ENVIRONMENTAL PROBLEMS, THEIR CAUSES, AND SUSTAINABILITY

ENVIRONMENTAL SCIENCE

Lecturer:

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Living in An Exponential Ages

The environmental problems we face:

- population growth

- wasteful use of resources

- destruction and degradation of wildlife habitats

- extinction of plants and animals

- poverty and pollution

=> are interconnected and are growing exponentially

The fact of World Population:

- Has more than doubled in 49 years, from 2,5 billion in 1950 to 6 billion in 1999 => Unless death rates rise sharply, it may reach 8 billion by 2028, 9 billion by 2054, and 10-15 billion by 2100 (Miller, 2001).

- Global economic output, much of it environmentally damaging, has increased almost eightfold since 1950

=> We will discuss these questions:

- What are natural resources? What is a sustainable society?
- How fast is the human population increasing?
- What are the earth's main types of resources? How can they be depleted or degraded?
- What are the principal types of pollution? How can pollution be reduced and prevented?
- What are the root causes of today's environmental problems?
- What major effects have hunter-gatherer societies, agricultural societies, and industrialized societies had on the environment?
- How serious are environmental problems, and is our current course sustainable?

1. Living Sustainability

What are Natural Resources and Sustainability?

- We can think of energy from the sun as solar capital and the planet's air, water, soil, wildlife, minerals, and natural purification, recycling, and pest control processes as natural resources or natural capital
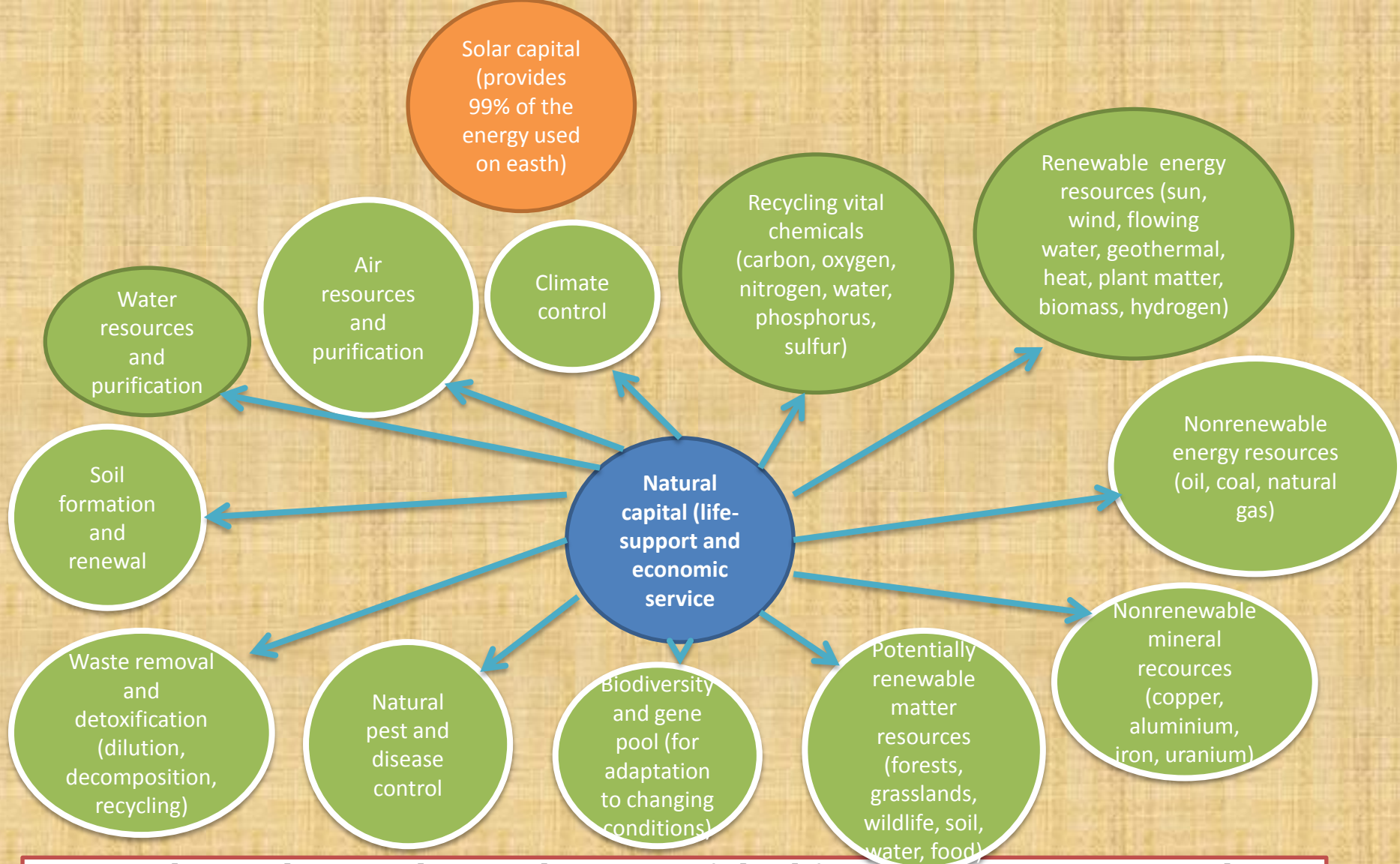
Fig.1. Solar and natural capital consist of the life-support resources and processes provided by the sun and the planet for use by us and other species. These two forms of capital support and sustain all life and all economies on the earth (Miller, 2001)

