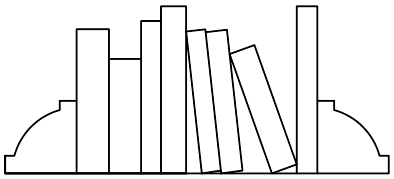
Environmental Science 101 *Fall 2012*

Introduction

Lecture Outline:

1. INTRODUCTION TO ENVIRONMENTAL SCIENCE
   A. Environmental Science—Aims and Challenges
   B. Public Views of the Environment in the PNW
   C. Concept of Sustainability
   D. The Scientific Method
   E. Public vs Scientists
   F. Science and Society
   G. Major U.S. Laws



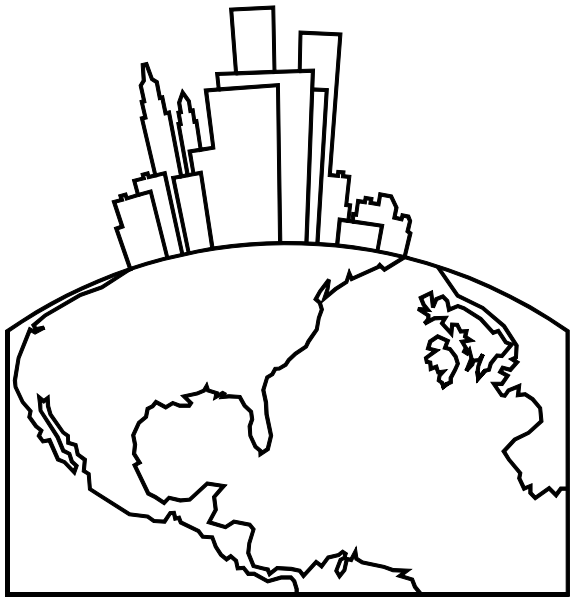
Learning Objectives:

When you are finished with this unit you should be able to:

1. Describe the world views of cornucopianism and environmentalism.
2. Define environmental science, the concept of sustainability, and ecological footprint.
3. Name and describe the steps of the scientific method.
4. Describe the science literacy level of the typical American.
5. Describe the importance of science in society's environmental decisions.
6. Define environmental wisdom and distinguish between public and scientist priorities in environmental issues.
7. Know the impact of major bills passed by Congress in the 1970s.
8. Know and define the four principles of ecosystem sustainability.
9. Describe how people in the Pacific Northwest view the environment.

Terms You Should Know:

- Cornucopian world view
- Environmentalism
- Frontier ethic
- Natural resources
- Sustainability
- Scientific method
- Hypothesis
- Controlled experiments
- Clean Water Act (CWA)
- Endangered Species Act (ESA)
- Safe Drinking Water Act (SDWA)
- Clean Air Act (CAA)
- Environmental wisdom
- Ecology
- Ecologists
- Information overload
- Theory
- Four Principles of Ecosystem Sustainability
- True blue greens
- Greens
- Sprouts
- Grousers
- Browns
- Ecological footprint



Reading Assignment:

Brennan and Withgott: Chapter 1; pages 2-22.

1. INTRODUCTION TO ENVIRONMENTAL SCIENCE

A. ENVIRONMENTAL SCIENCE—AIMS AND CHALLENGES

Environmental Science—the branch of science concerned with environmental issues

1. World Views

- Set of assumptions that a person holds regarding the nature of the world and how it works
- 2 opposing views

  –

  –

Continuum:

DEP—Dominant Environmental Perspective

Groups:

CORNUCOPIANISM — all parts of the environment are natural resources to be exploited for the advantage of humans (singly or collectively)

- Assumes resources are infinite
- Traditional way Western civilization has looked at things
- Europe N. America
  S. America
  Austrialia
- American movement:

  13 colonies
  Kentucky
  Missouri
  California
  Alaska
  Oceans Space
- Rainforests of Brazil, Indonesia....
- Oil fields
- Air, water, soil, minerals, plant and animal species are there for our use
- Has been a necessary part of the progress of civilization... but to what extent?

ENVIRONMENTALISM — natural resources are products of the natural environment; natural resources are not unlimited

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-

- Many native “primitive” cultures are based on environmentalism. Can you name some?

