



Lomonosov Moscow State University
Business School

Global Limits of Economic Growth

*Lomonosov Moscow State University,
Inter-Departmental Course, 2023-2024, Spring Fall*

Course Reader:

Evgeniya Anatolyevna Shvets, PhD.

e.shvec@edu.mgubs.ru

Course “Global Limits of Economic Growth” aims to:

- Improve your’ awareness of global challenges and elicit critical thinking on economic, social and environmental issues raised by contemporary global environment
- Develop your ability to analyze global problems impact on economic environment and understand how it’s possible to assess risks
- Provide understanding how some natural resources factors can be managed and mitigated in the most appropriate way on the level of companies, countries and international institutions

Requirements to Pass the Course

- 1) At least 50% of sessions are attended (6 sessions)
- 2) At least 60% points for the final course test
- 3) Individual Project (Presentation) is done properly and delivered in time

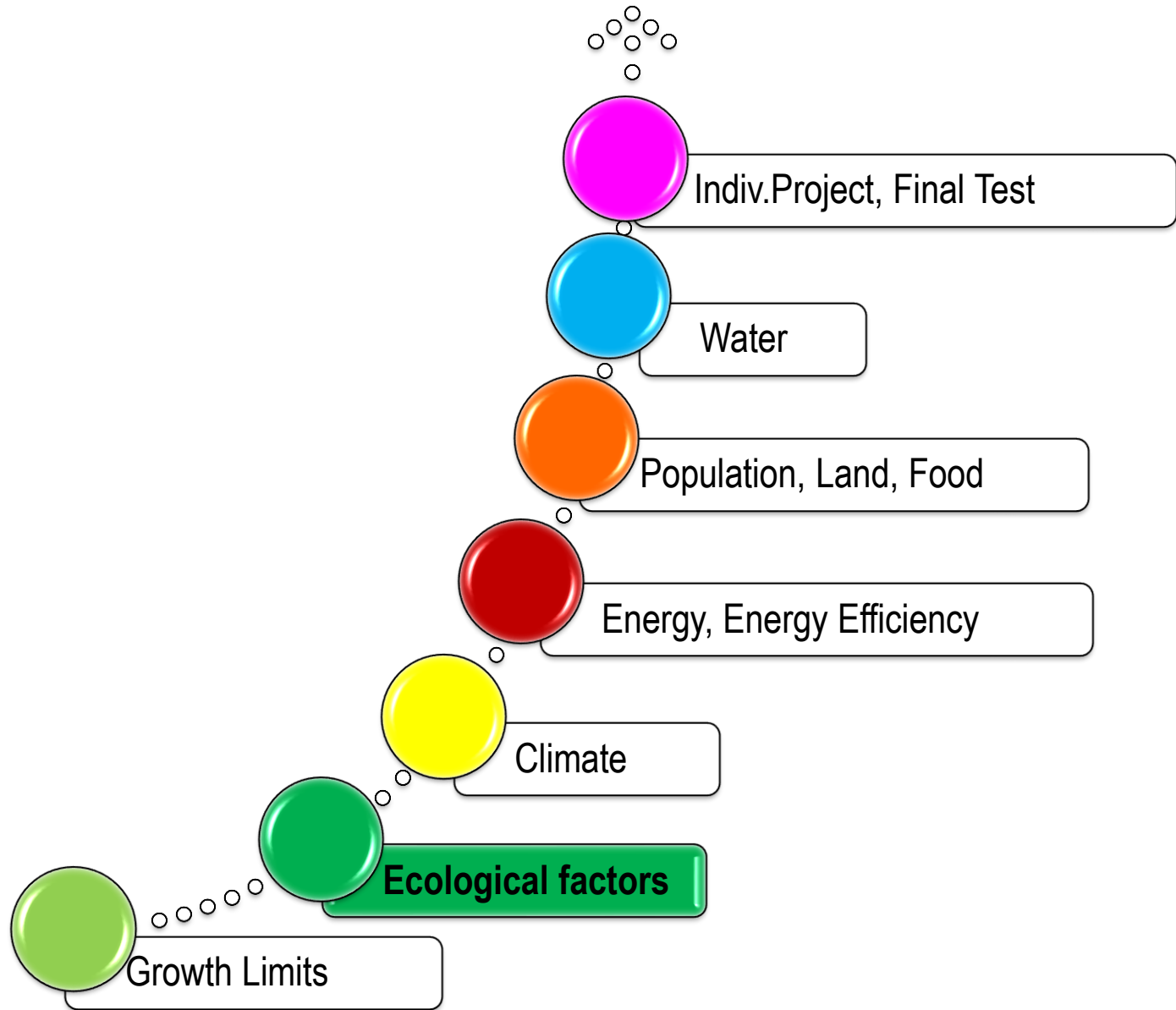
General Scheme for Resource Limitations Analysis



Scheme for the Individual Project (1-2 students per 1 project)

Resources	Steps of Analysis					
	Step 1	Step 2			Step 3	Step 4
	Role/ Importance	Limitations produced for			Ways used to overcome existing limitations	Suggestions how to improve these ways of coping with limitations
	World economy	National economy	Industries/ Business			
Unique Resource or Problem selected by you Scale: world or a country or an industry

Course Route



Pre-Reading and Food-for-Thought Assignment

Global Limits of Economic Growth (GLOEG) - 2024



Pre-Reading and Food-for-Thought Assignment before Session 2 (Febr., 14th)

GLOBAL ECOLOGICAL PROBLEMS

1. Read the **Prologue pp.xvi-xxi** from **Perkins J. "Confessions of an Economic Hit Man"**

Think about:

Who are economic hit men?
What kind of conflict is being described?
Who is involved in this conflict?

2. Read the abstract from the **World Development Report 2014: Risk and Opportunity, Managing Risk for Development, pp.76-77.**

Think about:

What are DISASTER RISK MANAGEMENT systems?
What are their differences in comparison to traditional approaches to natural hazards?

3. Calculate your **ecological (CO₂) footprint** for the last 1 year using the following websites:

- <http://www.carbonfootprint.com/calculator.aspx> (calculator 1)
- <http://www.carbonify.com/carbon-calculator.htm> (calculator 2)

You can also look for any another footprint calculator and use it too. Take notes of your results. How can you compare calculators used?

SPOTLIGHT 1

Preparing for the unexpected: An integrated approach to disaster risk management in the Philippines and Colombia

The frequency and severity of disasters resulting from natural hazards have been increasing. Losses from disasters amounted to \$3.5 trillion between 1980 and 2011, with one-third occurring in low- and middle-income countries. The complexity of problems posed by natural hazards cannot be addressed by single-sector development planning. Thus many countries are responding with multisectoral approaches and are moving quickly toward mainstreaming the management of risks from natural hazards into all aspects of development planning and in all sectors of the economy. Recognizing that the risks from natural hazards can never be completely eliminated, a balanced approach incorporates structural measures, as well as community-based prevention, emergency preparation, insurance, and other nonstructural measures, such as education and training or land use regulation. Two of the most effective systemic approaches to disaster risk management (DRM) have been developed in Colombia and in the Philippines.

An inclusive, innovative, and coordinated approach in the Philippines

Located along the western rim of the Pacific Ring of Fire and the Pacific typhoon belt, the Philippines is vulnerable to earthquakes, tsunamis, volcanic eruptions, landslides, floods, tropical cyclones, and drought. With 268 recorded disaster events over the past three decades and more than 40 million people affected between 2000 and 2010, the Philippines ranks eighth among countries most exposed to multiple hazards, according to the World Bank's Natural Disaster Hotspot list.

As early as 1941, the Philippines established the Civilian Emergency Administration to formulate and execute policies and plans to protect the population in emergencies. Since then, the institutional and disaster management systems have focused on emergency response, with important measures defined and implemented for short-term forecasting, early warning and evacuation, and postdis-

asters, and the private sector, and is complemented by Regional and Local Councils. This multistakeholder composition is preserved even at the provincial and municipal levels, where Disaster Risk Reduction Councils operate in coordination with the national council. Local government units are in charge of disaster preparedness, prevention, mitigation, and response, and since the 1970s have been committed to working with communities to effectively promote resilience.

Innovation and inclusiveness also guide the approaches taken in risk assessment and communication. In 2006, five technical agencies, which traditionally had not worked together, started collaborating on multihazard mapping of the 27 provinces most vulnerable to disasters. The READY project marked the first attempt to approach disasters in a multihazard fashion. It included capacity-building activities in the provinces and established community-based early warning systems for tsunamis, floods, and landslides.

Pre-Reading and Food-for-Thought Assignment



PROLOGUE

Extract from John Perkins

"Confessions of an Economic Hit Man", 2004

Quito, Ecuador's capital, stretches across a volcanic valley high in the Andes, at an altitude of nine thousand feet. Residents of this city, which was founded long before Columbus arrived in the Americas, are accustomed to seeing snow on the surrounding peaks, despite the fact that they live just a few miles south of the equator.

The city of Shell, a frontier outpost and military base hacked out of Ecuador's Amazon jungle to service the oil company whose name it bears, is nearly eight thousand feet lower than Quito. A steaming city, it is inhabited mostly by soldiers, oil workers, and the indigenous people from the Shuar and Kichwa tribes who work for them as prostitutes and laborers.

1st SURVEY on sustainable-oriented activities

What do you think about sustainability?

This is the survey about your opinions on sustainability-related issues. By sustainability-related issues we understand the complex of umbrella concepts like Sustainable Development, Green Economy and Circular Economy.

Please answer the questions as honestly as possible, in a way that shows what you really think or feel at the moment.