- Sustainability is the ability of a special system to survive and function over time. During this period, the system satisfies the needs of its inhabitans without depleting natural capital.

- Environmentalists and many scientists believe that we are living unsustainably by depleting and degrading the earth's natural capital at an accelerating rate as our population.

2. Growth and The Wealth Gap

- How rapidly is the human population growth?

World Population reached
1 billion in 1804
2 billion in 1927 (123 years later)
3 billion in 1960 (33 years later)
4 billion in 1974 (14 years later)
5 billion in 1987 (13 years later)
6 billion (12 years later)
World Population May Reach
7 billion in 2013 (14 years later)
8 billion in 2028 (15 years later)
9 billion in 2054 (26 years later)

(United Nations Population Division, World Population Prospects, 1998)

- Recent studies suggest that 48% of the earth's total land area has been partially or totally disturbed by human activities => If uninhabitable areas of rock and ice are excluded, 73% of the habitable area of the planet has been disturbed by human activities.

=> What will happen to the earth's remaining wildlife habitat and wildlife species if the human population increases from 6 billion to 8 billion between 1999 and 2028 and perhaps to 9 billion by 2054?

- What is Economic Growth?

⇒Virtually all countries seek economic growth = an increase in their capacity to provide goods and services for people's final use.

⇒ Such growth is normally achieved by increasing the flow or throughput of matter and energy resources used to produce goods and services

⇒ This increase is accomplished by population growth (more consumers and producers), more consumption per person, or both

⇒Is usually measured by an increase in a country's gross national product (GNP): the market value in current dollars of all goods and services within a country and outside a country by the country's businesses for final use during a year.

⇒ Gross Domestic Product (GDP): the market value in current dollars of all goods and services produced within a country for final use during a year.

⇒Per capita GNP: the GNP divided by the total population → to show one person's slice of the economic pie.

- The United Nations classifies the world's countries as economically developed or developing.

#The developed countries are:

- Highly industrialized

- Most (except the countries of the former Soviet Union) have high average per capita GNP's (above $4000)

- These countries, with 1,2 billion people (20% of the world's population in 1999):

  * have about 85% of the world's wealth and income

  * use about 88% of its natural resources

  * generate about 75% of its pollution and waste

The developing countries:

- low to moderate industrialization and per capita GNP's.

- most are in Africa, Asia, and Latin America

- Their 4,8 billion people (80% of the world's population in 1999):

  * have only about 15% the wealth and income

  * use only about 12% of the world's natural resources

Critical Thinking

Some economists argue that population growth is good because it provides more workers, consumers, and problem solvers to keep the global economy growing.