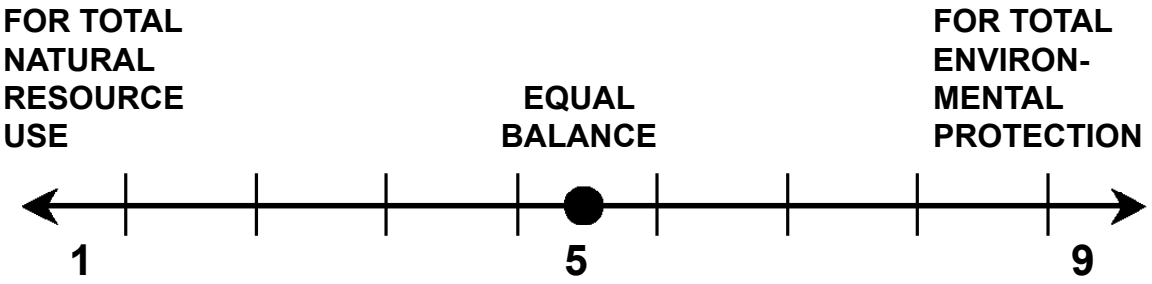
- Concept is in vogue in USA, Europe and some parts of the developed world; however, concepts do not necessarily translate to action

- Environmentalists are convinced that increasing exploitation is unsustainable

B. PUBLIC VIEWS OF THE ENVIRONMENT IN THE PACIFIC NORTHWEST

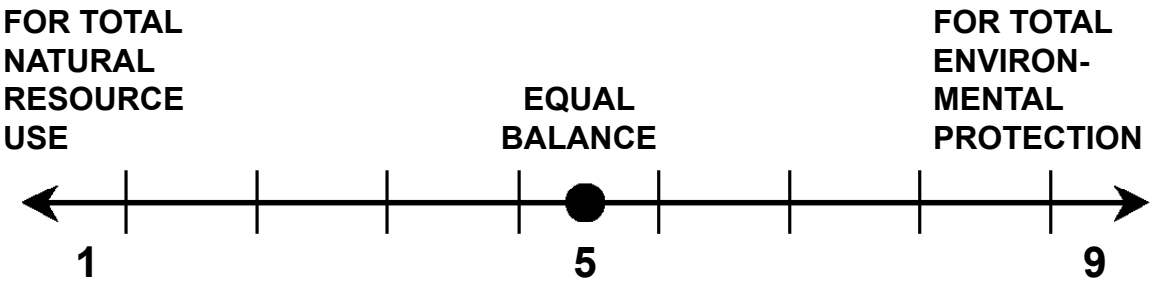
- 2002 Survey Question
  (University of Idaho)

HOW DO YOU SEE YOURSELF ON ENVIRONMENTAL ISSUES COMPARED TO THE AVERAGE AMERICAN ADULT?

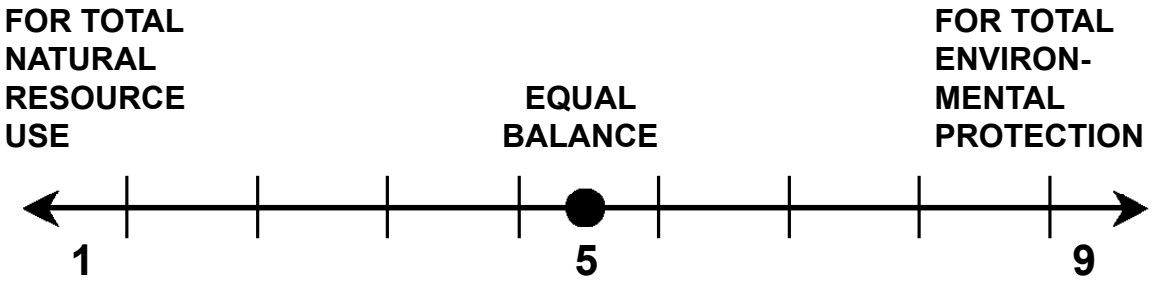


Place an X on the line

HOW DO YOU SEE YOURSELF?

