



LECTURE

Ecological Economics

WE WITNESS UNSUSTAINABLE HUMAN-ECOSYSTEM INTERACTIONS

- How could people make such serious mistakes in the past and why does society continue to repeat such mistakes today?



WE WITNESS UNSUSTAINABLE HUMAN- ECOSYSTEM INTERACTIONS

- How could people make such serious mistakes in the past and why does society continue to repeat such mistakes today?
- Is it inevitable that the environment must be degraded to satisfy human needs?



DRIVERS OF UNSUSTAINABILITY

○ HUMAN POPULATION INCREASE

- Agriculture
- Shelter
- Mobility
- Stuff



Use Energy and
Material Resources
causes

- Land use change
- Habitat loss
- Deforestation
- Alter biogeochemical cycles

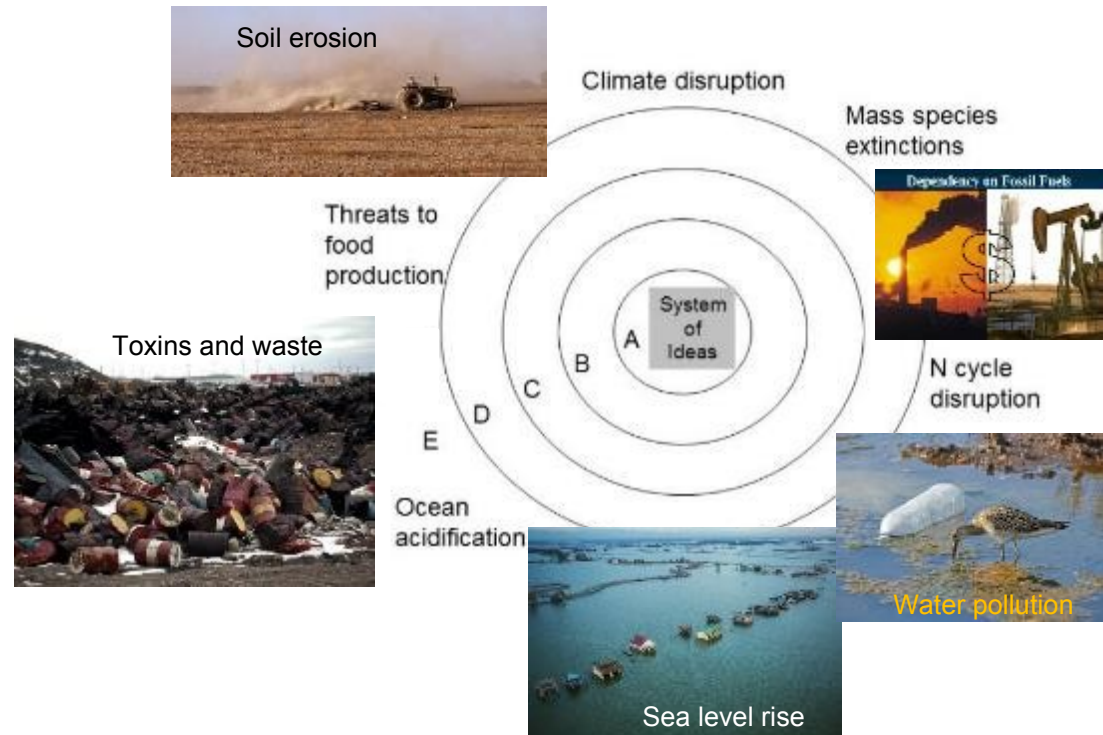


Climate Change
Eutrophication
Acid precipitation
Ozone Depletion
Smog
...

Leads to



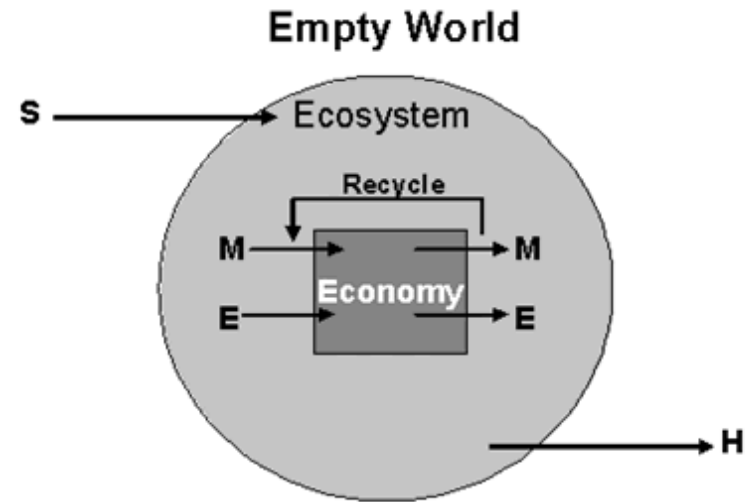
ENVIRONMENTAL (AND SOCIAL) PROBLEMS ARE SYMPTOMS OF DEEPER FAILURES



Emergence of humans, from a minor component of natural system to predominant occupant

Scale of humanity has increased greatly putting pressure on all natural resources

The changes have come so fast our customs, ethics, and religious patterns have not adapted to them.



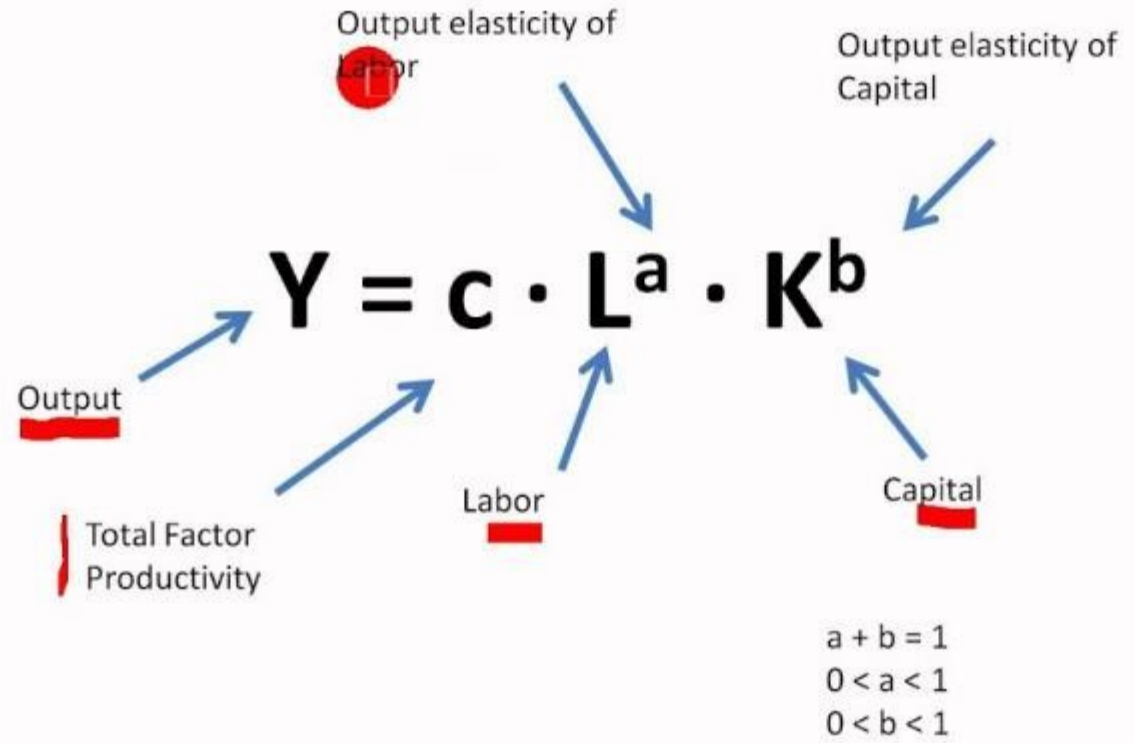
Man-made Capital Natural Capital
S = Solar Energy H = Heat M = Matter E = Energy

