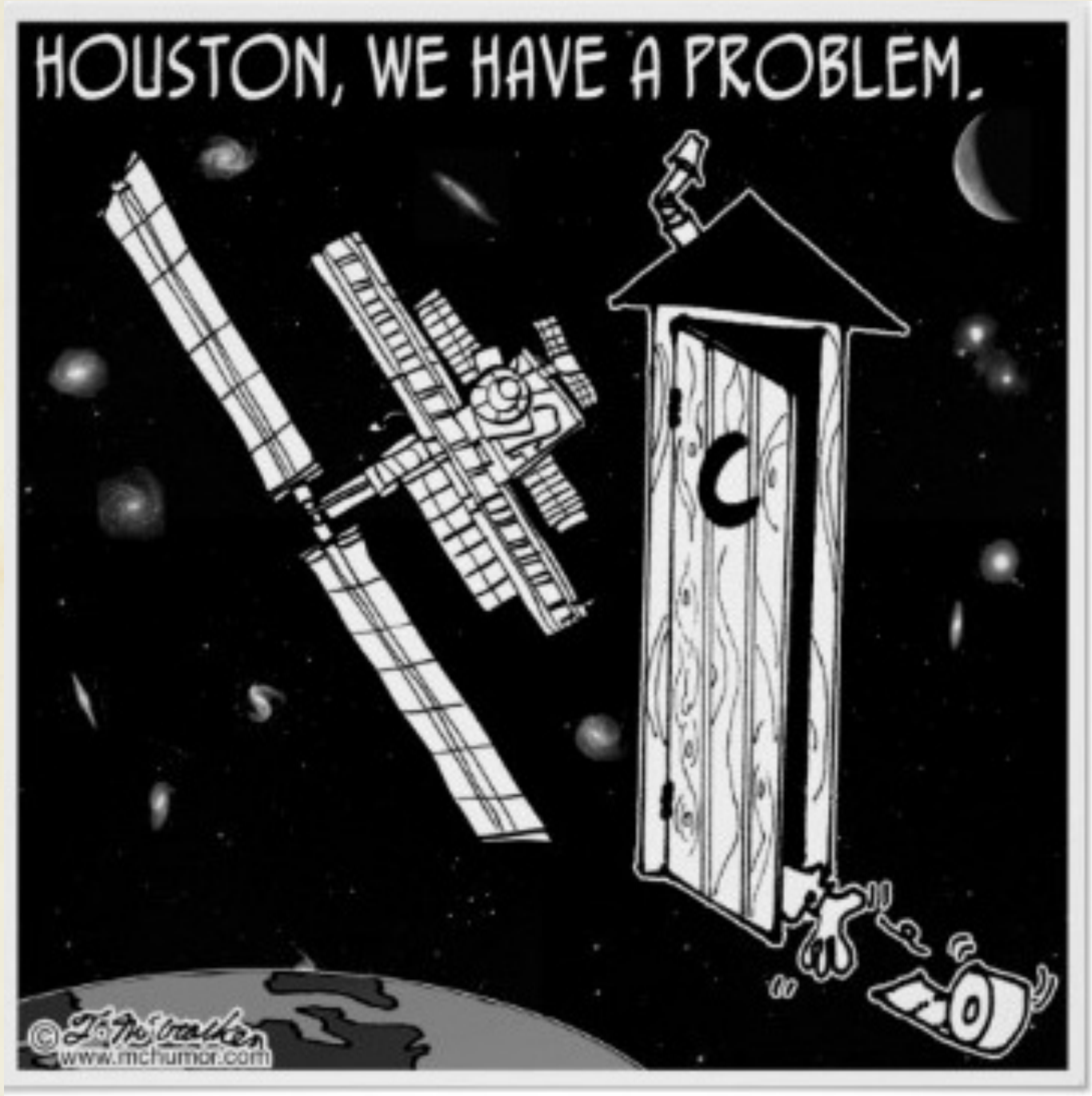
Role of Natural Resource Literacy in Ecological & Restoration success.

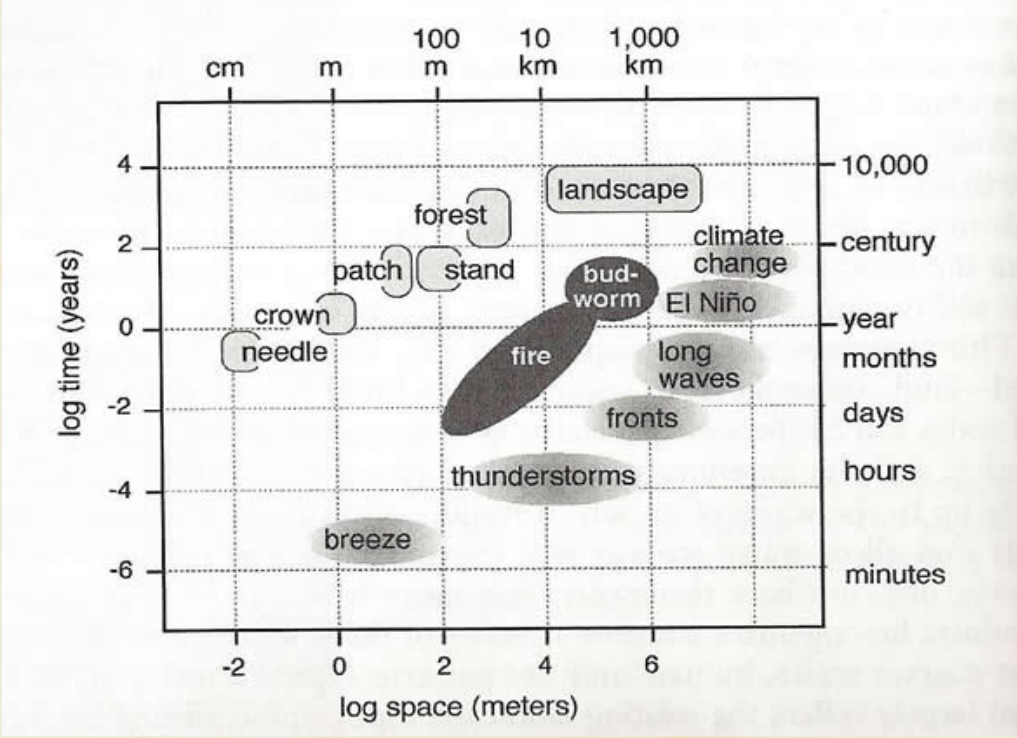
A Bunch of Us, and More Coming


HOUSTON, WE HAVE A PROBLEM.
www.mchumor.com

1969 Perspective

Ecological scale

- **Refers to the spatial and temporal dimensions of an object, process or problem**

