationships* between them.



# *The Purpose of Building Codes*

International Building Code (USA) - 2000 edition

101.3 ***The purpose of this code is to*** establish the minimum requirements to ***safeguard the public health, safety and general welfare*** through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property ***from*** fire and other ***hazards attributed to the built environment.***

**Big Picture in White - Details in Blue**

# *What's Protected and What's at Risk?*



Modern building codes enable us to design and build structures that are safe for their occupants, making it seem that we've eliminated or greatly reduced the risks associated with buildings.

# *What's Protected and What's at Risk?*

We've just moved those risks in space and time:

- away from the building site, and
- into the future.



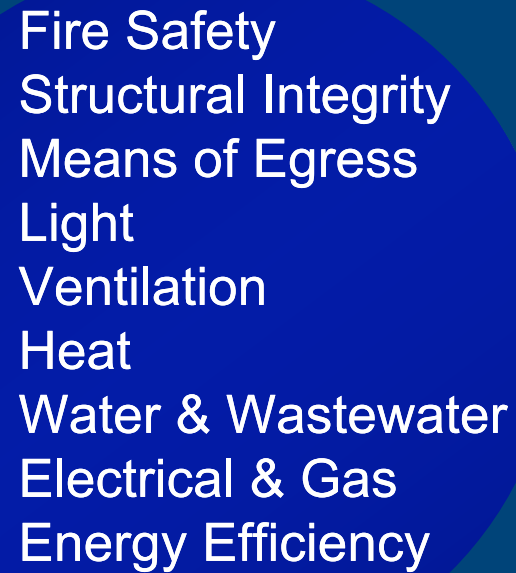
## *Big Problems Hidden in Plain View*

Looking at buildings through codes is like looking through a microscope. The individual, building-related risks fill the field of view.

But, it's like dealing with risk with tweezers, while creating many orders of magnitude greater, generalized risk for everyone, including all future generations.



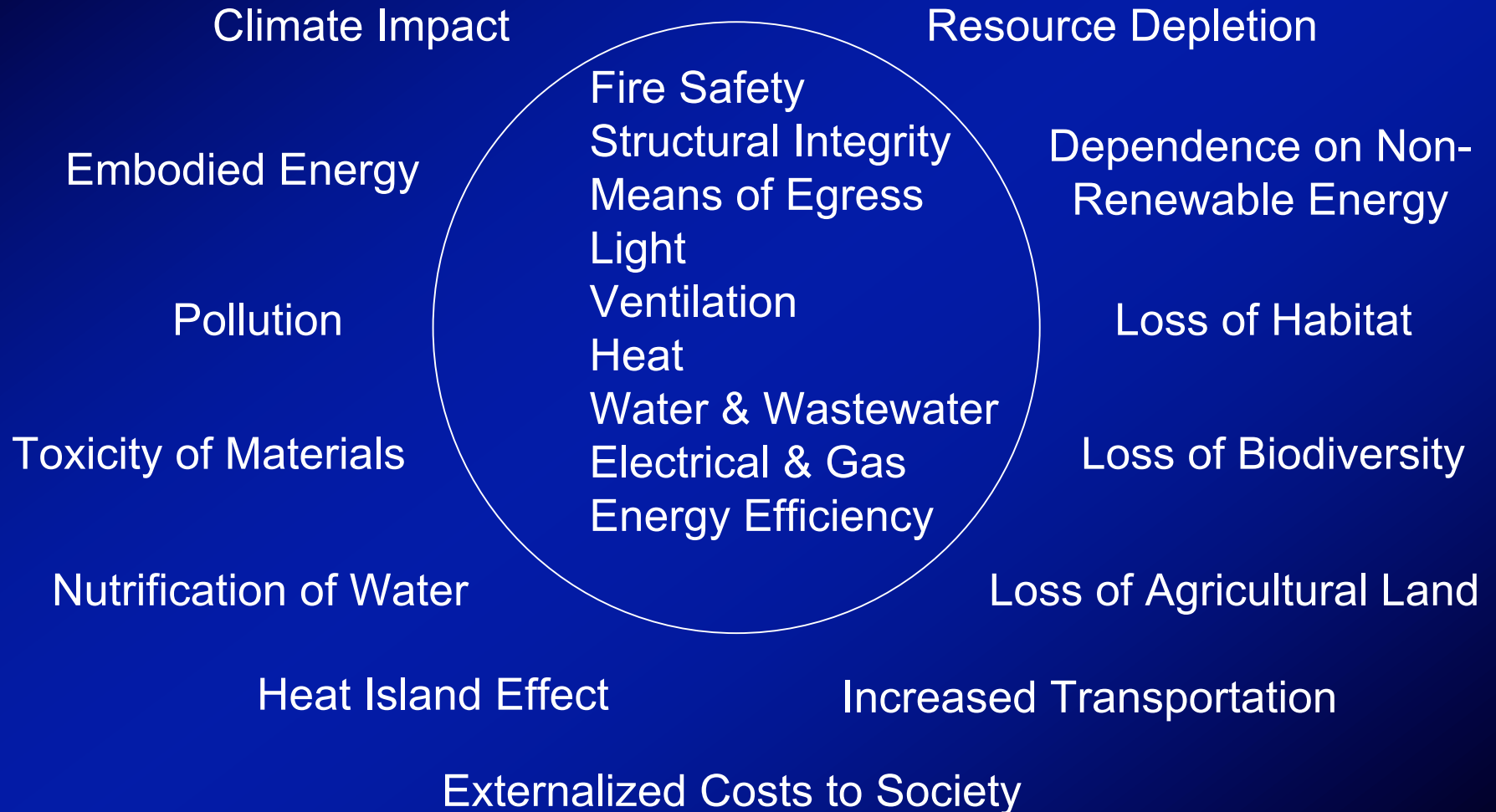
# *Risk - Through the Microscope of Codes...*