- We ask your name just for processing the results. It will be coded and used for technical purposes only. No personal data will be disclosed or shared in any way.
- 2 times survey: **at the beginning of the course** + at the end
- Follow the link: <https://forms.gle/vVYUHJSQvvFtAuANA>
- Put your real name!
- Up to 5-7 min. to complete the survey



Session 2

Global Ecological Problems

14.02.2024

Aims of Session 2

1. To develop basic understanding how financial evaluation of ecological damages is made
2. To analyze Disaster Risk Management Systems and understand their basic elements
3. To get closer to the concept of Ecological Footprint and take this concept critically

Session 2. Global Ecological Problems

1. Global Ecological Problems: Causes, Effects, Solutions.
 - Situation Analysis of the extract from Perkins J. “Confessions of an Economic Hit Man”
2. Disaster Risk Management approach
3. Financial Evaluation of Ecological Damages
4. Ecological Footprint Concept
5. Public Environmental Policy, International Environment Management Standards
6. Business Environmental Responsibility (Ecoratings, ESG-ratings), Environment Risk Management



- What kind of problems can be called



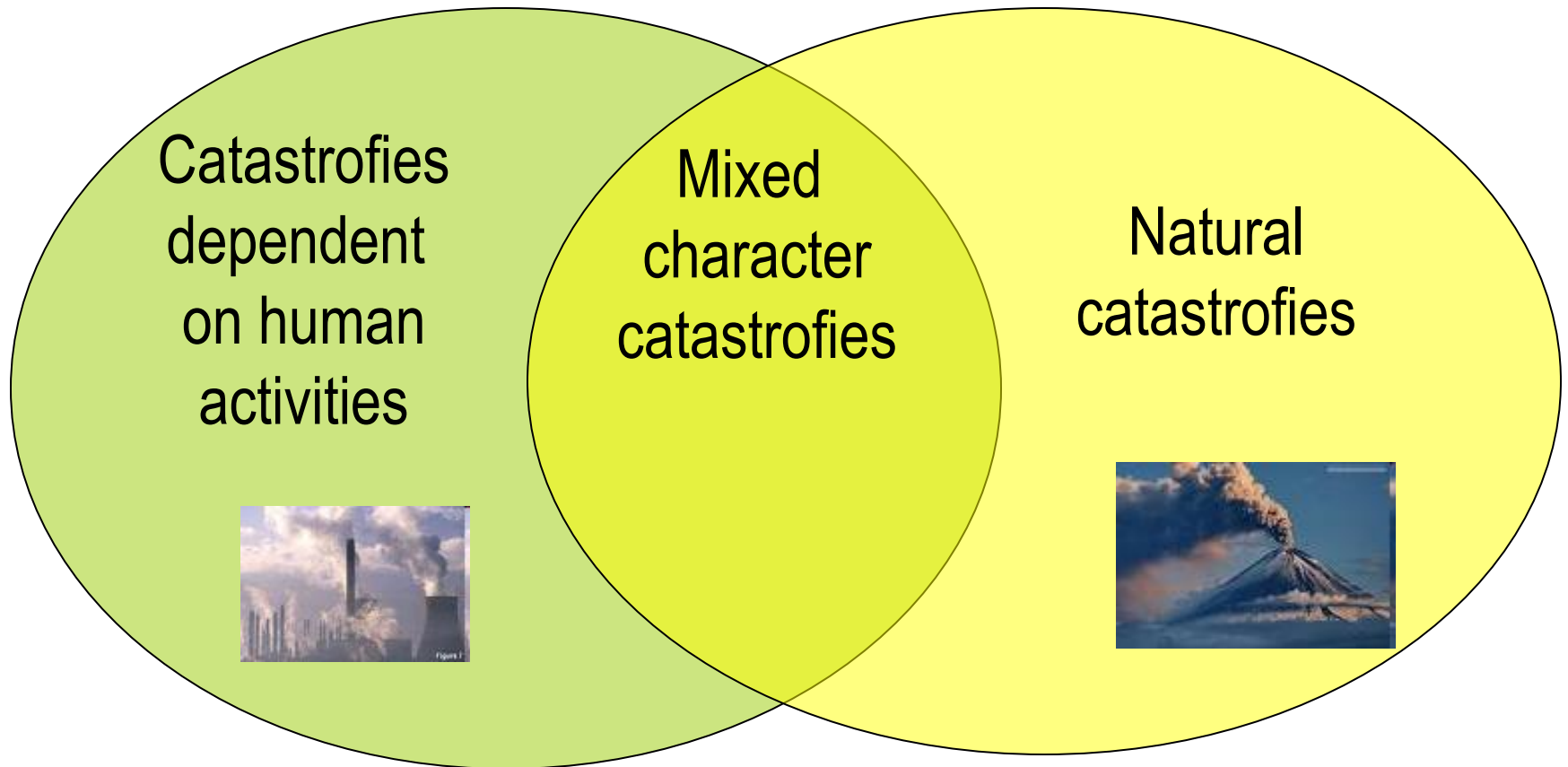
GLOBAL PROBLEMS?



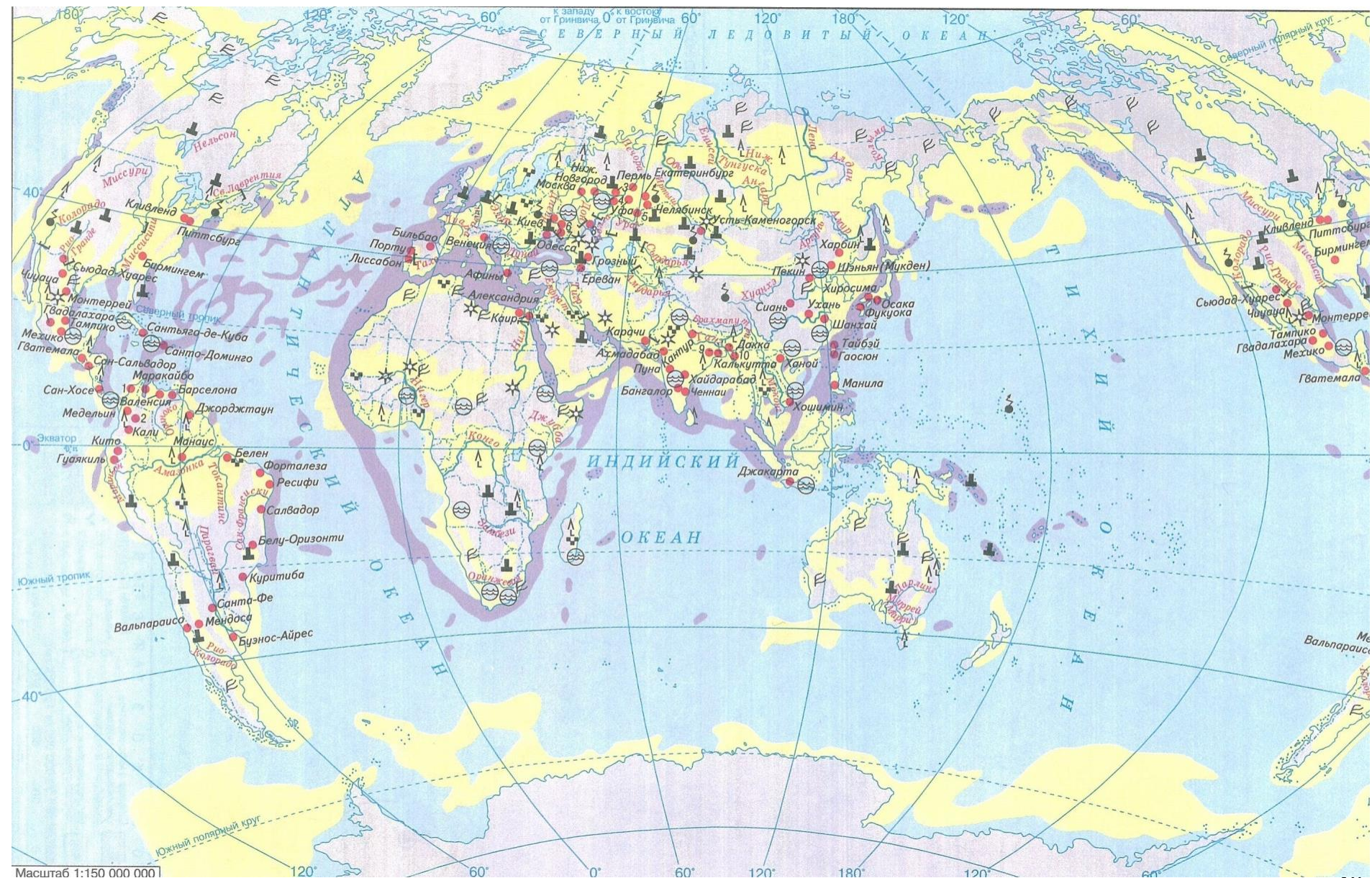
Global Ecological Problems

- **Global** problems
 - World Scale
 - Joint action needed
- **Ecological** problems \approx **environmental** problems
 - Types: climate change, all sorts of pollution, deforestation, biodiversity loss, draughts and desertification, water scarcity, floodings, etc.
 - Interconnection between ecological problems have made them multidimensional
- **Global Ecological** problems \rightarrow **global environmental disaster...**


Global Ecological Problems



World Ecological Problems



Environmental Risks and Their Impact

	Risk Description	Global impact
Droughts and desertification 	Increased frequency and severity of heatwaves and droughts and the spread of desertification significantly reduce agricultural yields around the world and displace populations	<ul style="list-style-type: none">• Increase in economic losses• Inefficient use of land resources• Change in weather patterns• Migration of human populations• Concentration of populations in regions with access to water• Competition for scarce resources• Biodiversity loss• Further damage to the environment
Air pollution		
Water Scarcity		
Nat.Cat.: Earthquake		

Source: Global Risk Report 2010, WEF



Natural Catastrophes: Earthquake

- **Risk Description Example**

- A strong earthquake hits an economic centre or densely populated area such as Tokyo, Los Angeles, San Francisco, Beijing or Mumbai

- **Global impact**



Natural Catastrophes: Earthquake

- **Risk Description**

- A strong earthquake hits an economic centre or densely populated area such as Tokyo, Los Angeles, San Francisco, Beijing or Mumbai

- **Global impact**

- Tremendous economic loss and loss of life
- Displacement and rehabilitation of people
- Destruction of infrastructure
- Infrastructure losses
- Investment in rebuilding the infrastructure

Air Pollution

- **Risk Description**

-

- **Global impact**

- ...