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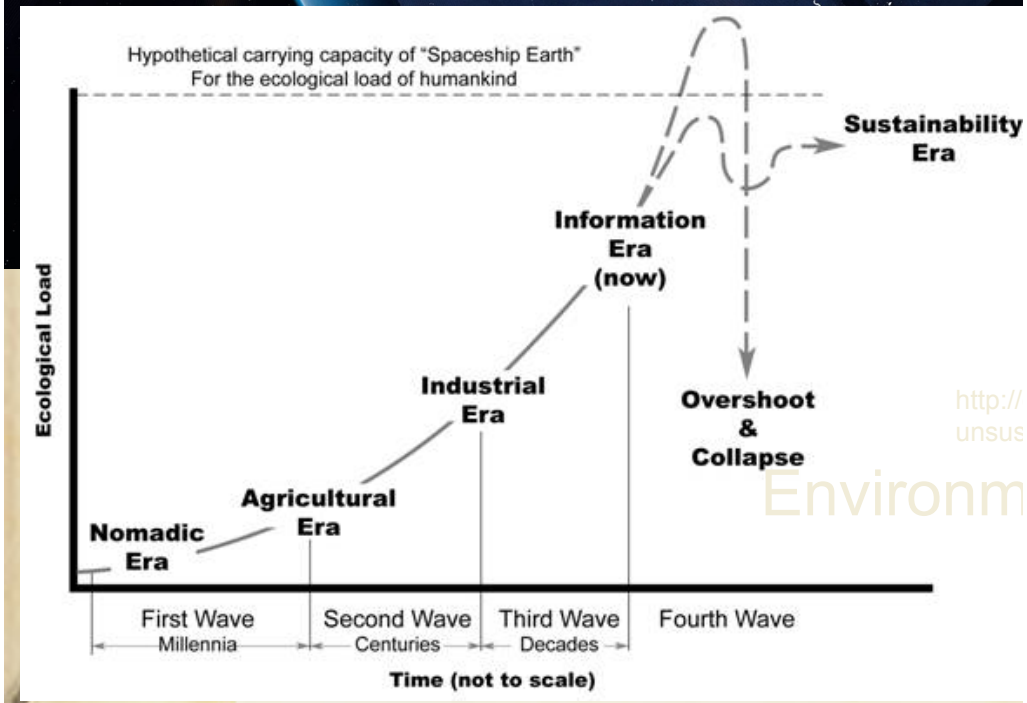
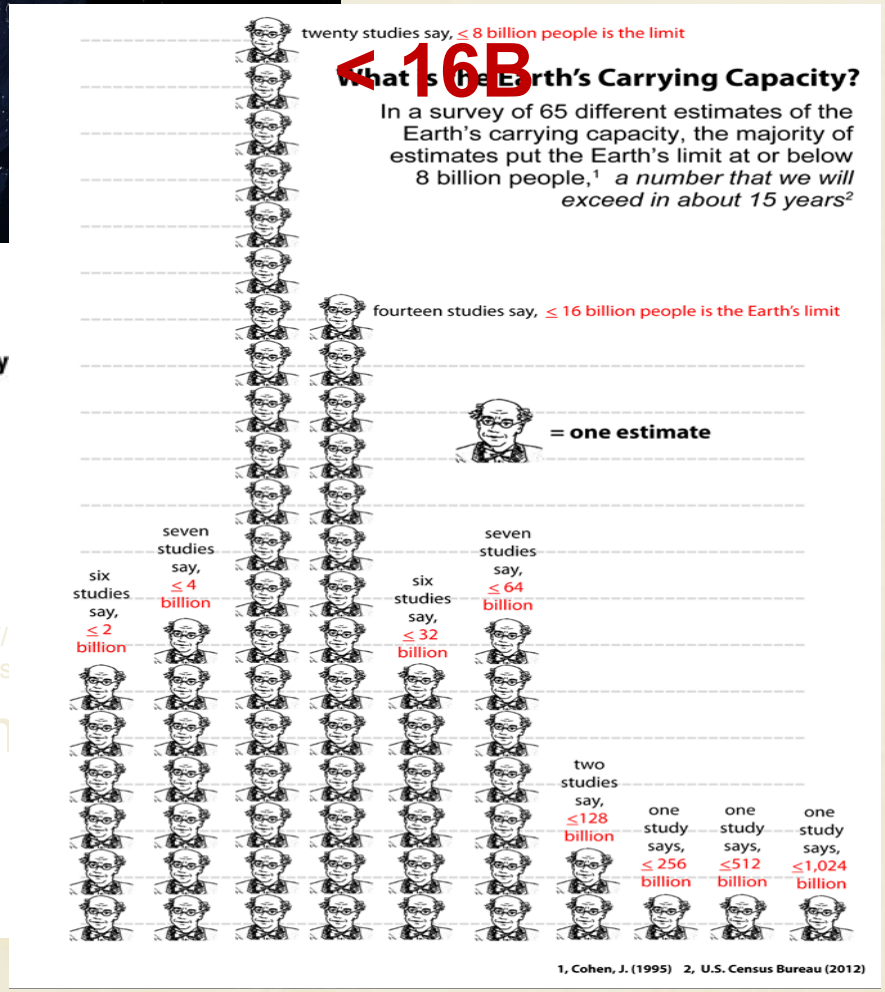
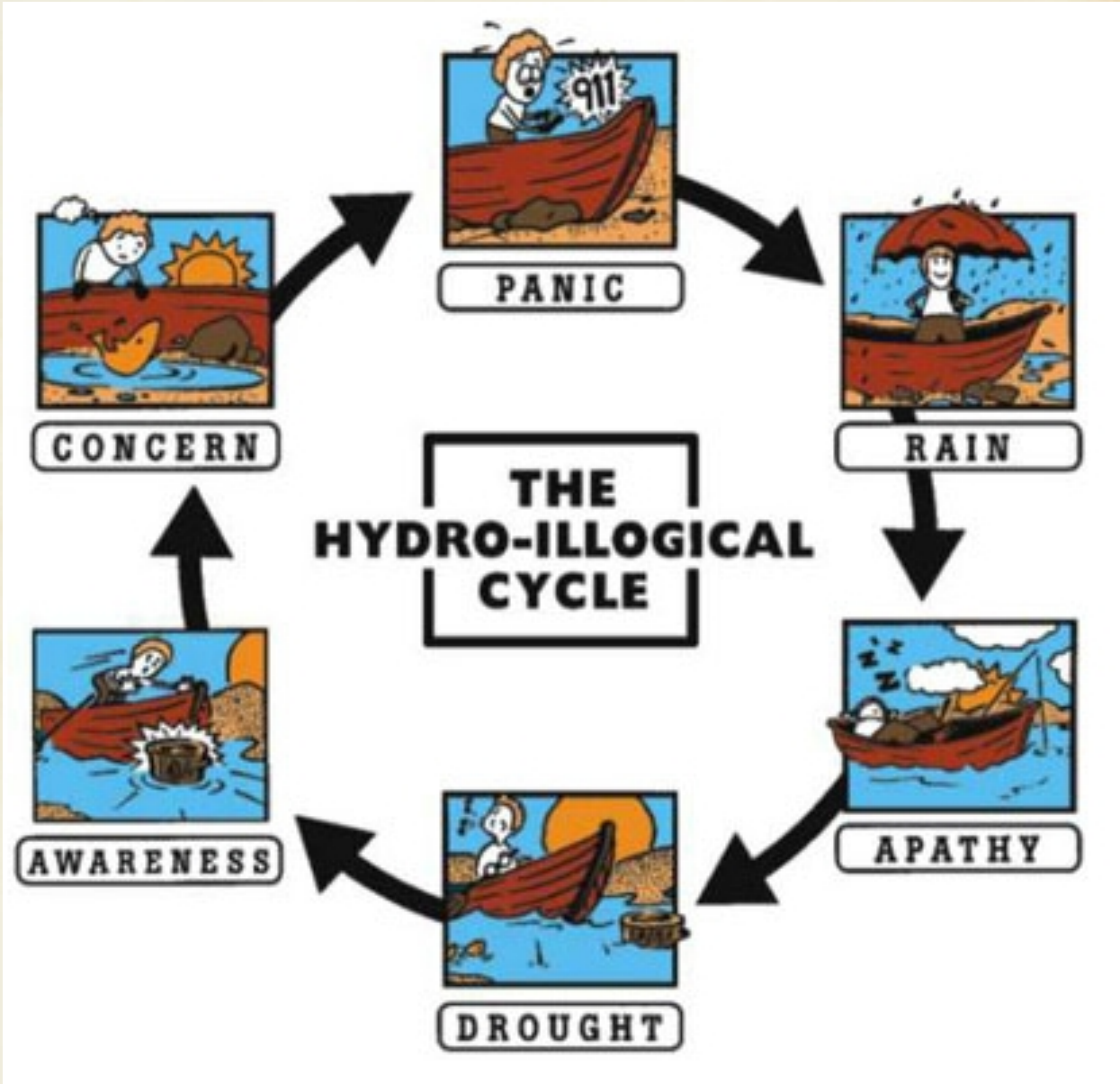
WELCOME TO
EARTH
POP. 6,000 000 000 000 00

