

ECOLOGICAL ECONOMICS

What's wrong with the world
and how to fix it

Evolution of Nature



Image courtesy of NASA

The Earth was formed over four billion years ago. Plants and photosynthesis emerged three billion years ago and started making oxygen with the help of the Sun's energy. The atmosphere plants produced was sufficient to support Homo sapiens 200 million years ago.

The speed at which humans have dominated the planet and overwhelmed the natural systems of the Earth is astounding. The timeline at the right documents the relationship.

The entire existence of humans on the planet is thinner than one line of ink on the timeline.

4.5 Billion BC:
Planet Earth is formed.

3.8 Billion BC:
The Earth's crust solidifies, and oceans begin to form from condensation of atmospheric water.

3.5 Billion BC:
Single cell organisms begin to form.

3 Billion BC:
Beginning of photosynthesis by blue-green algae. This works to strengthen the ozone layer and changes the Earth's atmosphere.

1.5 Billion BC:
Multicellular organisms begin to form.

500 Million BC:
Vertebrates / fish appear

420 Million BC:
Insects appear

300 Million BC:
Reptiles appear

250 Million BC:
Mammals appear

15,000 BC: Most recent ice age
10,000 BC: Permanent human settlement
326 BC: The trading network develops (The Silk Road begins)
1492 AD: Columbus discovers America
1850 AD: Industrial revolution
1875 AD: Conservation movement
1970 AD: Environmental movement
2050 AD: (Estimated) Ecosystems collapse

Development of the Network

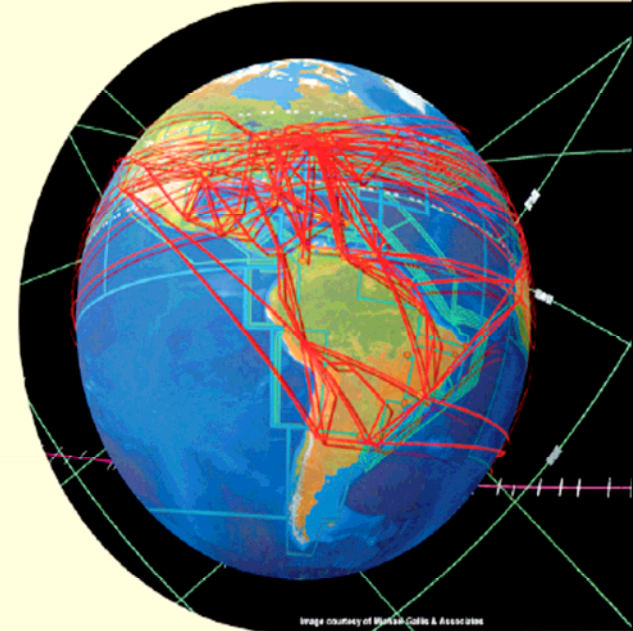
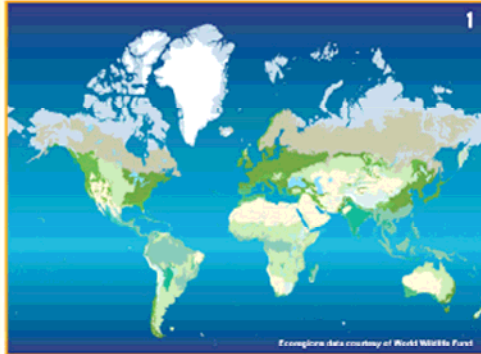


Image courtesy of Microsoft & Associates

The "network" is the system of communication and trade we have developed to fuel our lifestyle. The network is global, allowing people to obtain goods from anywhere in the world. Above, the network has been charted over the Earth so it can be visualized in relation to the natural global systems.

Nature & the Network

1. Land Form: A tapestry of mountains, valleys and plains has shaped terrestrial life. These areas have created an extremely complex, interwoven network of ecological niches. Each of these niches has become a self-sustaining system that supports unique species.



2. Air & Sea Currents: The earth's rotation causes the atmosphere and oceans to move. Influenced by the shape of the continental landmasses and the ocean floor, the earth produces a complex global pattern of air and ocean currents that circulate at various heights around the earth, distributing heat and moisture. These currents form the backbone of the global ecosystem and have a powerful affect on climates and plant and animal life.



3. The Natural System: This extremely sophisticated network is the result of billions of years of evolution. It is a highly interactive and resilient system that has been able to react to changing conditions—however sudden or dramatic—by continually evolving new life forms. Only since the mid-19th century have we appreciated the extraordinary complexity of the natural environment. Only in the last 50 years have we begun to realize nature's vulnerability to human-caused disturbance.



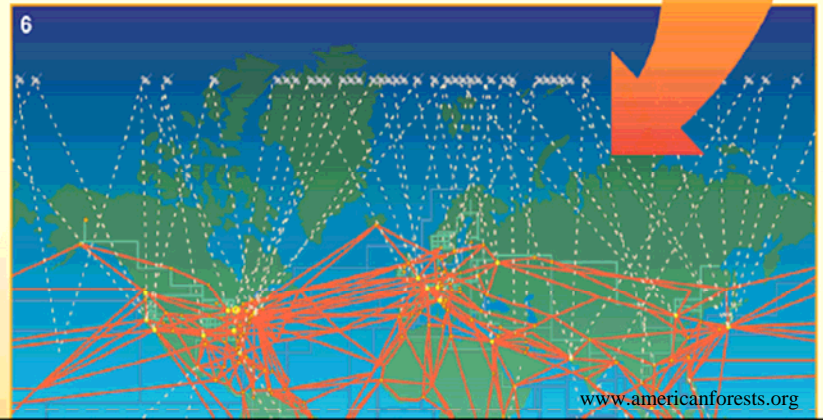
4. Transportation System: People and goods move around the earth by air, water, road, and rail—these means of travel form the transportation system. This system began in pre-history as paths and dirt roads. It began evolving a global network over the past 2,200 years, after Alexander the Great's conquests connected the East and West across Eurasia. It is continually evolving, growing larger and denser, and adding new layers, such as air and space travel.



5. Communications Layers: The exchange of ideas and information is fundamental to the human species. The modern communications system began with the telegraph then radio and telephone. Today's communications network has evolved into a vast web of surface cables and satellites. Information processing by computers has enabled this system to develop a wide array of new capabilities: memory, automatic controls, remote sensing and artificial intelligence.



6. The Network: As the 21st century opens, the global network is a vast and complex pattern. Interactive transportation and communications layers provide the framework for human activity. Divided through most of the 20th century by the Iron Curtain, the global network now forms a continuous pattern across the earth, even extending more than 28,000 miles into space. As expectations for higher living standards rise, global economic development accelerates the growth and evolution of the network, which is the foundation for the growth of cities, the global marketplace and the transmission of knowledge.



More than any time in history, humankind faces a crossroads. One path leads to despair and utter hopelessness, the other to total extinction. Let us pray that we have the wisdom to choose correctly.