Water Scarcity

- **Risk Description**

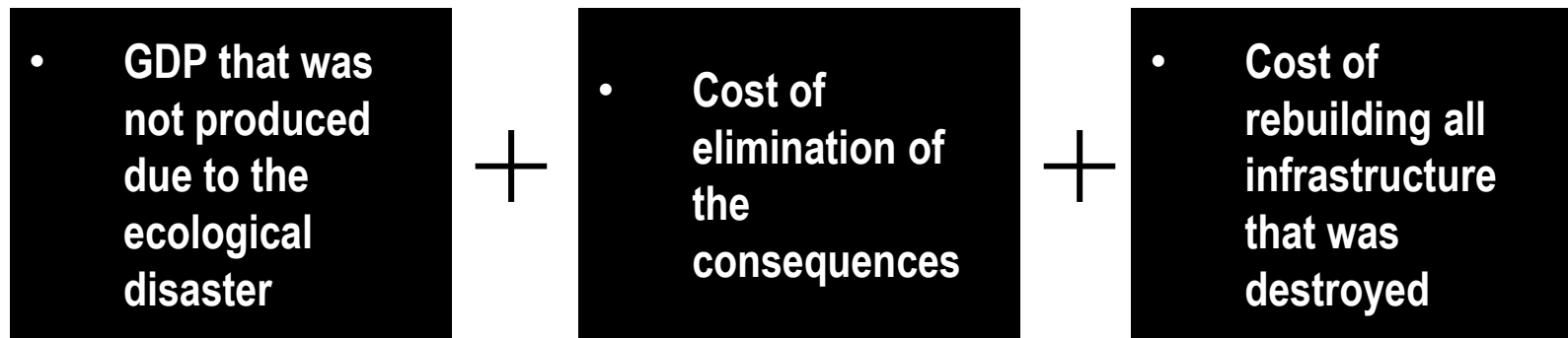
- ...

- **Global impact ..**

- ...

Evaluating Ecological Damages on a Country Level

Evaluation of the ecological damage is composed of the following basic elements:



Other aspects can also be covered:

1. insurance payments
2. following increase of GDP (recoil effect) / *Till certain scale of catastrophe/*

- **Direct losses** are losses of assets
- **Indirect losses** are the losses that accrue while productive assets remain damaged or destroyed. (Natural Disaster Hotspots A Global Risk Analysis, WB. 2005)

Leading natural disasters, by overall economic losses, since 1980

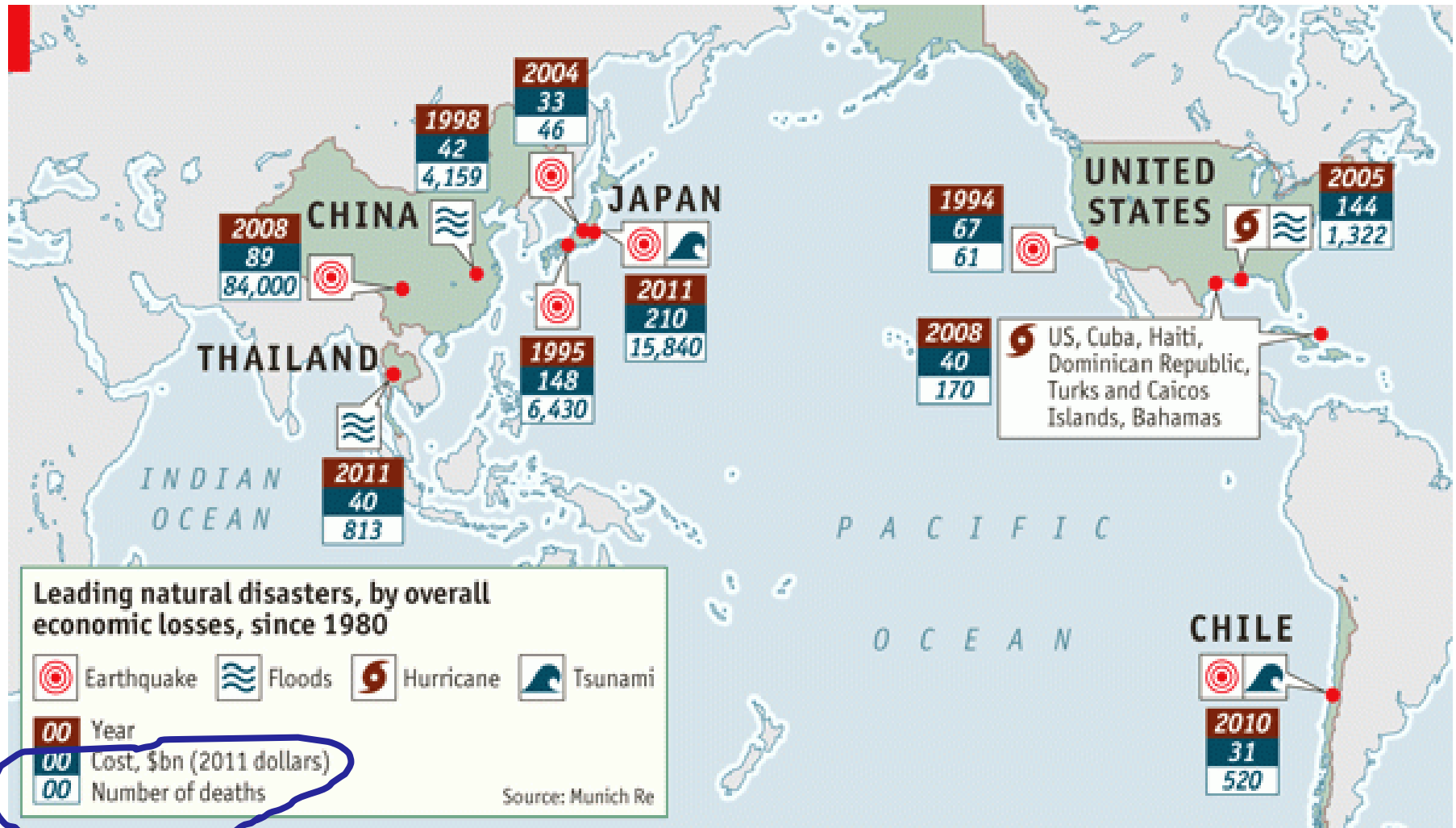


Table 1.1. Countries Most Exposed to Multiple Hazards*a) Three or more hazards (top 15 based on land area)*

<i>Country</i>	<i>Percent of Total Area Exposed</i>	<i>Percent of Population Exposed</i>	<i>Max. Number of Hazards</i>	<i>Country</i>	<i>Percent of Total Area Exposed</i>	<i>Percent of Population Exposed</i>	<i>Max. Number of Hazards</i>
Taiwan, China	73.1	73.1	4	Vietnam	8.2	5.1	3
Costa Rica	36.8	41.1	4	Solomon Islands	7.0	4.9	3
Vanuatu	28.8	20.5	3	Nepal	5.3	2.6	3
Philippines	22.3	36.4	5	El Salvador	5.1	5.2	3
Guatemala	21.3	40.8	5	Tajikistan	5.0	1.0	3
Ecuador	13.9	23.9	5	Panama	4.4	2.9	3
Chile	12.9	54.0	4	Nicaragua	3.0	22.2	3
Japan	10.5	15.3	4				

Disaster risk management (WDR)

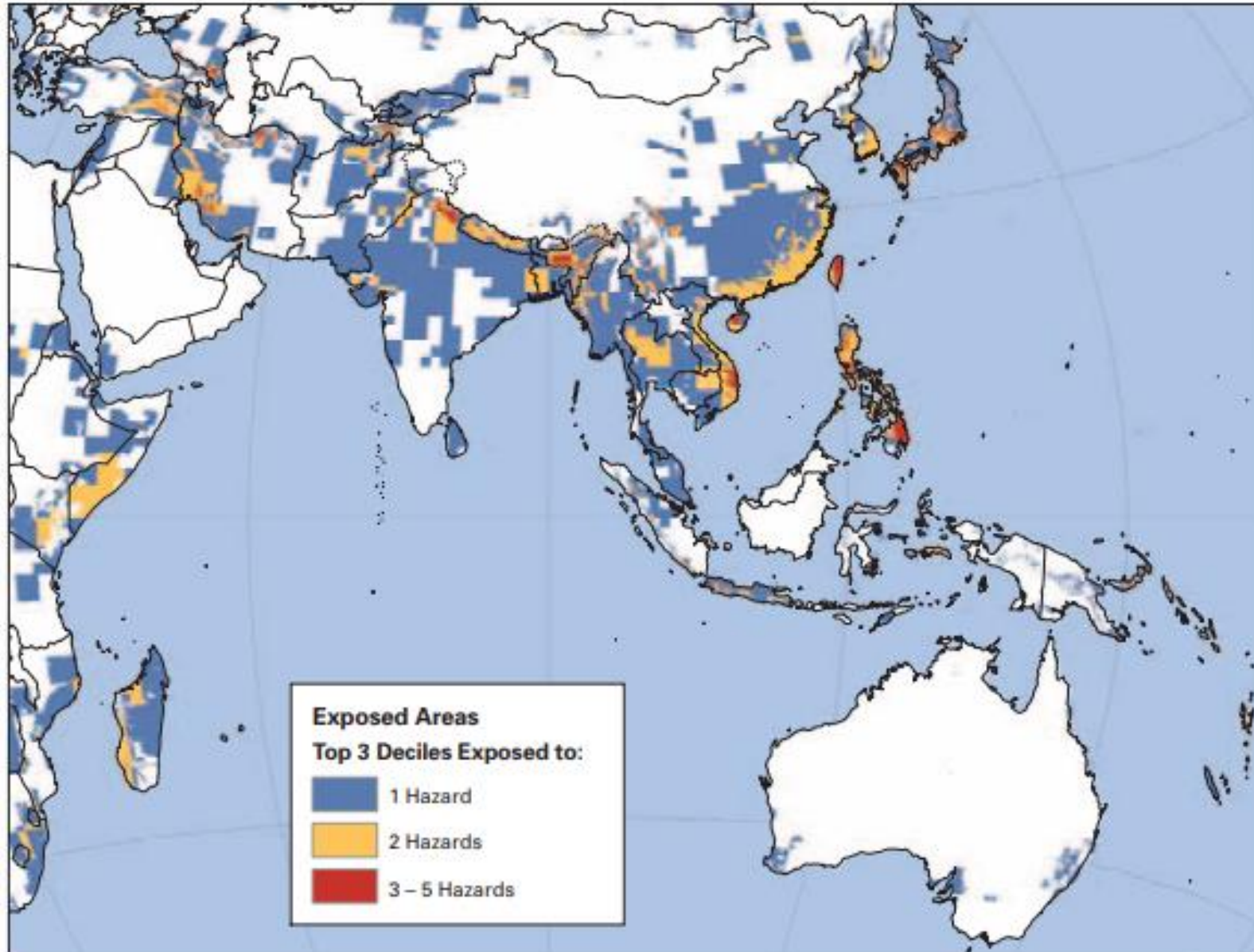
- Preparing for the unexpected: **An integrated approach to disaster risk management** in the Philippines and Colombia