Fire Safety  
Structural Integrity  
Means of Egress  
Light  
Ventilation  
Heat  
Water & Wastewater  
Electrical & Gas  
Energy Efficiency

# *Risk - The Bigger Picture...*

## Risks to Future Generations



## *Buildings are Complex Systems of Systems*

*English does not contain a suitable word for "system of problems." Therefore I have had to coin one. I choose to call such a system a "mess." The solution to a mess can seldom be obtained by independently solving each of the problems of which it is composed.* - Russell L. Ackoff

Or, more simply put...

*Optimizing components in isolation tends to pessimize the whole system.*

- Paul Hawken, Amory & L. Hunter Lovins



## *How to Not Pessimimize the System?*

Building codes typically optimize components of a building in isolation, often pessimizing both the building and the systems to which it's connected.

To truly optimize buildings requires considering the whole system of systems. All technologies need to be viewed this way, to include their whole risk/benefit profile.

## *What Buildings Should and Shouldn't Do...*

Building codes could be a set of principles for what buildings should and shouldn't do...

A good first principle would be a corollary of the Hippocratic Oath; buildings should first do no harm.

To consider the harm a building might do requires looking at the impacts from its entire lifecycle...

# Acquisition of Resources through Demolition & Beyond



# *We Need to Ask New Questions about Risk*

What?  
Where?  
To Whom?  
When?  
How?  
How Long?  
How Much?  
Reversible?  
Necessary?  
At What Cost  
and to Whom?  
We can't get where we need to be by avoiding risk...



## *The Task Before Us...*

We have to acknowledge that there are risks in all that we do. Until we can see the whole risk profile, however, we will not be able to make good decisions about which risks are worth taking.

Our task is to keep revealing what we now know is true, not claiming that what we do is risk-free. We need to make clear that we've recognized a much larger set of risks than the regulators and we're trying to address them as well as their concerns.