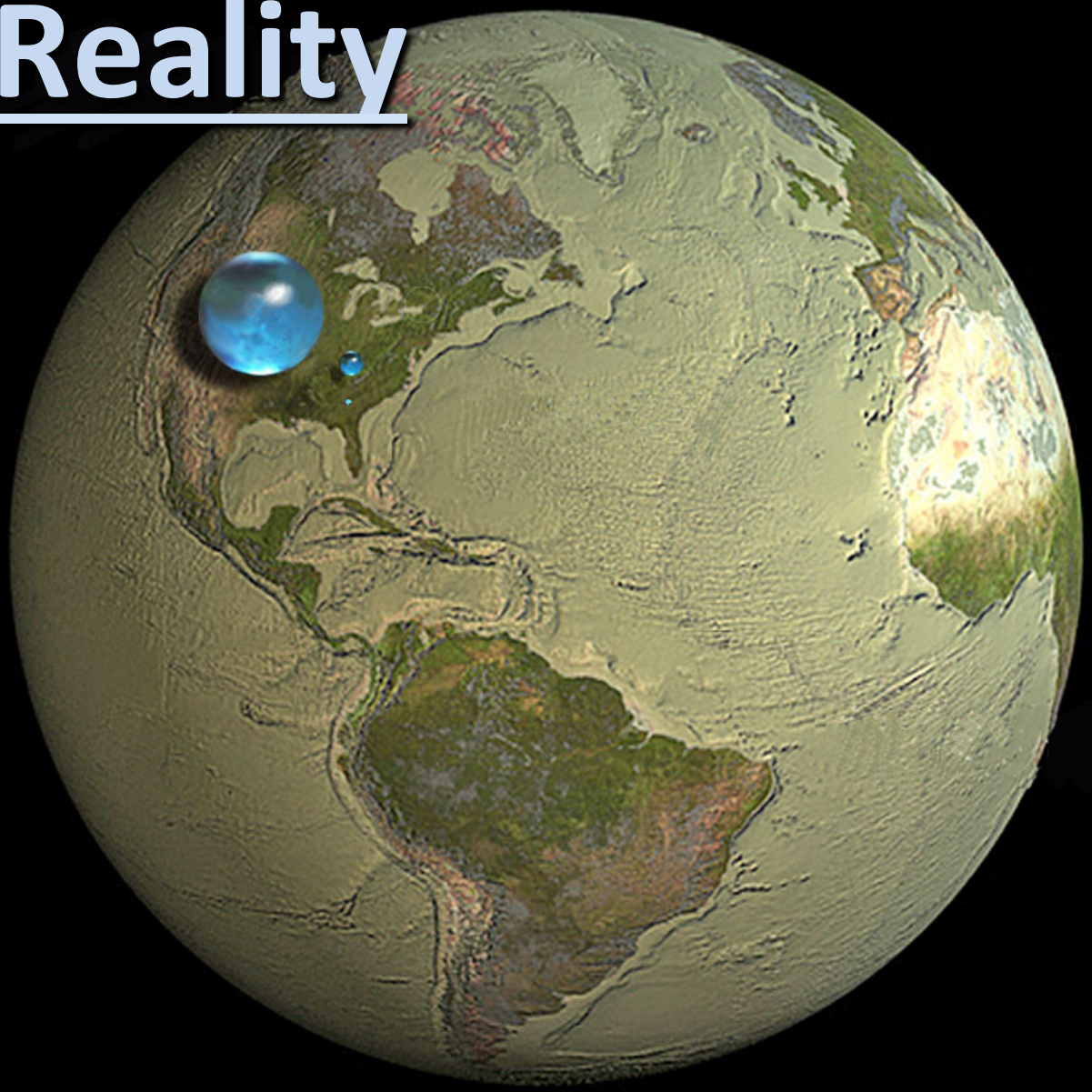

Hypothetical carrying capacity of "Spaceship Earth"
For the ecological load of humankind
Sustainability Era
Information Era (now)
Industrial Era
Overshoot & Collapse
Agricultural Era
Nomadic Era
Ecological Load
First Wave
Millennia
Second Wave
Centuries
Third Wave
Decades
Fourth Wave
Time (not to scale)


< 16B
twenty studies say, ≤ 8 billion people is the limit
What is the Earth's Carrying Capacity?
In a survey of 65 different estimates of the Earth's carrying capacity, the majority of estimates put the Earth's limit at or below 8 billion people,[1] a number that we will exceed in about 15 years[2]
fourteen studies say, ≤ 16 billion people is the Earth's limit
= one estimate
six studies say, ≤ 2 billion
seven studies say, ≤ 4 billion
six studies say, ≤ 32 billion
seven studies say, ≤ 64 billion
two studies say, ≤128 billion
one study says, ≤ 256 billion
one study says, ≤512 billion
one study says, ≤1,024 billion
1, Cohen, J. (1995) 2, U.S. Census Bureau (2012)


THE HYDRO-ILLOGICAL CYCLE
PANIC
911
RAIN
APATHY
DROUGHT
AWARENESS
CONCERN

Perception

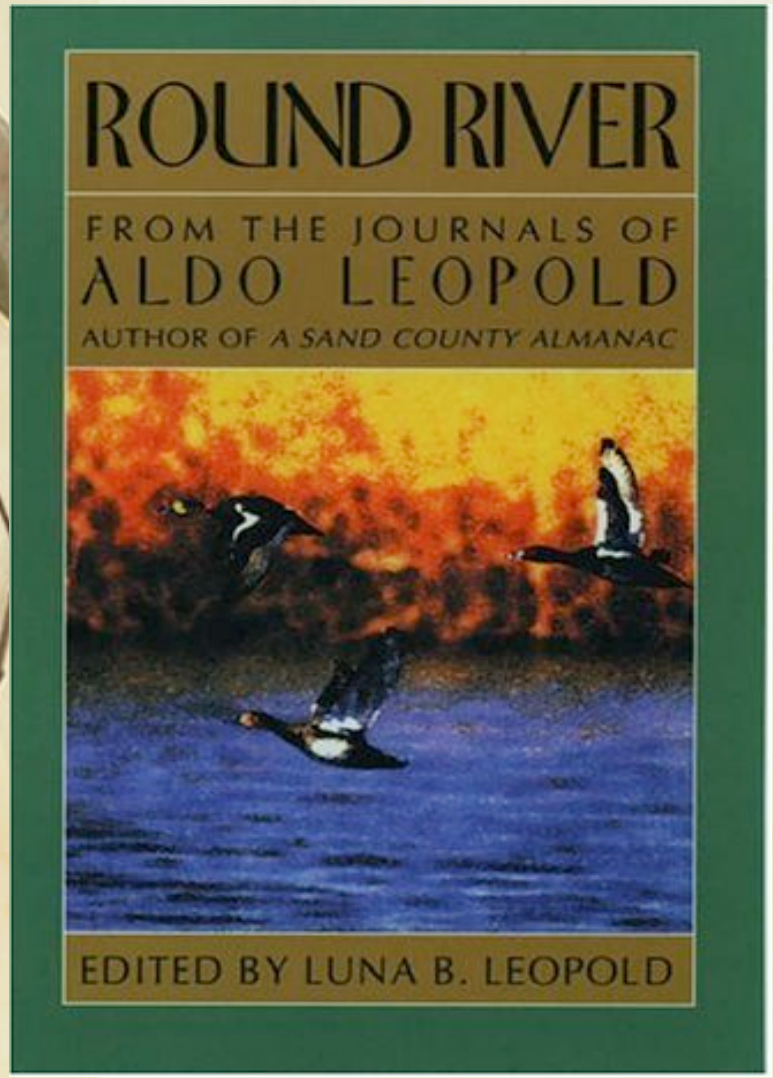
Reality



Millennium Ecosystem Assessment Findings

Finding #1

- Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history
- This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth



- "The last word in ignorance is the man who says of an animal or plant, "What good is it?" ……who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering."

