Introduction to the concepts of Global Environmental Issues

Key Questions and Approaches to Global Environmental Issues

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June 3, 2019

Basic Underlying Concepts throughout this Workshop

Concept #1: *The Conservation of Mass-Energy*

the Law of Conservation of Mass: matter is neither created nor destroyed.
Antoine Lavoisier, 1785

the Law of Conservation of Energy (First Law of Thermodynamics): energy is neither created nor destroyed.
Julius Robert Mayer, 1842

the Law of Conservation of Mass-Energy:
the total amount of mass and energy in the universe is constant.
Albert Einstein, 1907

Basic Underlying Concepts throughout this Workshop

Concept #1: *The Conservation of Mass-Energy*

- Everything we use in the world is derived from the natural elements that naturally exist in the world.

- All of these natural elements are referred to as natural resources.

- We normally think of natural resources as trees, water, soil and wildlife, but it also includes things such as oil, nitrogen, phosphorous, air, carbon.

- A resource is a stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function.

- A natural resource is a material or resource the occurs naturally in the environment

- Hence, the total amount of natural resources, or elements, we have in the world is fixed.

Basic Underlying Concepts throughout this Workshop

Concept #2: *What is a Natural Resource?*

- Materials or substances such as minerals, forests, water, fish and soil that occur in nature and can be used for economic gain
- Any form of matter or energy obtained from the environment that meets human needs.
- The availability of particular natural resources is an important determinant of comparative advantage and trade in products that depend on them.
- Natural resources are primary factors of production.
- It is an item that occurs naturally in nature (not man-made) and is used in some way and has value to society.
- Use and value makes it a resource
- It occurs naturally in the environment makes it natural

Basic Underlying Concepts throughout this Workshop

Concept #2: *What is a Natural Resource?*

Top 10 countries based on quantity and value of natural resources

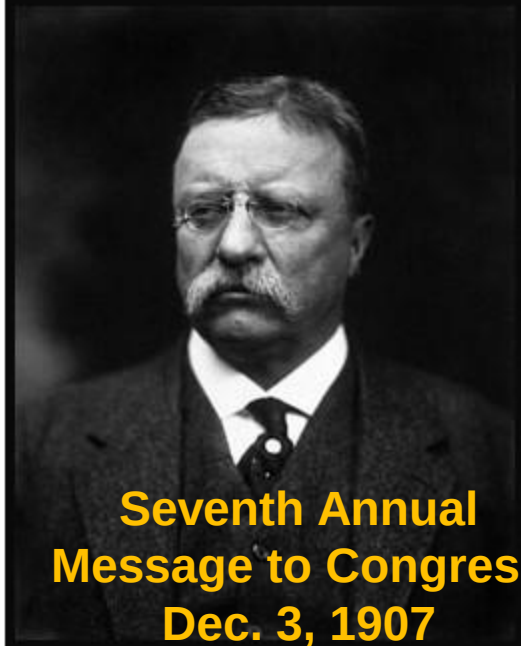
Rank	Country	Value (US Dollars)
1.	China	$23 trillion
2.	Saudi Arabia	$34.4 trillion
3.	Canada	$33.2 trillion
4.	India	$106.4 billion
5.	Russia	$75 trillion
6.	Brazil	$21.8 trillion
7.	The United States	$109.6 billion
8.	Venezuela	$14.3 trillion
9.	Democratic Republic of Congo	$24 million
10.	Australia	$19.9 trillion

INVESTOPEDIA

Basic Underlying Concepts throughout this Workshop

Concept #3: *Renewability and Sustainability*

Tenet: The overall well-being (economic/non-economic) of a country (and society) is determined by the abundance and condition of natural resources.



Seventh Annual Message to Congress Dec. 3, 1907

To waste, to destroy, our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified and developed.

(Theodore Roosevelt)

Basic Underlying Concepts throughout this Workshop

Concept #3: *Renewability and Sustainability*

According to Renewable Resources Coalition, the top 11 natural resources based on use and value are:

1. **Water**
2. **Soil**
3. **Timber (forests)**
4. **Salt**
5. **Oil**
6. **Natural Gas**
7. **Coal**
8. **Iron**
9. **Bauxite**
10. **Helium**
11. **Copper**

RENEWABLE RESOURCES COALITION

Basic Underlying Concepts throughout this Workshop

Concept #3: *Renewability and Sustainability*

A **renewable resource** is a natural resource which will be replenished to replace the portion depleted by usage and consumption, either through natural reproduction or other recurring processes in a finite amount of time in a human time scale.

A **non-renewable resource** is a natural resource which cannot be produced, grown, generated, or used on a scale which can sustain its consumption rate, once depleted there is no more available for future needs. Also considered non-renewable are resources that are consumed much faster than nature can create them.

Renewability depends on the resource abundance, replenishment and use rates, and productive capacity.

Basic Underlying Concepts throughout this Workshop

Concept #3: *Renewability and Sustainability*

Examples of Renewable Resources:

- Oxygen
- Fresh Water
- Solar energy
- Trees/plants
- Wildlife
- Fish
- Wind Energy

Examples of Non-Renewable Resources:

- Earth minerals
- Metal ores
- Fossil fuels (coal, petroleum, natural gas)
- Certain aquifers

Basic Underlying Concepts throughout this Workshop

Concept #3: *Renewability and Sustainability*

- In order for resources to be managed such that they continue to be **renewable**, they must be managed **sustainably**.
- If resources are not managed in a sustainable manner, they can be severely depleted or lost.
- Managing sustainably means providing for the needs of the world's current population without damaging the ability of future generations to provide for themselves.
- When a process is sustainable, it can be carried out over and over without negative environmental effects or impossibly high costs to anyone involved.
- It ultimately means meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Basic Underlying Concepts throughout this Workshop

Concept #4: *Conservation vs. Preservation*

…… Conservation ……

- **Conservation** of natural resources is usually embraced in the broader conception of conserving the earth's resources by protecting its capacity for self-renewal.

- **Conservation** of natural resources is the wise use of the earth's resources by humanity.

- Resources are used in a **conservation** approach, but used and managed in such a way that the resource is sustaining

Basic Underlying Concepts throughout this Workshop

Concept #4: *Conservation vs. Preservation*

…… Preservation ……

- **Preservation** is the non-use or limited use of resources, such that their state is maintained, restored or enhanced through management.

- The approach leaves the resource for future generations for them to enjoy through non-consumptive use, or to maintain certain ecological functions into the future.

Conservation =
resource use in such a way that the resource is sustainable

Preservation =
no resource use, or limited use. The fact that the resource is not used presumes it can be sustained on its own.

Basic Underlying Concepts throughout this Workshop

- All resources around the globe have fixed amounts, and with their use they must be conserved, preserved or recycled.
- Some resources have the ability to be renewable, and must be used in a manner such that their replenishment rates exceed their use rates.

All of this comes under the topic of managing our resources sustainably

Global Environmental Issues Now and in the Future

Not managing the global resources sustainably has resulted in several environmental issues that affects the quality of human life.

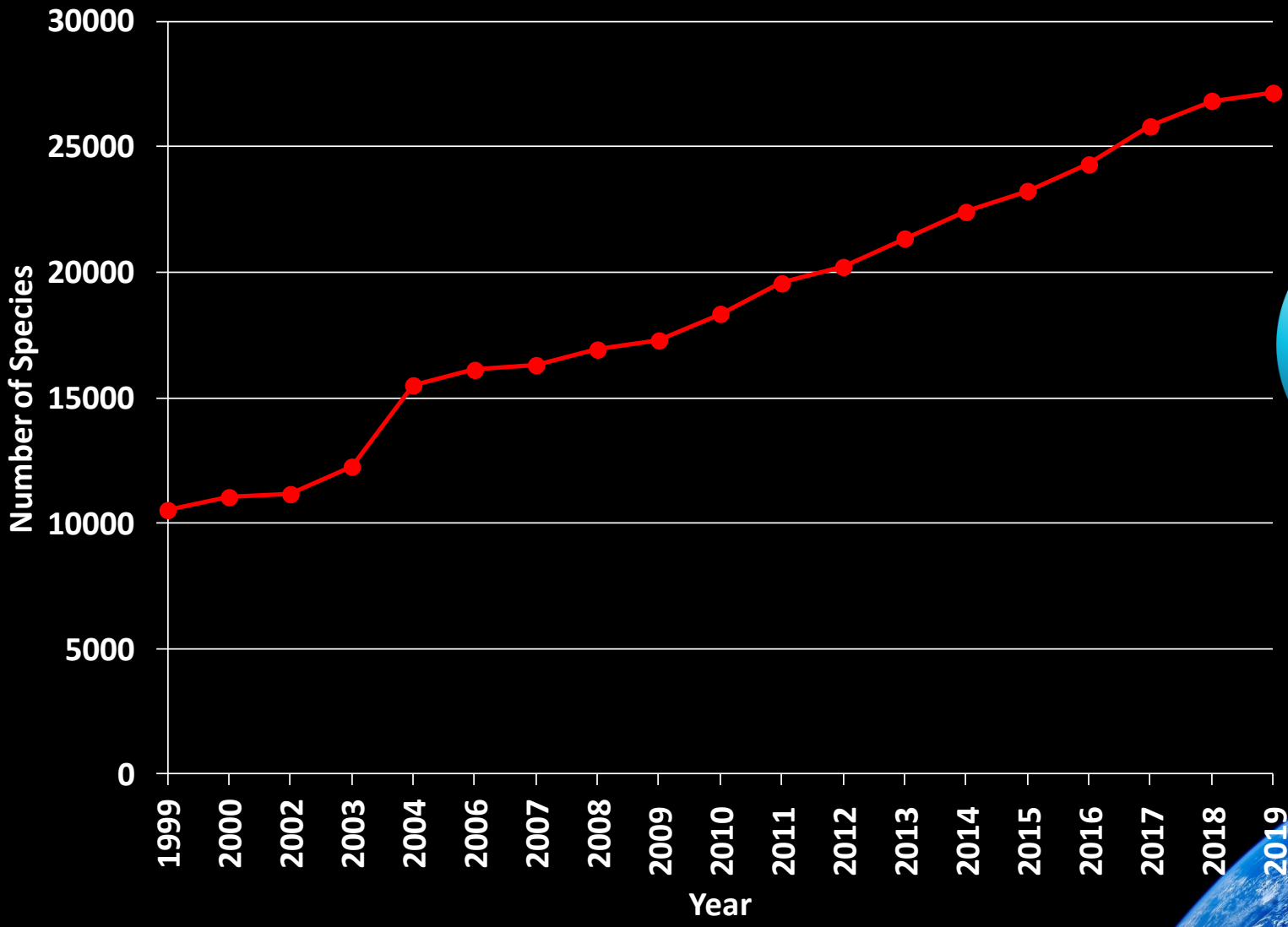
Some examples include (but not limited to):