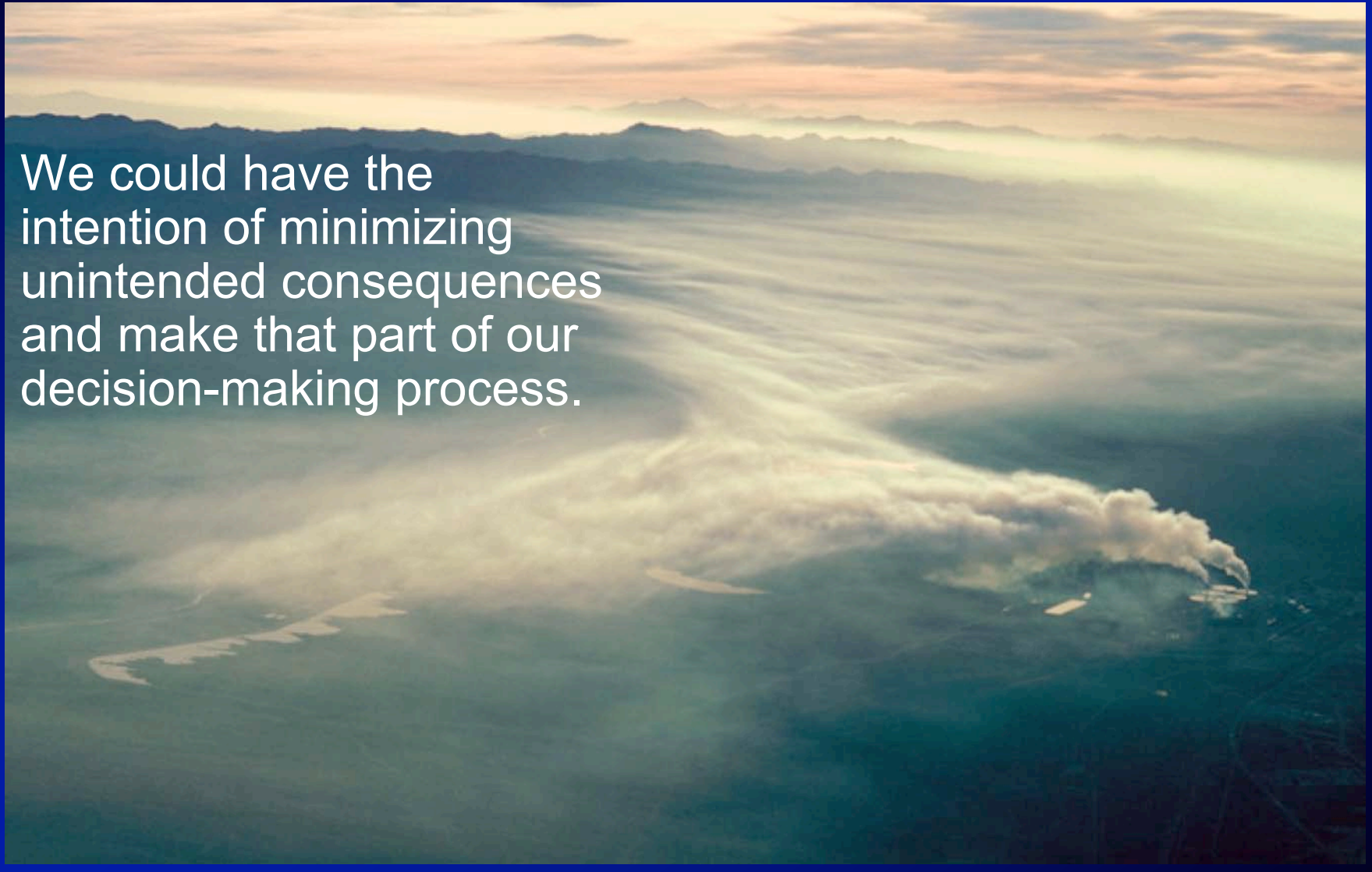
## *The Great Modern Myth*

We need to recognize and address the great modern myth - that we know what we're doing and are in control. We don't and we're not...



# *Addressing the Great Modern Myth*

We could have the intention of minimizing unintended consequences and make that part of our decision-making process.



## *Addressing the Great Modern Myth*

Thinking deeply about our choices of materials and systems might lead us to develop a preference for doing things as locally as possible, as simply as possible, and doing as little as possible of those things that we know are harmful or about which our knowledge and understanding is limited.





## *A Place to Start*

Appropriate technology - the lowest or simplest level of technology that can do the job well.

Appropriateness relates to where and for what purpose technology is used and the social, economic, and ecological context.

Truly appropriate technology doesn't make people or their communities dependent on systems over which they have no control. This means technologies that enhance the local capacity to meet local needs - in a lower energy world this is the foundation for security and sustainable communities.

## *Relocalization*

Doing things locally is important for many reasons, but first and foremost, the feedback loops are shorter and much higher quality. You're much more likely to run into the unintended consequences of your actions.

## *Relocalization*

If *security* is a goal, strengthening regional and local self-sufficiency is an essential strategy for us and for everyone else, everywhere else.

Enhancing the local capacity of people and their communities to meet their own needs, also:

- shortens vulnerable supply lines
- creates more robust & resilient supply systems
- supports vital, durable local economies, and
- supports healthy cultural, political, and social structures

## *Relocalization*

When we don't have inexpensive, abundant energy to drag materials around the world, process them as much as we imagine we need to, and then drag them around some more, it will become crucial that we learn, once again, how to use well those resources that are available to us where we live...

The rules and the way we think about risk and benefit will have to change - to become more nuanced, more inclusive, and more responsive.