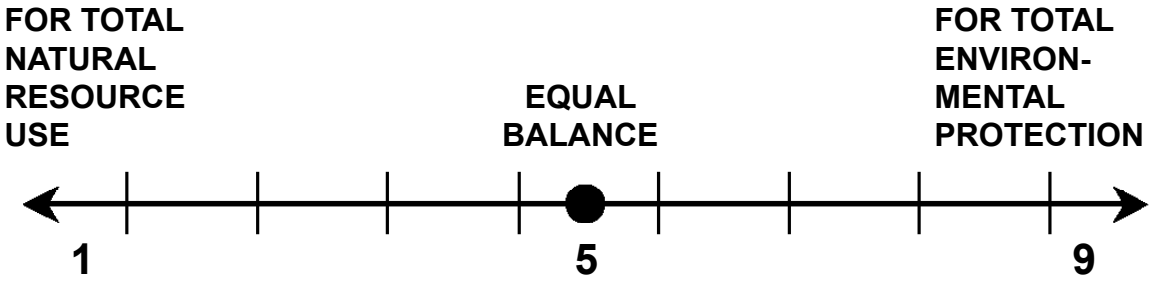


HOW DO YOU SEE YOURSELF? — STATE



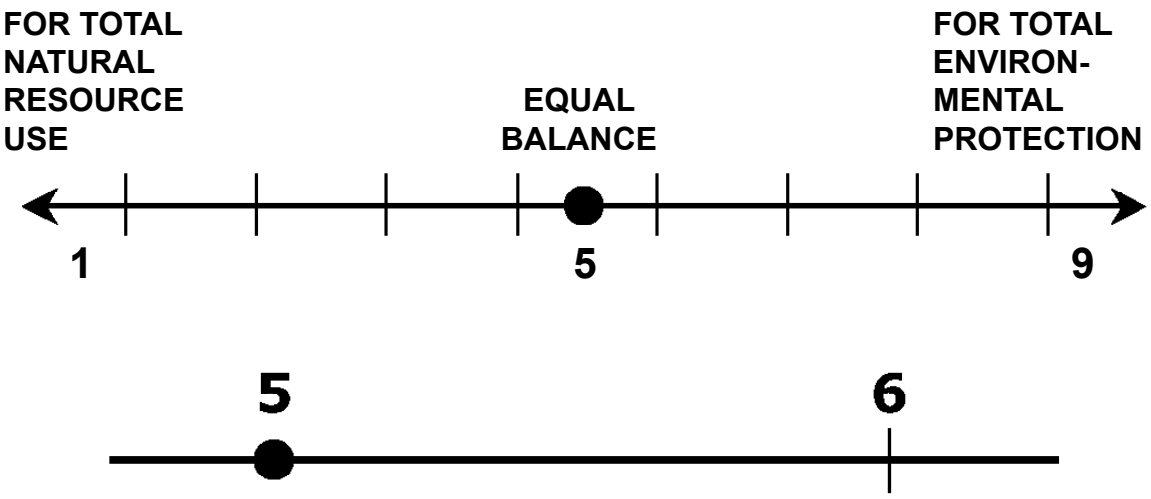
Likelihood Ratio Chi-Square = 0.0053

HOW DO YOU SEE YOURSELF? — AGE



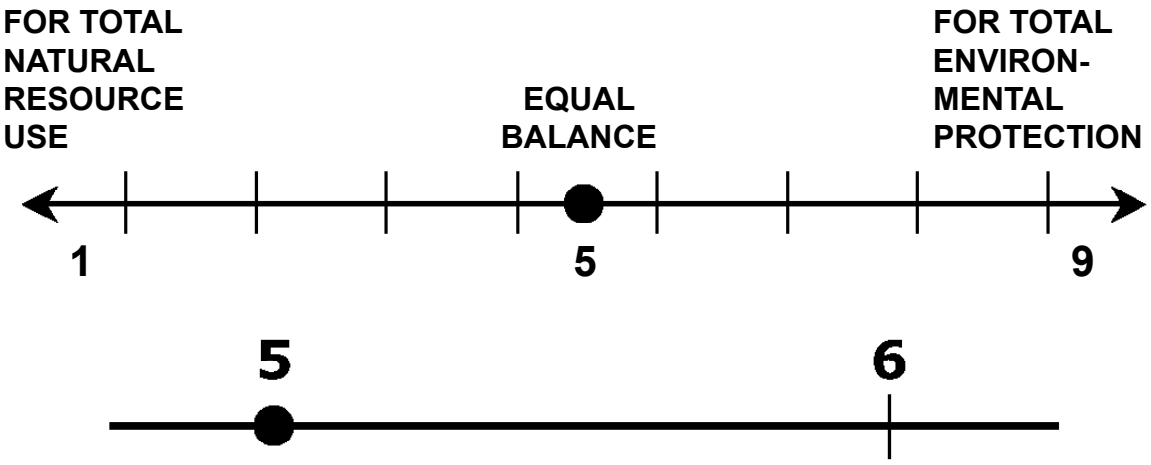
Likelihood Ratio Chi-Square = < 0.0001

HOW DO YOU SEE YOURSELF? — EDUCATION



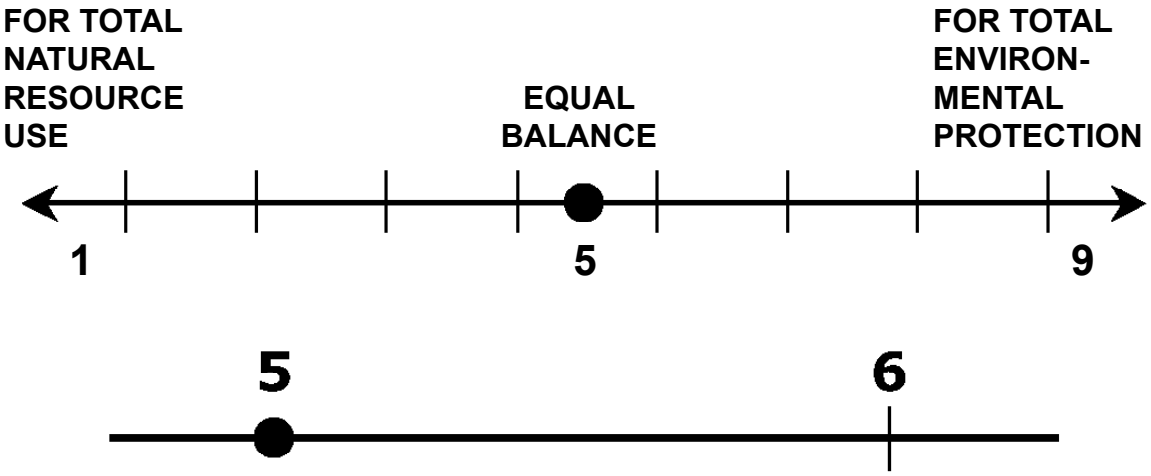
Likelihood Ratio Chi-Square = < 0.0001

HOW DO YOU SEE YOURSELF? — TIME IN PNW



Likelihood Ratio Chi-Square = 0.0011

HOW DO YOU SEE YOURSELF? — COMMUNITY SIZE



Likelihood Ratio Chi-Square = 0.0178

Important issues to public in the Pacific Northwest:

Issue	Very or extremely important 2012	2007	2002
	---------- % ----------		
1. Drinking water			
2. Clean rivers			
3. Water for AG			
4. Biodiversity			
5. Wetlands			
6. Food quality/quantity			
7. Energy			
8. Global warming			
9. Overpopulation			
10. Air pollution			

The USA Adult Population

- 5 Distinct Groups

10%

5%

-
-

30%

- can go either way on issues

25%

-

30%

- vocally hostile toward environment
-
-

In summary:

10% —

10% —

There is a 40–50% overlap between the two groups

C. CONCEPT OF SUSTAINABILITY

SUSTAINABILITY — refers to whether or not a process can be continued indefinitely

- If a process is not sustainable — a dead end will be reached
-