- Global Warming/Climate Change
- Natural Resource Depletion
- Loss of Biodiversity
- Species extinction
- Loss of Forests
- Soil degradation
- Fresh Water Availability and Pollution
- Air Pollution
- Desertification/degradation of soils

Underlying Causes:

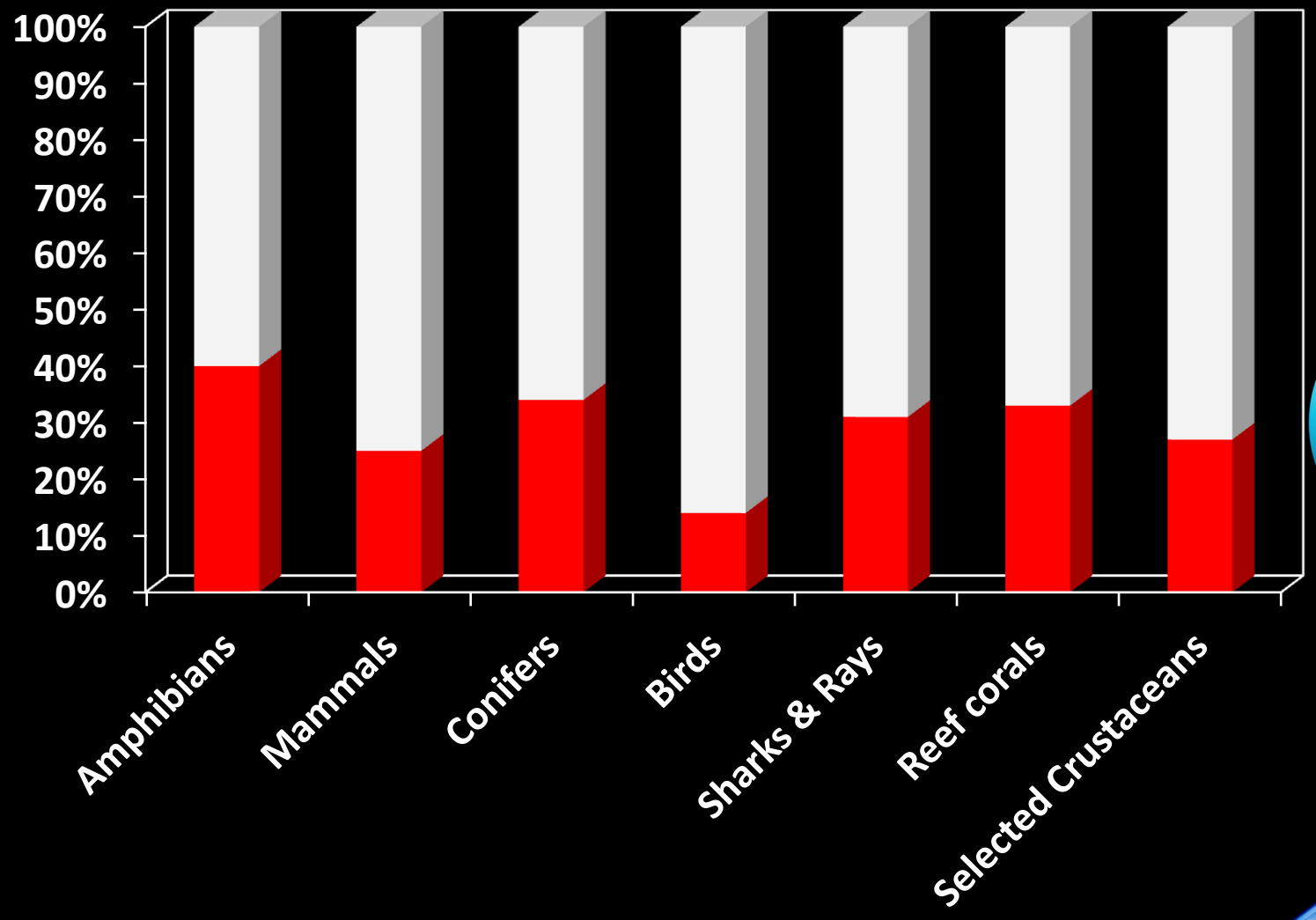
- Unsustainable management and use
- Growing population
- "Non-environmentally friendly" use of resources

Critically Endangered, Endangered or Vulnerable Flora and Fauna Species Globally, 1999 – 2019



IUCN

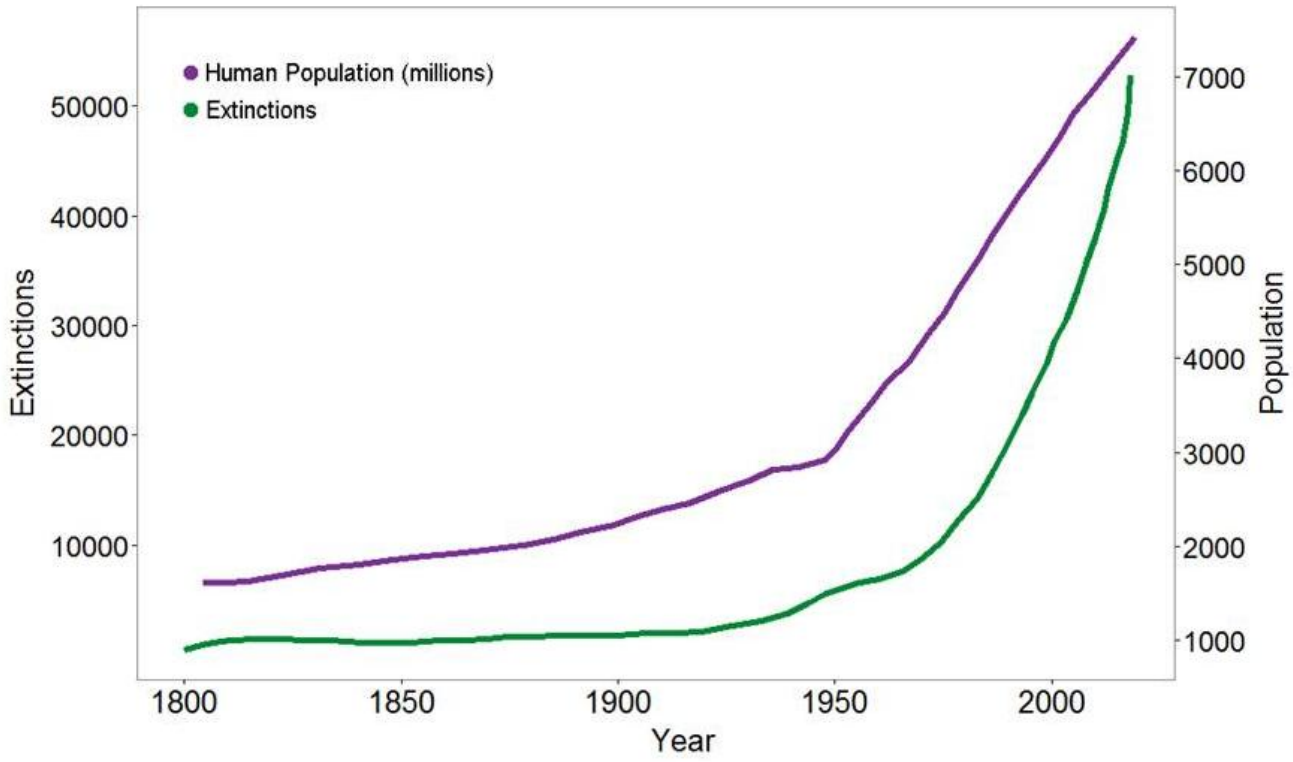
The Amount of Species Threatened with Extinction