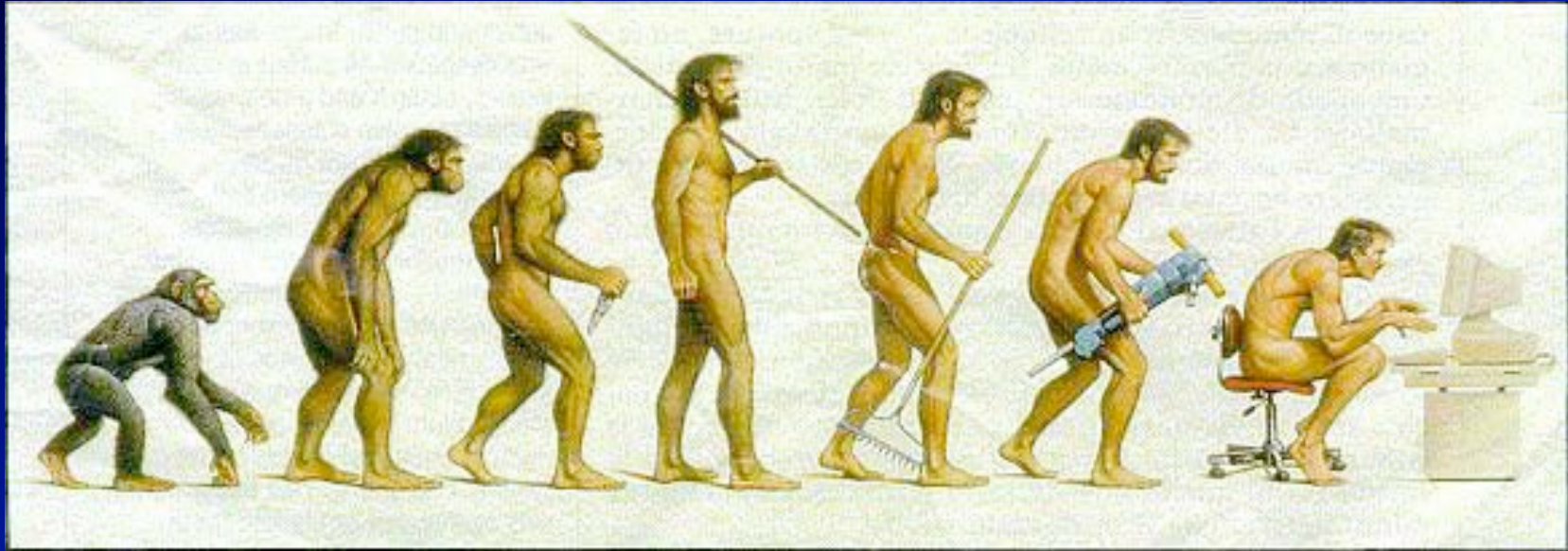
## *Some Tools and Resources*

The relocalization movement is a key part of the shift toward sustainable development and true security. This includes energy, materials, food, economic development and more. Check out these websites for more information:

[www.relocalize.net](http://www.relocalize.net)

[www.postcarbon.org/informed/relocalization](http://www.postcarbon.org/informed/relocalization)

# *And We Keep Asking Questions...*



Why do all our systems appear to be designed to make the world safe for technology and capital?

# *Making the World Safe for Technology?*

What if we understood that our task as human beings on this planet is to make the world safe for all life forever...



## *Some Questions We Should Be Asking*

Does this choice or action:

enhance or undermine your capacity to meet your needs locally/regionally?

create benefit without making you dependent on systems over which you have little or no control?

transfer wealth out of the community?

embed you and others in your community or displace or compel people to become transient?



## *Some Questions We Should Be Asking*

Does this choice or action:

enhance or destroy equity - both the social and cultural equity related to fairness and justice, and the tangible physical/economic benefits of belonging to and being "invested in" a place-based community?

promote or undermine health - your health, the health of your family, your neighbors, your community, region, nation and the health of people and living systems anywhere in the world?

## *Some Questions We Should Be Asking*

Does this choice or action:

increase or decrease the level of unintended consequences flowing from what you are doing?

increase or decrease your awareness, comprehension and ability to mitigate the unintended consequences of what you are doing?

bring people together or drive them apart?