ECONOMICS

- Economics is one the main organizing forces in society
- Many decisions are made based on cost-benefit analysis but true costs (direct + indirect) to individual or to society are often not known



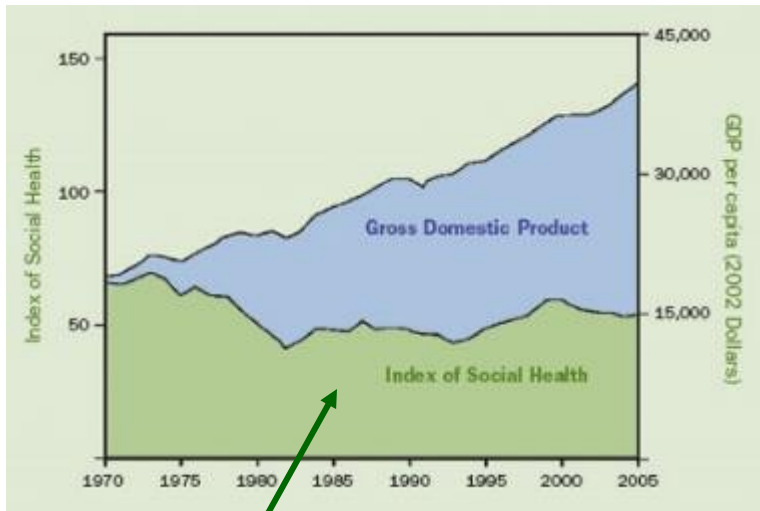
Cobb-Douglas Production Function



WHERE IS ENVIRONMENT?

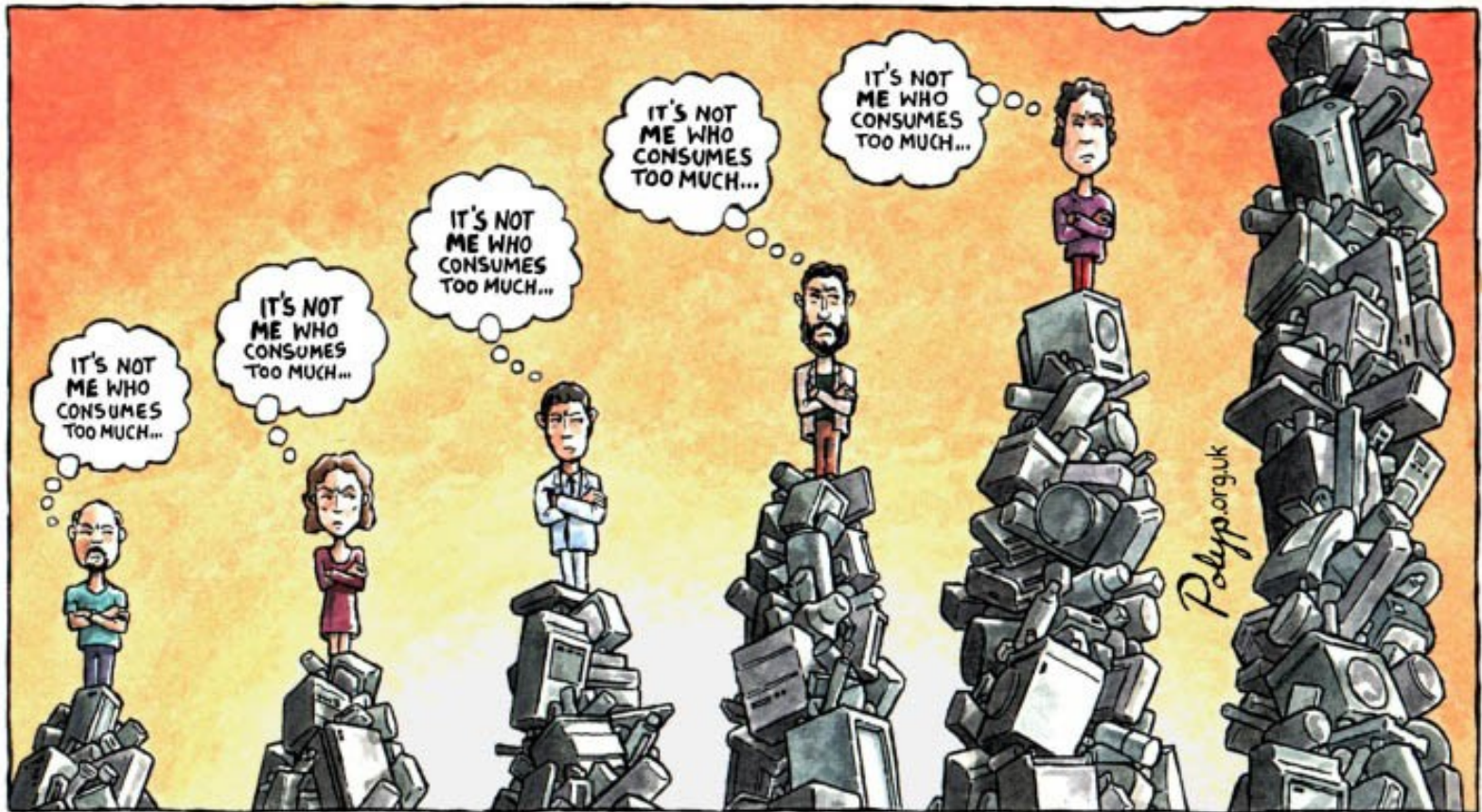
What is the purpose of growth?

Does bigger always mean better?



Alternative well-being indicators tell a different story

Humans are social animals, measuring in terms of others, not absolutes



'IT'S NOT ME'

WHY ENVIRONMENTAL RESOURCES HAVE BEEN POORLY CONSERVED IN THE PAST?