IUCN

More than 27,000 species are threatened with extinction

The Relationship between Species' Extinction and Human Populations

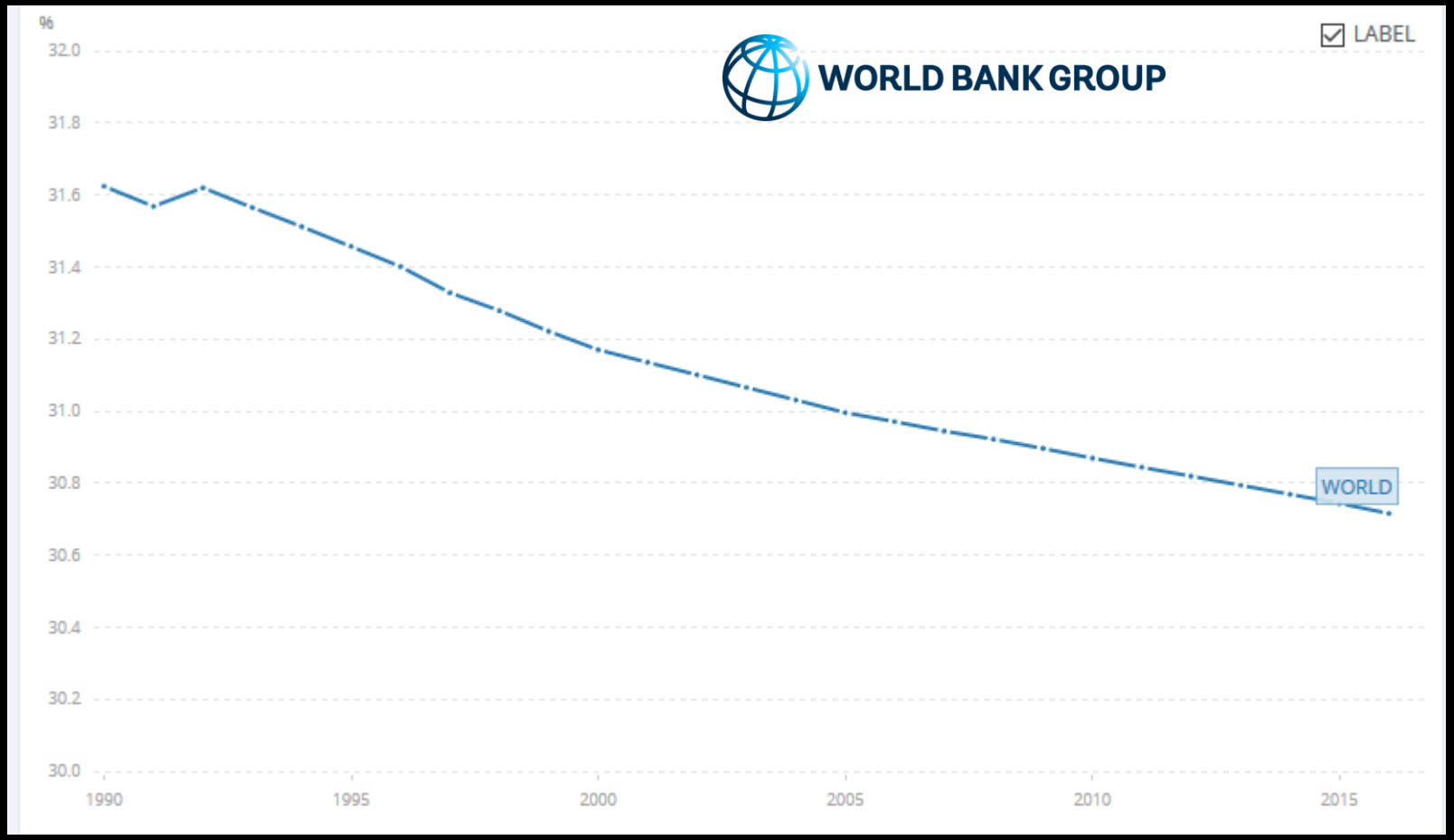


Data source: Scott, J.M. 2008. *Threats to Biological Diversity: Global, Continental, Local.* U.S. Geological Survey, Idaho Cooperative Fish and Wildlife, Research Unit, University Of Idaho.

- **Habitat Loss**
- **Habitat Fragmentation**
- **Over-harvests**
- **Exploitation**
- **Climate Change**
- **Water Pollution**
- **Invasive Species**

All of the reasons for species extinction are related to human activities

Trends in Global Forest Cover, 1990 – 2016



"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

~ Aldo Leopold

Satellite shows the extent of rainforest loss over time.

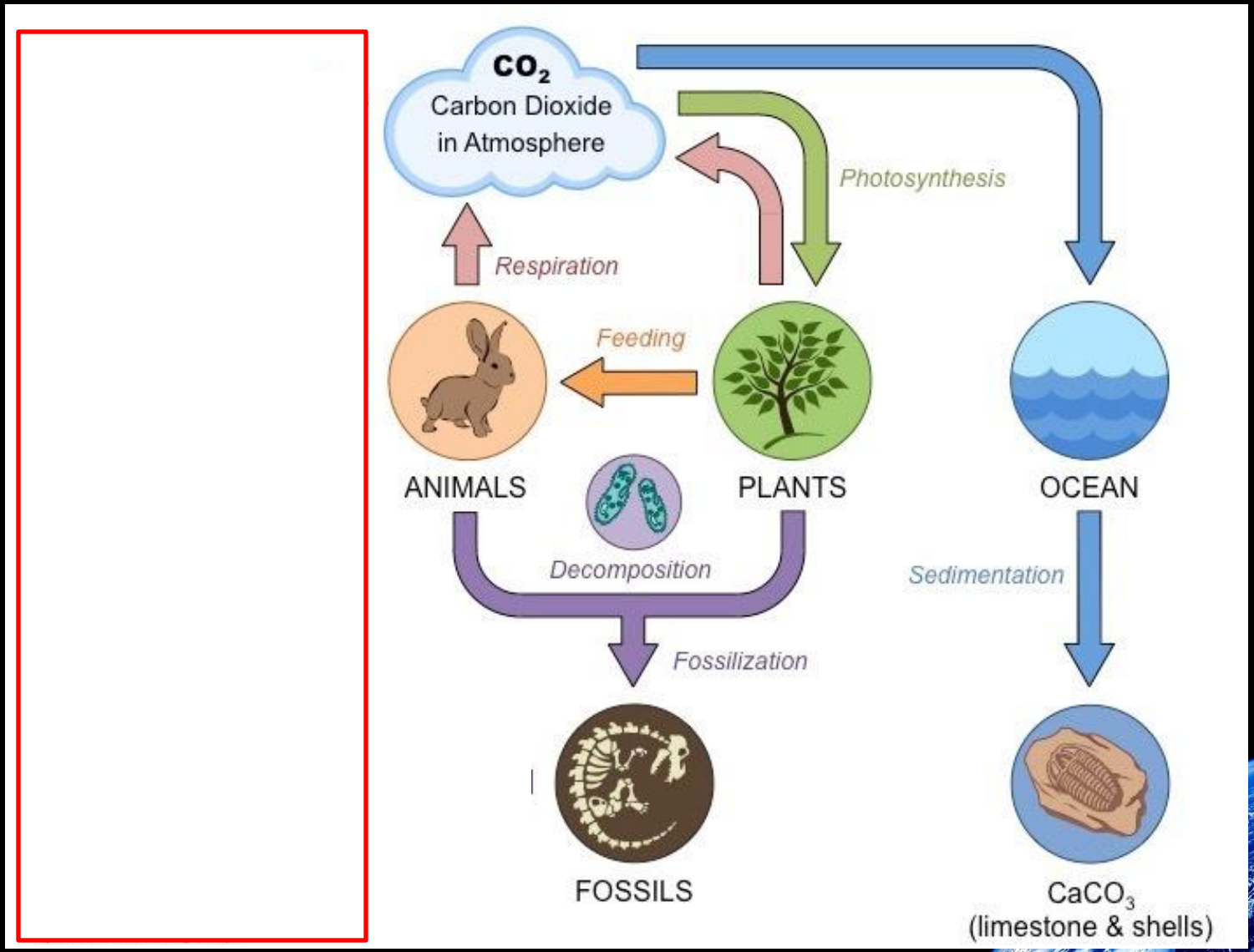
From year to year, environmental changes are incremental and often barely register in our lives, but from evolutionary or geological perspectives, what is happening is explosive change.