- What about politicians?
  - spotted owls and NW forests . . .
  -
  -

1. Four Principles of Ecosystem Sustainability

1. Recycling
   -
   - Example: plants die; decompose; nutrients nourish other plants
2. Energy
   -
   - Example: plants capture energy from the sunlight
3. Population
   -
   - Example:

4. Biodiversity

   –

   – Example:

2. Concept of Ecological Footprint

ECOLOGICAL FOOTPRINT

✓ As global affluence has increased . . .

✓ As the human population has increased . . .

   –

   – measures the total amount of the Earth's surface "used" by a given person or population

   –

   – expresses impact in cumulative amount of

      ✓

      ✓

   to produce raw materials for consumption

   –

   – more affluent people (countries) have bigger ecological footprints

   –

   –

Based on 2006 data 6,500,000,000 people

–

–

ECOLOGICAL FOOTPRINTS

USA Mexico China Pakistan

– Based on 6.5 B people -- there are 4.9 acres per person on this planet

– The average ecological footprint in the world is 6.9 acres

–

USA vs Bangladesh

- 25 acre footprint vs 1.2 acre footprint
-

- USA population will grow by 100,000,000 people over the next 50 years
  - ✓

D. THE SCIENTIFIC METHOD

1. What is science?

SCIENCE — seeks to acquire and explain factual knowledge, not just belief and opinion.