1. *Nature's rate of return of ecosystem services leads us to over exploitation*
 - Living off the flow is too slow, how we want to grow
 - Poor understanding of growth, exponential growth
2. *Externalities*
 - Indirect cost not paid for by producer and consumer as part of a transaction
 - When a decision (for example, to pollute the atmosphere) causes costs or benefits to individuals or groups other than the person making the decision
3. *Pressure for resource consumption*
 - Economic and institutional growth paradigm
 - Victor Lebow (1955): our enormously productive economy demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfactions, our ego satisfactions, in consumption
 - Marketing



1. LOW GROWTH RATE LEADS TO OVER EXPLOITATION

- Nature provides constant production of new goods and resources (through ecosystem services such as primary production).
- If this rate of production is lower than desired, we
 - Over exploit the resources (fisheries, forests, soils)
 - “juice” the system to increase production – adding nutrients, water, protect from pests, etc.
- Hardly occurs to us to manage our needs within this available production
 - living off the flows, not the capital



TRAGEDY OF THE COMMONS

- Garret Hardin (1968)
- Benefit to the individual is greater than the loss which is shared by all





Within carrying capacity

Benefits go to an individual, costs shared by all

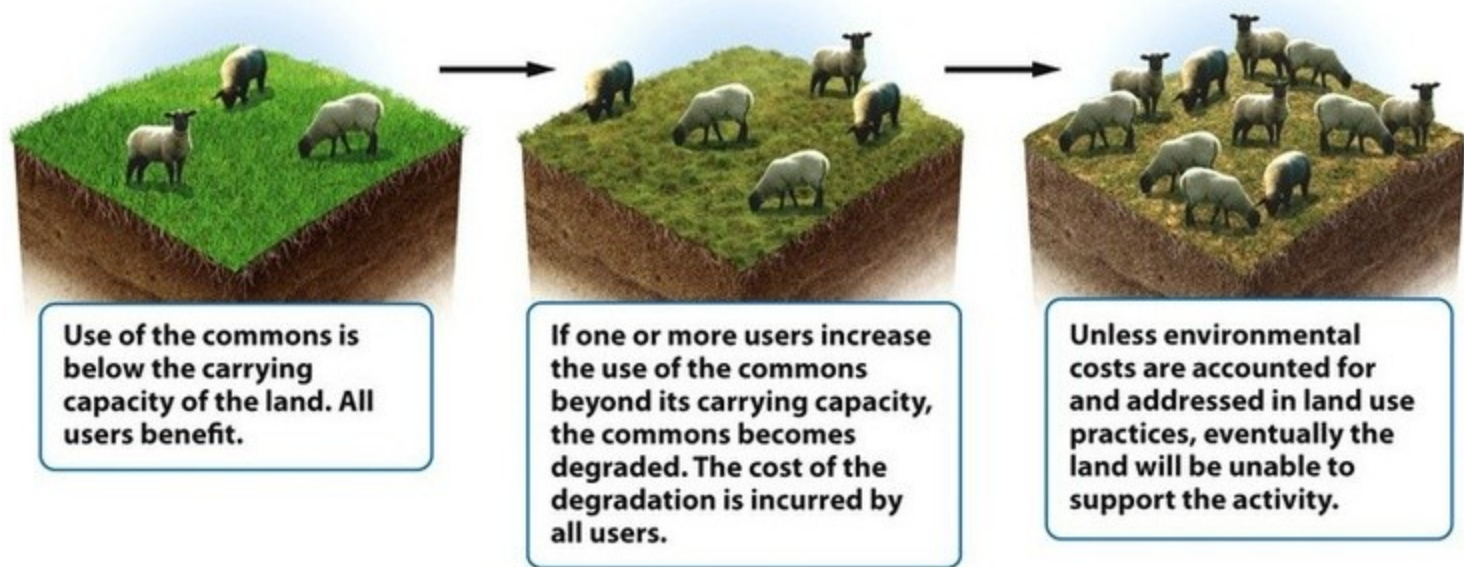
Above carrying capacity



division of costs and benefits to herders is unequal:
individual herder gains all of the advantage,
disadvantage is shared among all herders using the pasture



It's a tragedy because under the current economic paradigm, the "right" choice for the individual degrades the environment



RESPONSE TO TRAGEDY OF COMMONS

- Environmental Ethics that protects nature and the common goods
- Privatize resources so risk and reward are coupled (doesn't address off-site impacts, downstream, in airshed, etc.)
 - Some resources are not able to be privatized (oceans, air, groundwater, etc.)
- Hardin proposed: “Mutual coercion, mutually agreed upon” – meaning democratically imposed limitations
- Highlight win-win synergisms – Trees make the forest better; how can humans make the ecosystem better



STUDY: INSECT POPULATIONS DECLINED 75% OVER LAST 30 YEARS

Scientists in Germany have detected a 75 percent decline in the population of flying insects over the last three decades, which they warn could be disastrous for ecosystems worldwide. What do you think?

- “Thank God I don’t live in an ecosystem.”
 - Sam Endres • Figurine Carver

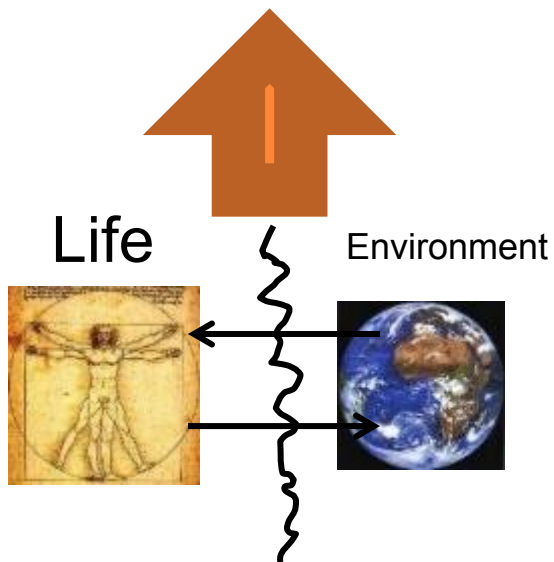
This is an article from *The Onion*.
Please note the sarcasm in it



SOCIO-ECOLOGICAL FRAGMENTATION

REAL IMPACTS OF CHOICE OF SYSTEM BOUNDARIES

Tragedy of the Commons
Humans win, environment degrades



Bounty of the Commons
Humans win, environment improves



Figures by Dan Fiscus



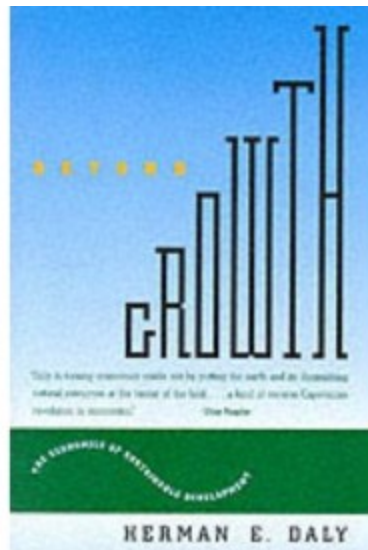
ECOLOGICAL ECONOMICS

- Biophysical based model of economy
 - Economics is an open, thermodynamic system
 - Limits to growth
- Focus on the life-support provided by nature:
Ecosystem Services
 - Regulating, Supporting, Provisioning, Cultural
- Particularly mindful of **intergenerational equity**
- How we measure progress:
 - Quality vs. quantity
 - Well-being vs. GDP



DALY, HERMAN. 1996. *BEYOND GROWTH: THE ECONOMICS OF SUSTAINABLE DEVELOPMENT*.

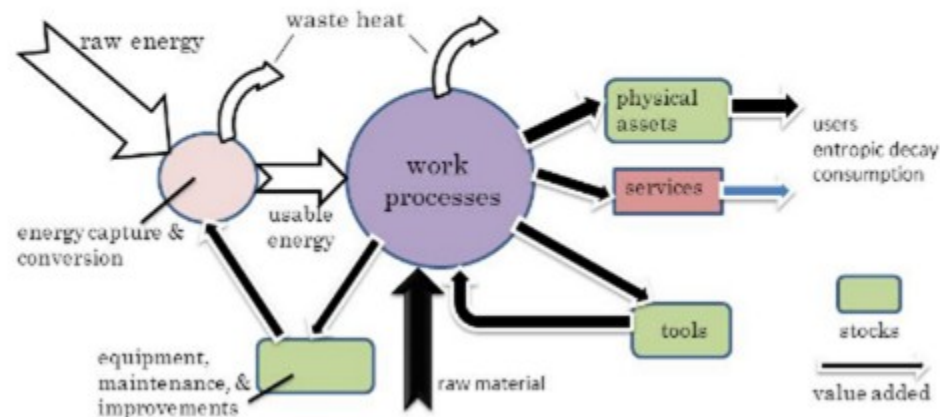
- The first and second laws of thermodynamics must be the starting point of economics
- neither the sources of useful inputs nor the sinks for polluting waste outputs are infinite.