Environmentalists argue that population growth threatens economies and the earth's life-support systems through increased pollution and environmental degradation.

What is your position? Why?

Between 1950 and 1999 the global output of goods and services increased almost eightfold. Is such exponential economic growth sustainable?

$\Rightarrow$ Some economists and business leaders say it is, but most environmental scientists and a growing number of economists disagree

They contend that many of the current forms of economic growth are not sustainable in the long run because:

1. The limits imposed by the earth's finite supplies of resources

2. The environment's capacity to absorb, detoxify, and recycle the waste products of human societies

=> We meet present human needs without preventing future generations of humans and other species from meeting their needs.

What is The Wealth gap?

- Since 1960, and especially since 1980, the gap between the per capita GNP of the rich, middle income, and poor has widened.

- In 1999, one person in five lives in luxury

- 1,4 billion people worldwide struggles to survive on less than $1 a day

- One person in five is hungry or malnourished

=> Poor families with several children may deplete and degrade local forests, soil, grasslands, wildlife, and water supplies => They do this for short-term survival even though they know it may lead to disaster in the long run.

$\Rightarrow$The poor often have to live in areas with the highest levels of air and water pollution and with the greatest risk of natural disasters such as floods, earthquakes, hurricanes, and volcanic eruptions.

$\Rightarrow$ The poor are also the ones who must take jobs (if they can find them) that subject them to unhealthy and unsafe working conditions at very low pay.

=> According to the WHO, each year, at least 10 million of the desperately poor die from malnutrition (lack of protein and other nutrients needed for good health), deseases related to malnutrition and deseases from contaminated drinking water. This premature death of about 27.400 human beings per day is equivalent to 69 jumbo jet planes, each carrying 400 passengers, crashing every day with no survivors. Half of those dying are children under age 5.

3. RESOURCES

What is a resource? Ecological versus Economic Resorces

***An ecological resource** is anything required by an organism for normal maintenance, growth, and reproduction. Examples include habitat, food, water and shelter.