Ecological restoration is *engaging*

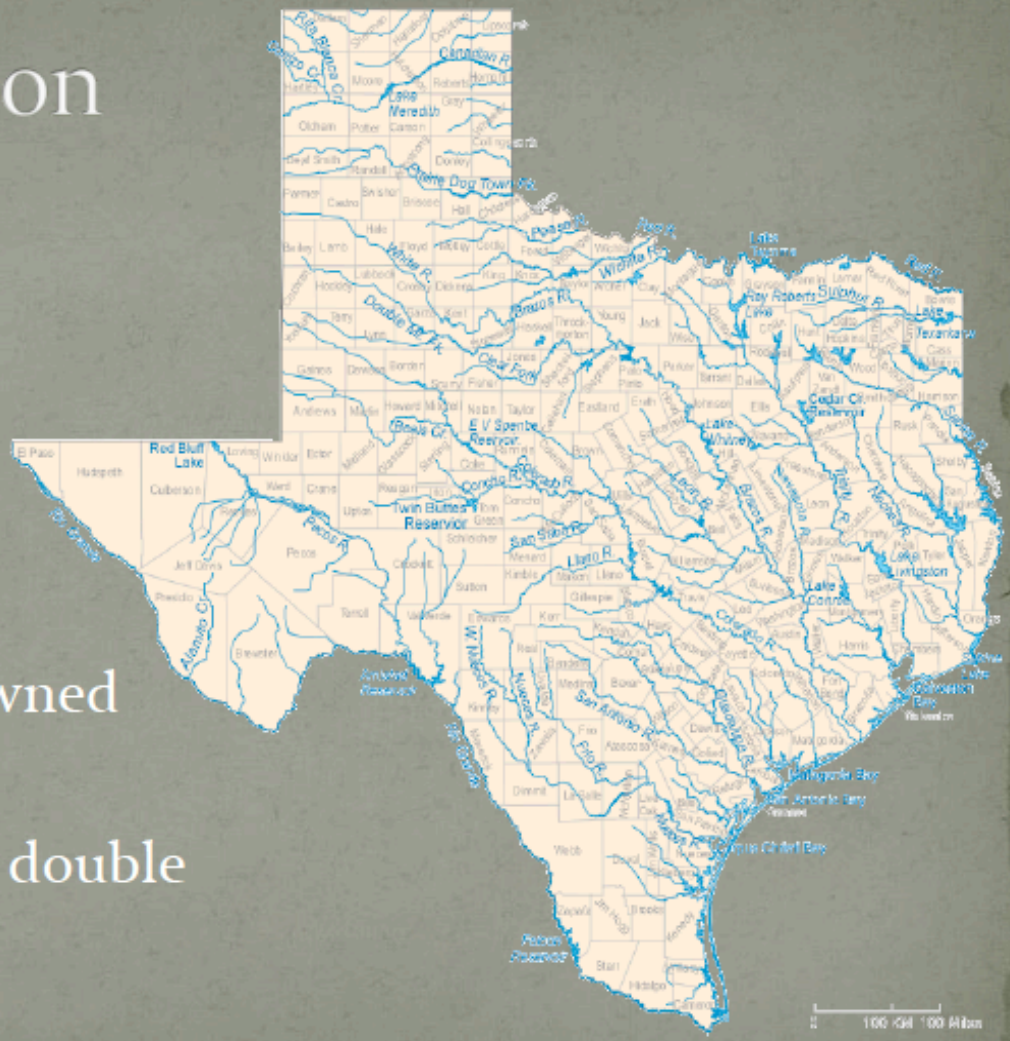
- Provides opportunities for people to connect more deeply with nature

- Enhances their understanding and appreciation of the relationships between cultural and ecological patterns and processes.

- Provides opportunities for community members, individuals, and groups to work together towards a common vision.

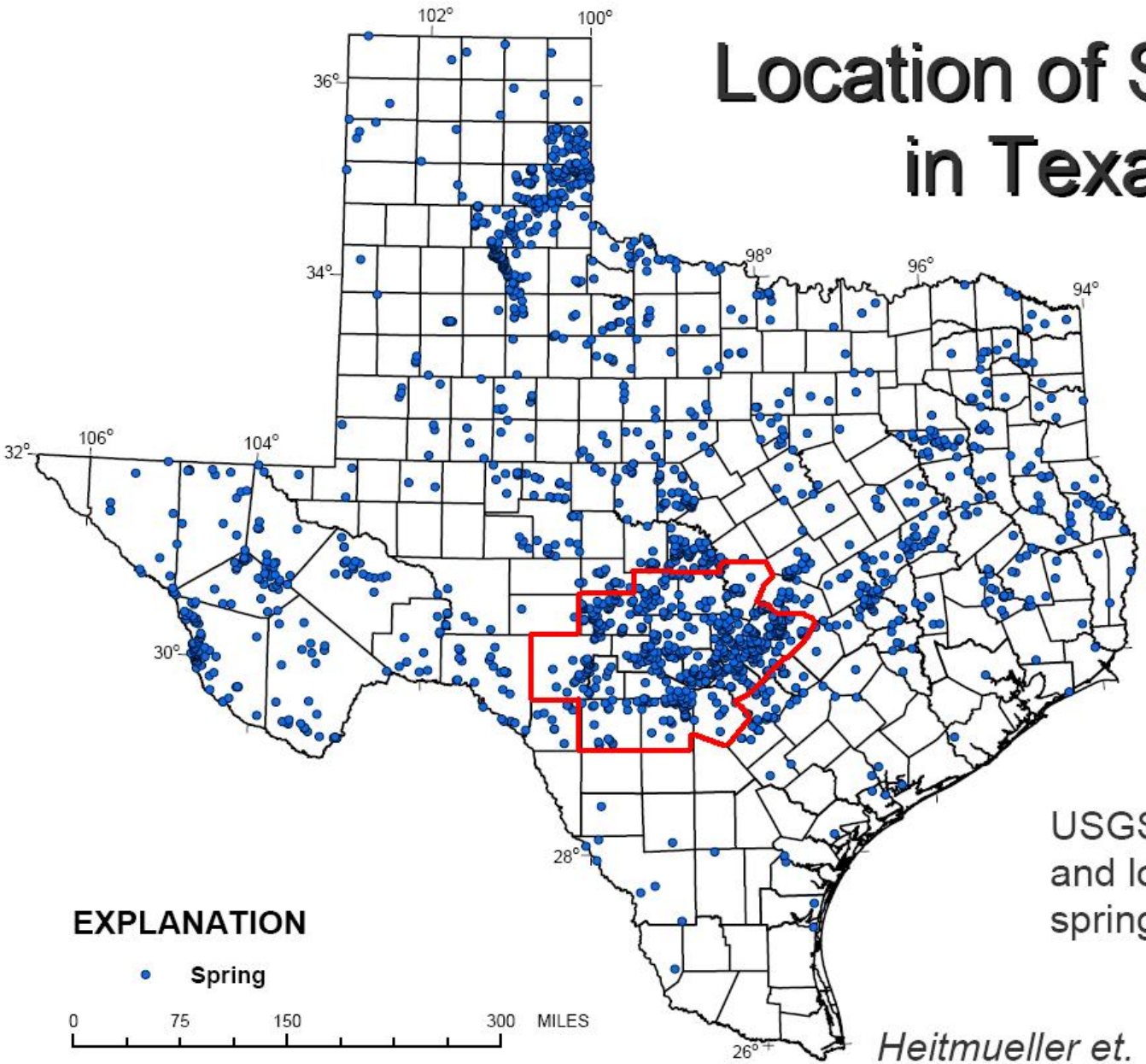
- Assists in promoting community wellness.