DALY (1996) CONTINUED

- Nicolas Georgescu-Roegen's *The Entropy Laws and the Economic Process* (1971), demonstrates:
 - Wealth is an open system, a structure maintained in the midst of throughput
 - It begins with the depletion of useful matter/energy and ends with the return of an equal quantity of spent matter/energy back to the environment.

- The Economy: Energy, work, and goods/services



DALY (1996) CONTINUED

- The first thing to change would be the circular flow diagram that conveys the preanalytic vision of the economic process as an isolated circular flow from households and back again, with no inlets or outlets.
- This diagram has its uses in analyzing exchange, but it fails badly as a framework for studying production and consumption... **requiring no dependence on an environment.**

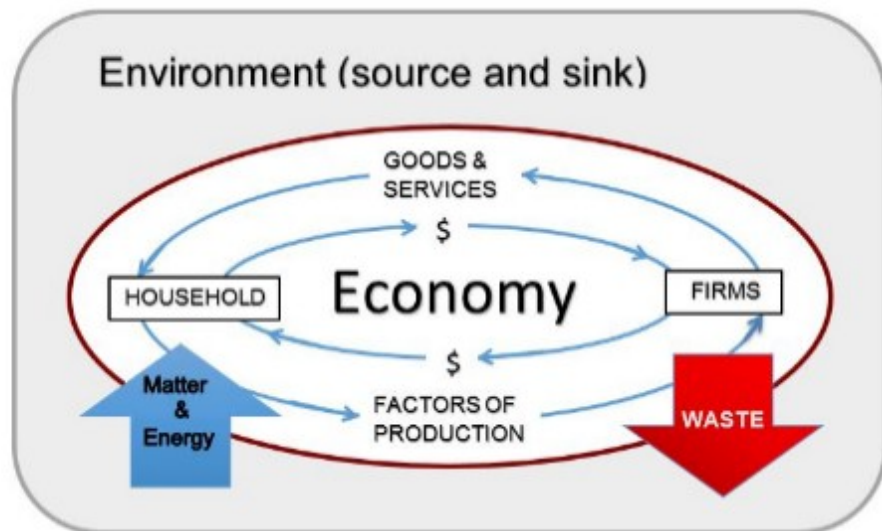
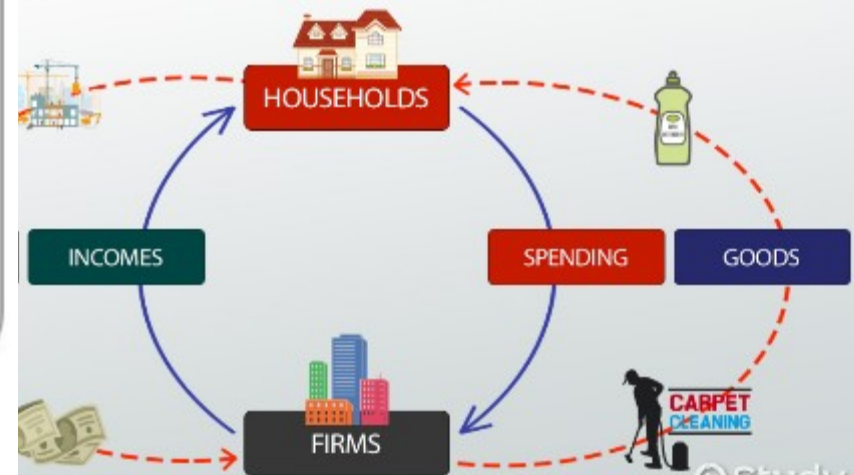


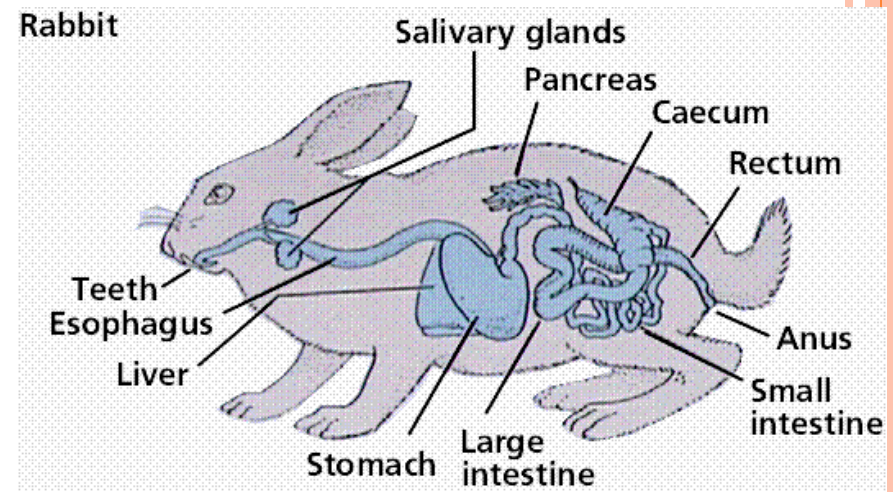
Fig. 2. Thermodynamic throughput model. Note the addition