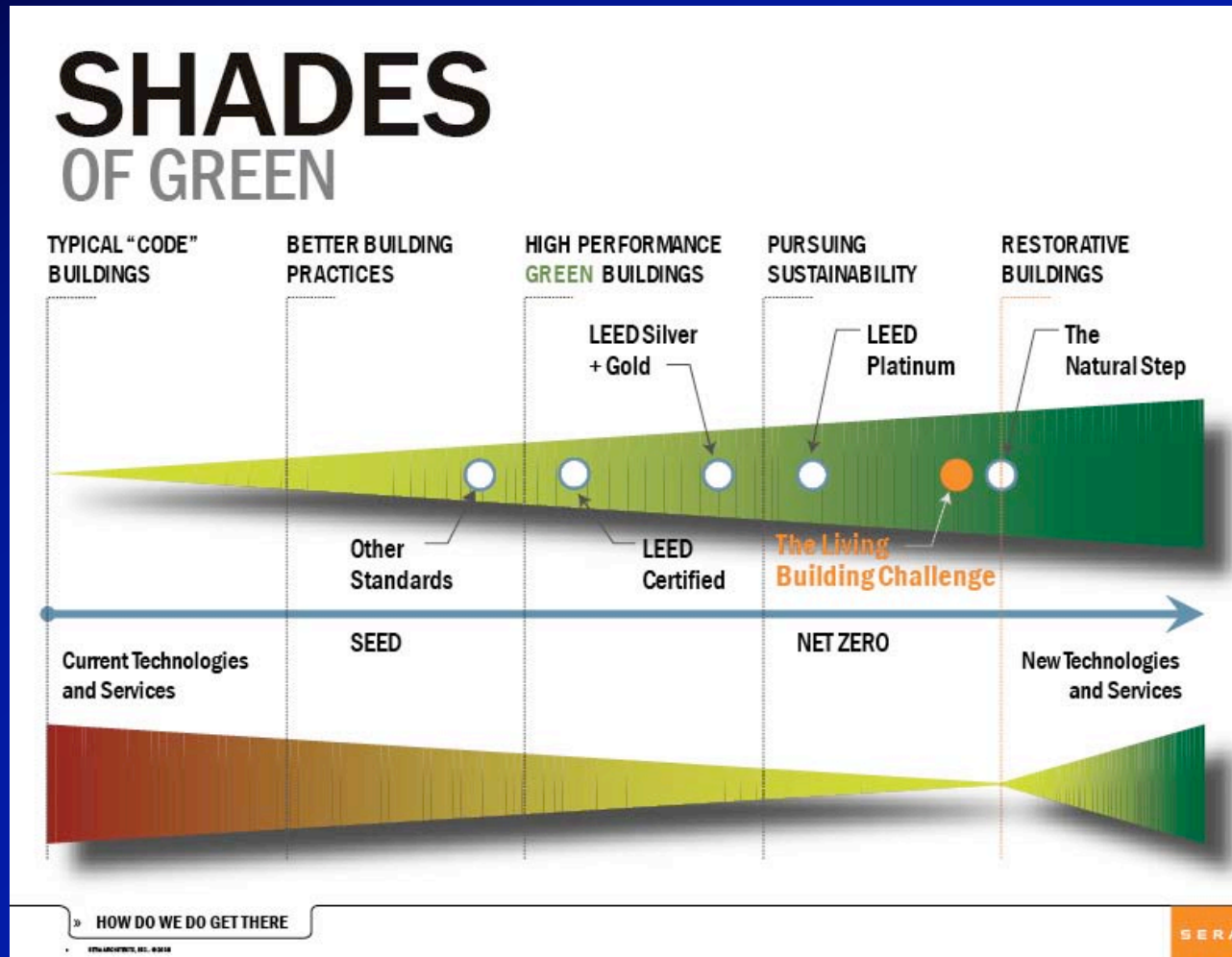
## *Some Questions We Should Be Asking*

Does this choice or action:

cause offense, concern, or harm?

bring joy and/or satisfaction to you and to everyone effected by it?