***An economic resource** is anything obtained from the environment to meet human needs and wants. Examples include food, water, shelter, manufactured goods, transportation, communication, recreation
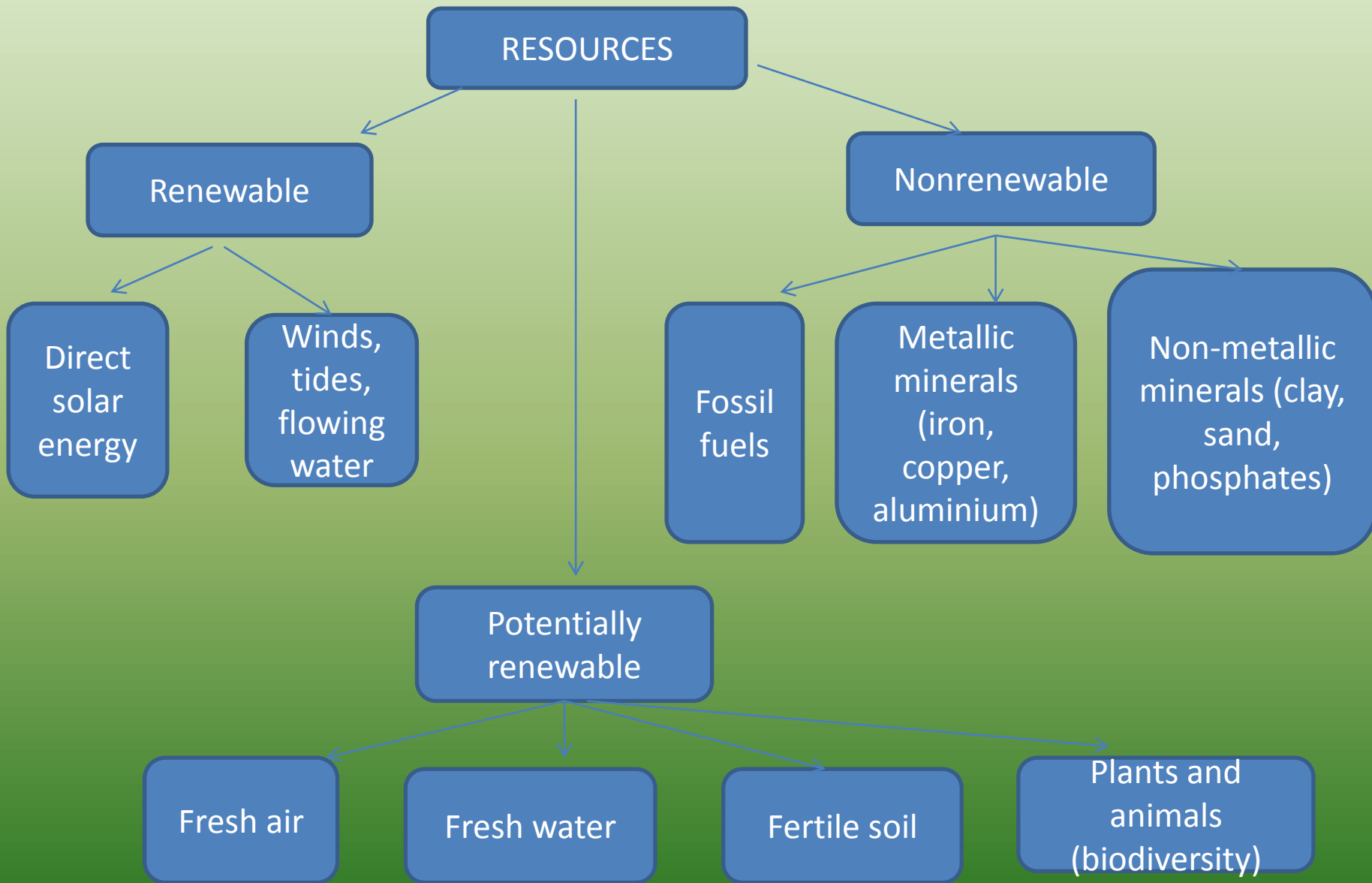
Fig.2. Major types of material resources. This scheme isn't fixed; potentially renewable resources can become nonrenewable resources if used for prolonged period at a faster rate than they are renewed by natural processes

- There are 2 kinds of the resources availability for humans:

1 Directly available: solar energy, fresh air, wind, fresh surface water, fertile soil, wild edible plants

2. Needs some effort (undirectly available): petroleum (oil), iron, groundwater, modern crops

4. Pollution

What is pollution, and where does it come from?

Pollution is any addition to air, water, soil, or food that threatens the health, survival, or activities of humans or other living organisms.

Pollution can enter the environment naturally or through human (anthropogenic) activities.

Most pollution from human activities occurs in or near urban and industrial area, where pollutants are concentrated.

- Some pollutants come from single, identifiable sources = point sources
- Other pollutants come from dispersed (and often difficult to identify) = nonpoint sources. Examples: the runoff of fertilizers and pesticides (from farmlands, golf courses, gardens) into streams and lakes; pesticides sprayed into the air or blown by the wind into the atmosphere
- It is much easier and cheaper to identify and control pollution from point sources than from widely dispersed nonpoint sources.