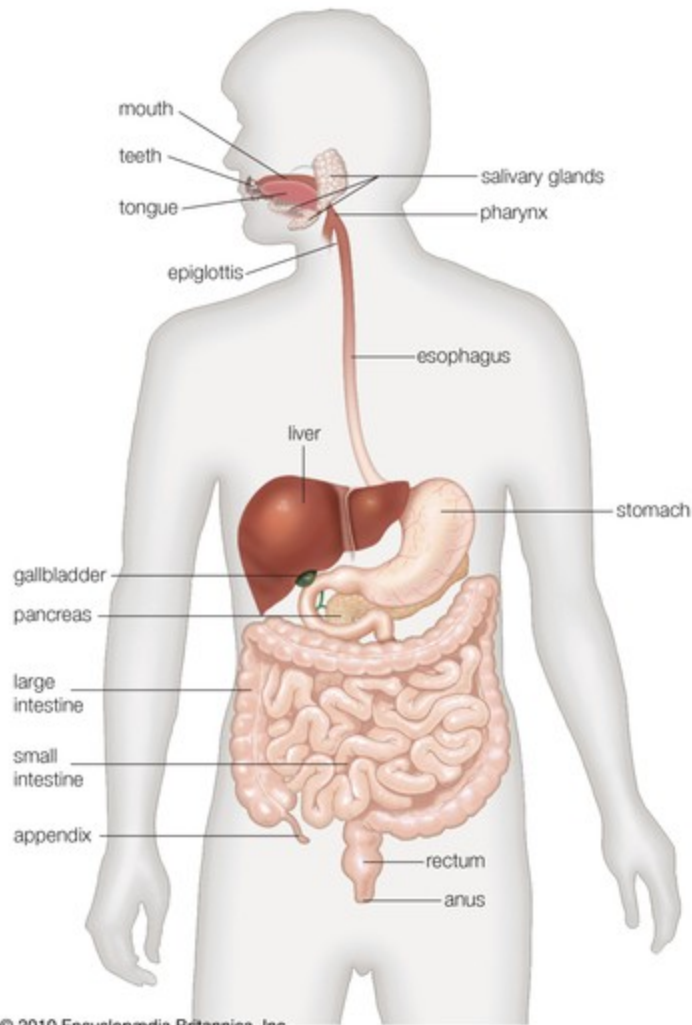
Circular Flow Diagram



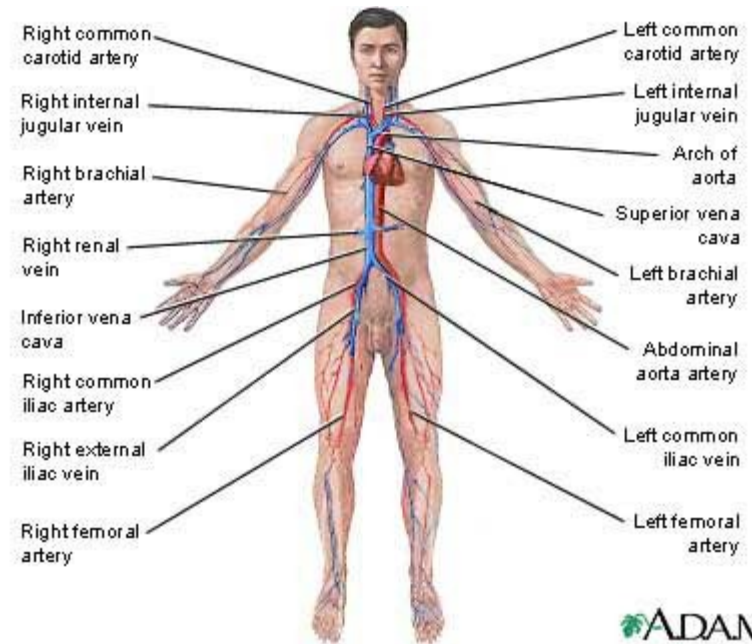
DALY (1996) CONTINUED

- It is exactly as if a biology textbook proposed to study an animal only in terms of its circulatory system, without ever mentioning its digestive tract!
- An animal with an isolated circulatory system and no digestive tract would be a perpetual motion machine.
- *Unlike this imaginary circular-flow animal, real animals have digestive tracts that connect them to their environment at both ends.*





Organisms continuously take in useful energy/matter and give back spent energy/matter.



ADAM.

Circulation in a closed system is not a measure of how the organism is connected to its environment.

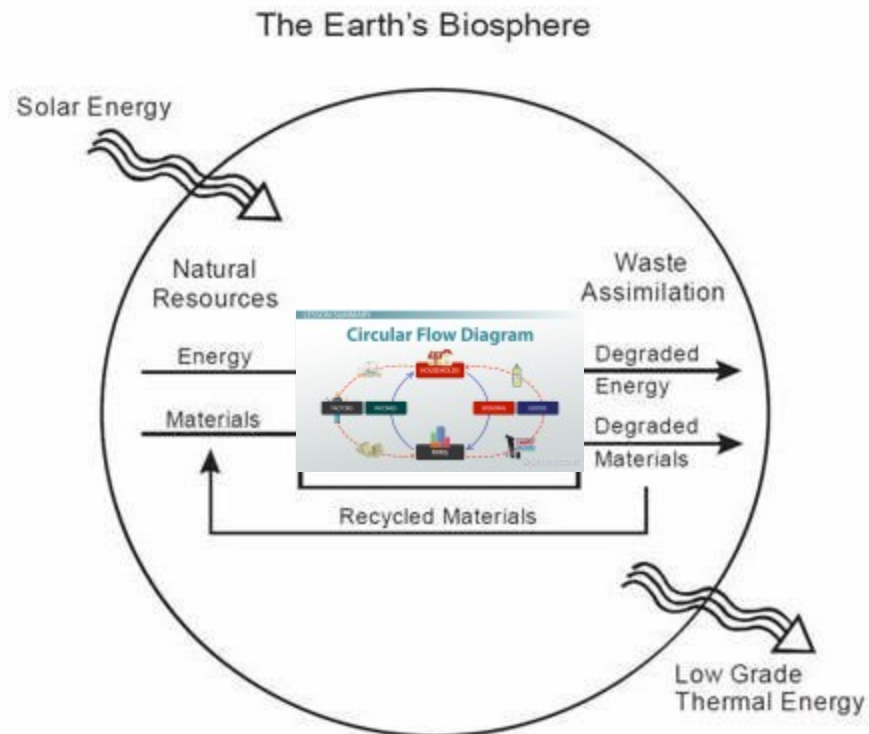


DALY (1996) CONTINUED

- Of course biology textbooks do not omit the digestive tract. They usually discuss it before the circulatory system, probably because of its prior evolutionary emergence.
- Can't have circulation without digestion



ECONOMY AS AN OPEN SYSTEM CONNECTED TO AND DEPENDENT ON ITS ENVIRONMENT



Functioning **Ecosystems** provide **Services** such as:

- biological productivity
- cycle and transport nutrients
- hydrologic cycle
- generate soils
- decompose wastes
- maintain biodiversity
- purify the air and water
- contribute to climate stability
- protect from the ultraviolet solar radiation
- protect against erosion
- disperse seeds
- pollinate crops and natural vegetation
- control agricultural pests
- regulate disease carrying organisms



Healthy ecosystems provide free "services" to human communities, including: water filtration, groundwater recharging, stormwater control, air purification, nutrient recycling, crop pollination, and soil enrichment.



ECOSYSTEM SERVICES

Supporting

- NUTRIENT CYCLING
- SOIL FORMATION
- PRIMARY PRODUCTION
- ...

Provisioning

- FOOD
- FRESH WATER
- WOOD AND FIBER
- FUEL
- ...

Regulating

- CLIMATE REGULATION
- FLOOD REGULATION
- DISEASE REGULATION
- WATER PURIFICATION
- ...

Cultural

- AESTHETIC
- SPIRITUAL
- EDUCATIONAL
- RECREATIONAL
- ...