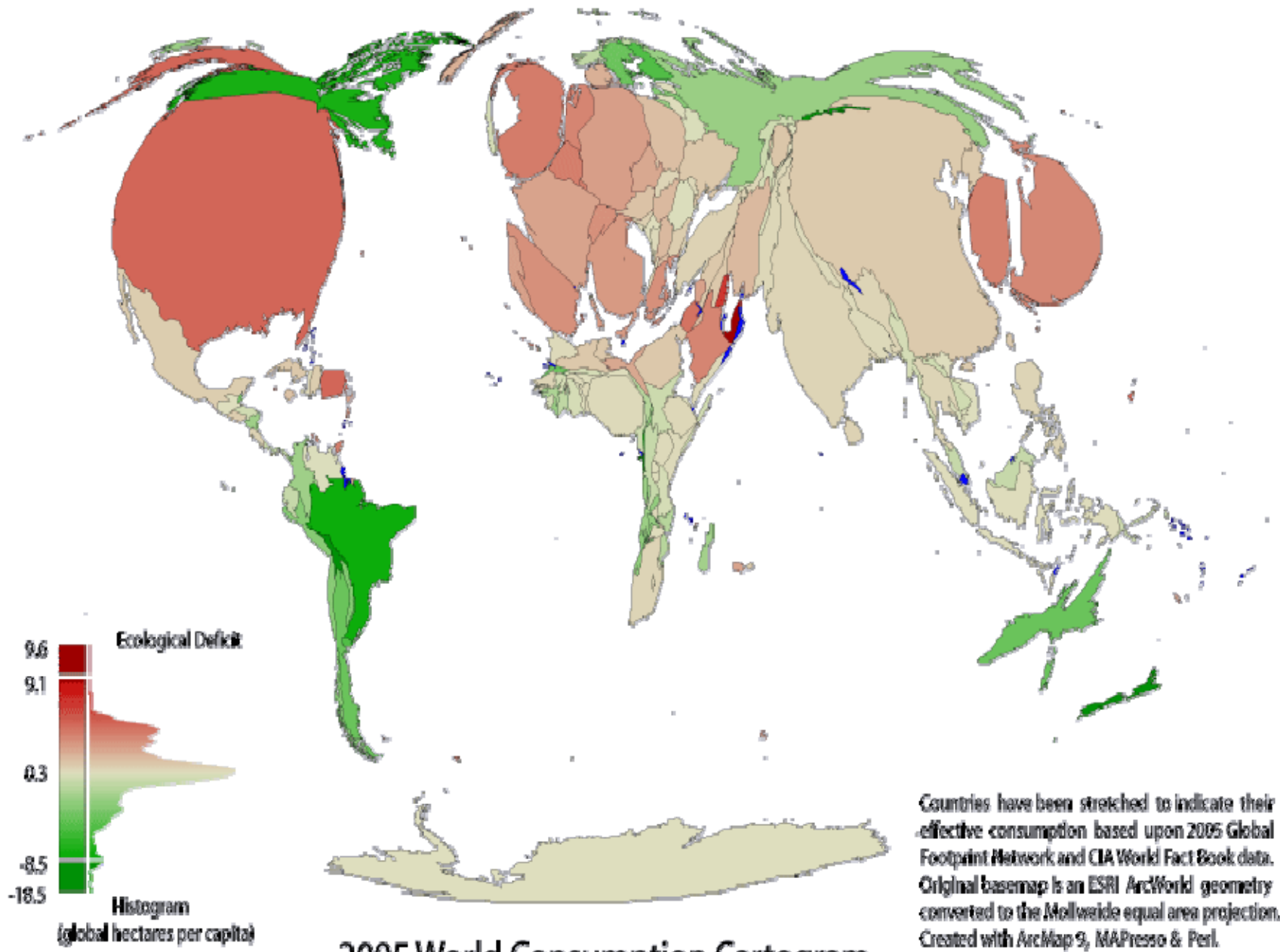
Woody Allen

CONDITIONS FOR SUSTAINABILITY

- Limit substances removed from the Earth

U.S. ECOLOGICAL FOOTPRINT

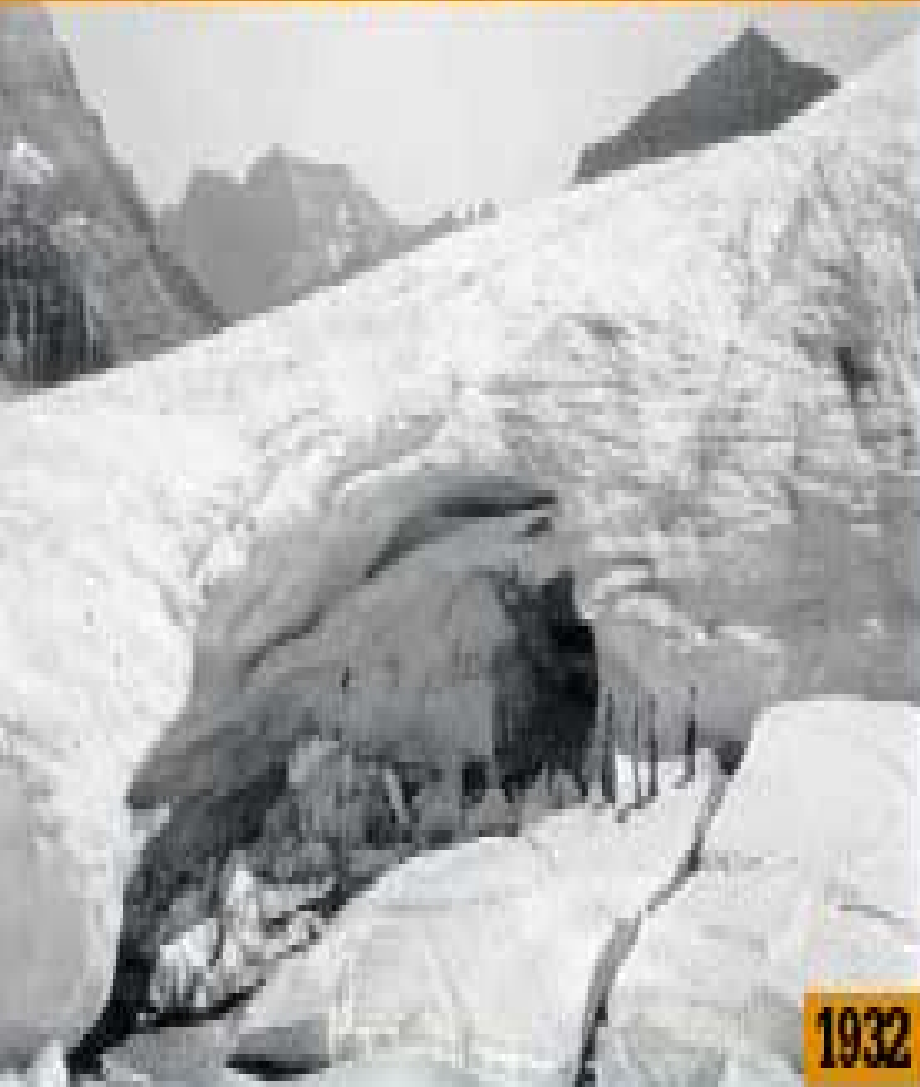
- 🌍 5% of Earth's population
- 🌍 25% of Earth's natural resources
- 🌍 25% of global CO₂ emissions