Texas Situation



- 95% Privately Owned
- 85% Urban
- Pop. Expected to double in 50 years

Location of Springs in Texas



USGS verified existence and location of 1,891 springs in Texas

Heitmueller et. al (2003)

Threats to Spring Ecosystems

- Aquifer depletion (66/281 major springs-dry)
- Anthropogenic disturbance – pollution
- Invasive species

We think environmental education is important,

95% of Americans and 96% of parents think environmental education should be taught in schools,

We think we know a lot but ……

70% of Americans rate themselves as fairly knowledgeable about environmental issues,

but only ~10% receive a passing grade on a multiple choice quiz of basic knowledge.

What is Environmental Education (EE)?

"teaches children and adults how to learn about and investigate their environment and to make intelligent, informed decisions about how they can take care of it."

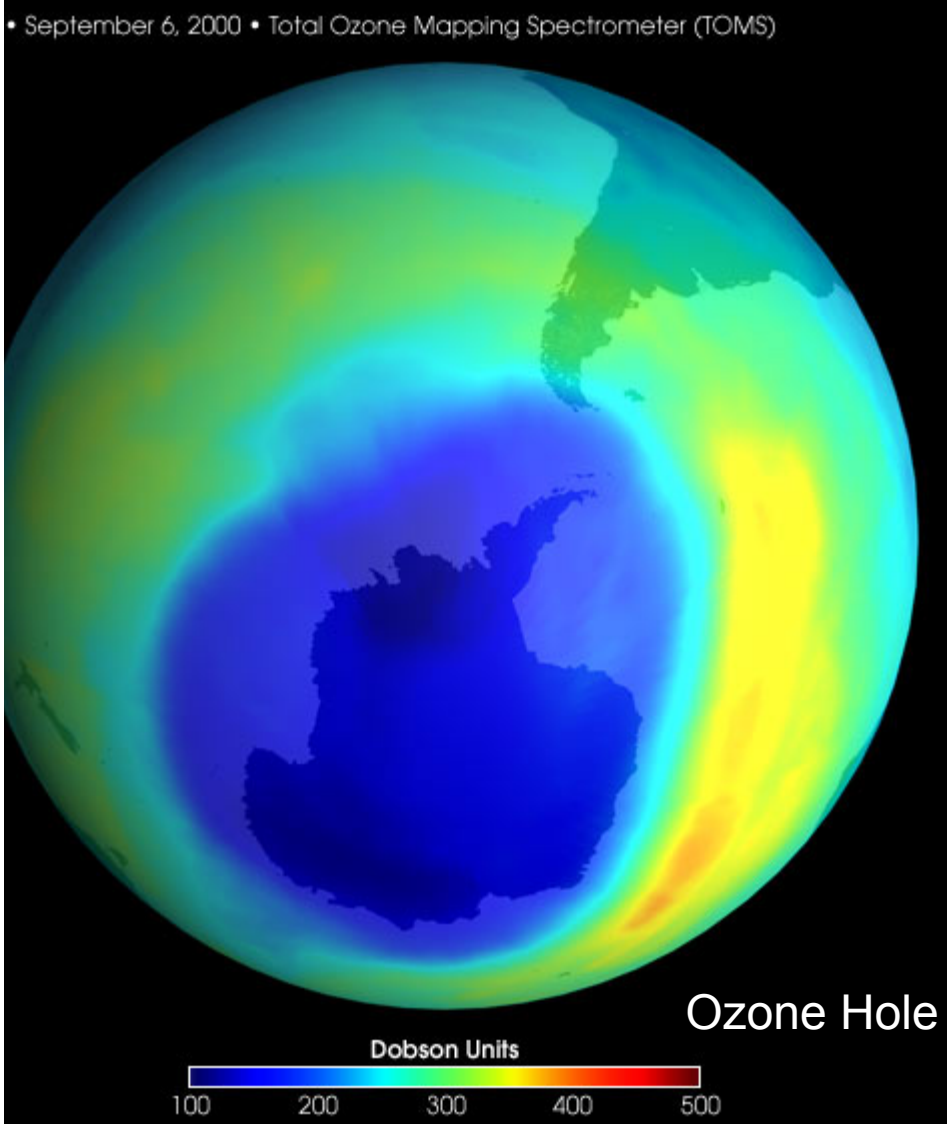
(EETAP, 2010; NAAEE, 2013)

After 40 years of EE, what do we know?

45 Million Americans think the Ocean is a Source of Freshwater

Coyle, 2005

120 Million Americans think Spray Cans Still have Chlorofluorocarbons



Ozone Hole

Coyle, 2005

130 Million Americans think Hydropower is Our Top Energy Source

Coyle, 2005

In Math and Science, American Students are Ranked Far Behind other Countries

Trends in International Mathematics and Science, 2003; National Center for Education Statistics, 2004 & 2007

How Widespread Is Belief in Pseudoscience??

- 41% of the public believe astrology is scientific
- >50% public believes in haunted houses and ghosts, faith healing, communication with the dead and lucky numbers

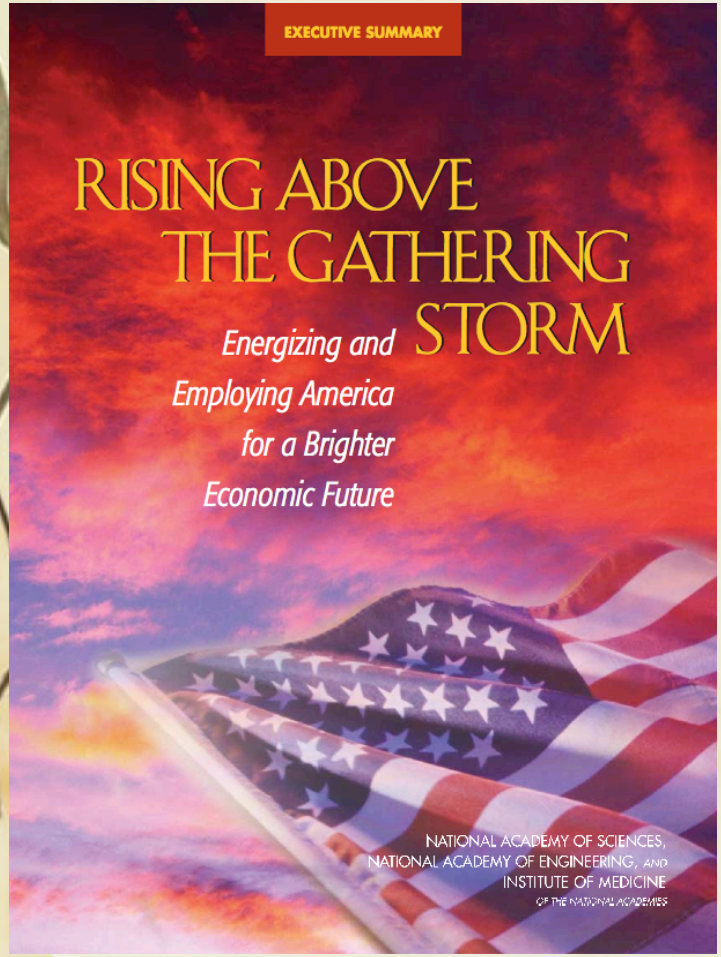
Why is it important to have a population wise in the ways of science?

- Need more sophisticated workforce
- Need more scientifically literate consumers
- equally as important, a scientifically literate electorate who can help shape public policy

Why Natural Resource/Env Literacy

- "Over recent decades, the number of public policy controversies that require some scientific or technical knowledge for effective participation has been increasing,”
- "Any number of issues, including the siting of nuclear power plants, nuclear waste disposal facilities, and the use of embryonic stem cells in biomedical research point to the need for an informed citizenry in the formulation of public policy."