CONSTITUENTS OF WELL-BEING



Source: Millennium Ecosystem Assessment

ARROW'S COLOR
Potential for mediation by socioeconomic factors

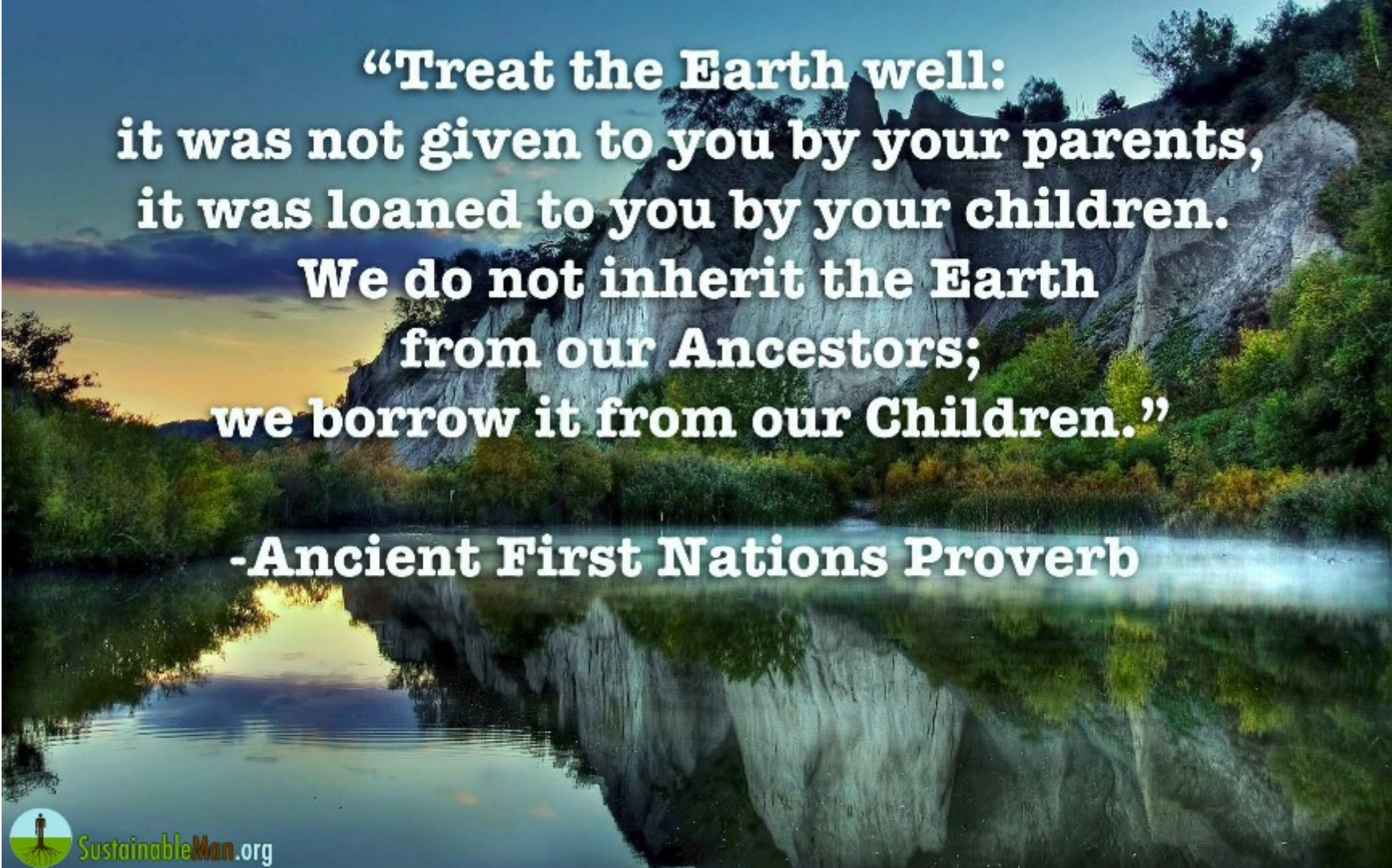
- Low
- Medium
- High

ARROW'S WIDTH
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong



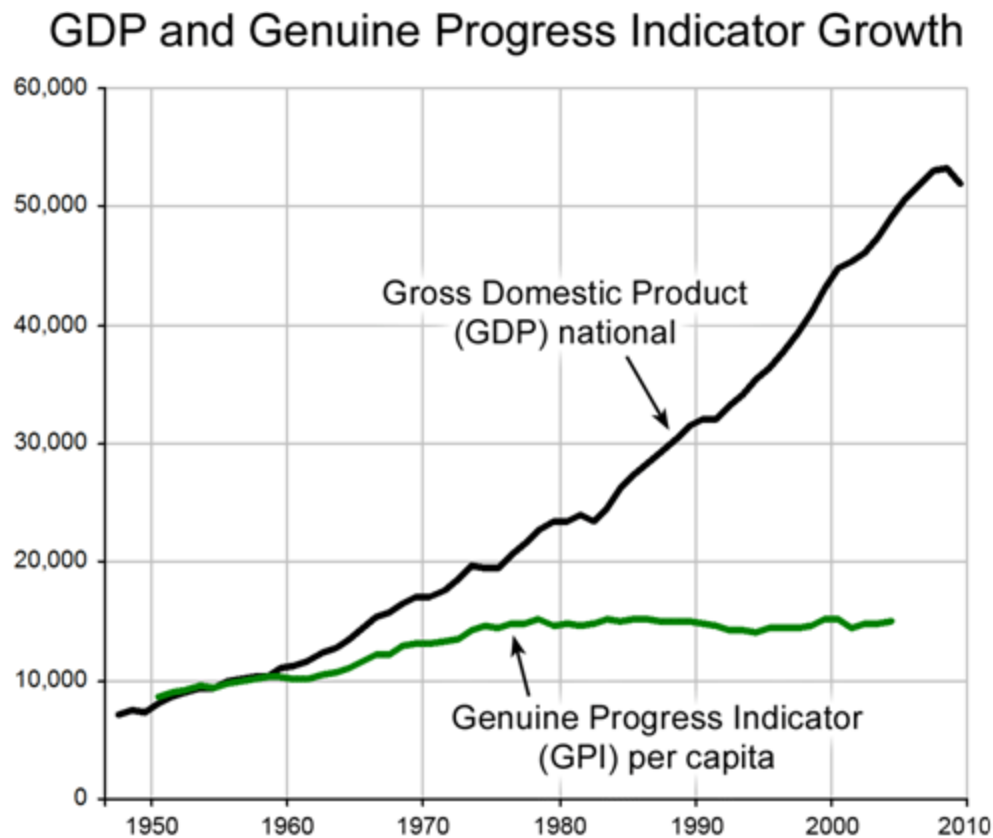
3. Intergenerational equity



**“Treat the Earth well:
it was not given to you by your parents,
it was loaned to you by your children.
We do not inherit the Earth
from our Ancestors;
we borrow it from our Children.”**

-Ancient First Nations Proverb

HOW WE MEASURE PROGRESS MATTERS



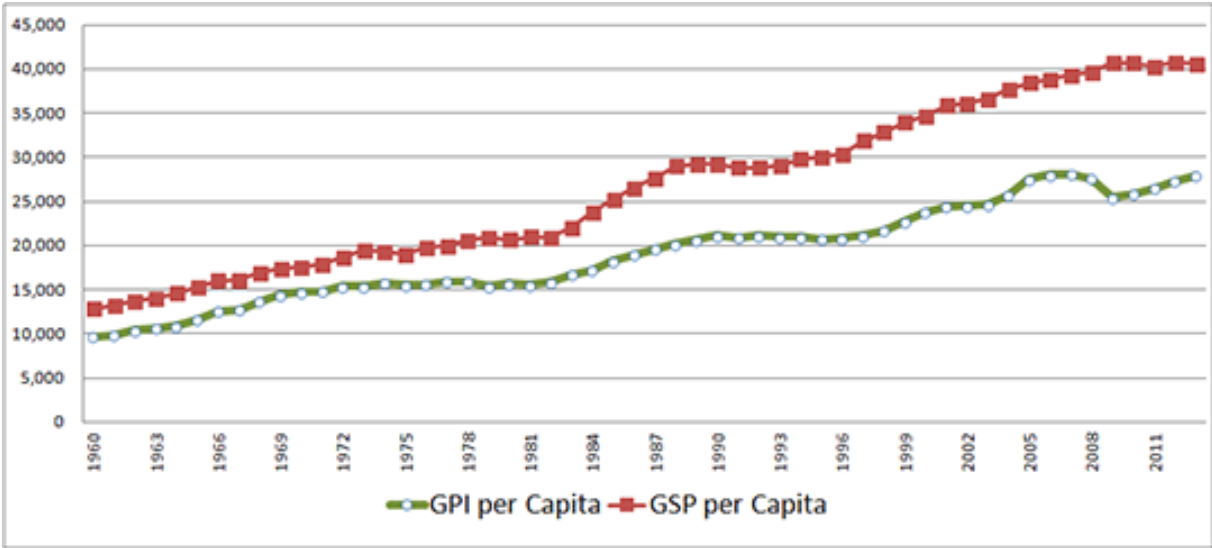
GDP measures the circulation of money

GPI accounts for 26 indicators including economic, environmental, and social factors to determine if we are well off.