Land use changes over time in select areas of East Asia, 1984 - 2016

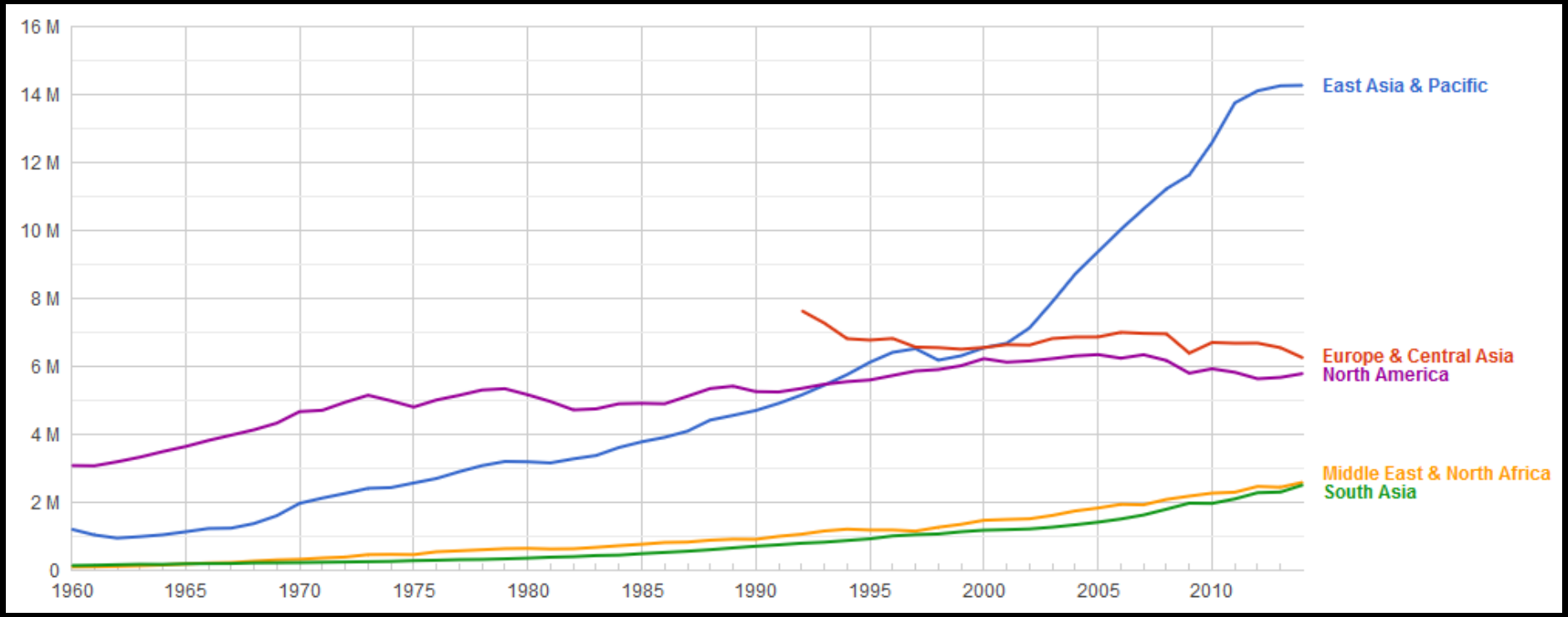
Concepts of Cycle and Recycle

The Carbon Cycle (simplified)

Human Activity



Comparison of CO_2 Emissions from Regions We will be Studying, Compared with North America, 1960 - 2015

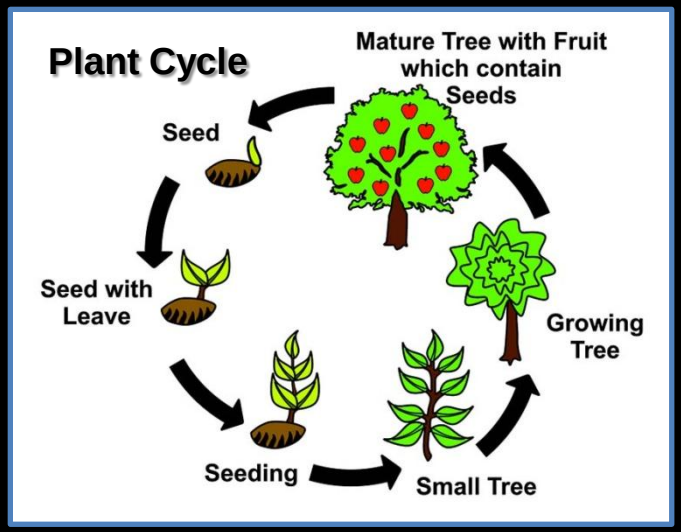


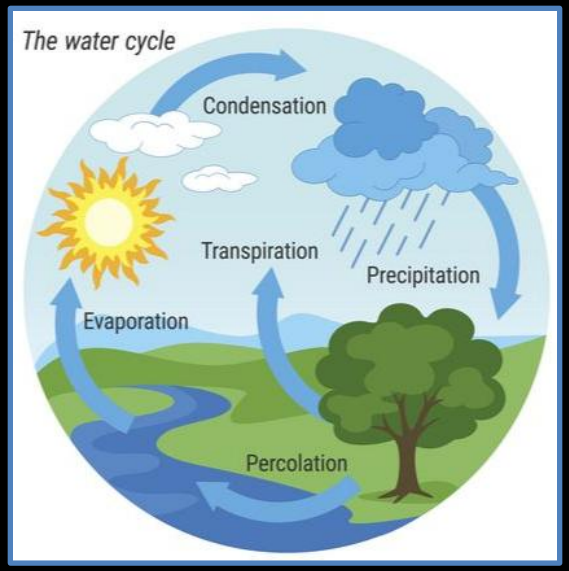
Google Data Studio

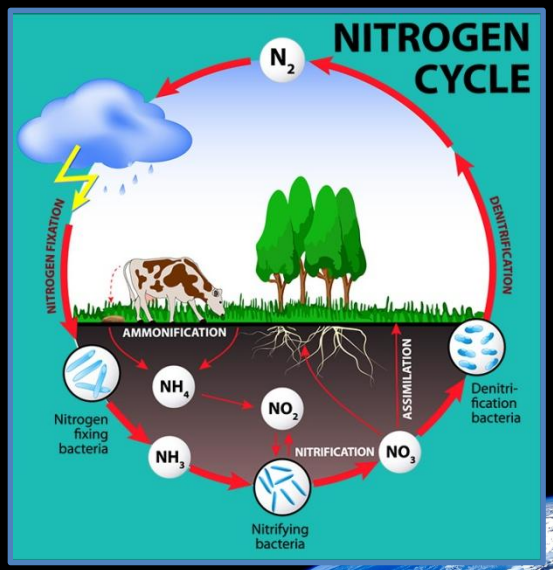
Natural Life Cycle Concept

All natural elements, compounds and organisms have a natural life cycle that maintains their health and existence, and keeps a balance in the environment.

Many of these elements, compounds and organisms are interconnected, and the demise of one can lead to the demise of another; hence the balance is interrupted.







Human Populations and Consumption

Humans use resources every day for living, whether it be air, water, paper, wood, energy, minerals, chemical elements, etc.

These resources have finite use-life, and are either recycled or treated as waste.

The amount used per person (consumer) per day varies greatly by person, region and country, and is determined by:

Income	Resource availability
Age	Country GDP
Education	Developed vs. Under-developed country status

The U.N. projects that world population will increase 41 percent by 2050, to 8.9 billion people, with nearly all of this growth in developing countries.

People must consume to survive

Human Populations and Consumption

"I*f the levels of consumption that the most affluent people enjoy today were replicated across even half of the roughly 9 billion people projected to be on the planet in 2050, the impact on our water supply, air quality, forests, climate, biological diversity, and human health would be severe*." (WorldWatch Institute)

Today's human economies are designed with little attention to the residuals of production and consumption. Among the most visible unintended byproducts of the current economic system are environmental problems like air and water pollution and landscape degradation.

Human Populations and Consumption

Nearly all the world's ecosystems are shrinking to make way for humans and their homes, farms, malls, and factories

WWF's Living Planet Index, which measures the health of forests, oceans, freshwater, and other natural systems, shows a 35 percent decline in Earth's ecological health since 1970.

Calculations show that the planet has available 4.7 acres of biologically productive land per person to supply resources and absorb wastes—yet the average person on Earth already uses 5.7 acres worth.

Ecological Footprint

Ecological footprint is an estimate of the amount of space/resources on the earth that an individual uses in order to live using existing technology.

This space includes the biologically productive land and water area that produces the resources consumed by that individual such as food, water, energy, clothing, and building materials.

It also includes the amount of land and water required to assimilate the wastes generated by that person.

In other words, the ecological footprint measures a person's demand on the bio-capacity of the Earth.

The Ecological Footprint

MEASURES

how fast we consume resources and generate waste

Energy

Settlement

Timber & Paper

Food & Fiber

Seafood

COMPARED TO

how fast nature can absorb our waste and generate new resources.