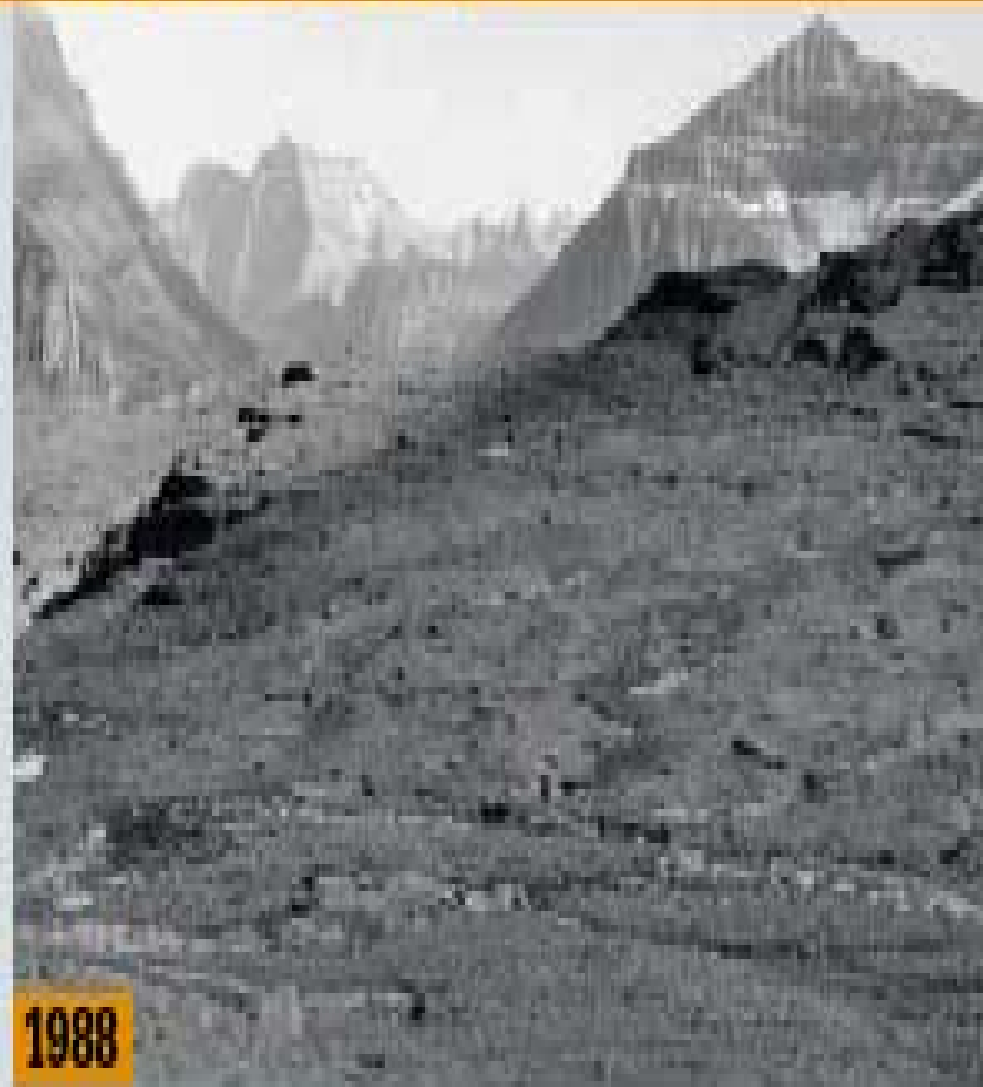
CONDITIONS FOR SUSTAINABILITY

- Limit substances removed from the Earth
- Limit persistent man-made substances

MIGHTY GLACIERS...RECEDING INTO MIST



1932



1988

In Glacier National Park in Montana, an ice cave in Boulder Glacier (left) completely vanished in the course of 56 years

...AND THE EFFECTS ON THE PLANET COULD BE DIRE

1 FLOODING Seawaters could rise almost a meter in this century, and continue going up. Some coastal regions already see seasonal flooding, and the situation would get worse as water levels rise.

2 OCEAN DISRUPTIONS Coral reefs are under pressure from changes in water level and temperature. As more carbon goes into the sea, plankton could suffer, and that would affect species higher up the food chain.

3 SHIFTING STORM PATTERNS There are no data to show an increase in violent storms right now, but many scientists believe warming will bring more violent and unpredictable climate events.

4 REDUCED FARM OUTPUT In certain regions, each degree rise in the surface temperature brings a further drop in crop yields.

5 ANIMAL EXTINCTIONS Some species are already moving to cooler regions—and some aren't making it. Global warming may not yet be a factor, but it will almost certainly take its toll on species.

6 DROUGHTS In past periods of climate change, whole sections of Africa turned to desert. In extreme scenarios, areas that are currently fertile could become barren and dry.



CONDITIONS FOR SUSTAINABILITY

- Limit substances removed from the Earth
- Limit persistent man-made substances
- Avoid degradation of ecosystem

TRASH TALK

-  Recycle
-  Reuse
-  Renew

IS IT REAL? IS IT MEMOREX?