What types of harm do pollutants cause?
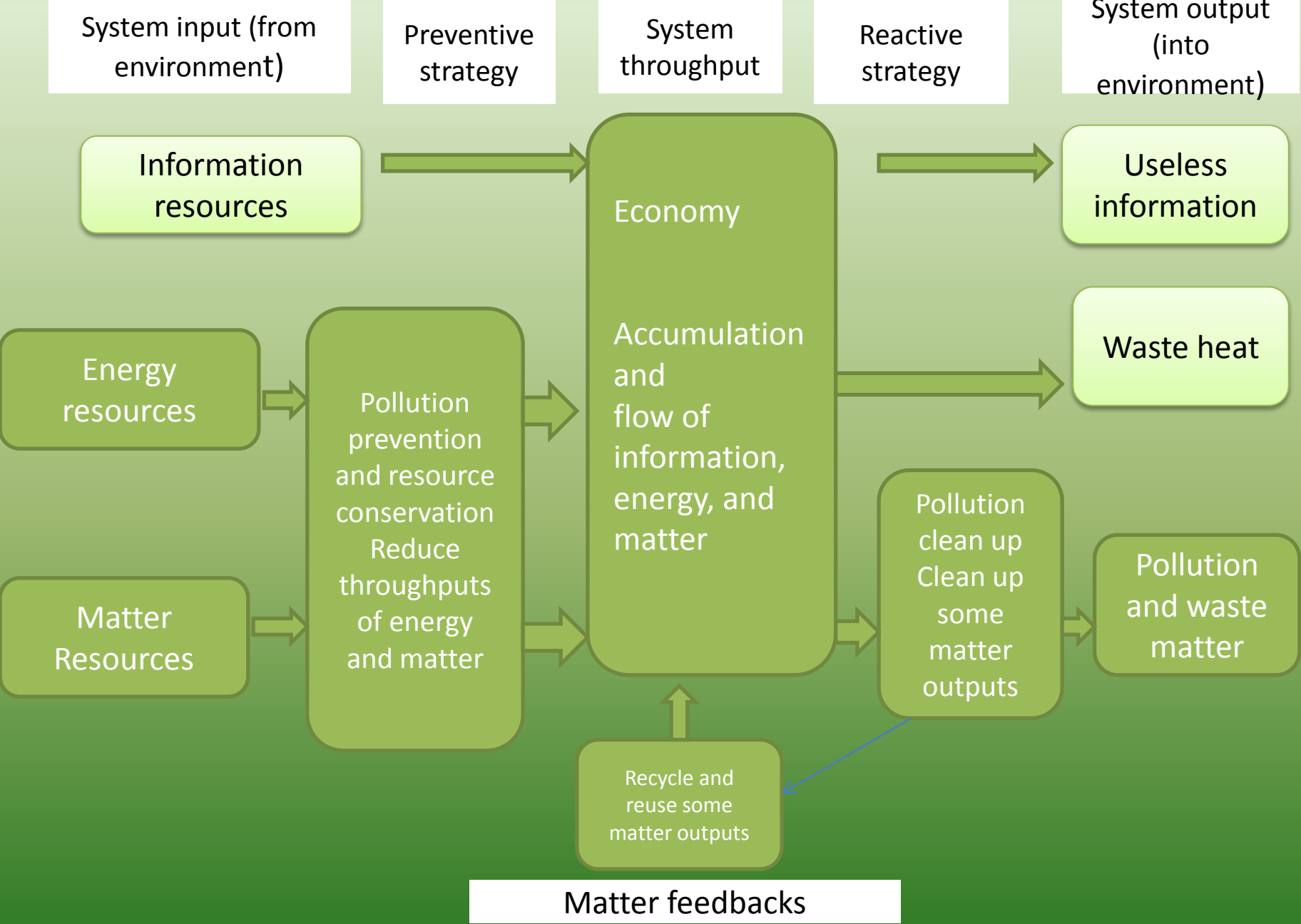
Unwanted effects of pollutants include:

(1) Disruption of life-support systems for humans and other species;

(2) Damage to wildlife, human health, and property;

(3) Nuisances such as noise and unpleasent smells, tastes, and sights

- Three factors determine how severe the harmful effects of a pollutant are:

1. Its chemical nature: how active and harmful it is to living organisms

2. Its concentration: the amount per unit of volume or weight of air, water, soil, or body weight. Sometimes expressed in ppm

3. Pollutant's persistence: how long it stays in the air, water, soil, or body:

-nonpersistent (degradable/biodegradable),

- slowly degradable (persistent): take decades or longer to degrade

- nondegradable: can not be broken down by natural processes, examples include the toxic element lead and mercury

Solutions: What can we do about pollution?