Philippines

- What kind of shift did occur in **DISASTER RISK MANAGEMENT (DRM)** system after 2010?
- What are the peculiarities of DRM system of Philippines?



Figure 5.2. Detailed View of Multihazard Areas
 b) Asia/Pacific



- Preparing for the unexpected:
An integrated approach to disaster risk management in the Philippines and Colombia

Colombia

- What are the peculiarities of DRM system of Colombia?
- What is the role of local government in Colombian DRM system?

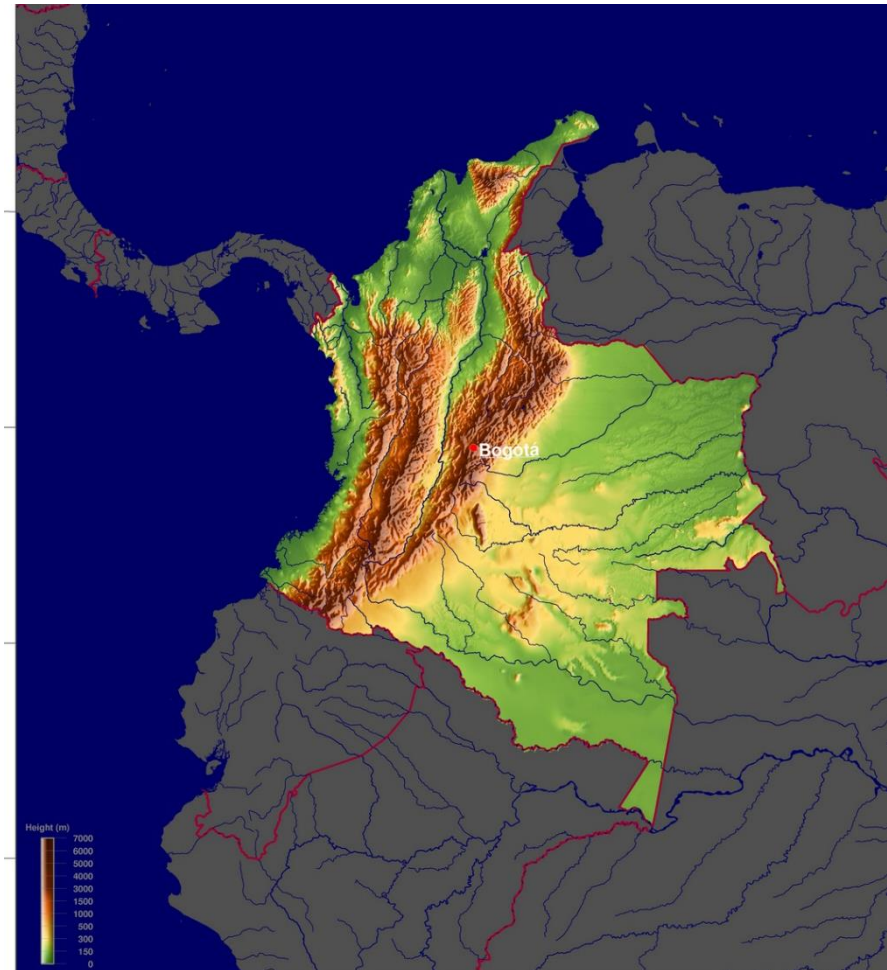
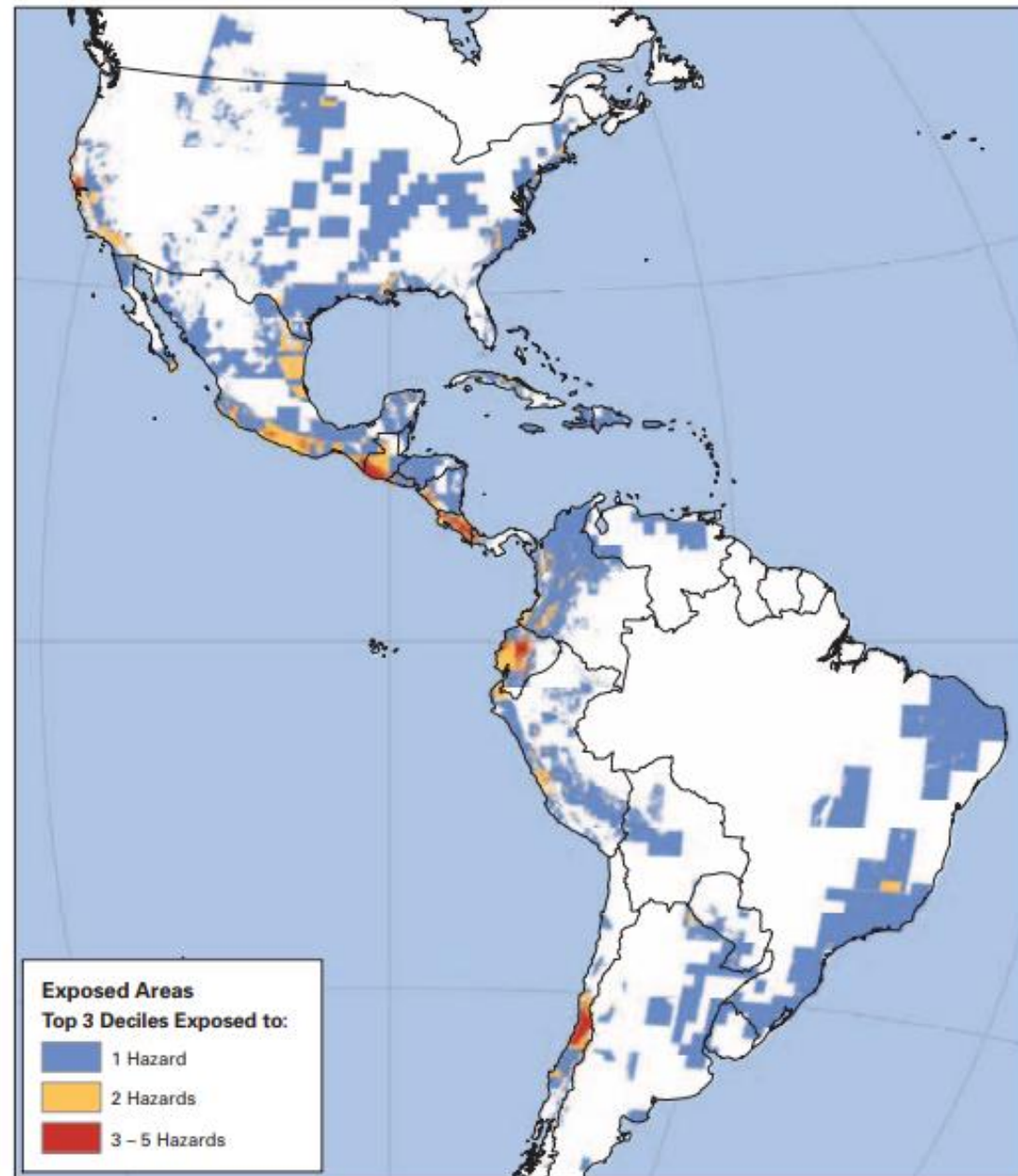


Figure 5.2. Detailed View of Multihazard Areas
a) Western Hemisphere



Global Natural-Disaster costs



Why there is a trend of growing costs of disasters?

How to minimize the consequences of disasters

- **What should be done by actors on different levels in order to minimize the consequences of disasters?**

By National Governments

By Private Companies

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PROLOGUE

*Extract from John Perkins
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Questions for situation analysis of the extract from Perkins J. “Confessions of an Economic Hit Man” (2004)



1. Who are economic hit men?
2. Who are the actors of the war?
3. What kind of the relationship is occurring between local community and the extracting company?
4. Name ecological effects that were produced in a country.
5. What kind of other correlated global problems are mentioned?
6. Find possible solutions for this conflict situation on behalf of an independent consultant of the local government (or producer company).