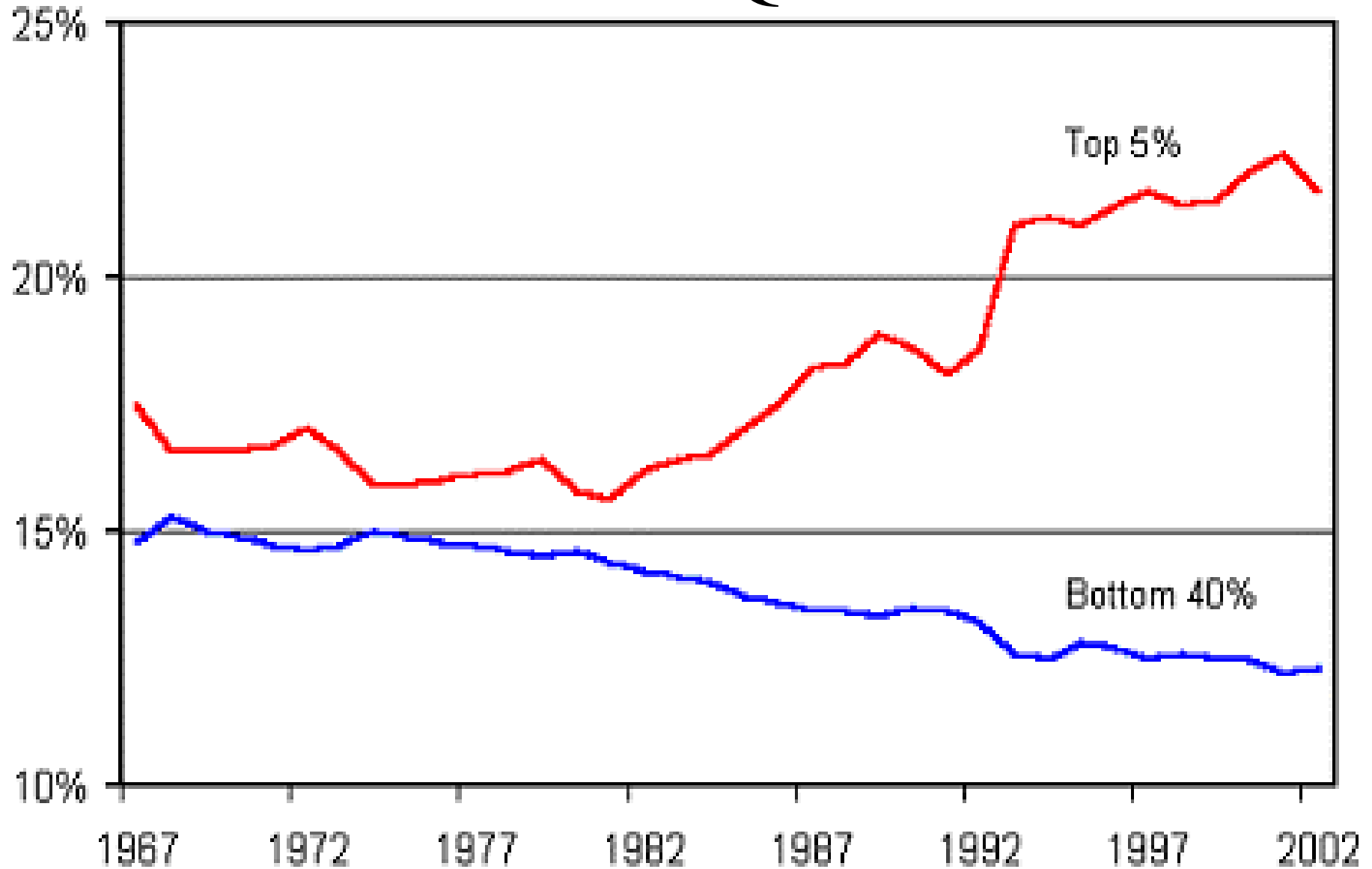
- Nike – old sneakers become tennis courts
- Stonyfield Farms – yogurt cup becomes toothbrush
- Unilever – plastic packaging becomes park benches
- Norcal – turns food scrap into rich compost

CONDITIONS FOR SUSTAINABILITY

- Limit substances removed from the Earth
- Limit persistent man-made substances
- Avoid degradation of ecosystem
- Meet basic human needs

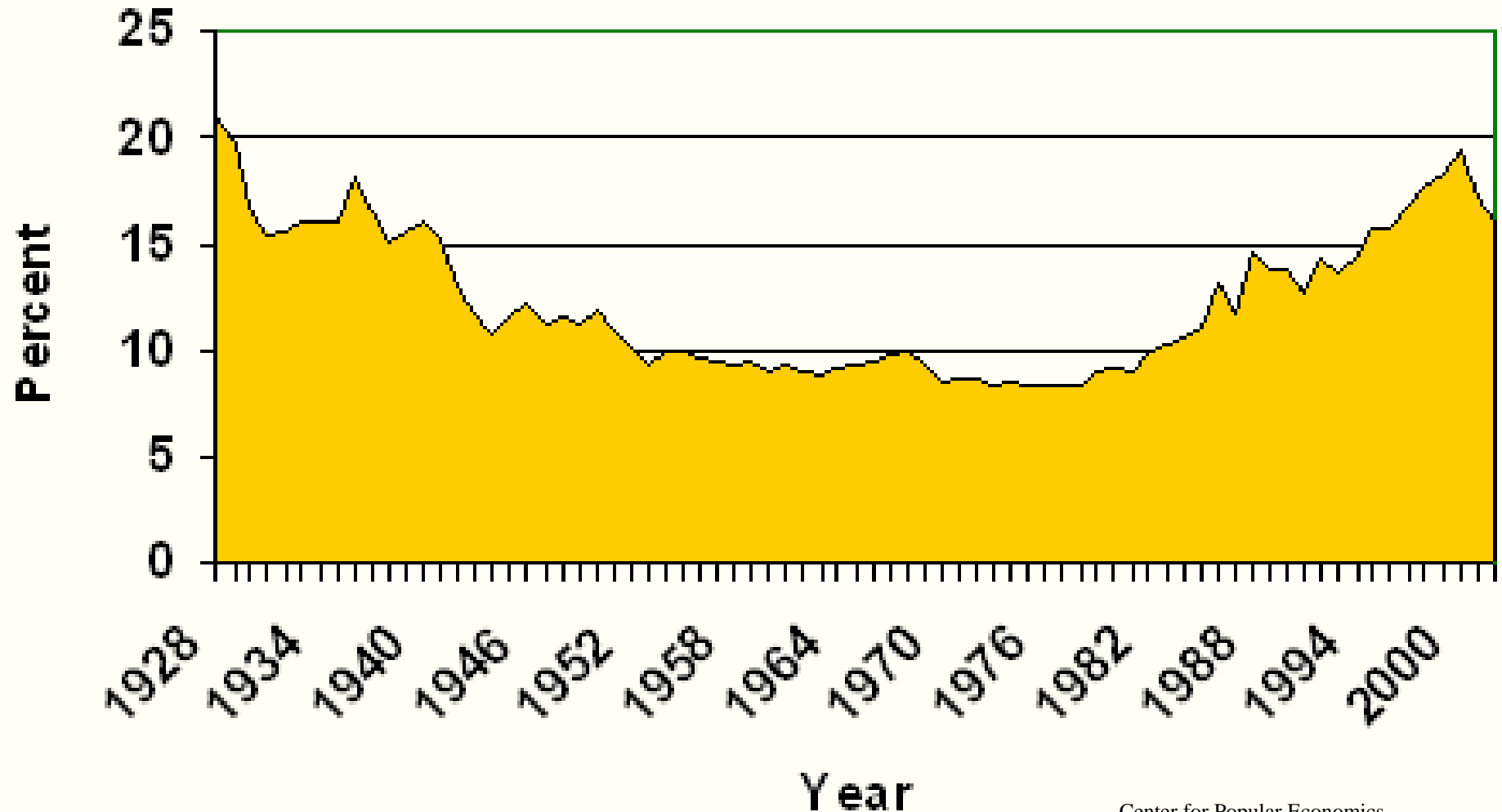
from www.naturalstep.org

INCOME INEQUALITY



Source: Center for Popular Economics

Percent of After-Tax Income Going To Top 1% of Earners - 1928-2002



INCOME INEQUALITY

- High debt
- Inadequate safety net
- Social unrest
- Terrorism

CHINA: POVERTY VS. POLLUTION

Goal

- Reduce poverty
- Minimize social unrest

Result

- 200mm reduction in poverty
- Toxic air
- Polluted water

Rebalance priorities

WHY PEOPLE MAKE POOR CHOICES

Beliefs determine choices

- Not enough for everyone
- Me against the world
- One and done
- More things = happiness