One of Many Reports



- 10,000 TEACHERS, 10 MILLION MINDS, AND K-12 SCIENCE AND MATHEMATICS EDUCATION
- Action A-2: Strengthen the skills of 250,000 teachers through training and education programs at summer institutes…
- RECOMMENDATION A: Increase America's talent pool by vastly improving K-12 science and mathematics

LAST CHILD IN THE WOODS

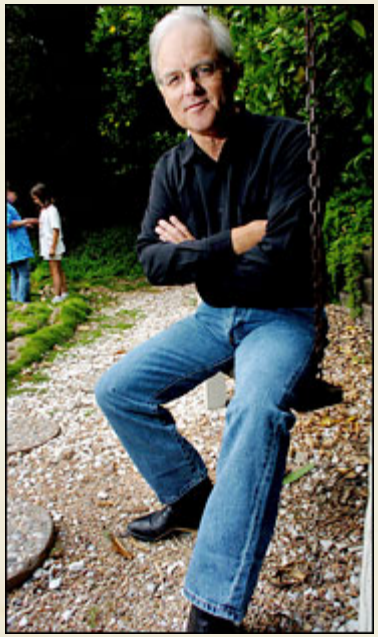
SAVING OUR CHILDREN FROM NATURE-DEFICIT DISORDER

RICHARD LOUV

Richard Louv

- *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder*
- Awareness
  -Problem Exists
  -Associated Health Issues
    -Obesity
    -4% of children were obese in 1960

    -20% were obese in 2004
      -Attention Deficit Disorder
      -Stress, Depression



Richard Louv

Nature Deficit Disorder

- “Describes an environmental dissatisfaction or dejection flowing from children's fixation on artificial entertainments rather than the natural wonders.”

- “Miss the restorative effects that come with the nimbler bodies, broader minds and sharper senses that are developed during random running-around at the relative edges of civilization.”

http://www.nytimes.com/2005/04/28/garden/28kids.html?ex=1272340800&en=f0988c8058f2763d&ei=5090&partner=rssuserland&emc=rss

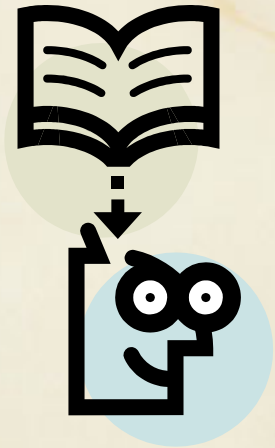
Associated Health Issues

- Dr. Howard Frumkin, Director of the National Center for Environmental Health, CDC, says in his Land Trust Alliance Special Anniversary Report:

"Evidence suggests that children and adults benefit so much from contact with nature that land conservation can now be viewed as a public health strategy."

Dr. Howard Frumkin

Solutions



- Educating the public about the problem.
- Steps to correct the problem.
  - -Training
  - -Communication
    - -Children and Nature Network
      - -*www.cnaturenet.org*
    - -Media

Solutions

-Research on successful actions
  -Must reach all cultures, ages, and affiliated groups
-Mentors
-Adult and Youth Leaders
  -Young people are not just the future, they are the present!
-Joining with other groups in support of amending H.R. 3036 and S. 1981- the No Child Left Behind Act- to include the No Child Left Inside Act.

Role of FSMLs Field-Based Education

- + Experience early or < interest in environment later in life
- Experience > meaningful if linked to student's science curriculum
- + Linkage requires teachers with field/ science training, often not the case
- + Student field experience > science careers

"As children observe, reflect, record, and share nature's patterns and rhythms, they are participating in a process that promotes scientific and ecological awareness, problem solving, and creativity."

~ Richard Louv,
The Nature Principle

Llano River Field Station Outdoor School

Since 2003: 60 ISDs, 16,000 K-12 students, hundreds of teachers

- *"Yes, the children saw, experienced, touched, and learned more than a week in a classroom could provide. More importantly, we saw learning and teaching going on the way we know it should. They (students) explored, caught, measured, encouraged, questioned, hypothesized, corrected, ran, whispered, walked, dreamed, and laughed all day long."* 5th grade teacher on Outdoor School experience

One study examined standardized test scores in the Washington Assessment of Student Learning, and Iowa Test of Basic Skills.

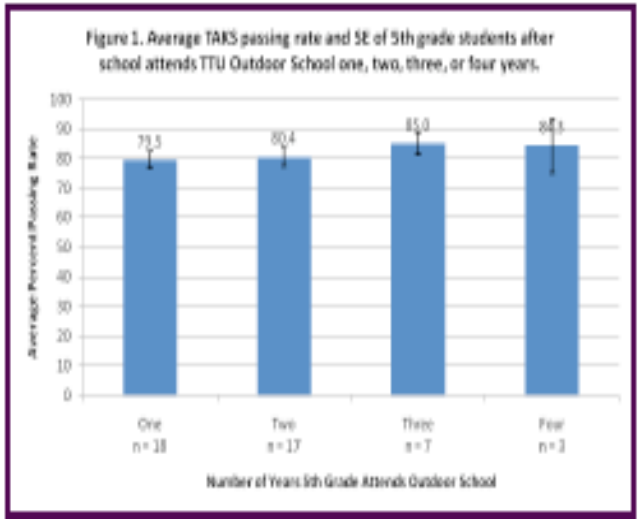
Schools with Environmental Education programs showed higher scores in:

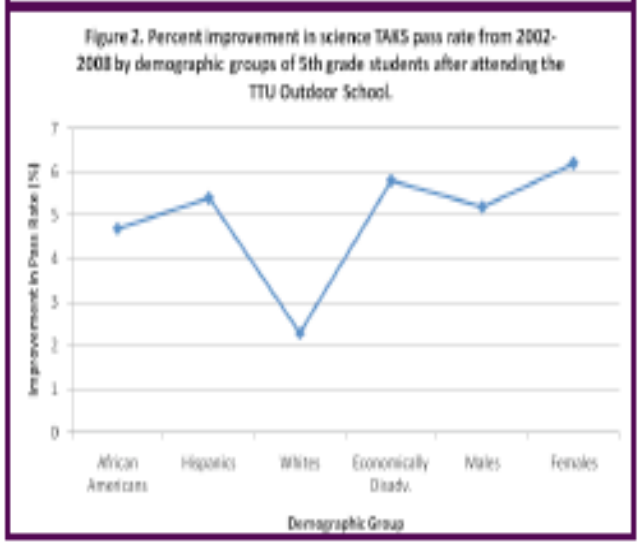
- Math,
- Reading, writing, and listening.

From: ***Time Out: Using the Outdoors to Enhance Classroom Performance***

Results

Data collected on participating 5th graders from 18 schools during the 2002-2003 to 2007-2008 school years were analyzed for impact of the OS experience on science TAKS passing rate.