Recent Example of a Similar Conflict

- The rebels in Nigeria have exploded the oil pipe line of Royal Dutch Shell producing a huge ecological damage in the area. During decades Nigerian rebels are fighting to liberate the Niger Delta from foreign resource exploiting companies. The usual practice before that was to take refugees from the company staff.

01.02.2010, RBC-Daily

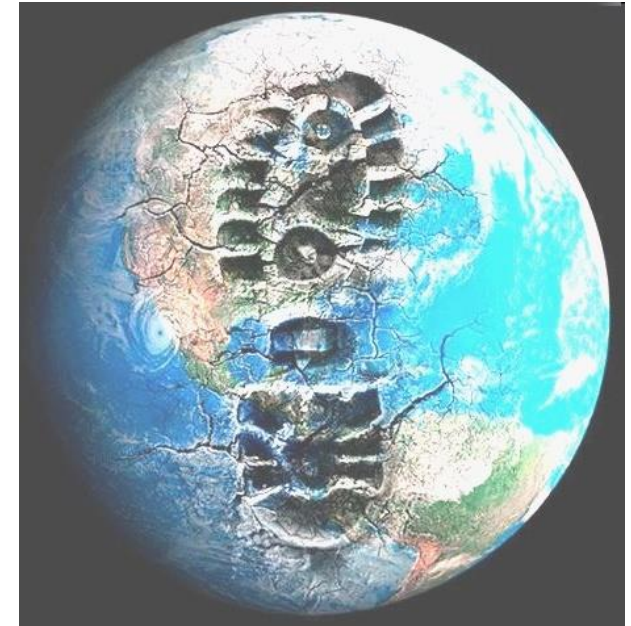
A corporate political prisoner of nowadays

- Steven Donziger, the lawyer who won a multibillion-dollar judgment in Ecuador against Chevron over the massive contamination in the Lago Agrio region and has been fighting on behalf of Indigenous people and farmers there for more than 25 years.
- Steven Donziger has lost his career, his income and his freedom to Chevron corporation while trying to help everyone in Ecuador.



Ecological Footprint

What does
the term mean?



The **ecological footprint** is a measure of human demand on the Earth's ecological capacity to regenerate.



Data Source: Global Footprint Inquiry

Key Questions for the Inquiry

How much nature do we have?
How much nature do we use?

Does it matter if we use more
than what nature can renew?

Ecological Footprint Accounting

The two underlying questions:

How much nature do we have?
= biocapacity
= SUPPLY

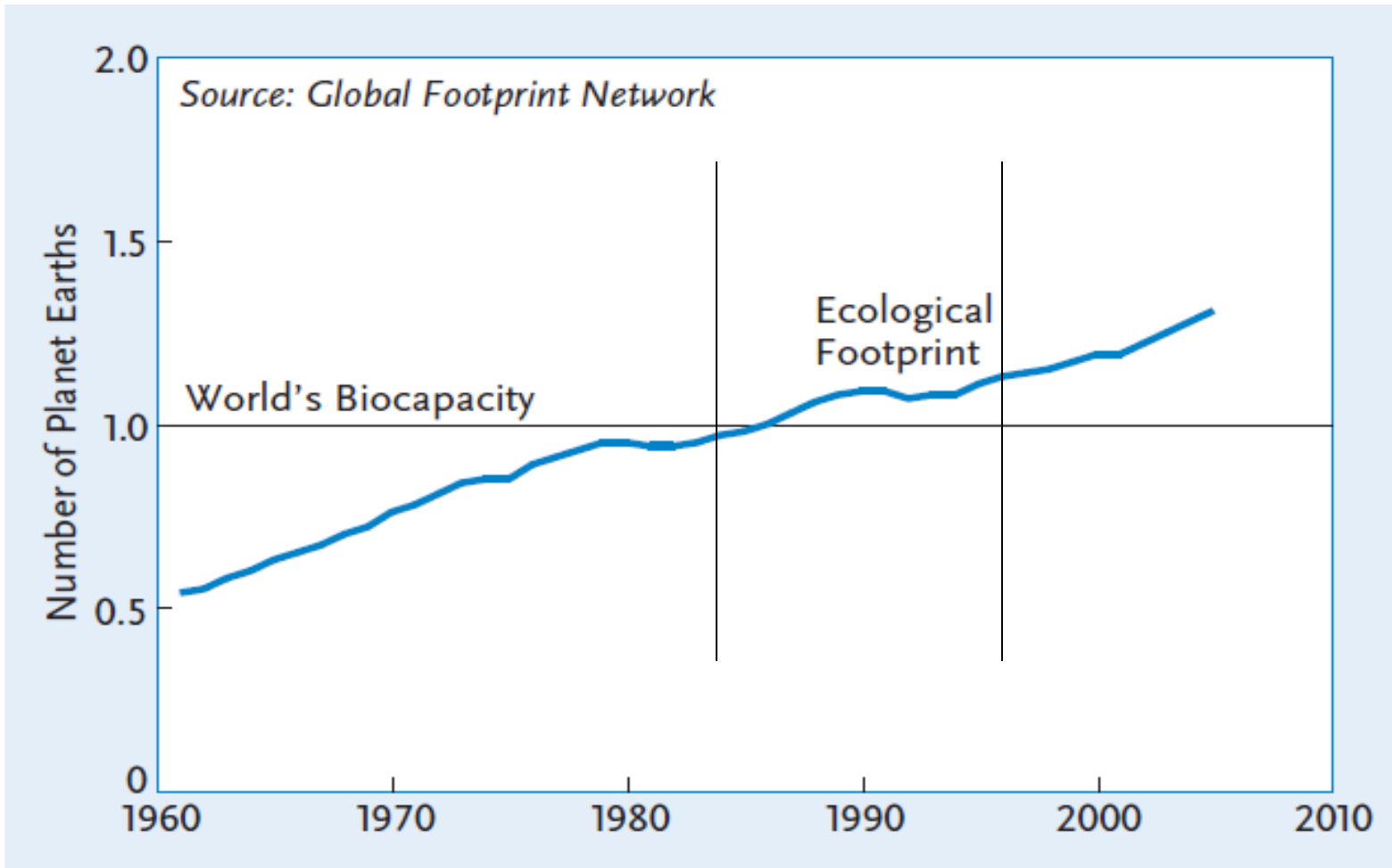
How much nature do we use?
= Footprint or demand on biocapacity
= DEMAND

A concrete, scalable answer to the planetary
boundary (safe operating space) concern.

How good is the answer?

1. Reviewed by over 10 national government institutes
2. Only answers one question (not quality).
3. Constant improvement with better data

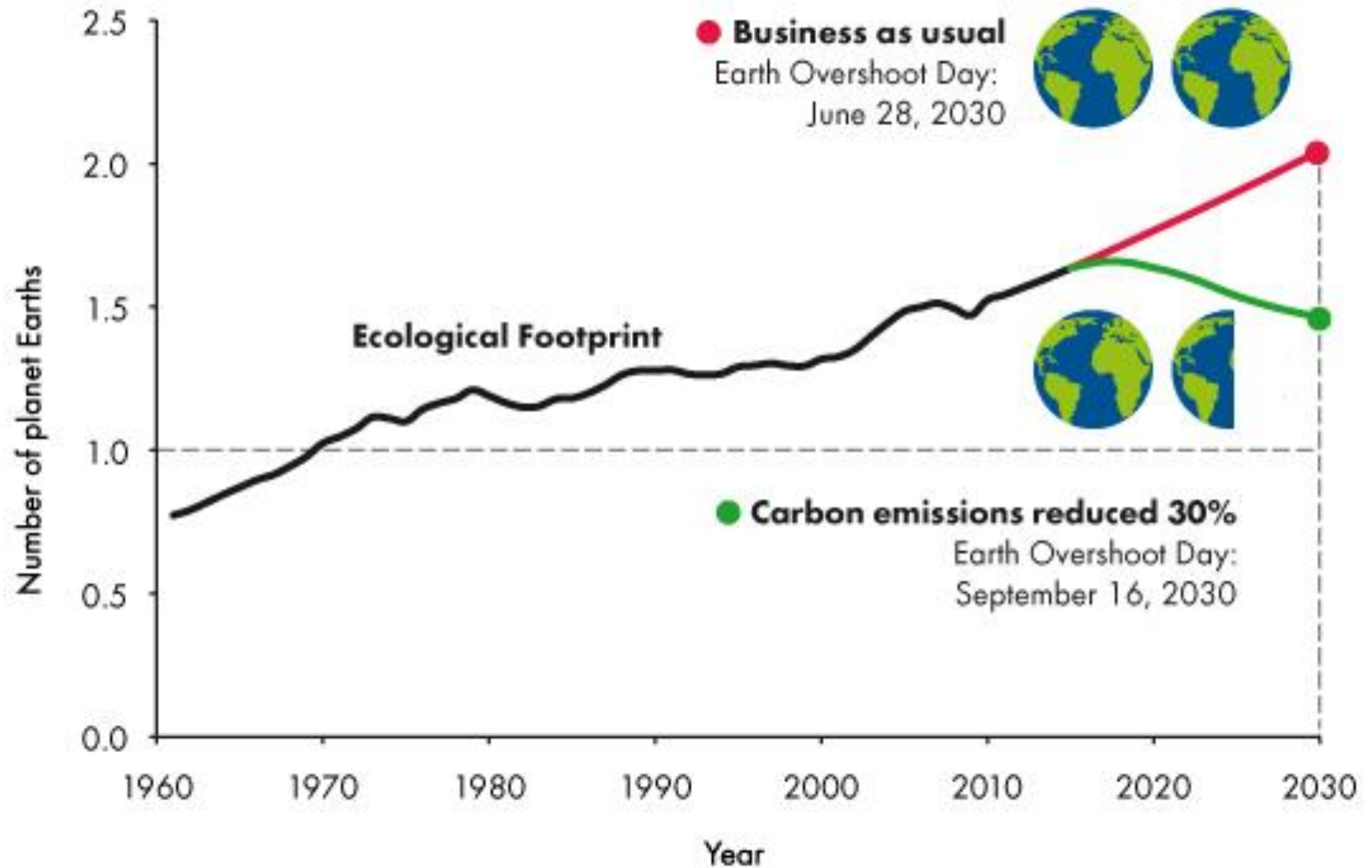
Humanity Ecological Footprint



Source: The State of the World, 2010. Worldwatch Institute.