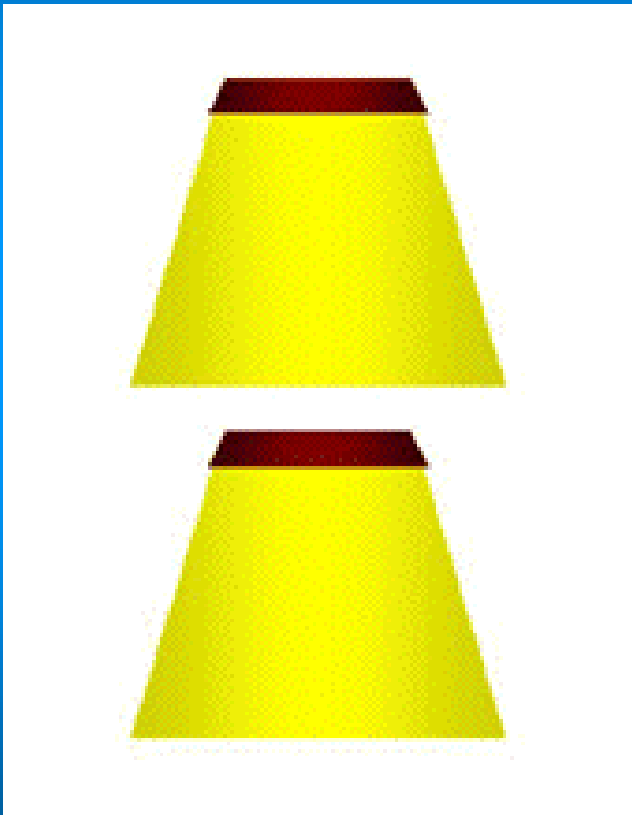
Distorted views of self interest

COME TO YOUR SENSES

- 🍌 Feel it
- 🍌 Smell it
- 🍌 Hear it
- 🍌 Taste it
- 🍌 See it

NONSENSE

SEEING

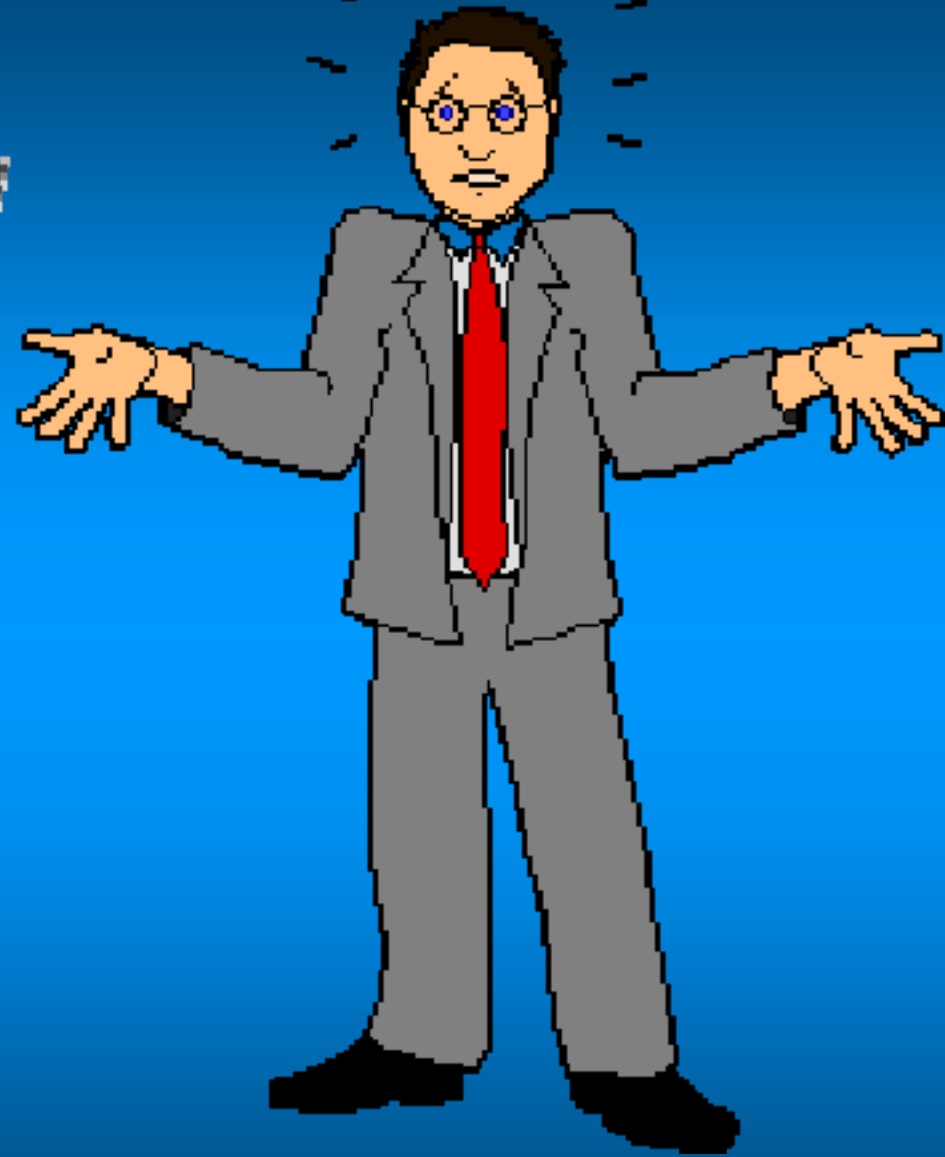


IS



BELIEVING?

**You
environmentalists
have to
understand the
destruction of the
planet is the price
we must pay for a
healthy economy.**



EXPAND CONSCIOUSNESS

- We can create what we need
- We're connected and interdependent
- Everything we do has consequences
- Happiness unrelated to more things