=> There are 2 basic approaches to dealing with pollution:

1. Prevent it from reaching the environment (refuse/don't use, reduce, reuse, recycle); or

2. Clean it up if it does

System input (from environment) | Preventive strategy | System throughput | Reactive strategy | System output (into environment)

Information resources → Economy → Useless information

Accumulation and flow of information, energy, and matter

Energy resources

Matter Resources

Pollution prevention and resource conservation Reduce throughputs of energy and matter

Waste heat

Pollution clean up Clean up some matter outputs

Pollution and waste matter

Recycle and reuse some matter outputs

Matter feedbacks

5. Environmental and Resource Problems: Causes and Connections

What are key environmental problems and their root causes?

=> We face a number of interconnected environmental and resource problems
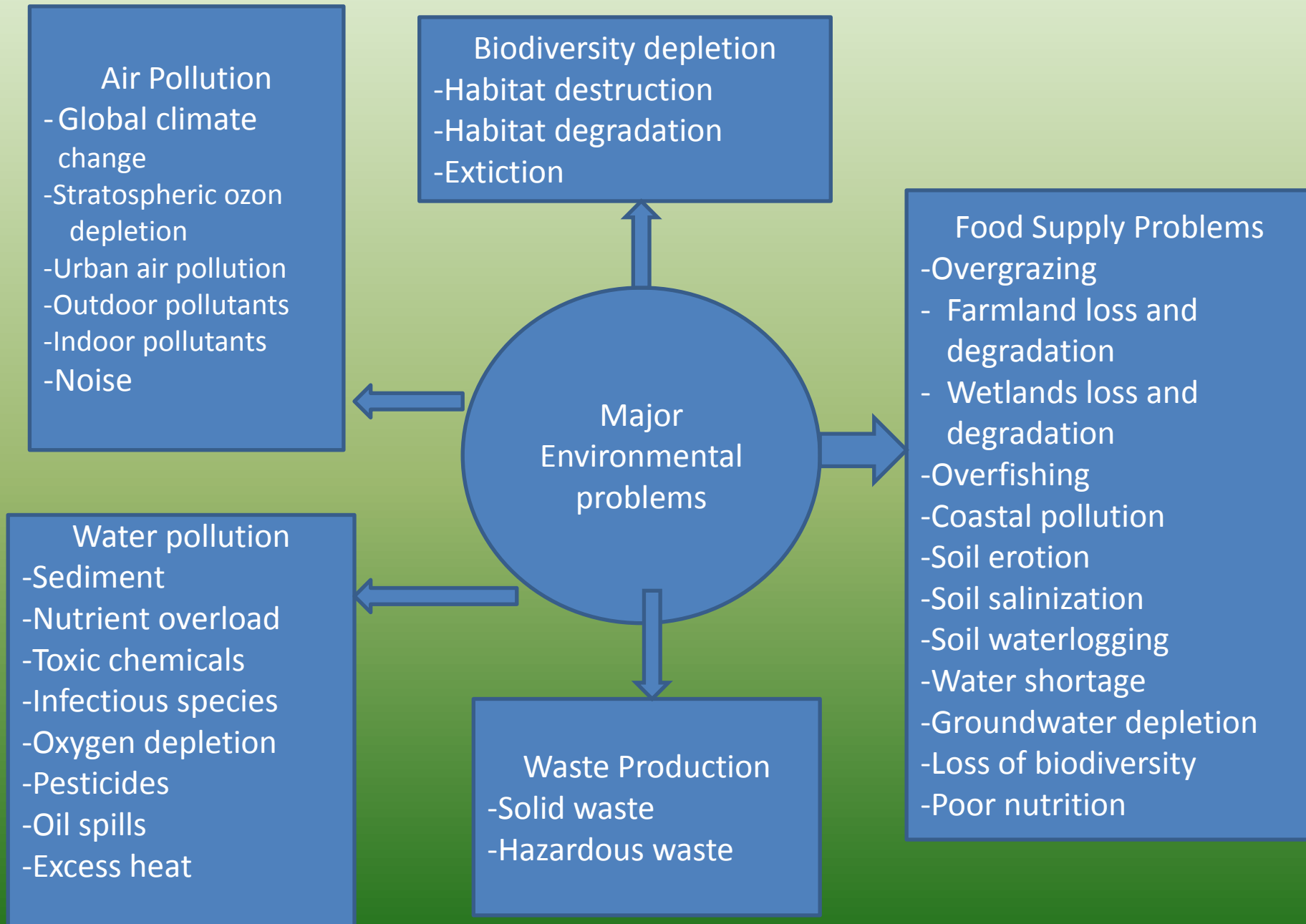
How are environmental problems and their root causes connected?