Carbon Footprint

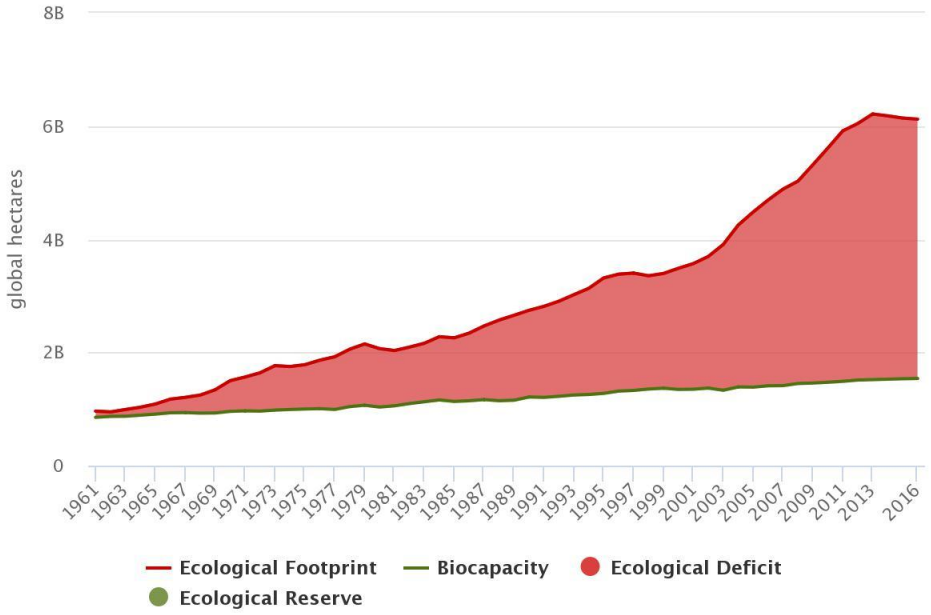
Built-up land

Forest

Cropland & Pasture

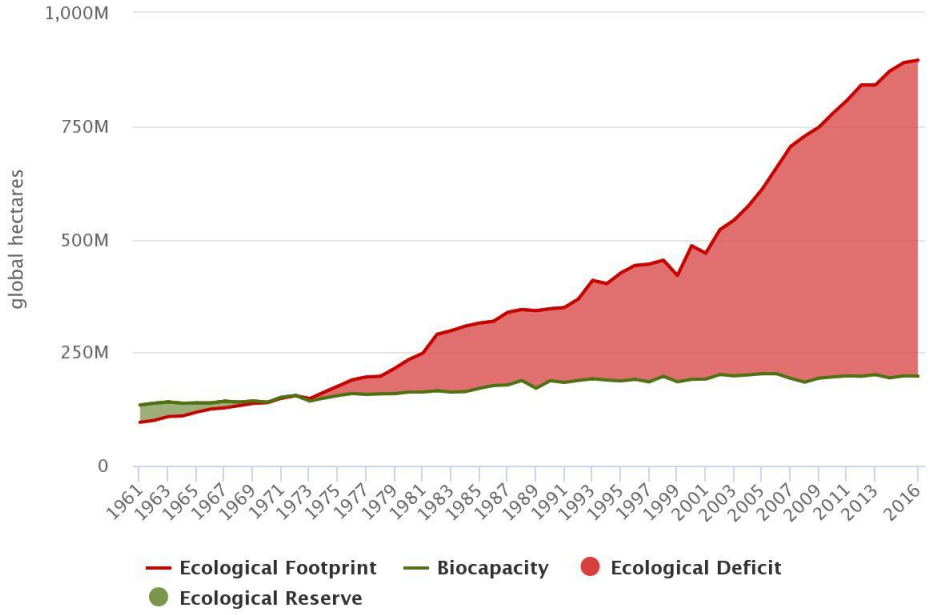
Fisheries

East Asia



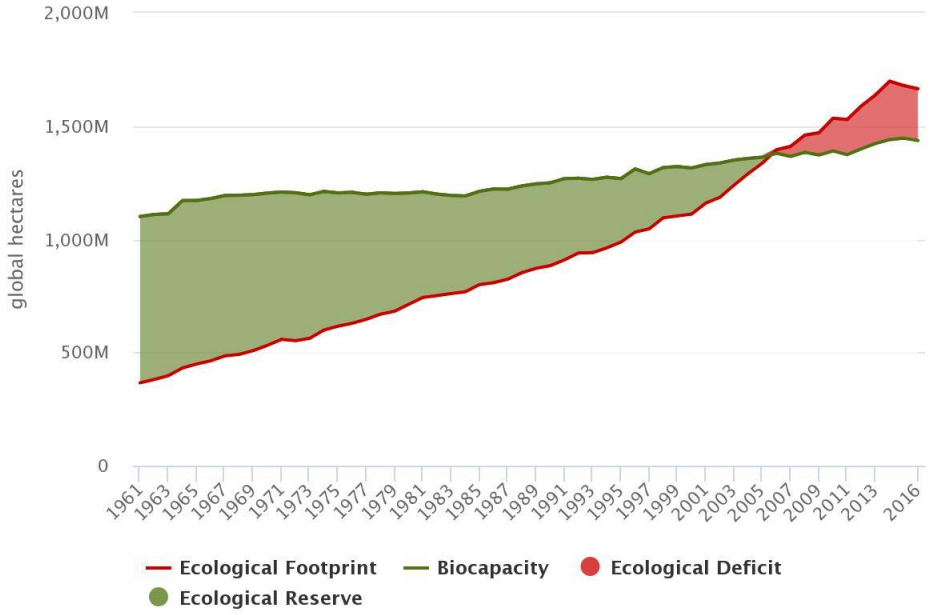
Global Footprint Network, 2019 National Footprint Accounts

Western Asia/Middle East



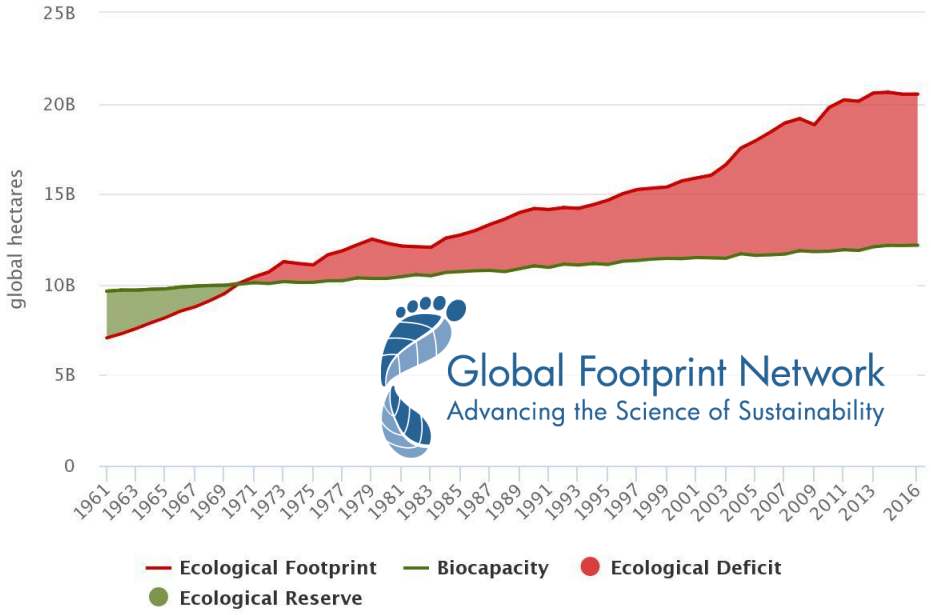
Global Footprint Network, 2019 National Footprint Accounts

Africa



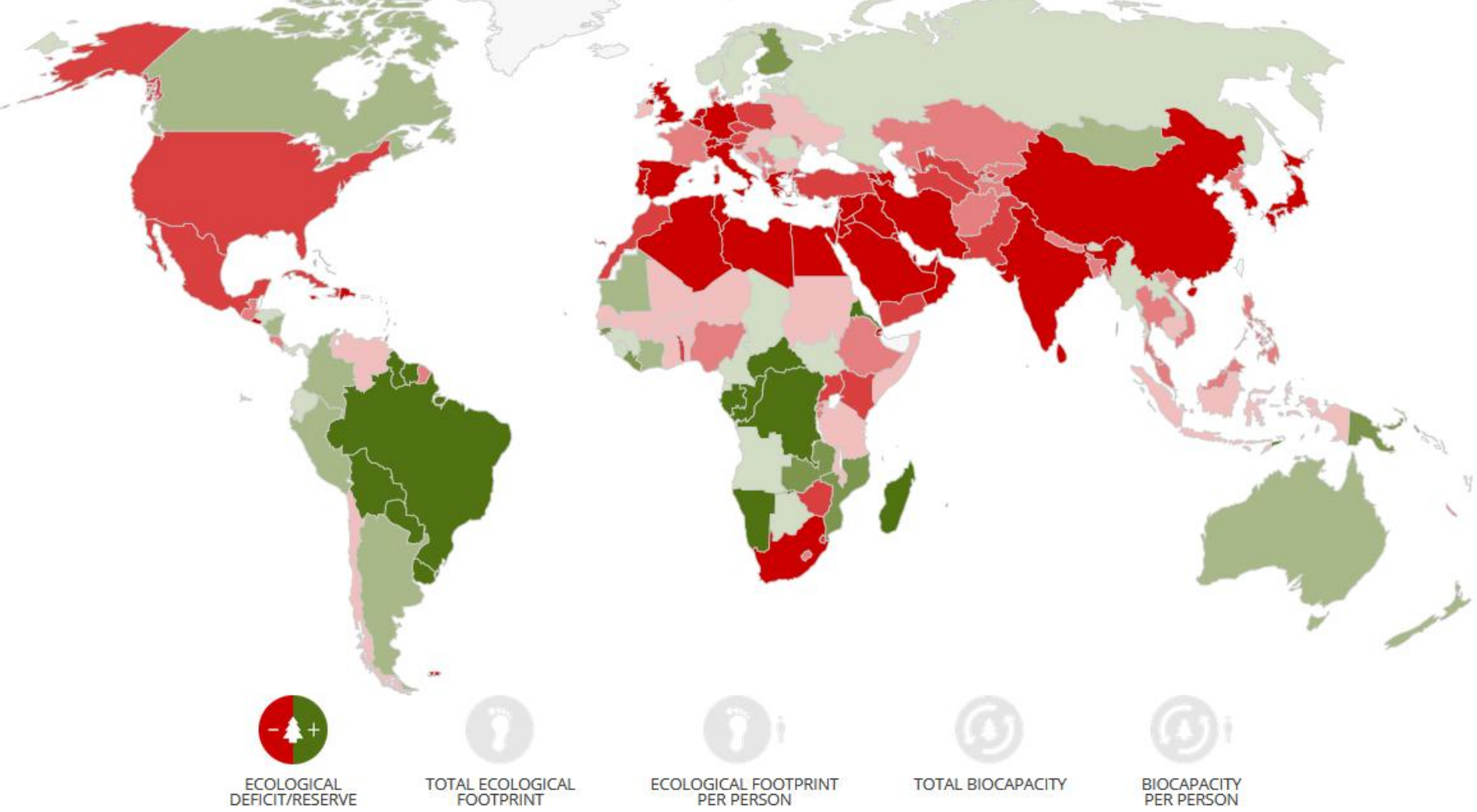
Global Footprint Network, 2019 National Footprint Accounts