ECONOMICS OF HAPPINESS



Happiness is

- Basic
- Relative
- Inner



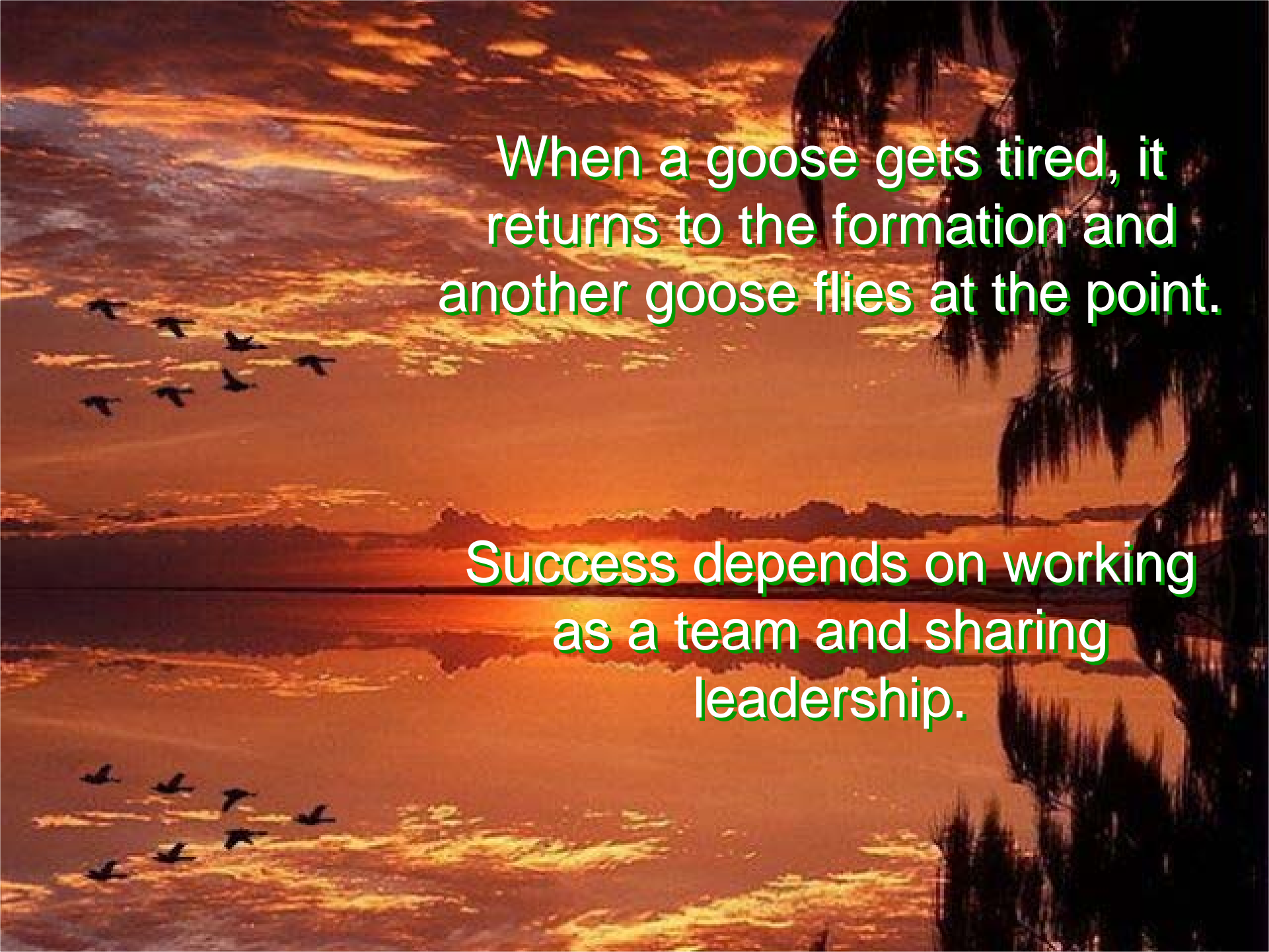
A LESSON FROM GEESE

AUTHOR UNKNOWN

Like geese...

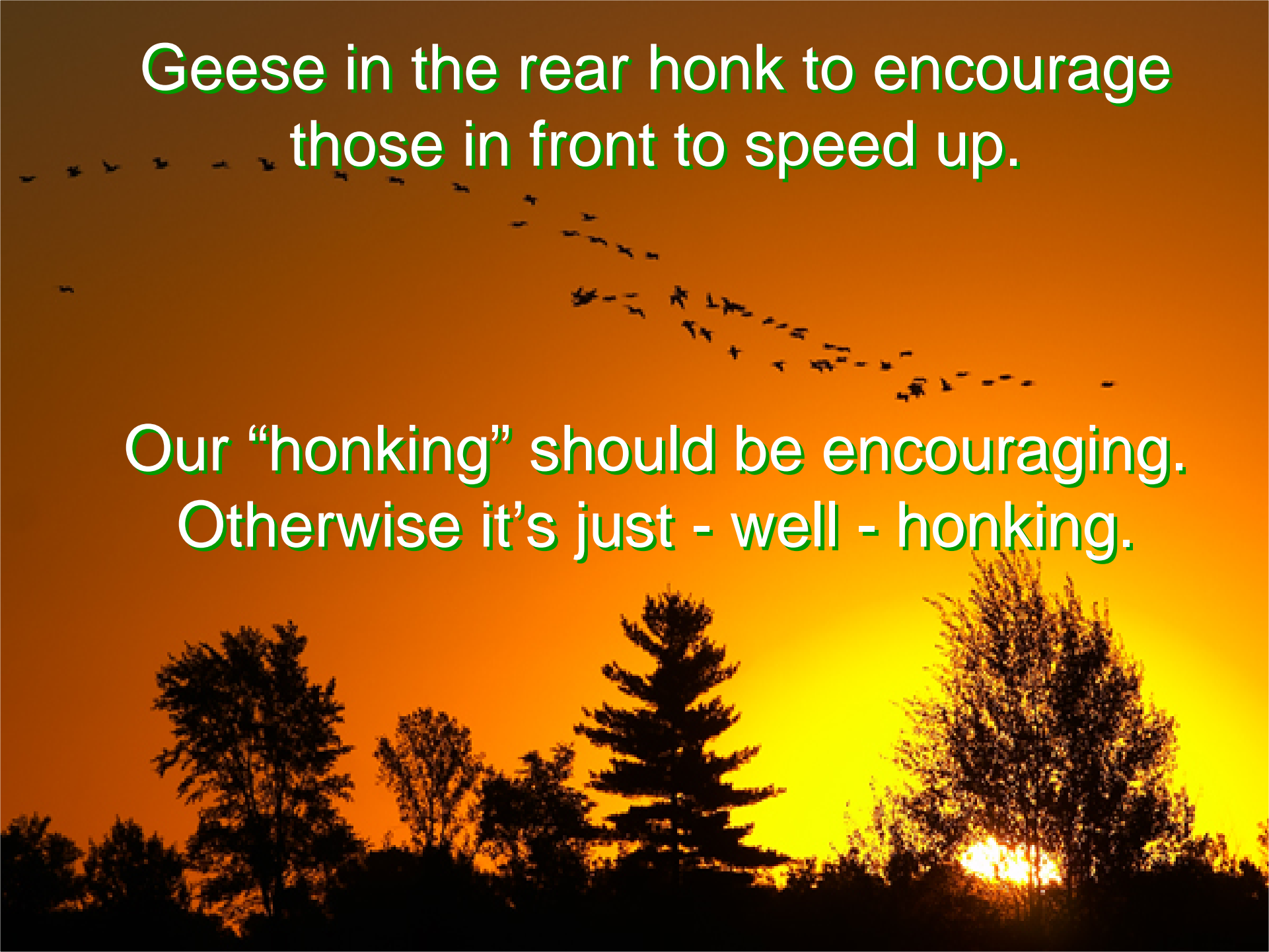


... people who share a common direction
can get where they are going easier than
those who try to go it alone.



When a goose gets tired, it returns to the formation and another goose flies at the point.

Success depends on working as a team and sharing leadership.

A flock of geese is flying in a V-formation across a bright orange and yellow sunset sky. The birds are silhouetted against the glowing light. In the foreground, the dark silhouettes of various trees, including a prominent evergreen, are visible against the horizon.