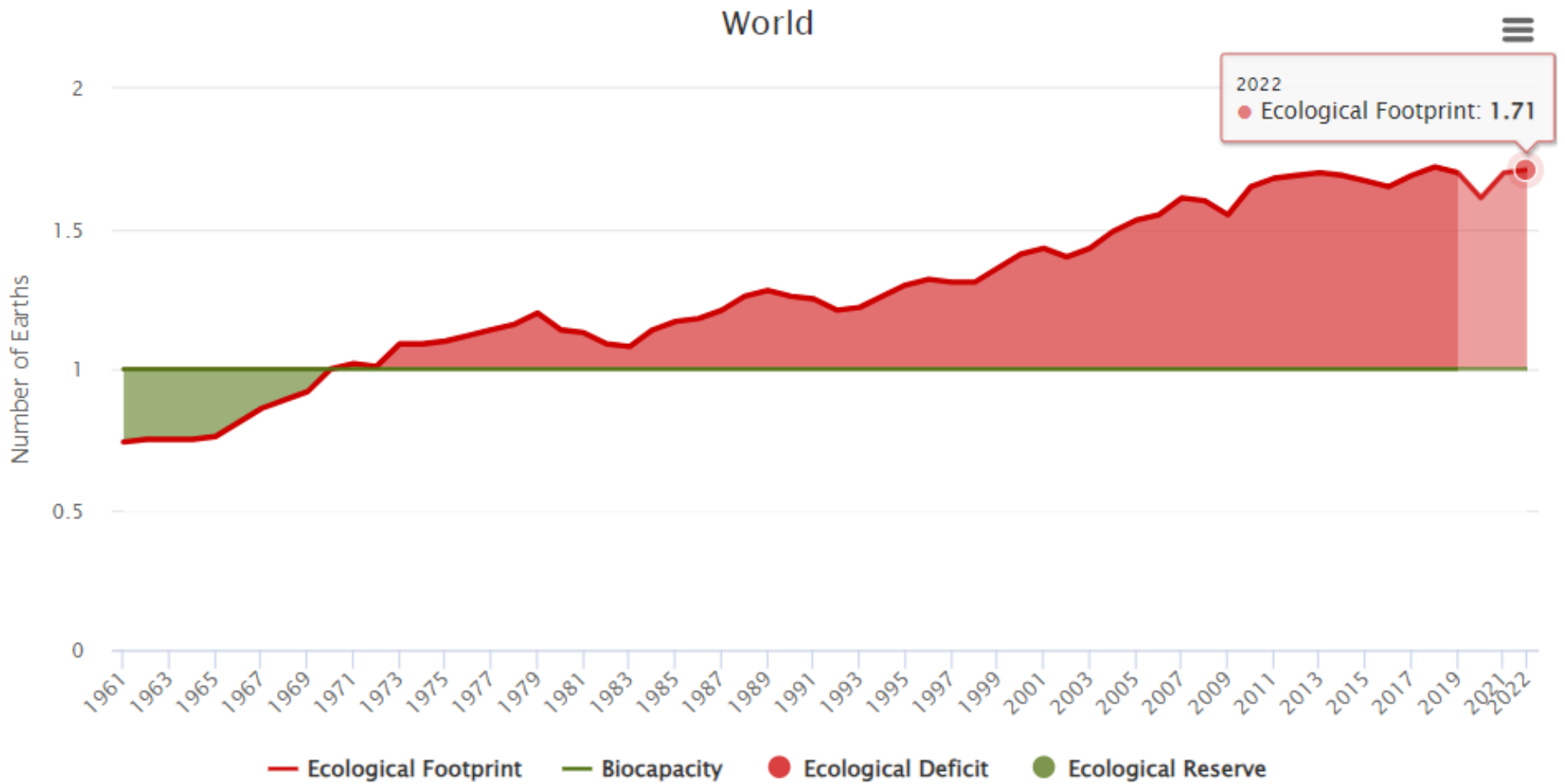
Humanity Ecological Footprint

How many Earths does it take to support humanity?



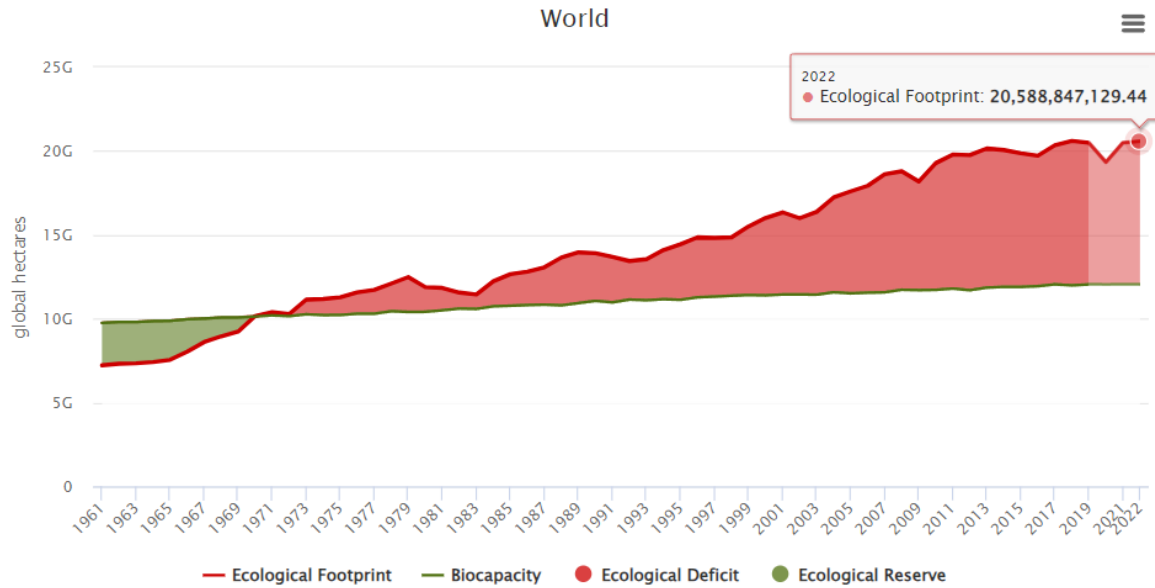
Sources: Global Footprint Network, 2016

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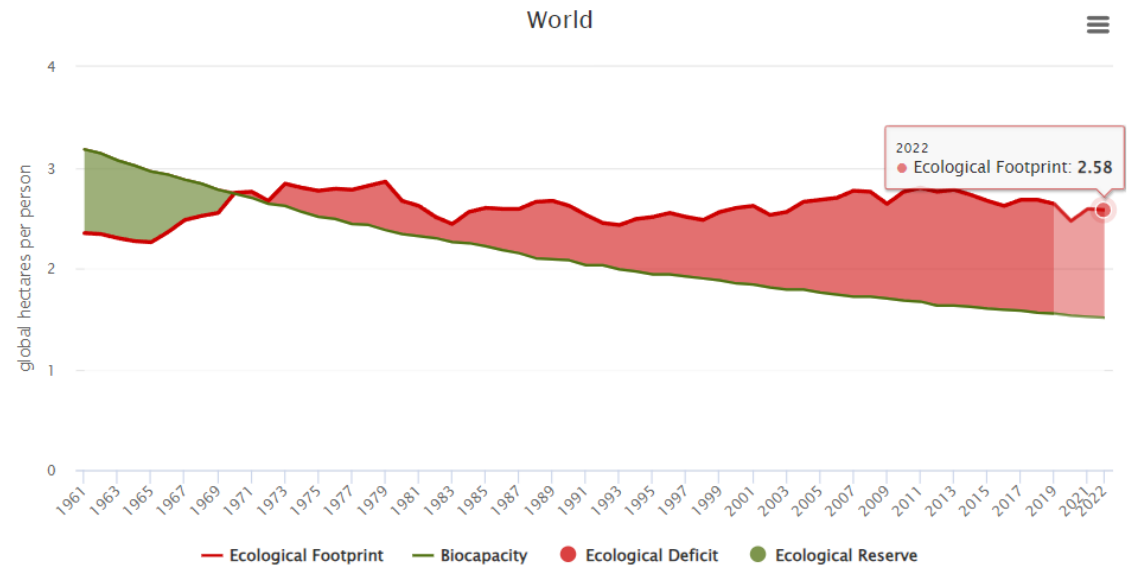


Global Hectars VS Global Hectars per Person

Show Page Hints



Show Page Hints



X WORLD (2022) (ESTIMATE)

GDP PER PERSON
\$13,004

POPULATION
7,975,099,904

Biocapacity
per person

1.5
gha

Ecological Footprint
per person

2.6
gha

BIOCAPACITY
RESERVE(+)/DEFICIT(-)

-1.1
gha

X WORLD (1970)

GDP PER PERSON
-

POPULATION
3,695,389,952

Biocapacity
per person

2.7
gha

Ecological Footprint
per person

2.7
gha

BIOCAPACITY
RESERVE(+)/DEFICIT(-)