World



Global Footprint Network
Advancing the Science of Sustainability

Global Footprint Network, 2019 National Footprint Accounts



Ecological Deficit/Reserve

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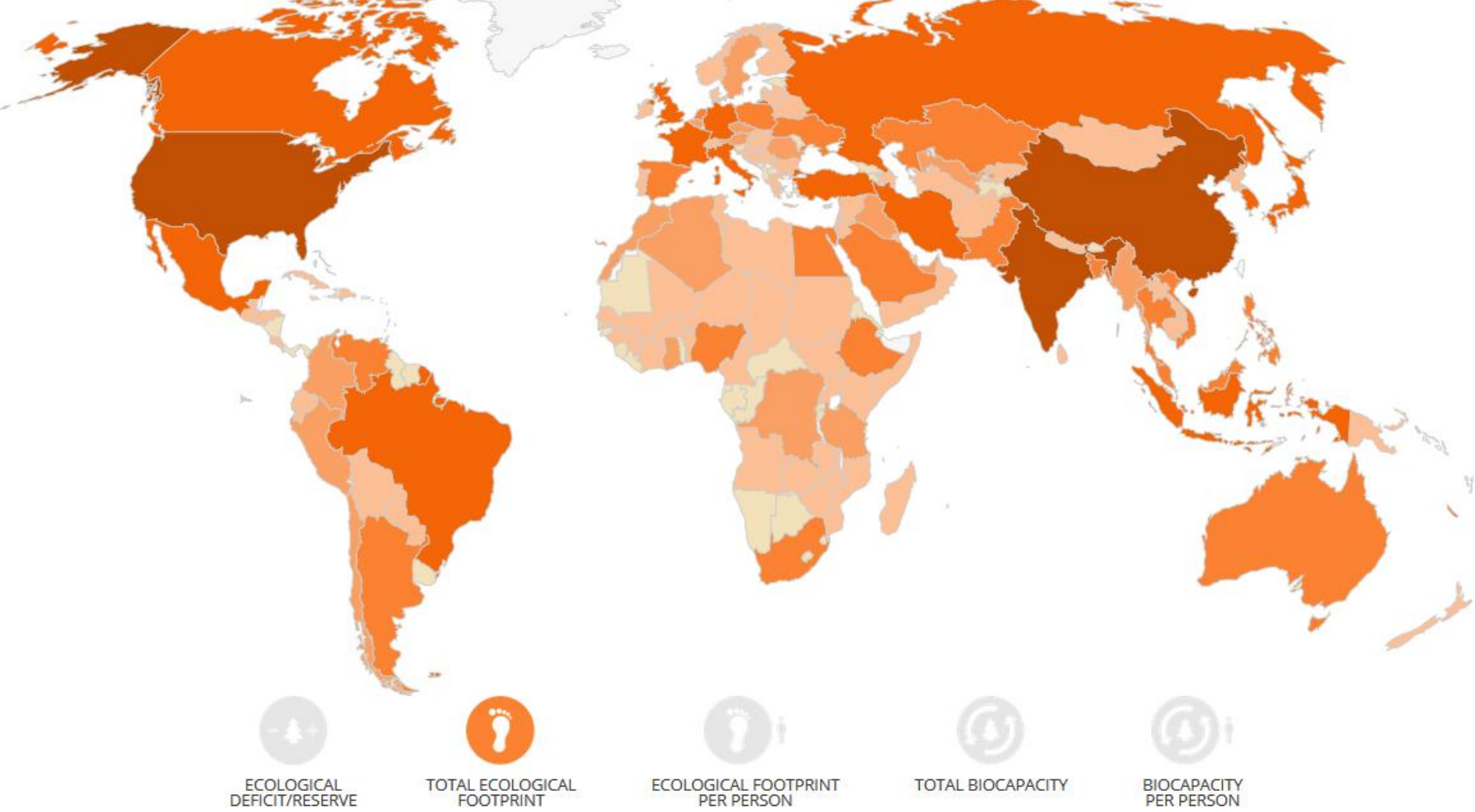

Total Ecological Footprint

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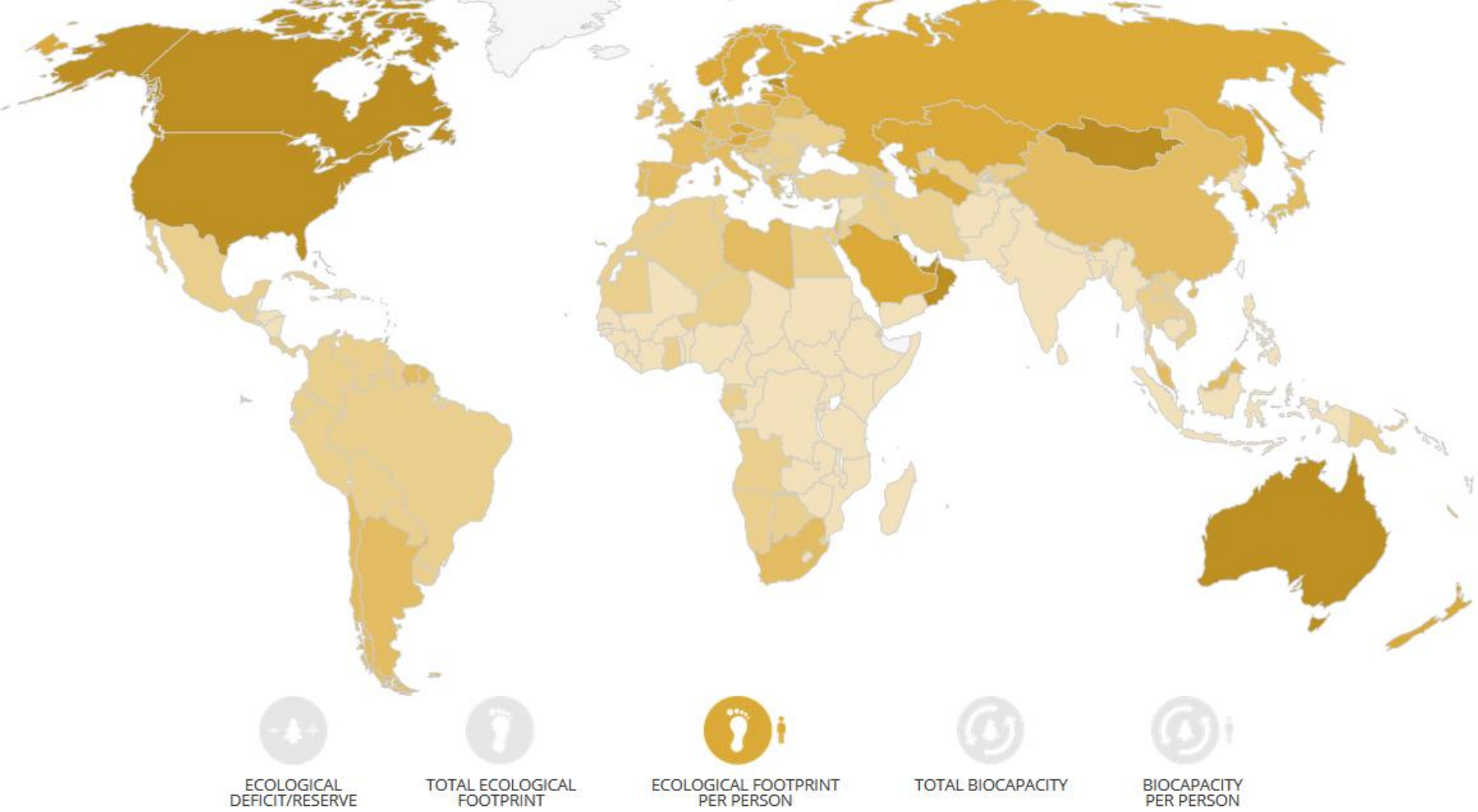