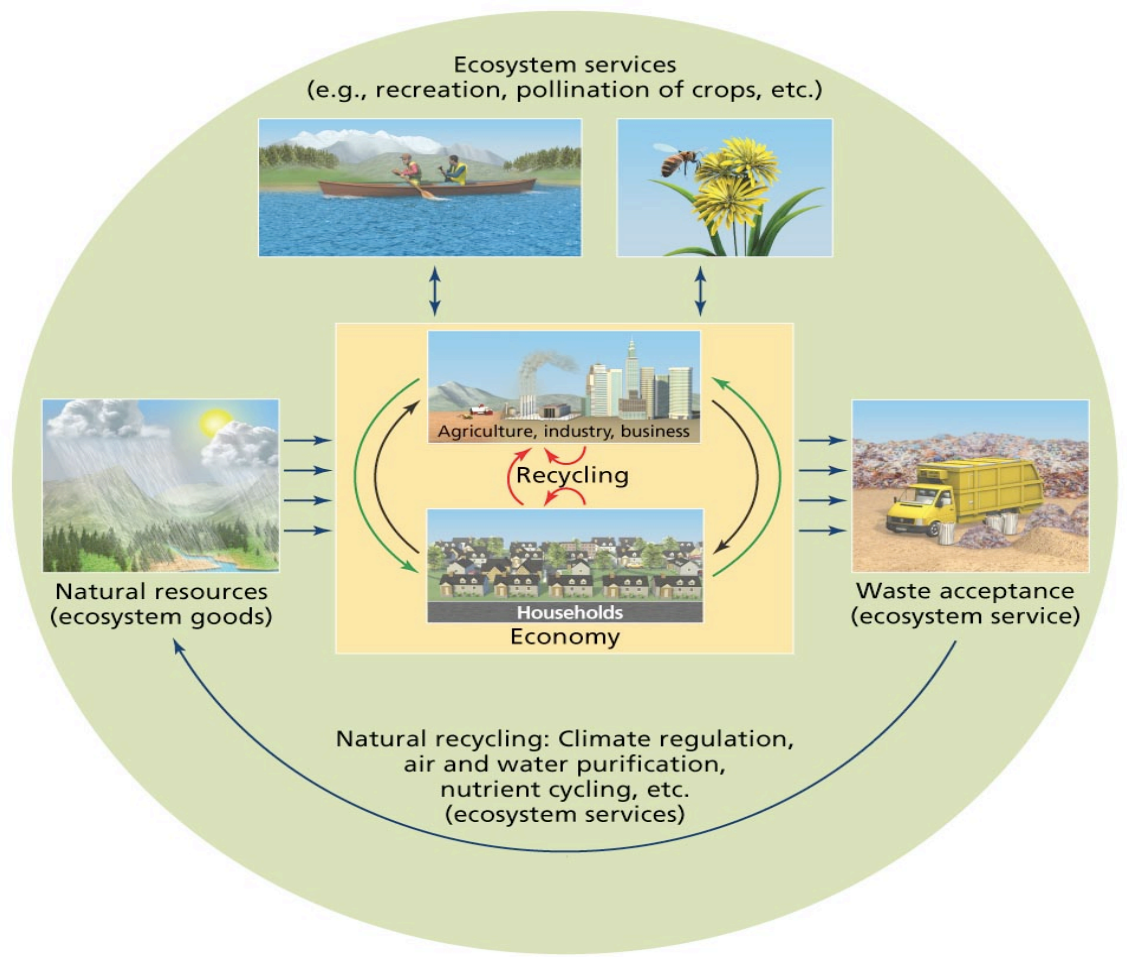




- Overall, TAKS Science pass rate was 5.6% higher on years of attendance to the OS versus years the schools did not attend.
- Average pass rate increased with multiple visits to the OS during consecutive years (Fig. 1 left).
- A 16.3% decrease in pass rate was noted for 10 schools who did not return to the OS during the 2007-2008 school year as compared to 8 schools who returned to the OS.
- When analyzed by demographic groups (male, female, African Americans, Whites, Hispanics, and economically disadvantaged), female and economically disadvantaged students achieved the highest improvement in pass rate after attendance to the OS (Fig. 2 left).

Ecological view of economics

- Human economies exist within, and depend on, the environment
- Without natural resources, there would be no economies



(b) Economic activity as viewed by environmental and ecological economists

Ecological goods & Services

Threatened because of:

- Land-use change and irreversible conversion of landscapes and their ecological functions
- Disruption of the water cycle and ground water recharge
- Invasion/introduction of exotic (non-native) organisms
- Toxins, pollutants and human wastes
- Climate change

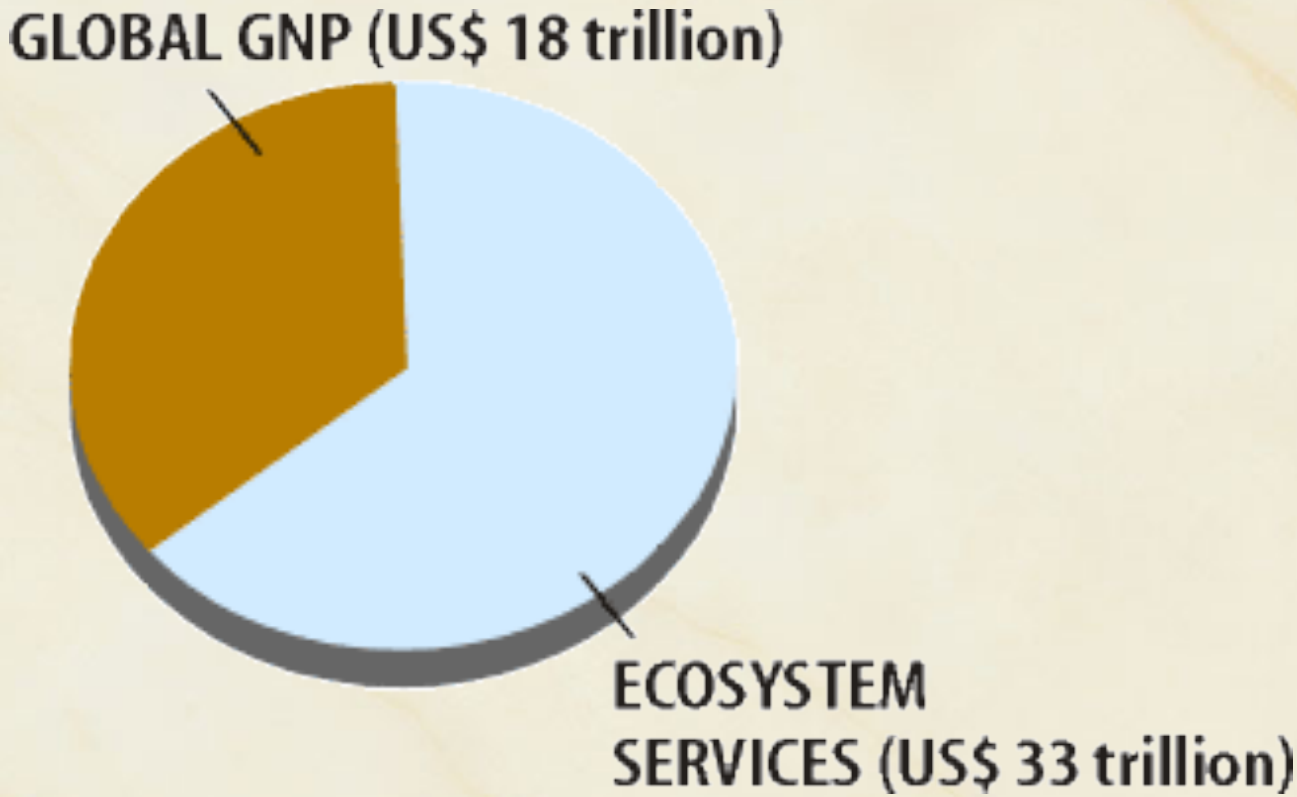
NATURE IVOL 387 I 15 MAY 1997 253

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

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

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

2nd most cited article in the last 15 years in the Ecology/ Environment area according to the ISI Web of Science.



Source: Adapted from R. Costanza *et al.*, “The Value of the World’s Ecosystem Services and Natural Capital,” *Nature* Vol. 387 (1997), p. 256, Table 2.

- Our society mistreats the very systems that sustain it
  - the market ignores/undervalues ecosystem values
- **Nonmarket values** = values not included in the price of a good or service

(a) Existence values

(c) Option values

(e) Scientific values

(g) Cultural values

(b) Use values

(d) Aesthetic values

(f) Educational values

ENVIRONMENTAL SCIENCE:

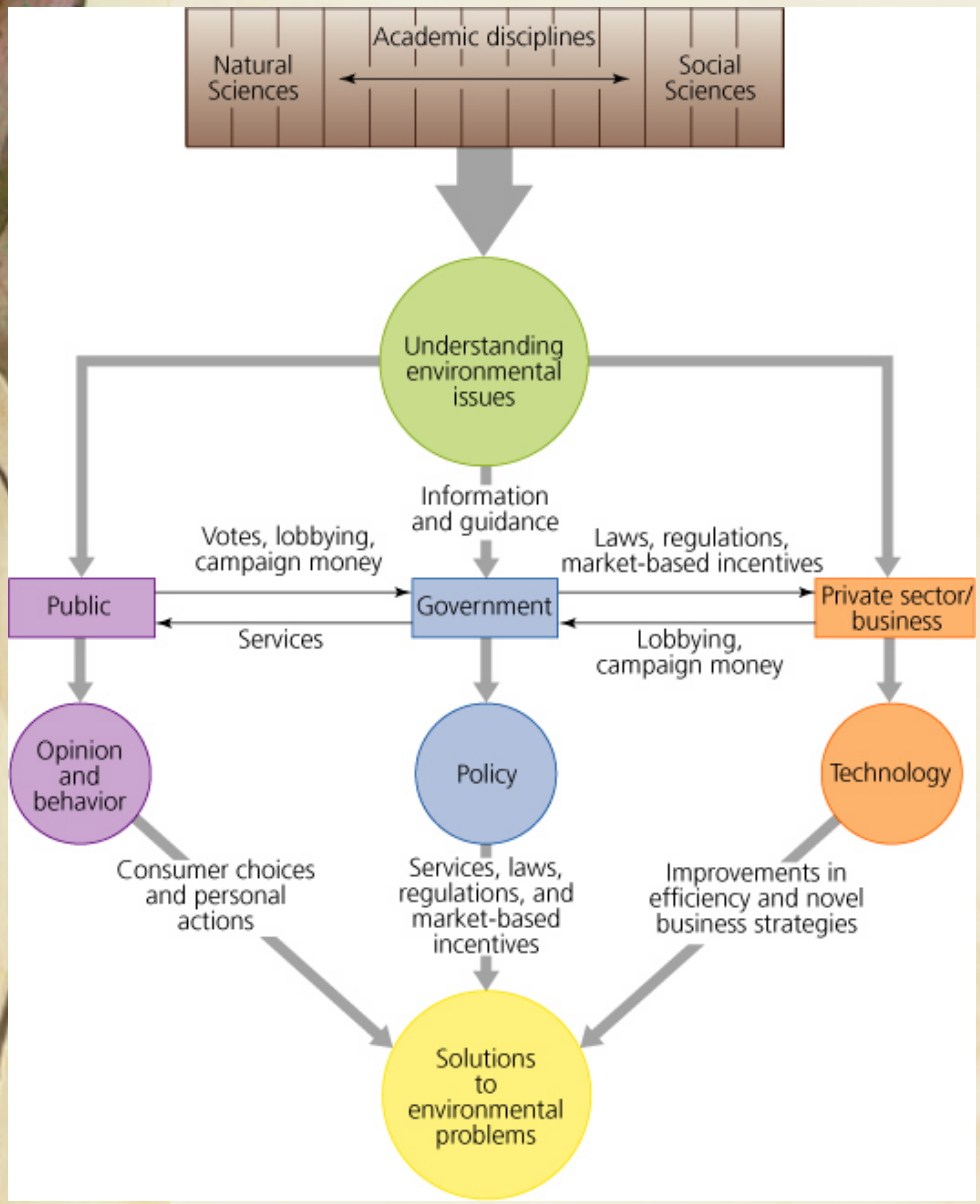
- Provides an understanding of the structure and functioning of natural systems
- Helps elucidate human interrelationships with and impacts on these systems
- Can provide critical guidance to resource managers, decision-makers, and the public to inform policy decisions and development of sustainable practices

"Teaching children about the natural world should be seen as one of the most important events in their lives."

Thomas Berry,
The Dream of the Earth

Why ?

Science, policy, and solutions



- Science informs policy directly.
- Science also informs the public and the private sector, which influence policy.
- Policy is one path to solving environmental problems.

Figure 3.1

American Institute of Biological Sciences

Scientific association dedicated to advancing biological research and education for the welfare of society.

Founded in 1947 as a part of the National Academy of Sciences.

Headquartered in Washington, DC.
Website: www.aibs.org

About AIBS

Scientific association dedicated to advancing biological research and education for the welfare of society.

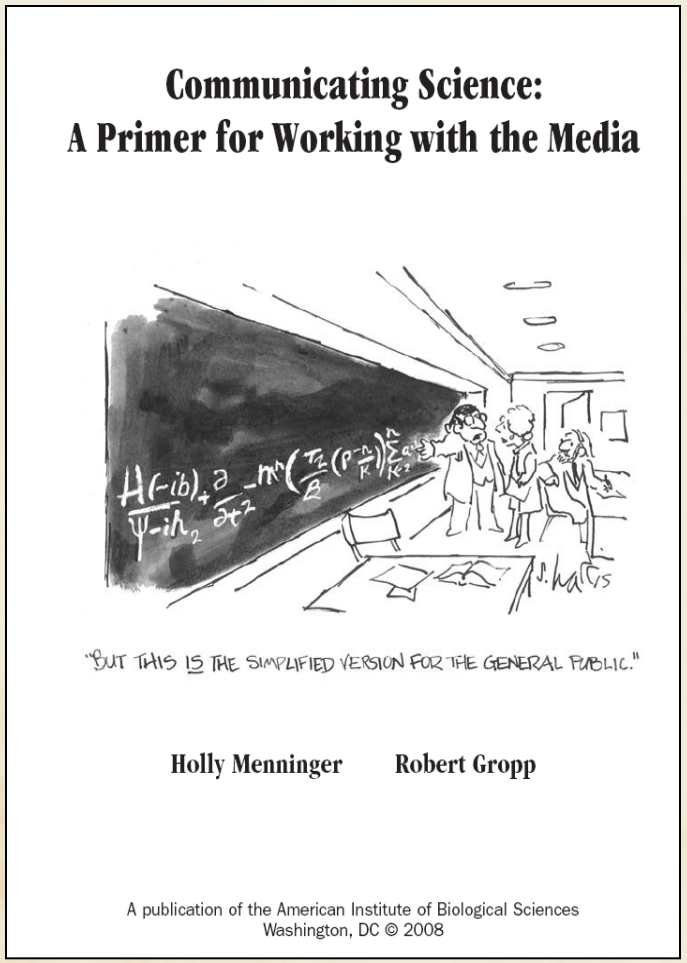
- Founded in 1947 as a part of the National Academy of Sciences -- became an independent, member-governed organization in the 1950s.
- Headquartered in Washington, DC.
- Website: www.aibs.org.

Membership

- 5000 individual members
- 200 scientific societies, organizations and research centers (roughly 100 natural science collections)
- Combined membership of approximately 250,000 individuals
- 16 member organizations target funds for public policy

Policy Communication

- Bridge between scientists and policymakers
- Work with media to communicate science to decision-makers and public
- Provide scientists with tools to influence policy and media
- Provide timely policy analysis



Texas Natural Resource/ Environmental Literacy Plan

Texas Natural Resource/ Environmental Literacy Plan Summit for Leadership and Action

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San Antonio Water System

SAN ANTONIO RIVER AUTHORITY · Leaders in Watershed Solutions

TEXAS WILDLIFE ASSOCIATION

TRINITY UNIVERSITY

SAN ANTONIO ZOO

TEXAS NATURAL RESOURCE ENVIRONMENTAL LITERACY PLAN

Texas Association for Environmental Education

Conclusions: Challenges

- Many factors can hinder environmental policy.
- Lobbyists, campaign contributions, and the revolving door can create conflicts of interest.
- Ignorance and Willful Ignorance
- Environmental justice remains a challenge.

Conclusions: Solutions

- Innovative approaches can help overcome opposition to environmental policy.
- It is possible to create or influence policy if one follows the policy process.
- **Greater public participation in the political process can help reduce the roles of lobbyists, campaign contributions, and the revolving door.**
- A steady-state economy may offer an attractive alternative to a growth-oriented economy.

Land Ethic: Aldo Leopold

- 1887-1948
- Ecologist, Forester, Writer
- *A Sand County Almanac*

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics."

"We can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in."


BALDO
BY CANTU AND CASTELLANOS
SO FAR THIS SUMMER, I'VE READ THREE BOOKS...
WRITTEN FIVE POEMS...
AND NOW I'M STARTING MY NOVEL!
THAT'S WONDERFUL, GRACIE...
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