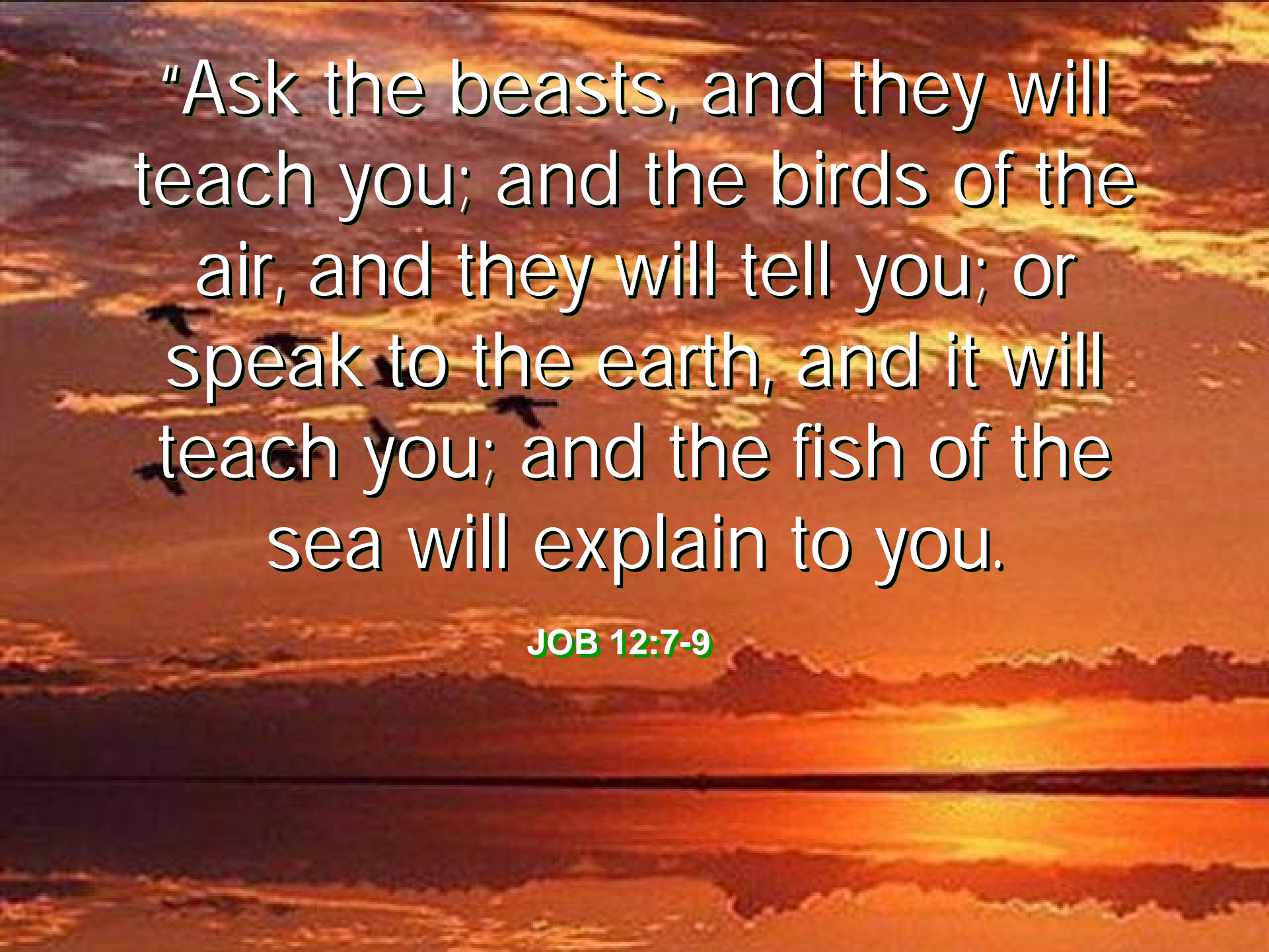
Geese in the rear honk to encourage
those in front to speed up.

Our “honking” should be encouraging.
Otherwise it’s just - well - honking.

When a goose gets sick or wounded, two other geese drop out of formation to help.



They stay with the unhealthy member of the flock until it is able to fly again or dies.

A vibrant sunset or sunrise scene with a warm orange and yellow sky. The sun is low on the horizon, creating a bright glow. Several birds are silhouetted against the sky, flying in various directions. The water in the foreground is dark, reflecting the colors of the sky.

“Ask the beasts, and they will teach you; and the birds of the air, and they will tell you; or speak to the earth, and it will teach you; and the fish of the sea will explain to you.

JOB 12:7-9

Bad

Good

Inevitable

NATURAL RESOURCE CONFLICTS ABOUND

- Business – exploits
- Government – regulates
- Activists – limit use

... BUT GOVERNMENTS MUST SHOW LEADERSHIP



THE U.S. is funding research in new energy technologies, while calling for voluntary reductions in carbon emissions. But both parties have failed to make global warming a top policy priority. Some states are now calling for mandatory cuts and some are requiring that electricity be generated from alternative sources.

THE EUROPEAN UNION will begin a carbon-cutting and trading system in January. The EU has also made a deal with auto makers to cut vehicle emissions. In addition, Britain has been particularly aggressive, setting a long-term target of 60% reduction in carbon emissions.

CHINA is struggling to devise a road map that will allow for continued, rapid growth without huge rises in pollution and greenhouse-gas emissions.

JAPAN hosted and signed the Kyoto accord on emissions reductions in 1997. It hopes to meet its commitments through conservation efforts and increased use of nuclear power.

SOME COMPANIES ARE ALREADY MAKING CHANGES...



AMERICAN ELECTRIC POWER Is investing in renewable energy projects in Chile, exploring ways to burn coal more cleanly, and testing methods to sequester carbon.

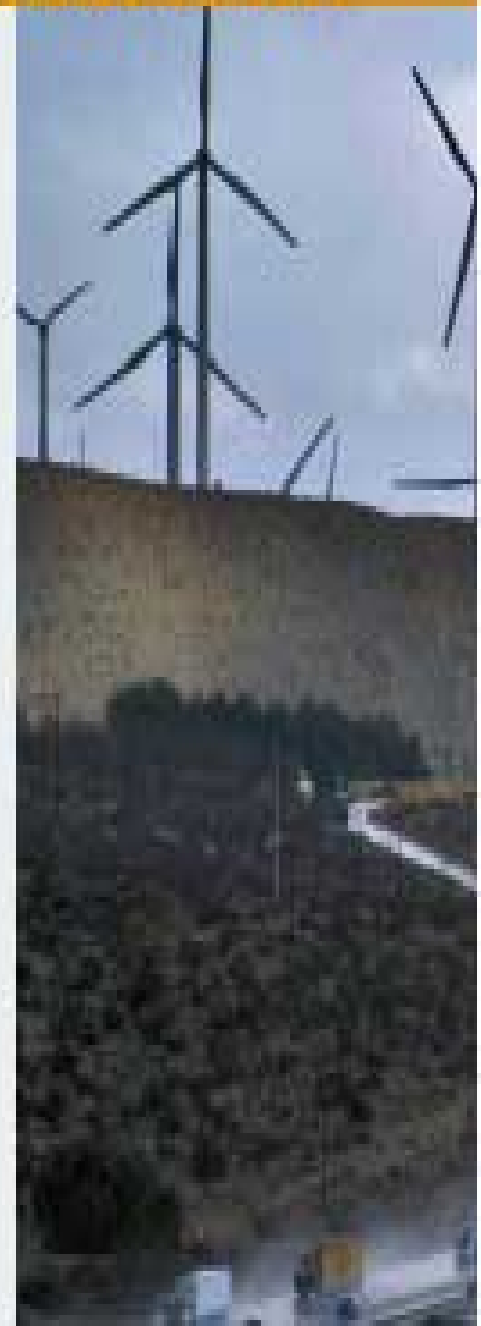
FLORIDA POWER & LIGHT Invested in 42 wind facilities and energy efficiency, eliminating the need to build 10 power plants.