2. The Scientific Method

- Technique of compiling scientific information
-
-

- Five parts to the scientific method

1. Observations and Facts
   - Observations should be measurable
   - Observations are restricted to only impressions gained through one or more of the five basic senses in their normal state:
     - ✓
     - ✓
     - ✓
     - ✓
     - ✓
   - Observations must be verifiable to be considered facts

- Observation of a spaceship? if you can not verify; it is not a fact
- Fish are dying in a stream; measure dead bodies

2. Hypothesis and Testing

- Numerous observations may lead a scientist to make an educated guess about something
- Fish example: pollutant ***a*** is causing disease ***x*** in fish

3. Controlled Experiments

- An experiment to test a hypothesis
- Controlled means two groups, a test group and a control group
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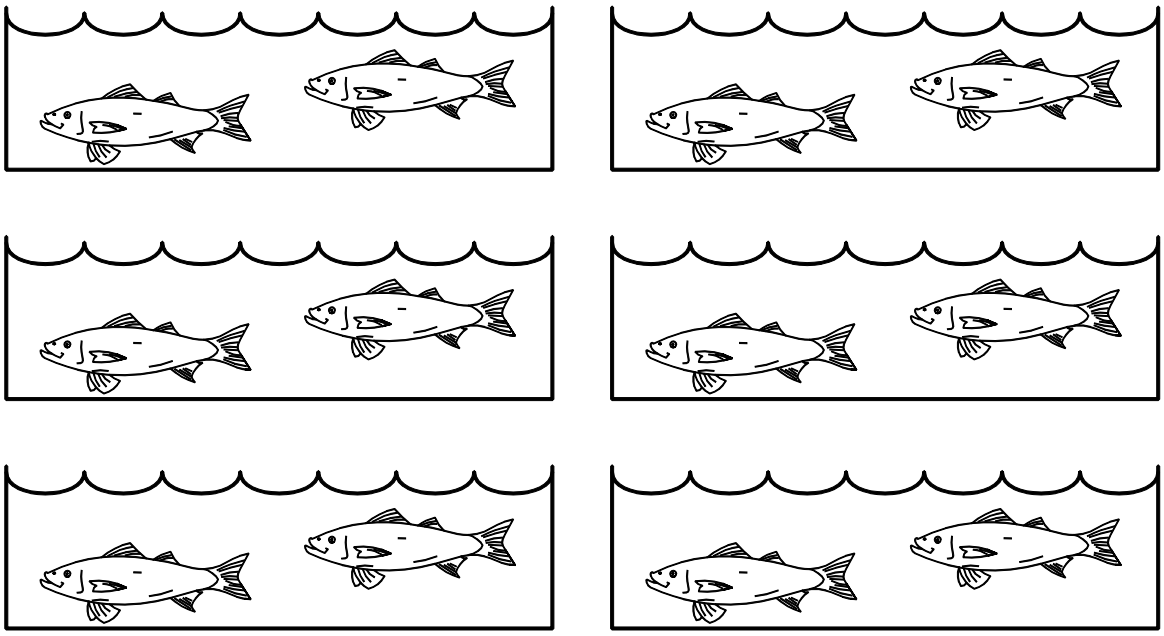
- Fish example: one group of fish is exposed to no pollutant; all groups of fish are treated exactly the same except for exposure to pollutant ***a***



4. Formation of Theories

   – When lots of pieces of information are brought together into a unifying concept, you have a theory

   –

   –

   – What is Creationism?