Maryland was first state to adopt GPI as official indicator

Maryland's Genuine Progress Indicator compared with Gross State Product



PRESSURE FOR RESOURCE CONSUMPTION



Consumerism is a cultural pattern that leads people to find meaning, contentment and acceptance primarily through consumption of goods and services.

Equates high consumption with well-being and success

Defining success and happiness through how much a person consumes is not sustainable.





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THE RISE OF CONSUMERISM





We help the environment by consuming less

We help the environment by consuming lots of environmentally safe products

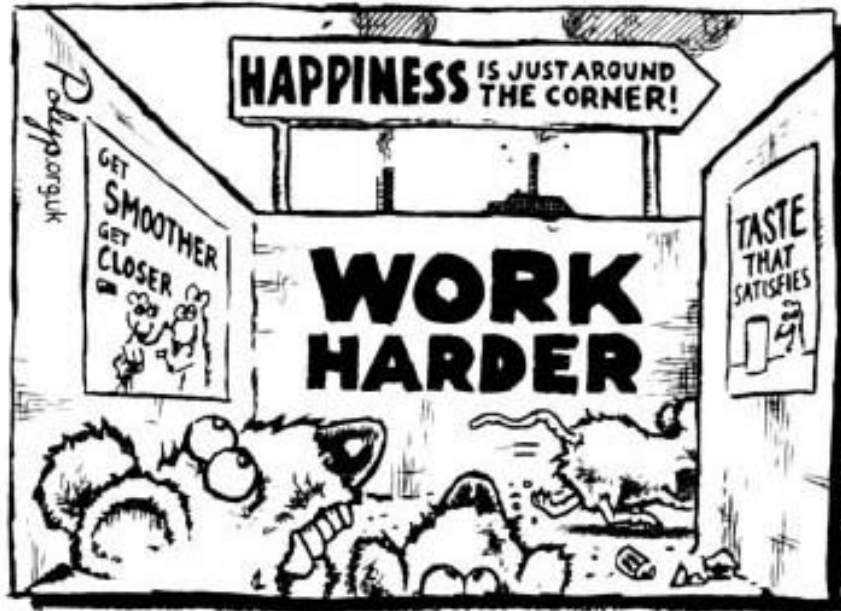


Cultural orientation did not just appear as a byproduct of growing incomes but was engineered over several centuries:

POSITIVE FEEDBACK – consumption – production cycle

Reinforced through exposure to cultural symbols





'RAT RACE'

Business practices to entice consumerism –

Increase in consumer credit

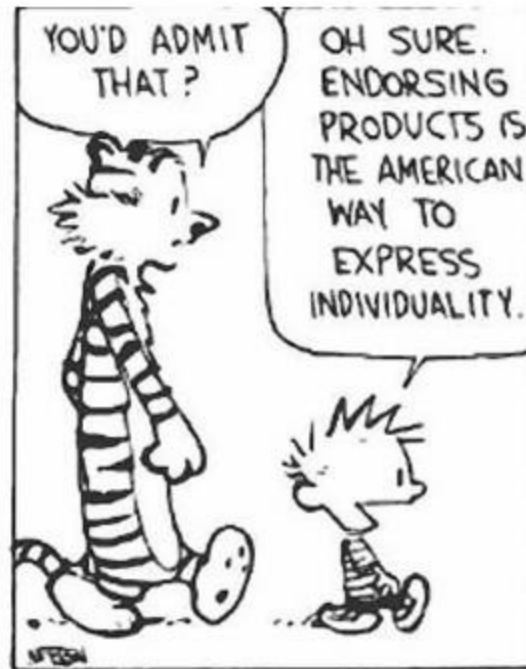
Advertisement – particularly to youth

BABY WALKER





IT SAYS TO THE WORLD, "MY IDENTITY IS SO WRAPPED UP IN WHAT I BUY THAT I PAID THE COMPANY TO ADVERTISE ITS PRODUCTS!"



Early social customs actually blocked consumerism

Religion

Fasting (lent)

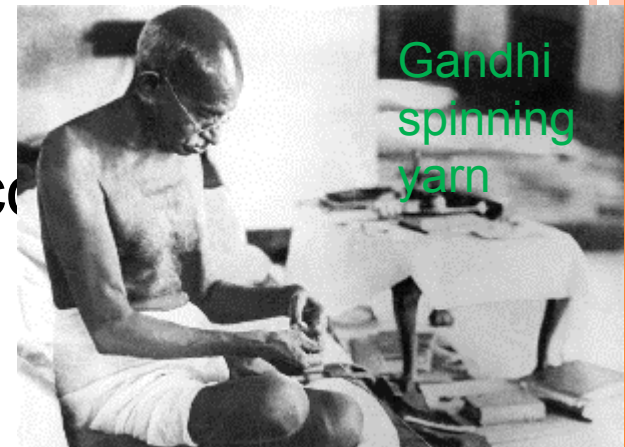
Poverty

Simple living

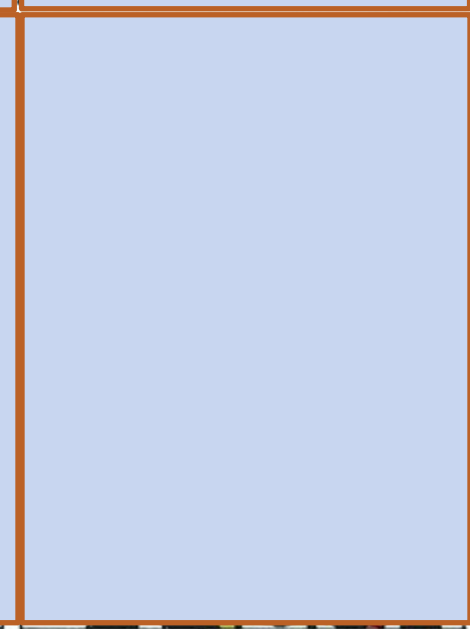
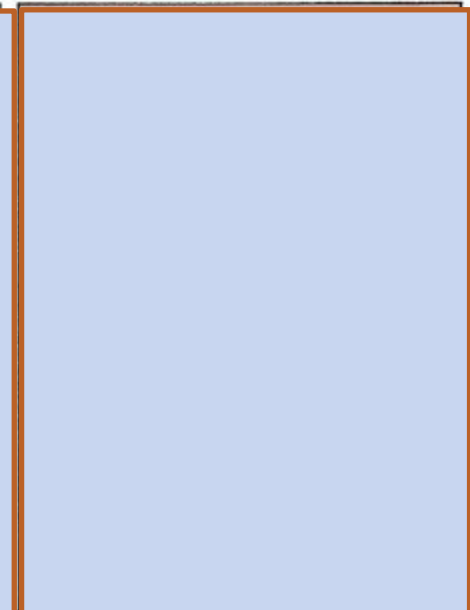
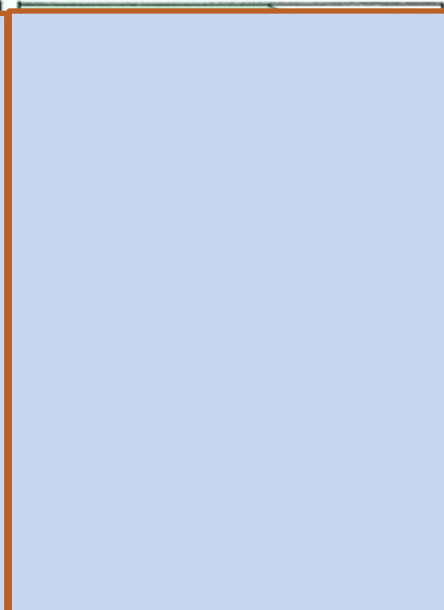
Limited credit