⇒ The environmental impact of population on a given area depends on 3 factors (= 1x2x3):

1. The number of people (population size)

2. The average number of units of resources each person uses (per capita consumption or affluence)

3. The amount of environmental degradation and pollution produced for each unit of resource used (the environmental destructiveness of the technologies used to provide and consume resources)

6. Cultural Change and Sustainability

What major human cultural changes have taken place?

=> Evidence from fossils and studies of ancient cultures suggest that the current form of our species, *Homo sapiens sapiens*, has walked the earth for only about 60.000 years (some recent evidence suggests 90.000 – 176.000 years), an instant in the planet's estimated 4,6-billion-year existence.

⇒Until about 12.000 years ago, we were mostly hunter-gatherers who moved as needed to find enough food for survival.

⇒Since then, there have been 2 major cultural shifts:

(1) the **agricultural revolution**, which began 10.000-12.000 years ago

(2) the **industrial revolution** , which began about 275 years ago

⬇

Cultural revolution

These cultural revolutions have given us much more energy and new technologies with which to alter and control more of the planet to meet our basic needs and increasing desires

=> By expanding food supplies, lengthening life spans, and raising living standards for many people, each cultural shift contributed to the expansion of the human population and increased resource use, pollution, and environment degradation

How did ancient hunting-and-gathering societies affect the environment?

How has the agricultural revolution affected the environment?

How has the industrial revolution affected the environment?

How might the information revolution affect the environment?

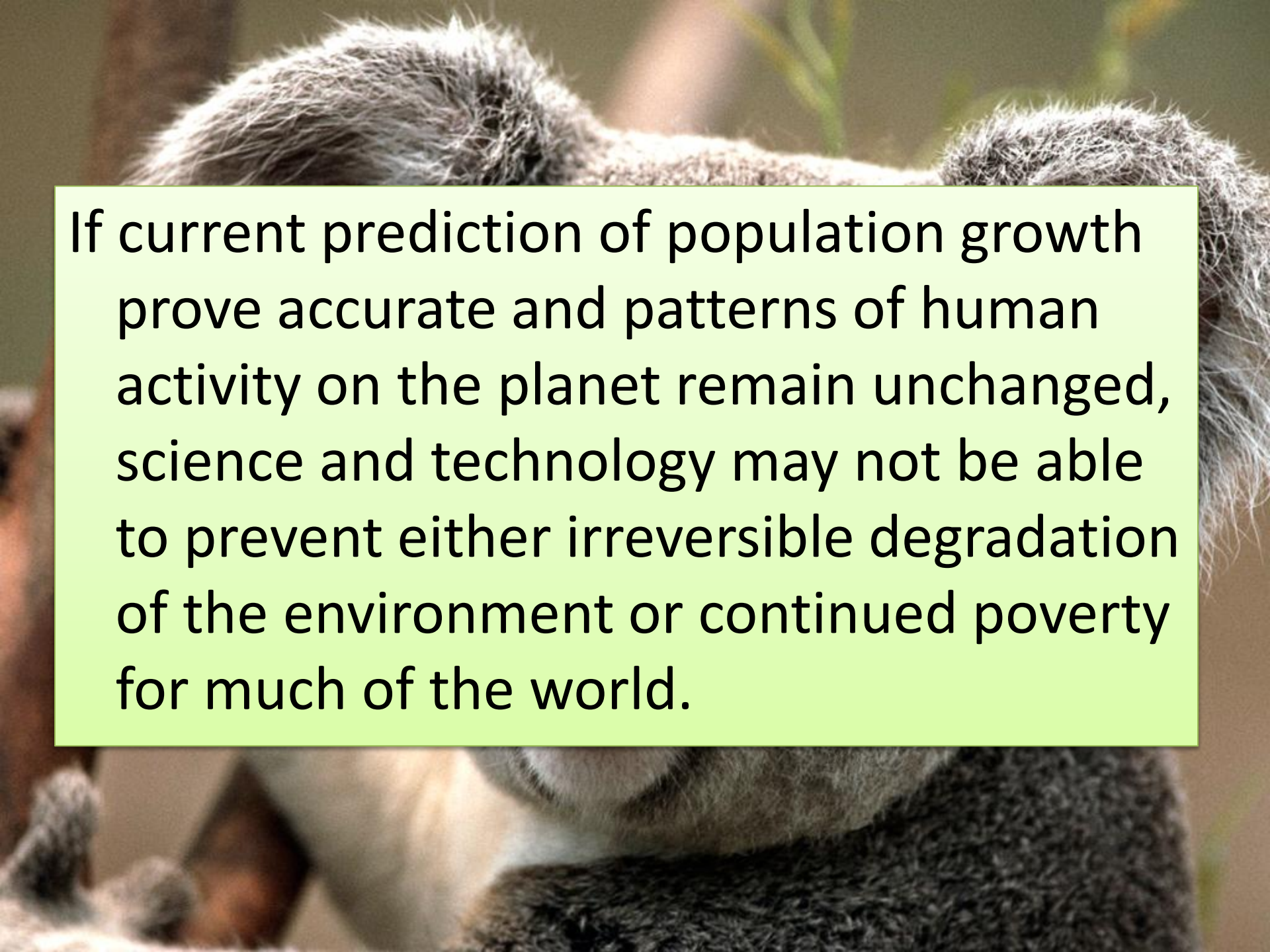# 7. Is our present course sustainable?