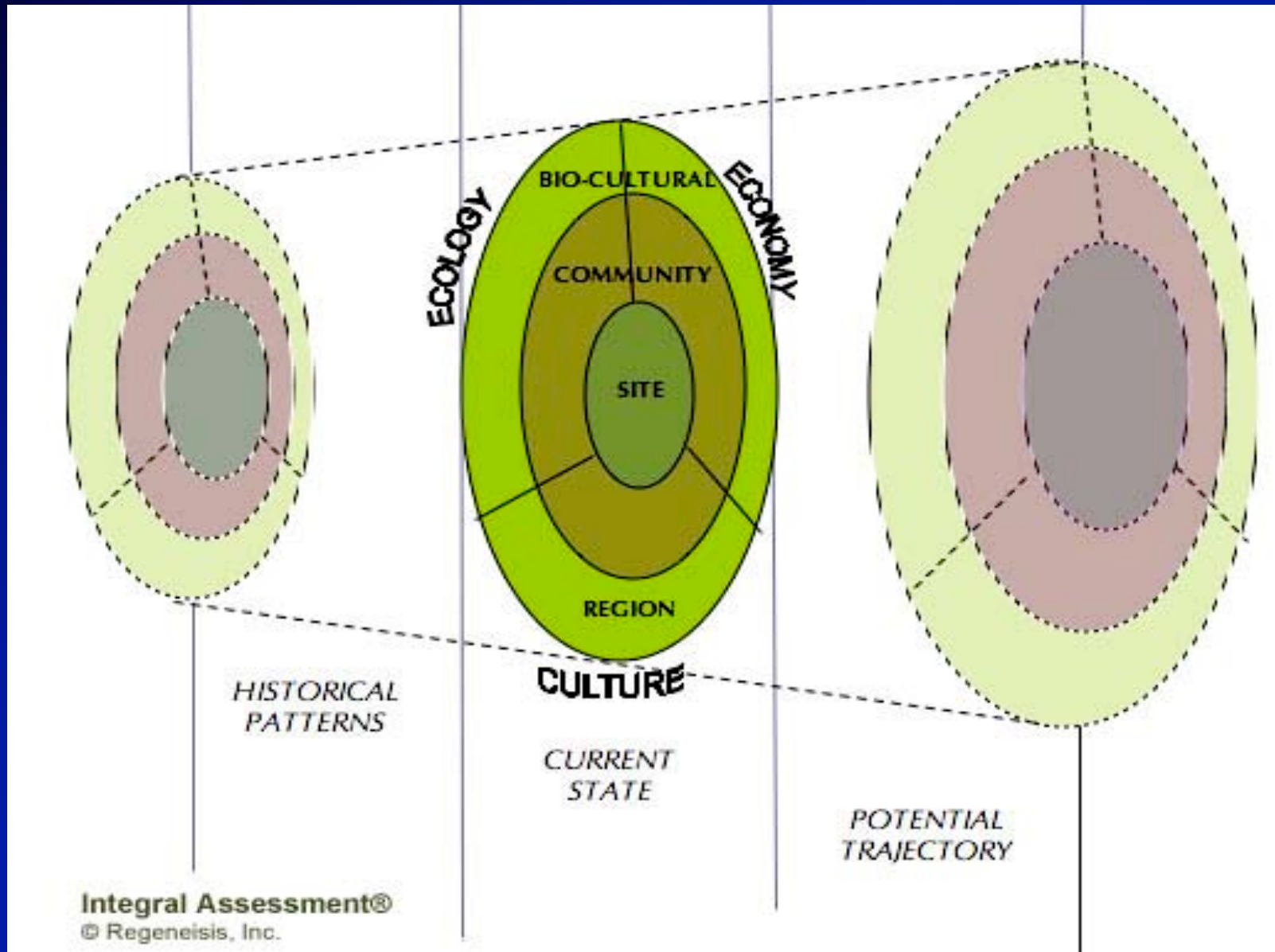
# The Larger Context

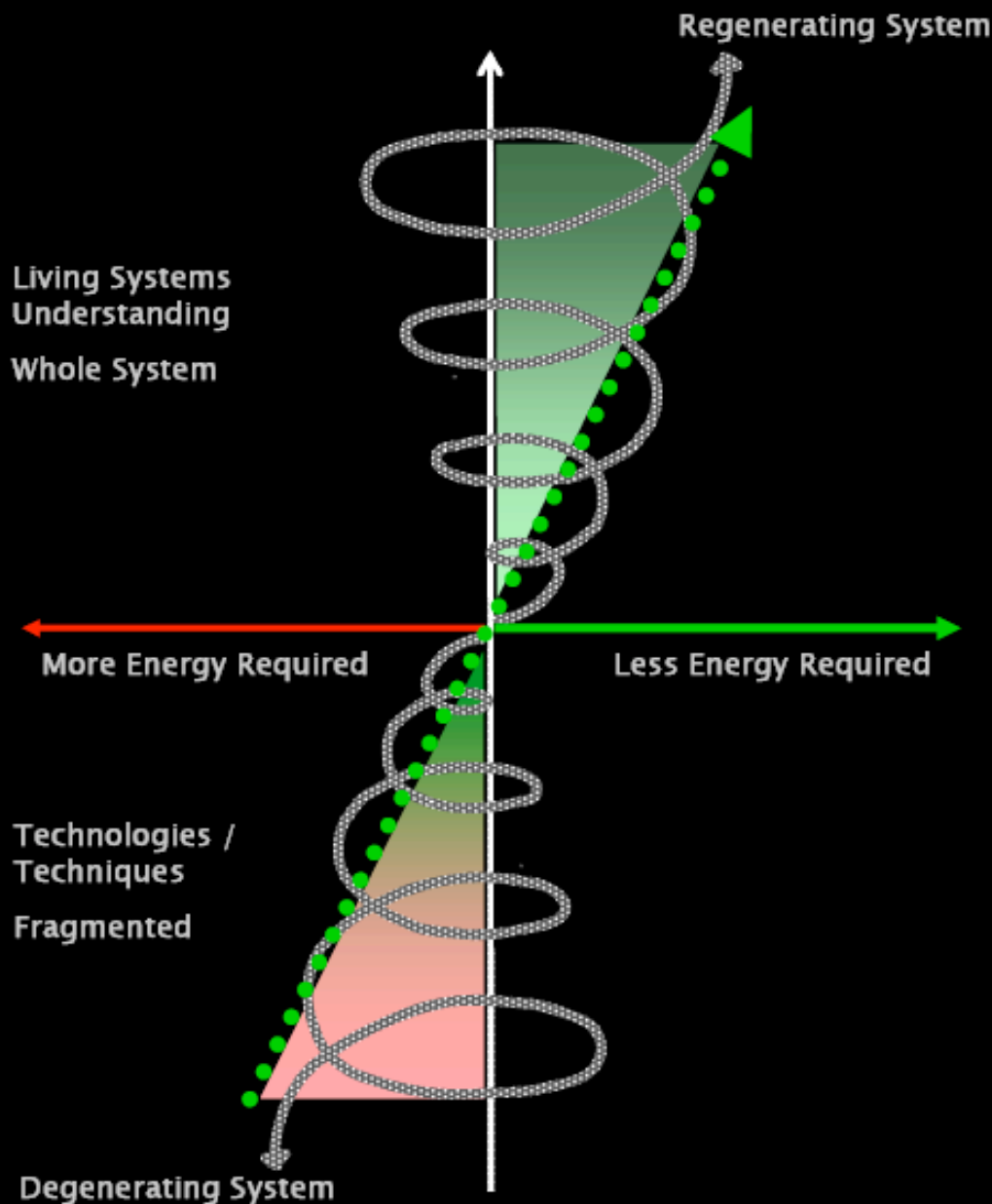


Source: SERA Architects, Portland, OR - 2008

Development Center for Appropriate Technology - 2008

# *This is a Trajectory not a Target*





## Regenerative

Humans (Hominids)  
**PARTICIPATING AS** nature –  
 Co-evolution of the Whole  
 System

## Restorative

Humans **DOING THINGS**  
**TO** nature – assisting the  
 evolution of Sub-Systems

## Sustainable

Neutral –  
 “100% less bad” (McDonough)

## Green

Relative Improvement  
 (LEED, GB Tool, Green Globe, etc.)

## Conventional Practice

“One step better than  
 breaking the law” (Croxtan)