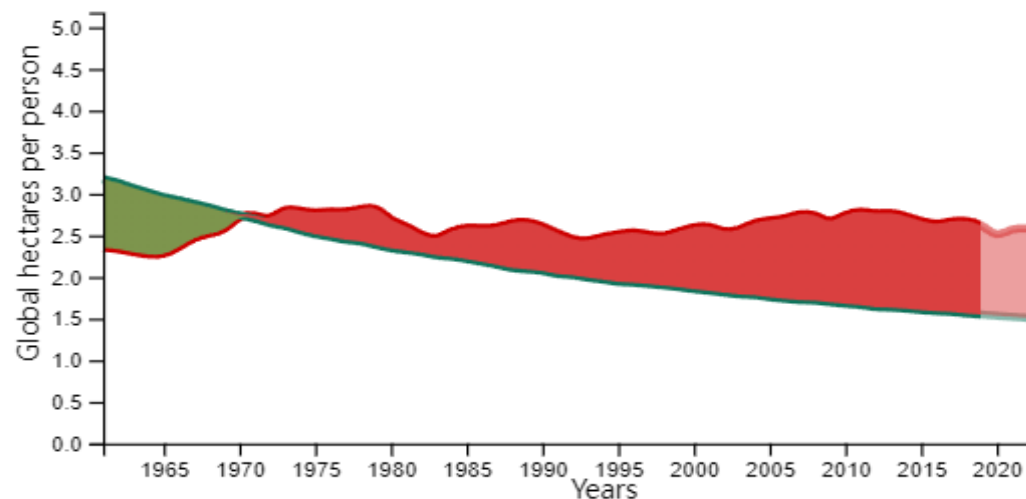
0.0
gha

Ecological Footprint and
Biocapacity
From 1961 to 2022
(last 3 years are estimates)

Ecological
Footprint per
person

Biocapacity per
person

Learn More



Data Sources: [National Footprint and Biocapacity Accounts 2023 edition \(Data Year 2019\)](#);
GDP, International Financial Statistics (IFS); Population, U.N. Food and Agriculture Organization.

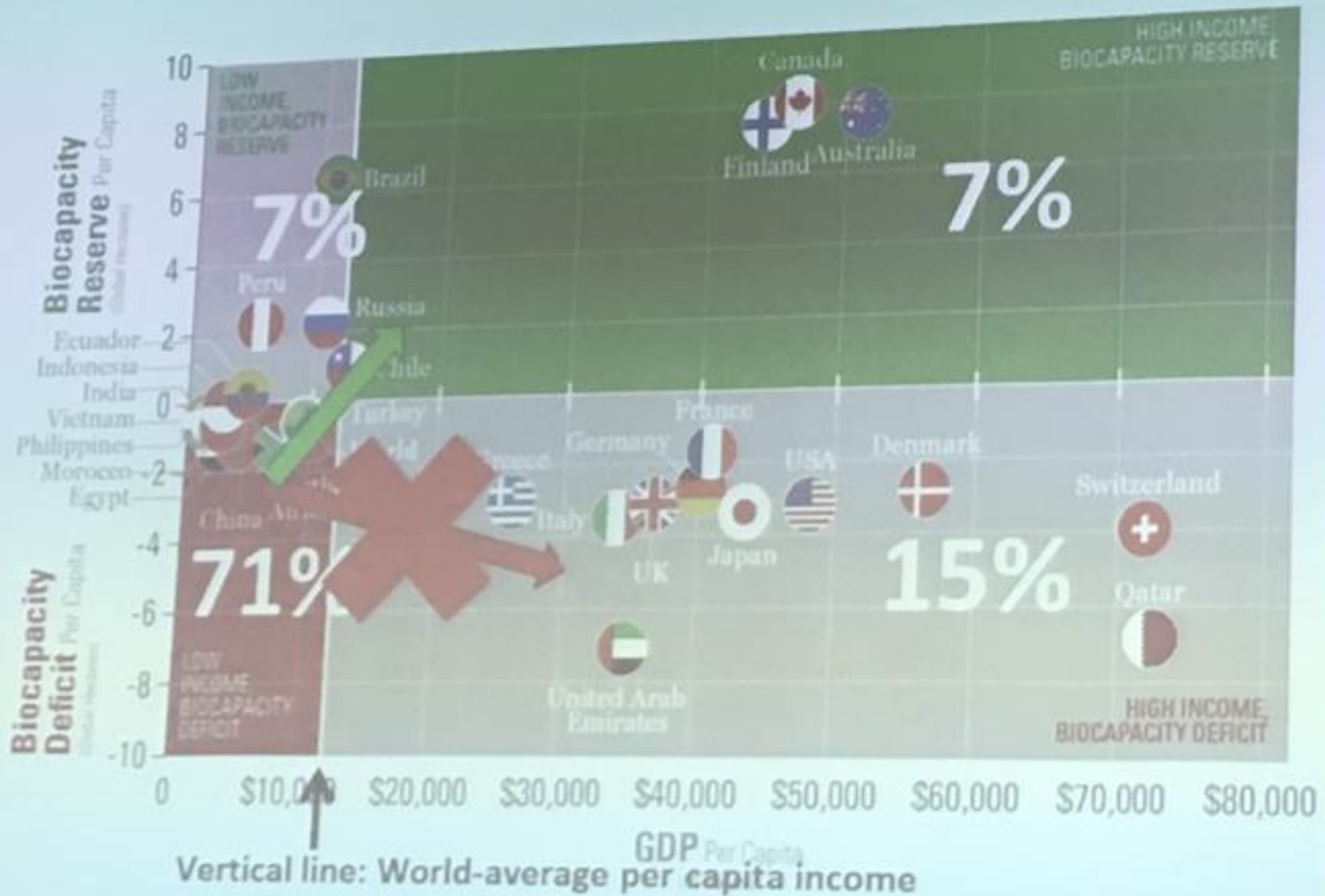
Ecological Reserves and Ecological Deficits – current



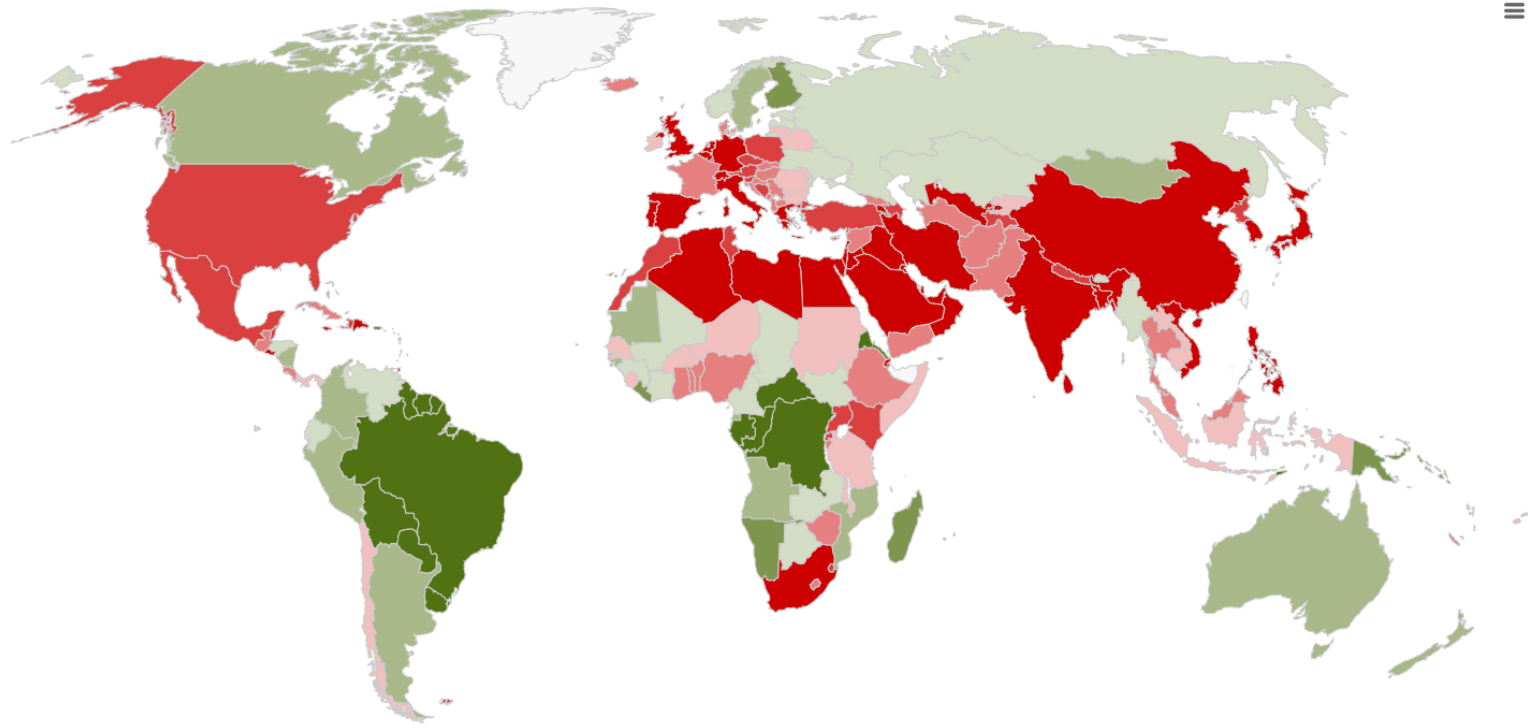
$$\frac{\text{Humanity's Footprint}}{\text{Global Biocapacity}} = 1.6$$

Distribution of Countries

Biocapacity vs. Income



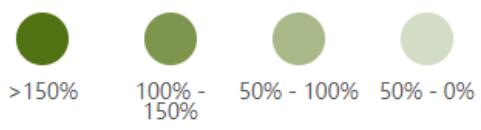
Ecological Creditors and Debtors (2024)



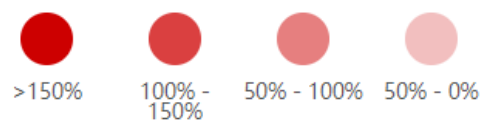
ECOLOGICAL DEFICIT/RESERVE

An ecological deficit occurs when the [Ecological Footprint](#) of a population exceeds the [biocapacity](#) of the area available to that population. A national ecological deficit means that the country is net-importing biocapacity through trade, liquidating national ecological assets or emitting more carbon dioxide waste into the atmosphere than its own ecosystems absorb. In contrast, an ecological reserve exists when the biocapacity of a region exceeds its population's Ecological Footprint.