Are things getting better or worse?

$\Rightarrow$ Some analysts, mostly economists, believe that human ingenuity and technological advances will allow us to:

(1) clean up pollution to acceptable levels

(2) find substitutes for any resources that become scarce

(3) keep expanding the earth's ability to support more humans, as we have done in the past

But, most scientists and environmentalist: The serioussness of the environmental problems we face:

- population growth

- wasteful use of resources

- destruction and degradation of wildlife habitats

- extinction of plants and animals

- poverty and pollution

=> are interconnected and are growing exponentially

If current prediction of population growth prove accurate and patterns of human activity on the planet remain unchanged, science and technology may not be able to prevent either irreversible degradation of the environment or continued poverty for much of the world.

- Leading environmantalists call for us to launch an environmental or sustainability revolution to take place over the next 50 years. This would involve shifting our efforts from:
1. Pollution clean up to pollution prevention (clean production)
2. Waste disposal (mostly burial and burning) to waste prevention and reduction
3. Protecting species to protecting the places they live (habitats)
4. Environmental degradation to environmental restoration
5. Increased resource use to increased resource conservation

=> **Do you agree or disagree with this assessment?**

SISTIMATIKA PENULISAN ARTIKEL

PENDAHULUAN

ISI (PEMBAHASAN) → LANGSUNG MASUK KE SUB-SUB JUDUL DARI ISI YG AKAN DIBAHASA

KESIMPULAN/PENUTUP

DAFTAR PUSTAKA

CONTOH

JUDUL: PENGARUH PERKEMBANGAN INDUSTRI TRANSPORTASI TERHADAP LINGKUNGAN

I.   PENDAHULUAN

II. PERKEMBANGAN INDUSTRI TRANSPORTASI DI INDONESIA

III. DAMPAK POSITIF INDUSTRI TRANSPORTASI THD LINGKUNGAN SOSIAL BUDAYA DAN EKOSNOMI MASYARAKAT

IV. DAMPAK NEGATIF THD LINGKUNGAN

V.   DST....

VI. KESIMPULAN

VII. DAFTAR PUSTAKA

NB: BUAT DALAM 5-10 HALAMAN SAJA!

MINGGU DEPAN ARTIKEL YG DIKETIK DIKUMPULKAN, POWER POINT DIPRESENTASIKAN DI DEPAN KELAS!