GENERAL ELECTRIC Purchased Enron's wind business and a solar energy company; doing research on earth-friendly hydrogen and lower-emission jet engines and locomotives.

GENERAL MOTORS Developing hydrogen-powered cars that don't emit CO₂.

INTEL Researching chemicals, for use on chip production lines, that don't contribute to greenhouse effect; developing ultra energy-efficient chips.

TOYOTA The world leader in hybrid gas-electric cars that deliver superior fuel efficiency.



A CRITICAL MASS
IS FORMING

EVOLUTIONARY SPIRAL

The Omega point
complete centralization and
radialization of all energy

Ever increasing complexity
of social organizations

Fire, language, tool making

Mammals

Primates

Man – The
emergence
of reflective
consciousness

DNA, RNA

Higher
animal
forms

Increasing order and
corresponding increase of
radial energy component causes
still further tightening of spiral

Cells

Metazoa

Atoms
evolve

Molecules

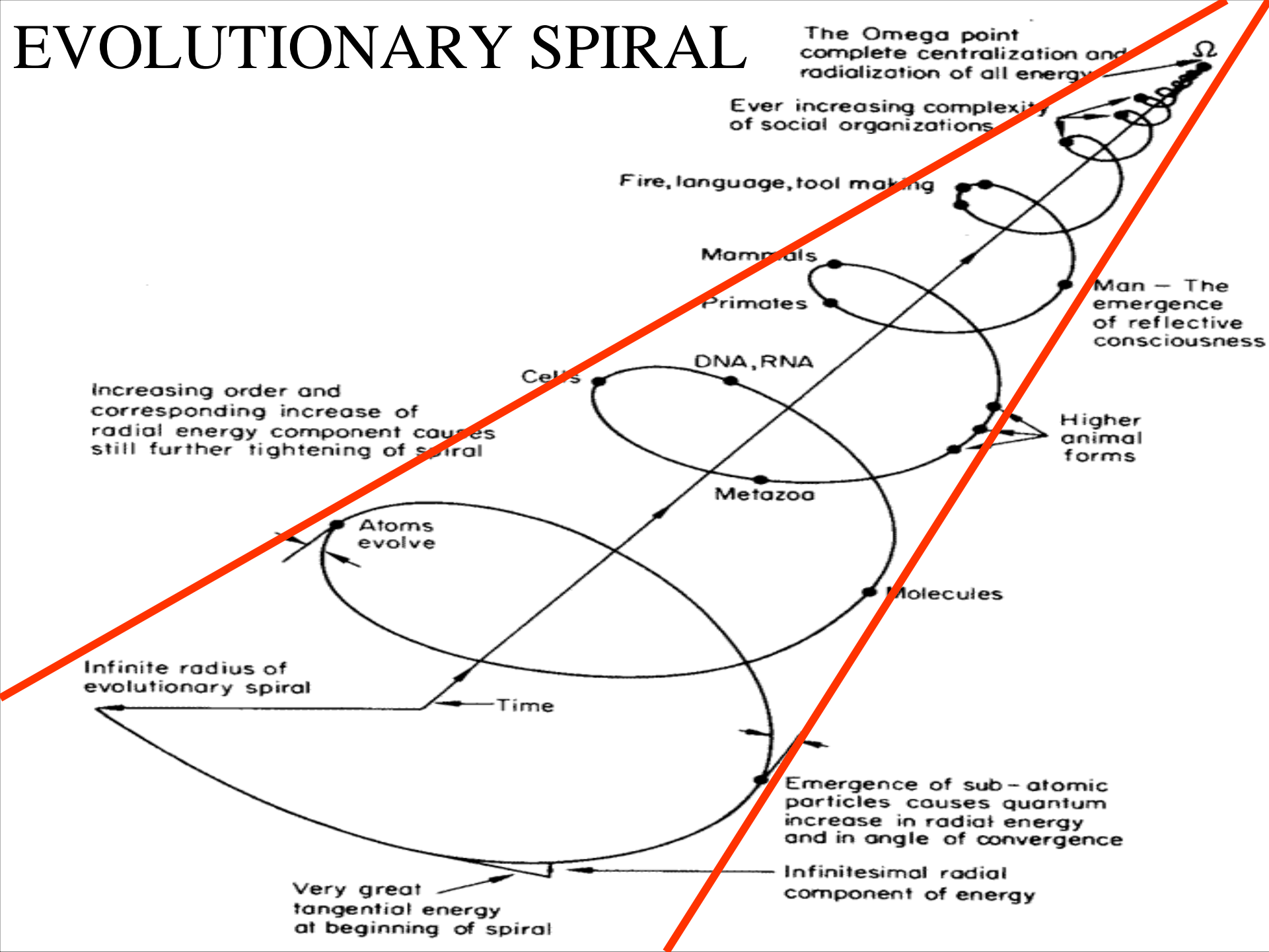
Infinite radius of
evolutionary spiral

Time

Emergence of sub-atomic
particles causes quantum
increase in radial energy
and in angle of convergence

Infinitesimal radial
component of energy

Very great
tangential energy
at beginning of spiral



USE EFFECTIVE INCENTIVES

- Encourage user fees
- Discourage subsidies
 - Energy
 - Agriculture
 - Flood plain insurance

Aware

Model

Activist

AMA CHALLENGE

Twenty Questions: Have you or do you now?

1. Separate your waste and recycle it _____
2. Donate money for planting trees (great gift idea) _____
3. Use recycled paper – towels, facial, toilet, office supplies _____
4. Use reverse side of paper when first side becomes scrap _____
5. Use energy saving light bulbs – 50% - 100% _____
6. Offset CO2 emissions generated by car, air travel, appliances _____
7. Recently purchased energy efficient fridge, heater, A/C, dryer _____
8. Drive a car that gets over 30 miles per gallon _____
9. Minimize use of grocery bags - buy minimally packaged goods _____
10. Donate time or money to environmental organizations _____
11. Communicate environmental views to political representatives _____
12. Support a large (\$1.50 min.) tax on gallon of gasoline _____
13. Tell politicians you support tax on amount trash disposed _____
14. Actively encourage others to minimize use of natural resources _____
15. Tell politicians you favor rising taxes to help poor _____
16. Actively boycott irresponsible companies _____
17. Actively patronize responsible companies _____
18. Buy household cleaners made from vegetable not fossil oil _____
19. Purchased water saving shower or toilet _____
20. Ask corporate exec to change specific environmental policy _____