# Trajectory of Environmentally Responsible Design



Truly restorative and regenerative projects demand a fundamentally different mindset; a commitment to honor the essence of each place we inhabit and to enhance the evolutionary capacity, vitality and health of both the natural and human systems.

# The Living Building

*The metaphor of the flower...*

- Harvests all its own energy and water
  - Adapted to climate and site
  - Operates pollution free
  - Promotes health and well-being
  - Comprised of Integrated Systems
  - Is Beautiful
- [www.cascadiagbc.org/lbc](http://www.cascadiagbc.org/lbc)



**The Living Building Challenge**  
In Pursuit of True Sustainability in the Built Environment



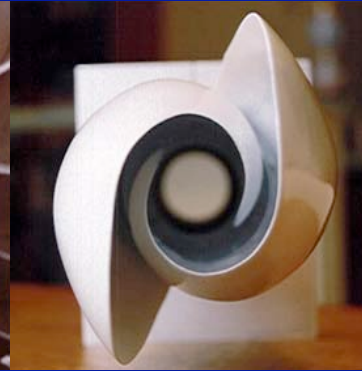
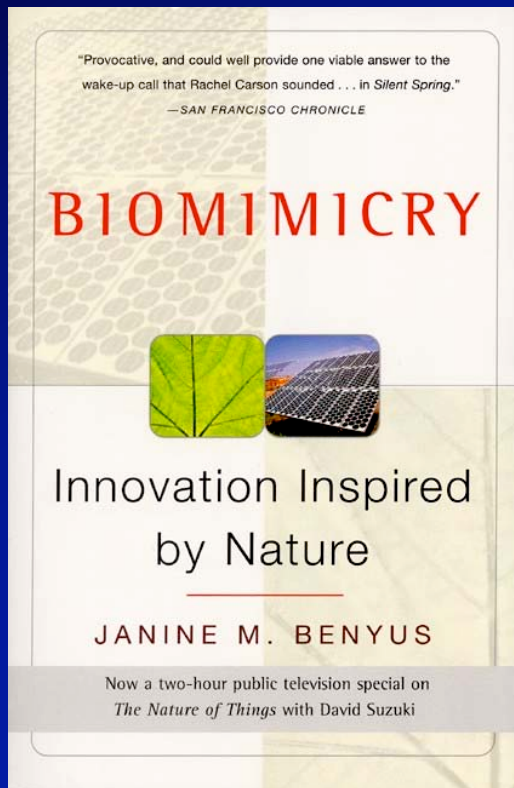