Preference for leisure time

How can we regain control over consumption?



calvin and H



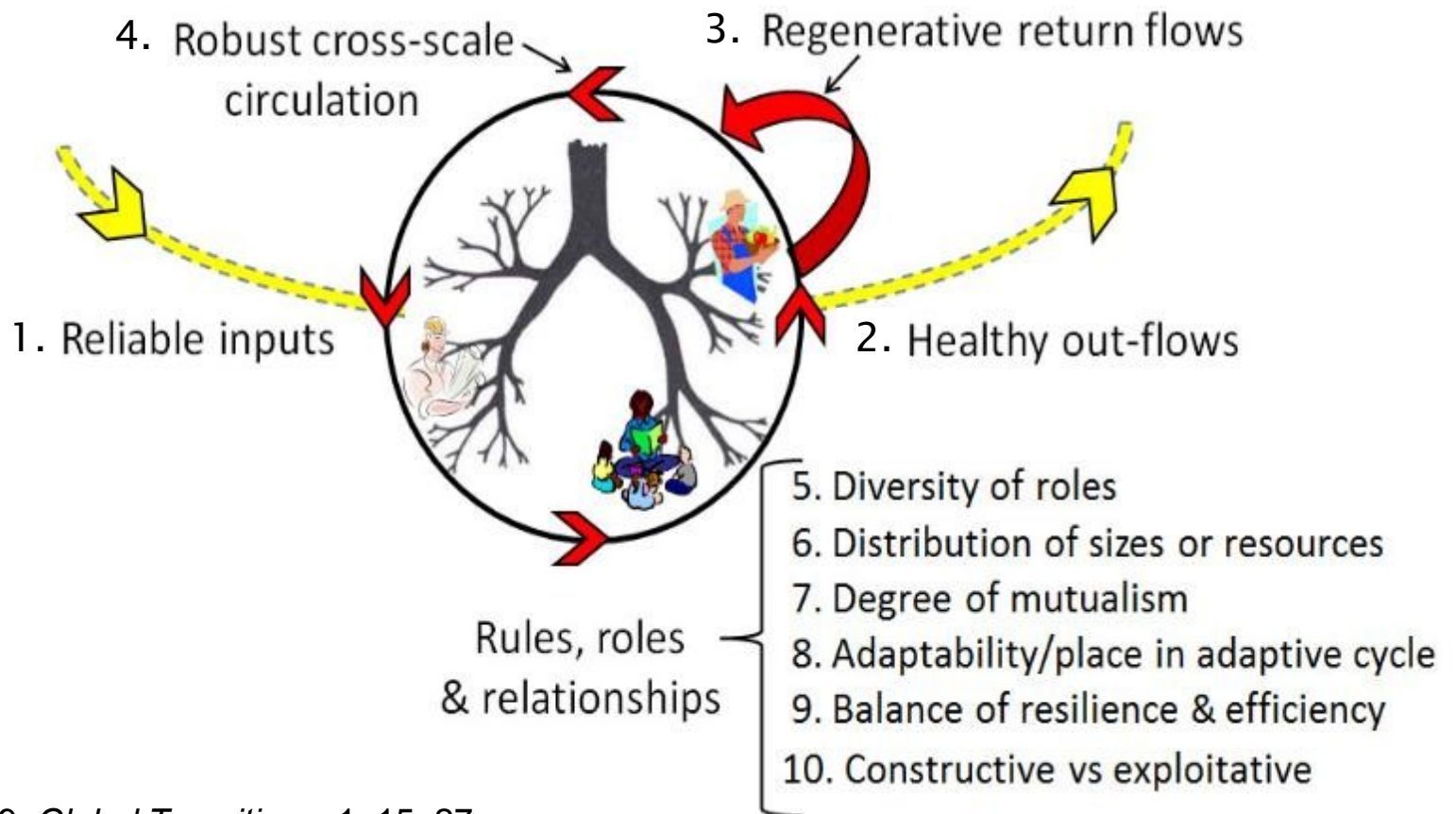
STEPS FORWARD

- Market corrections for externalities
- Ecosystem Services now guiding policy decisions
- Consider other “quality of life indicators”
 - Genuine Progress Index
 - Index of Sustainable Economic Welfare
 - Human Development Index
 - Gross Happiness Index
- Development of Steady State Economics
- But the mindset to growth is deeply embedded – and flawed

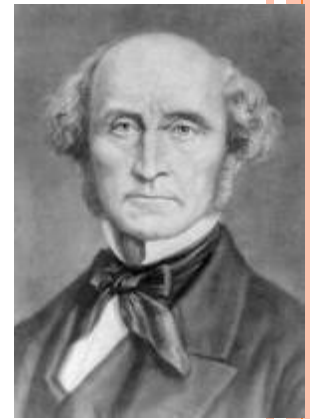


REGENERATIVE ECONOMY

Input, Output, and System Dynamics



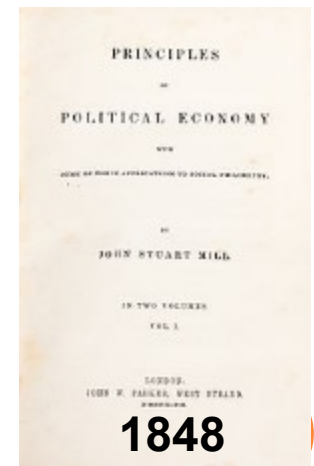
JOHN STUART MILL (1806-1873)



- British philosopher, political economist and civil servant
- Considered “the most influential English-speaking philosopher of the nineteenth century”

“Perpetual growth in material well-being is not possible or desirable.”

Mill argued that the logical conclusion of unlimited growth was destruction of the environment and a reduced quality of life. He concluded that a stationary state could be preferable to unending economic growth



WHY HAVE WE NOT LEARNED THIS LESSON?

DISCUSSION QUESTIONS

- In which sectors of the economy is the transformation of the classic economy to green economy already taking place?
- What pro-ecological economic activities are carried out in the region where you live?
- What are the biggest barriers to sustainable green economy development?
- What can you do in your daily life to make economics decisions consistent with ecological ethics?
- Shorter working hours? Universal Basic Income?
- Is capitalism consistent with ecological ethics?
 - Examples yes and no