5. Principles and Natural Laws

   – Provable statements about matter or energy that appear to be without exception

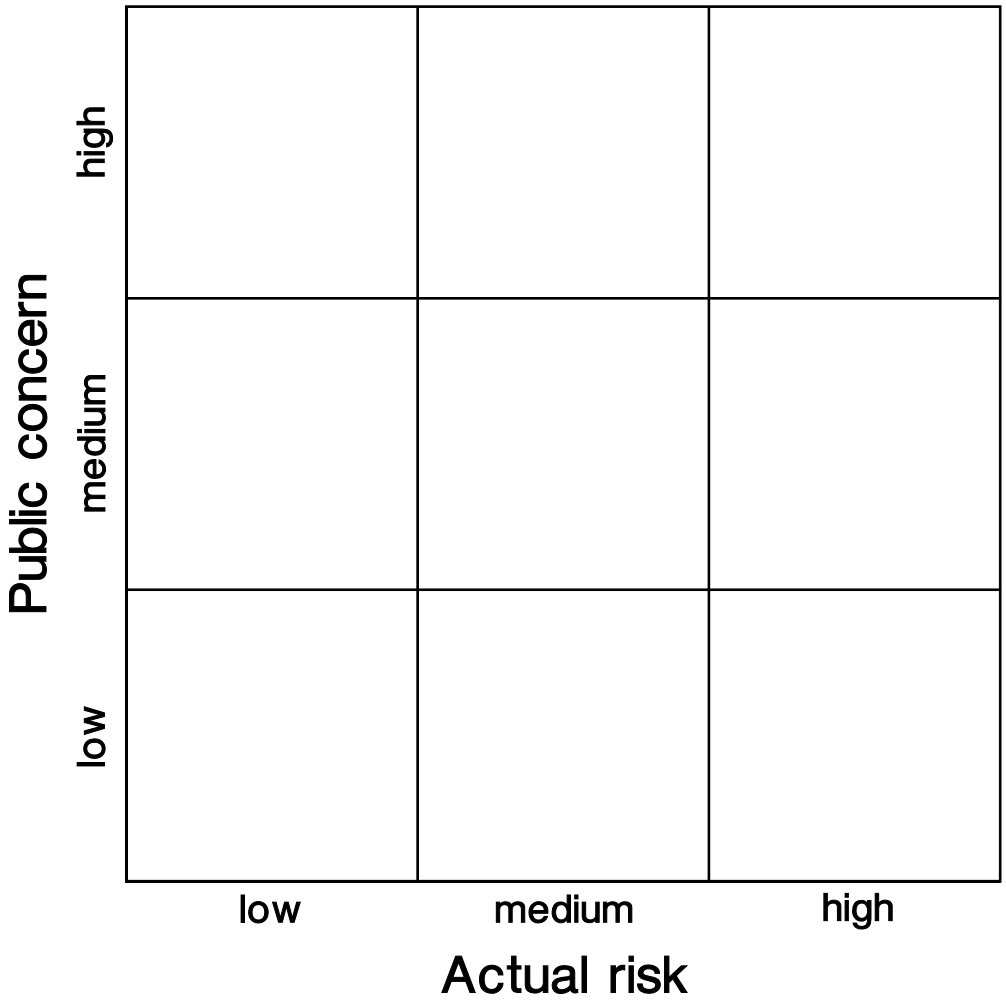
   – i.e., Law of Gravity

E. PUBLIC vs SCIENTISTS

- Perception vs Reality?

Place the following issues in a box in the following figure:

- ✓ Air pollution (AP)
- ✓ Asbestos (AS)
- ✓ Global warming (GW)
- ✓ Hazardous waste (HW)
- ✓ Indoor air pollution (IAP)
- ✓ Indoor radon (IR)
- ✓ Nuclear accidents (NA)
- ✓ Old dump sites (ODS)
- ✓ Ozone layer depletion (OLD)
- ✓ Sewage (S)



F. SCIENCE AND SOCIETY

ECOLOGY — the study of the relationships among organisms and between organisms and their environment

Scientists that study ecology are called ***ECOLOGISTS***

Does society trust science?

Yes_____

No_____

Historical perspective:

- Back in the 1950s the Soviets launched Sputnik; panic in USA
- 1960 — new emphasis on science, technology and space; science held in high esteem
- 1960-1972 — massive training of scientists and engineers;
-
-
- Today —
- Percent of public that reads an article in a scientific magazine or journal once a month (i.e. ***Scientific American***, ***Natural History*** ...)

1964 –

1970 –

1990 –

1997 –

2004 –

2011 –

- Percent of public that can sort out scientific data concerning an every day controversy:

1963 –

1970 –

1984 –

1991 –

2003 –

2011 –

- What went wrong? Where did science lose?
  - –
  - –
  - –
  - –
  - –
- Can the public sort out data?
- If they can not, who will they trust to do so for them?

G. MAJOR US LAWS

In the early 1970s Congress passed several key laws that changed the way we interacted with the environment

1. Clean Air Act (CAA)

-
-

2. Clean Water Act (CWA)

-
-

1.

2.

3. Safe Drinking Water Act (SWDA)

-
-

4. Endangered Species Act (ESA)

-
-

1.

2.

3.