Ecological Footprint per Person

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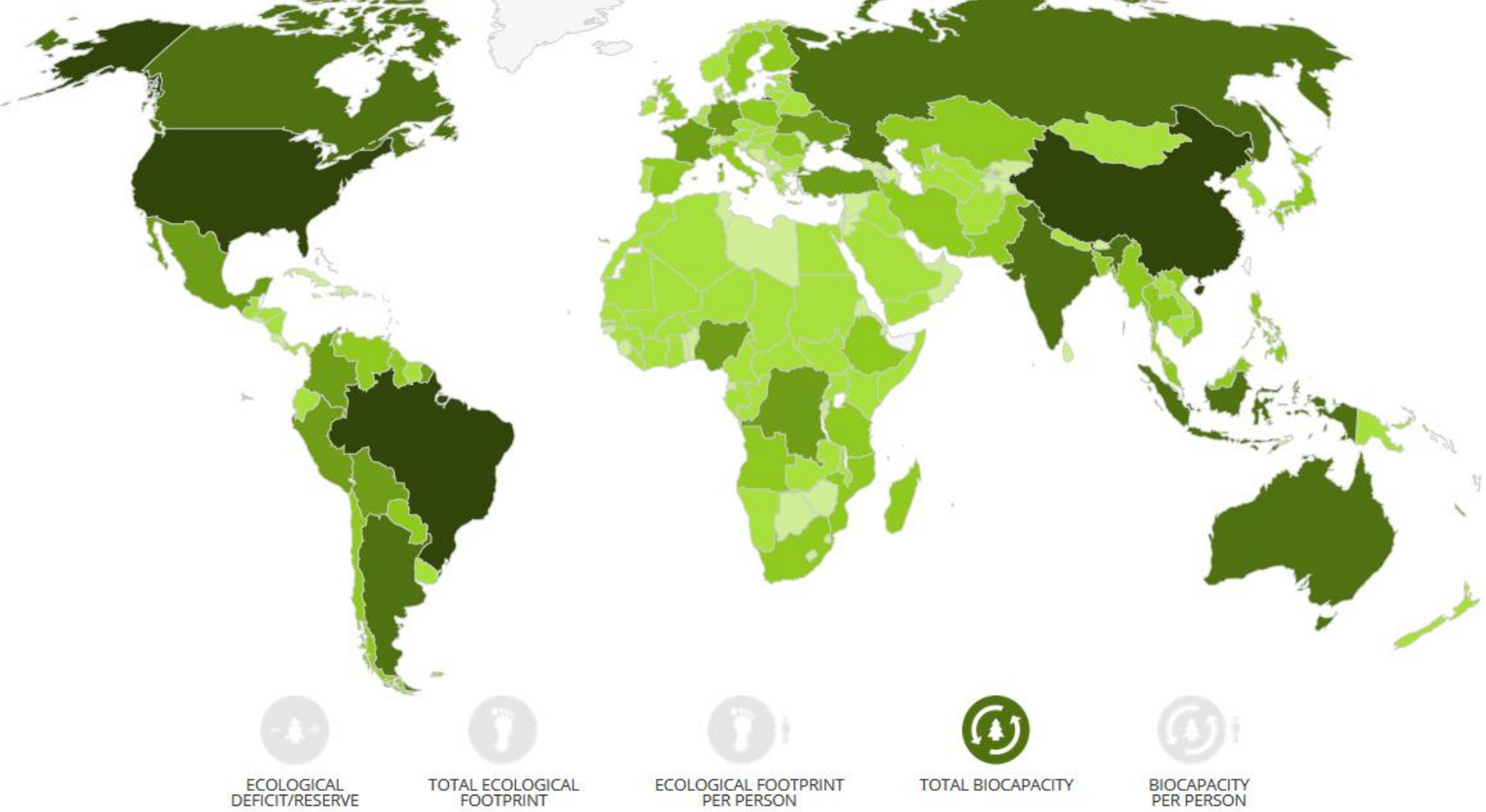
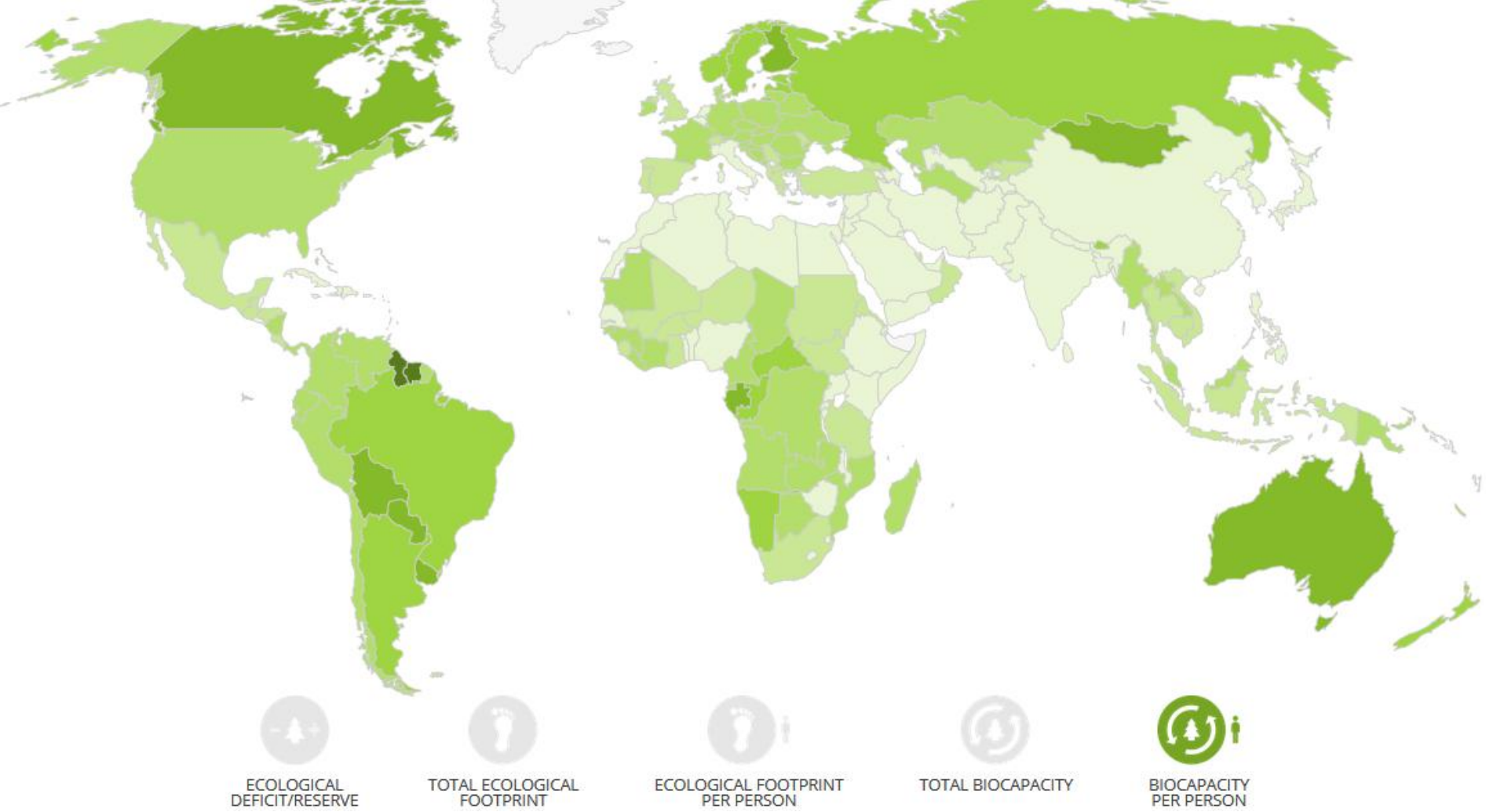