## Summary of Prerequisites

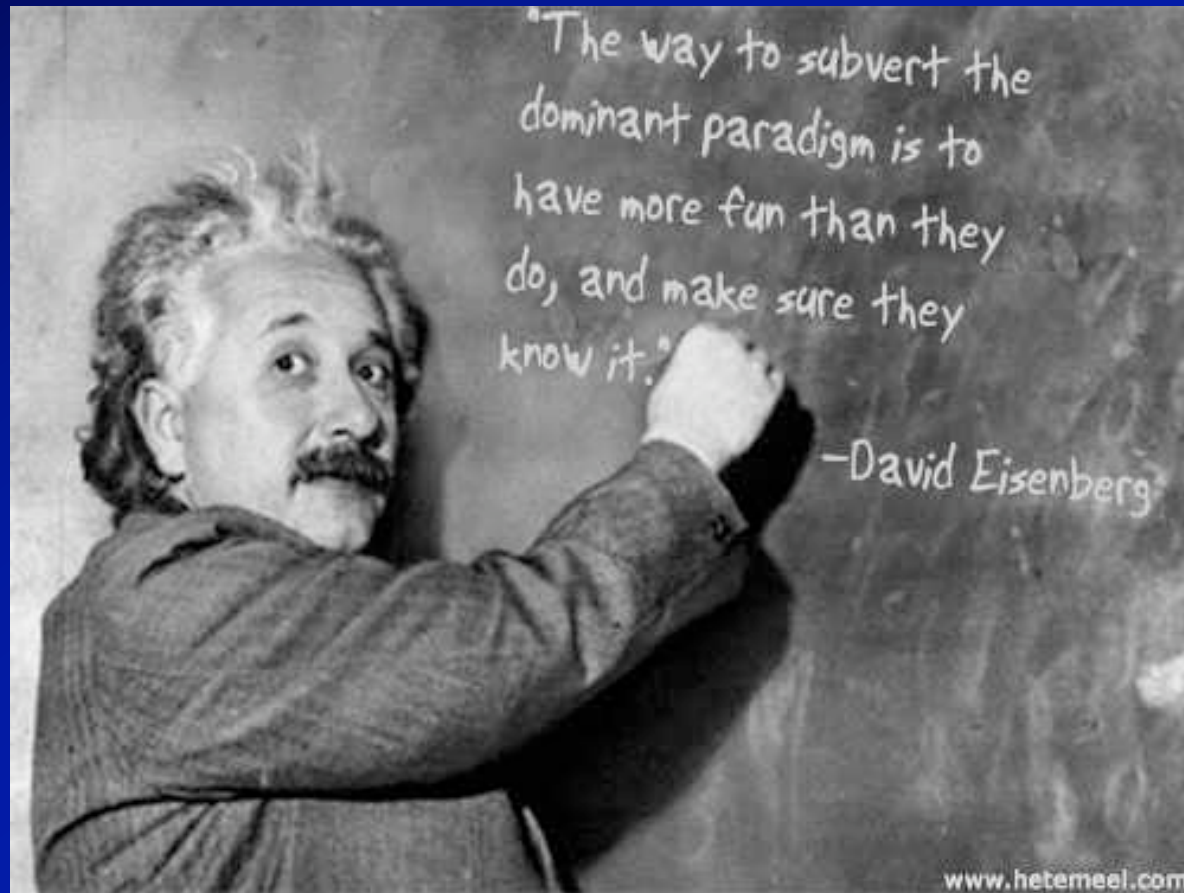
Number	Category	Prerequisite
One	Site Design	Responsible Site Selection
Two	Site Design	Limits to Growth
Three	Site Design	Habitat Exchange
Four	Energy	Net Zero Energy
Five	Materials	Materials Red List
Six	Materials	Carbon Footprint
Seven	Materials	Responsible Industry
Eight	Materials	Appropriate Materials Radius
Nine	Materials	Construction Waste
Ten	Water	Net Zero Water
Eleven	Water	Sustainable Water Discharge
Twelve	Indoor Environmental Quality	Civilized Work
Thirteen	Indoor Environmental Quality	Source Control
Fourteen	Indoor Environmental Quality	Ventilation
Fifteen	Beauty & Inspiration	Design for Spirit
Sixteen	Beauty & Inspiration	Inspiration and Education

# Why Not Look at How We Got Here?

[www.biomimicry.net/](http://www.biomimicry.net/)



## *And Remember -*





*Thank you!*

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And please visit our website:  
[www.dcat.net](http://www.dcat.net)

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