Total Biocapacity

Global Footprint Network
Advancing the Science of Sustainability

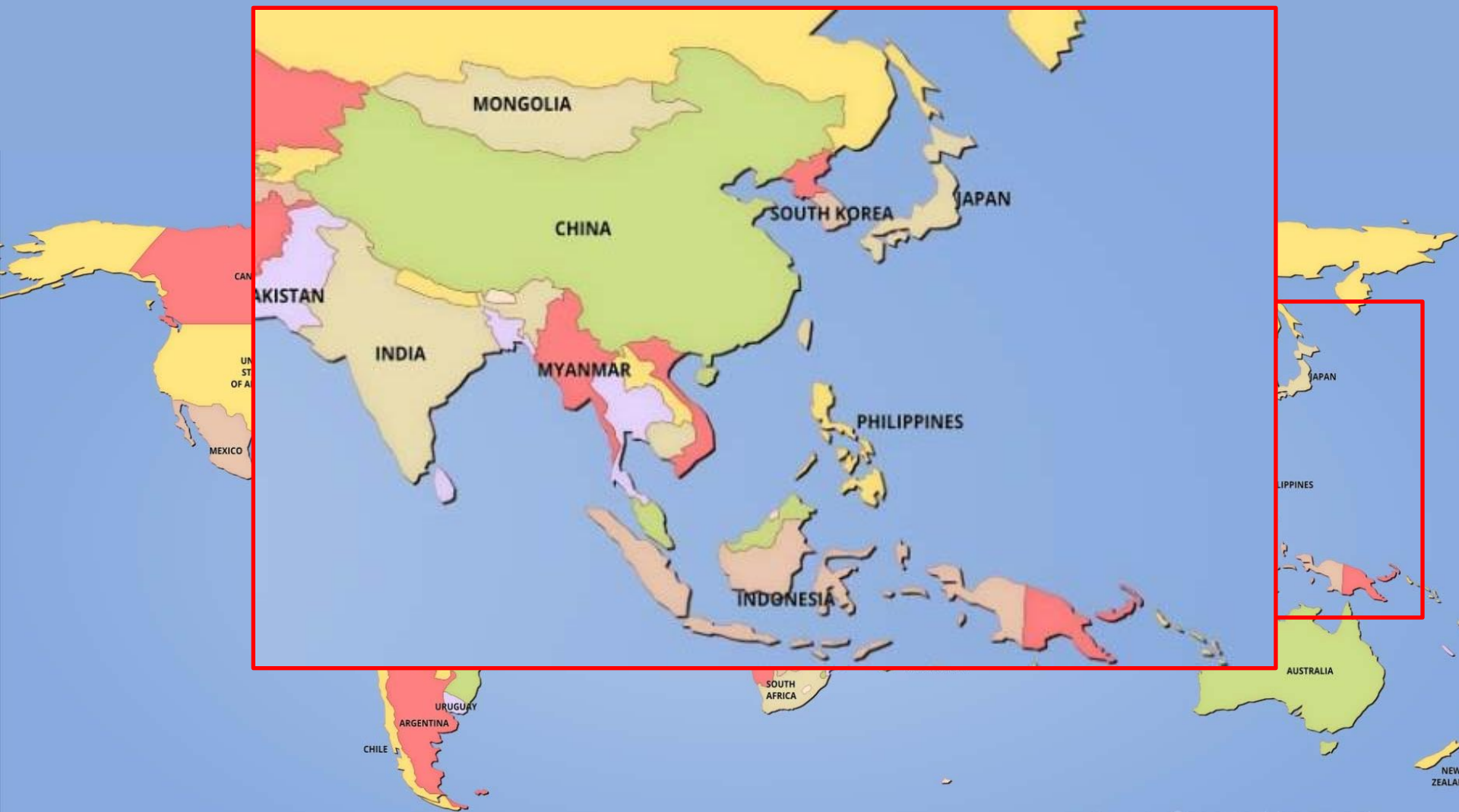


Biocapacity per person

Global Footprint Network
Advancing the Science of Sustainability

The Regions of the World We will be Examining this Week

East Asia


MONGOLIA
CHINA
SOUTH KOREA
JAPAN
INDIA
MYANMAR
PHILIPPINES
INDONESIA
AUSTRALIA
SOUTH AFRICA
URUGUAY
ARGENTINA
CHILE
MEXICO

Middle East

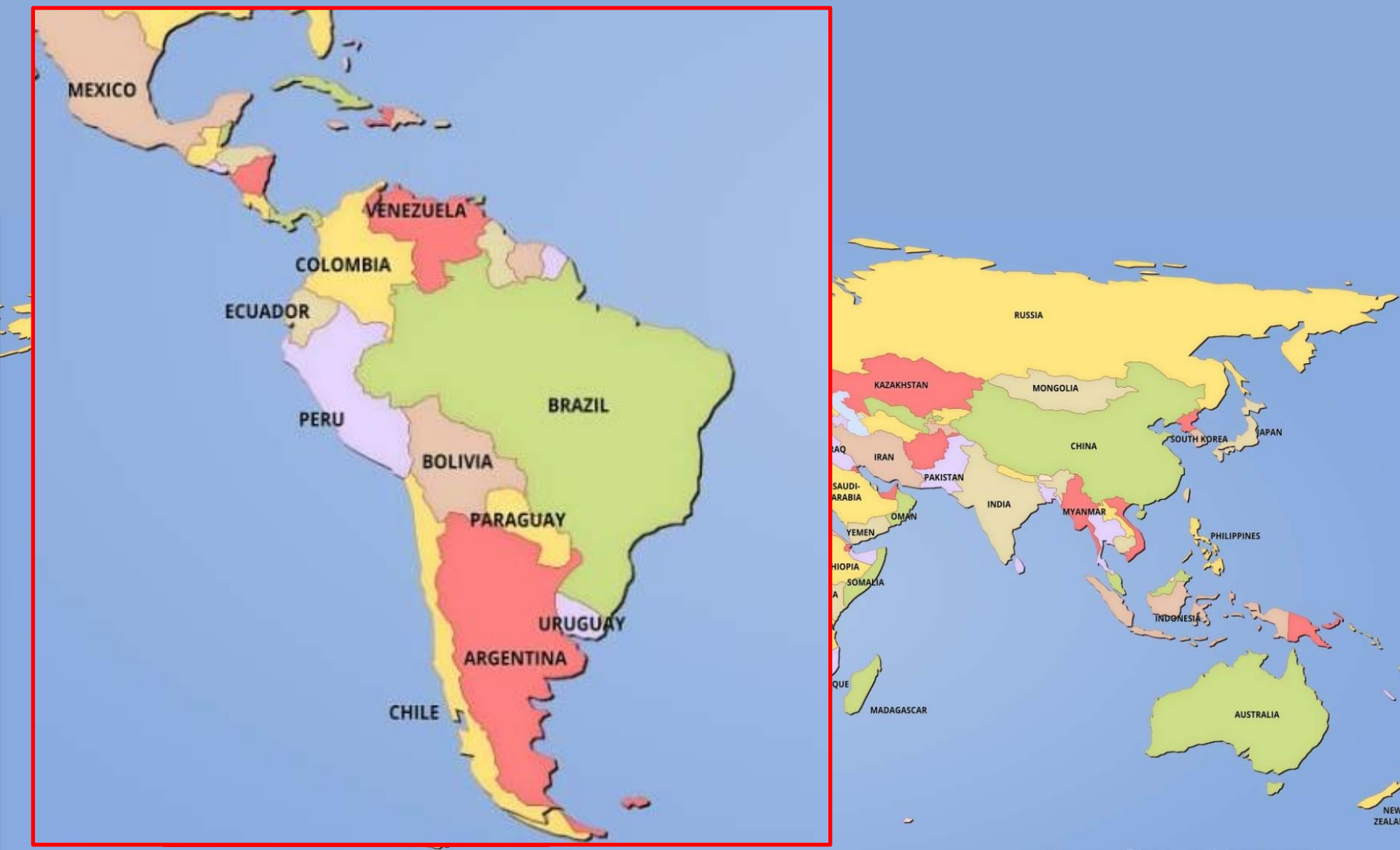

UKRAINE
KAZAKHSTAN
TURKEY
IRAQ
IRAN
PAKISTAN
EGYPT
SAUDI-
ARABIA
SUDAN
OMAN
YEMEN
IND
CANADA
UNITED
STATES
OF AMERICA
MEXICO
SOUTH KOREA
JAPAN
PHILIPPINES
INDONESIA
AUSTRALIA
BOLIVIA
PARAGUAY
URUGUAY
ARGENTINA
CHILE
NAMIBIA
BOTSWANA
SOUTH
AFRICA
MOZAMBIQUE
MADAGASCAR

Eastern and Northern Europe

Africa


TUNISIA
MOROCCO
ALGERIA
LIBYA
EGYPT
IRAQ
IRAN
SAUDI-
ARABIA
OMA
MALI
NIGER
CHAD
SUDAN
YEMEN
SENEGAL
NIGERIA
IVORY
COAST
ETHIOPIA
SOMALIA
KENYA
DEMOCRATIC REP.
OF THE CONGO
TANZANIA
ANGOLA
MOZAMBIQUE
NAMIBIA
BOTSWANA
MADAGAS
SOUTH
AFRICA

Latin America



This Week We Will Examine the Problems and Solutions within Each Region.

Because of the differences between the regions in:

1) **the population numbers,**
2) **the population distribution,**
3) **the nature of the societies,**
4) **the affluence of the countries and its people,**
5) **the available technologies,**
6) **the available natural resources,**
7) **the ecosystems in which they reside,**

each region faces unique problems, and produce unique ecological footprints.

This Week We Will Examine the Problems and Solutions within Each Region.

While each region may have its unique environmental problems to deal with, the problems all boil down to the same type of problems we all share globally.

And it is all a result of misuse, abuse and waste, and the disruption of the natural life cycles that exist for all elements and organisms.

"Earth provides enough to satisfy every man's needs, but not every man's greed."

— Mahatma Gandhi

"A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people. "

— Franklin D. Roosevelt