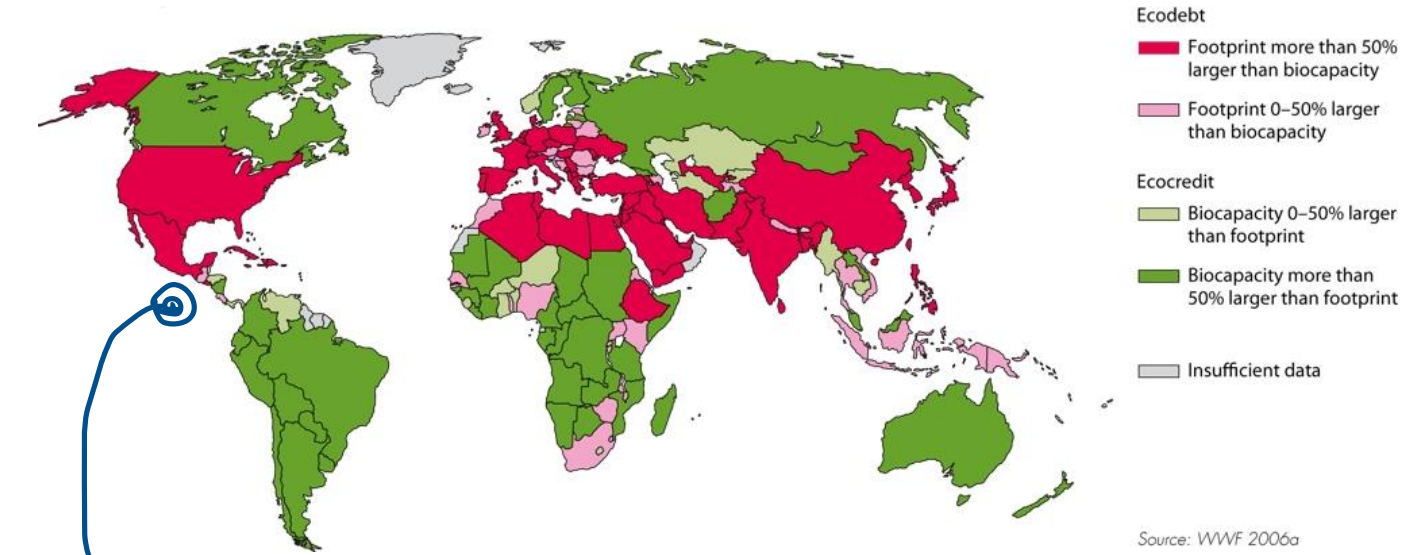
BIOCAPACITY CREDITORS BIOCAPACITY GREATER THAN FOOTPRINT



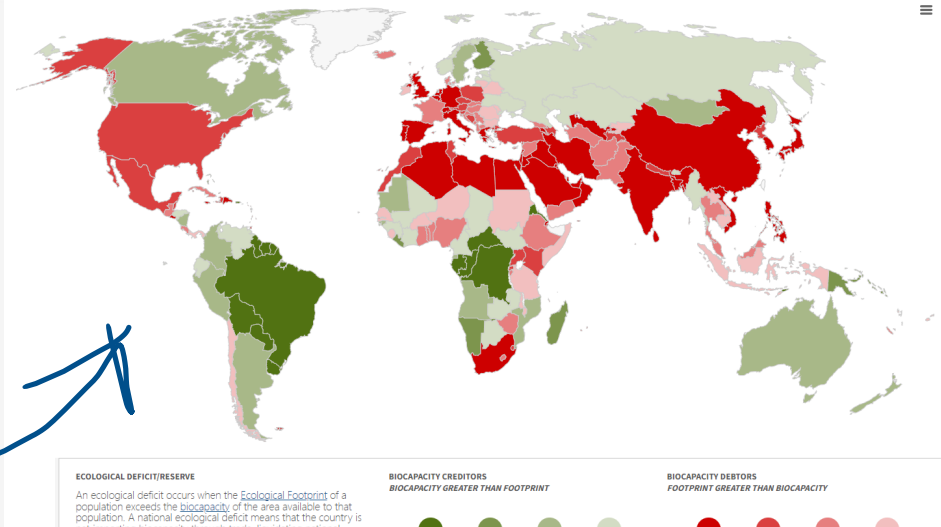
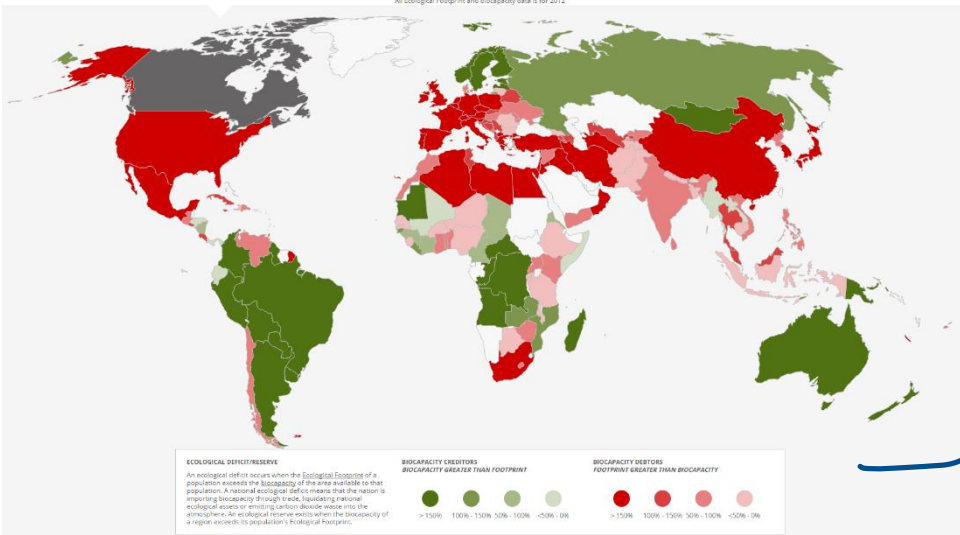
BIOCAPACITY DEBTORS FOOTPRINT GREATER THAN BIOCAPACITY



Ecological Creditors and Debtors: dynamics 2002-2012-2024



All Ecological Footprints and biocapacity data is for 2012



Ecological Debtors (2012-2024)

COUNTRIES WITH BIOCAPACITY RESERVE

PERCENTAGE THAT BIOCAPACITY EXCEEDS ECOLOGICAL FOOTPRINT

Eritrea	160%
Timor-Leste	150%
Congo, Democratic Republic of	90%
Congo	69%
Angola	68%
Central African Republic	68%
Mozambique	67%
Madagascar	63%
Zambia	56%
Liberia	43%
Guinea-Bissau	32%

COUNTRIES WITH BIOCAPACITY RESERVE

PERCENTAGE THAT BIOCAPACITY EXCEEDS ECOLOGICAL FOOTPRINT

French Guiana	4,900%
Suriname	2,160%
Guyana	1,460%
Gabon	811%
Congo	635%
Central African Republic	462%
Bahamas	447%
Uruguay	380%
Bolivia	361%
Puerto Rico	315%

South Sudan	8%
Ecuador	5%
Chad	4%
Bhutan	2%
Kazakhstan	1%
Fiji	0%
Vanuatu	0%
Panama	0%

Ecological Creditors (2012-2024)

COUNTRIES WITH BIOCAPACITY DEFICIT

PERCENTAGE THAT ECOLOGICAL FOOTPRINT EXCEEDS BIOCAPACITY

Singapore	16,000%
Réunion	1,900%
Israel	1,700%
Cyprus	1,100%
Lebanon	1,100%
Jordan	890%
Luxembourg	840%
Korea, Republic of	740%
Japan	600%
Iraq	560%
Belgium	530%

COUNTRIES WITH BIOCAPACITY DEFICIT

PERCENTAGE THAT ECOLOGICAL FOOTPRINT EXCEEDS BIOCAPACITY

Laos	-1%
Seychelles	-1%
Sudan	-1%
Romania	-13%
Lithuania	-14%
Sierra Leone	-15%
Tanzania	-16%
Bulgaria	-18%
Chile	-20%
Grenada	-21%

Qatar	-1,100%
Barbados	-1,200%
Kiribati	-1,300%
Bahrain	-1,400%
United Arab Emirates	-1,500%
Israel	-1,600%
St. Kitts and Nevis	-1,800%
Reunion	-3,200%
Singapore	-6,100%
Nauru	-46,000%

EF_C

=

 EF_P

+

 EF_I

-

 EF_E

)

Ecological Footprint of Consumption

The Ecological Footprint of consumption indicates the consumption of biocapacity by a country's inhabitants.

In order to assess the total domestic demand for resources and ecological services of a population, we use the Ecological Footprint of consumption (EF_C). EF_C accounts for both the export of national resources and ecological services for use in other countries, and the import of resources and ecological services for domestic consumption.

EF_C is most amenable to change by individuals through changes in their consumption behavior.

Ecological Footprint of Production

The Ecological Footprint of production indicates the consumption of biocapacity resulting from production processes within a given geographic area, such as a country or region.

It is the sum of all the bioproductive areas within a country necessary for supporting the actual harvest of primary products (cropland, grazing land, forestland and fishing grounds), the country's built-up area (roads, factories, cities), and the area needed to absorb all fossil fuel carbon emissions generated within the country.

This measure mirrors the gross domestic product (GDP), which represents the sum of the values of all goods and services produced within a country's borders.

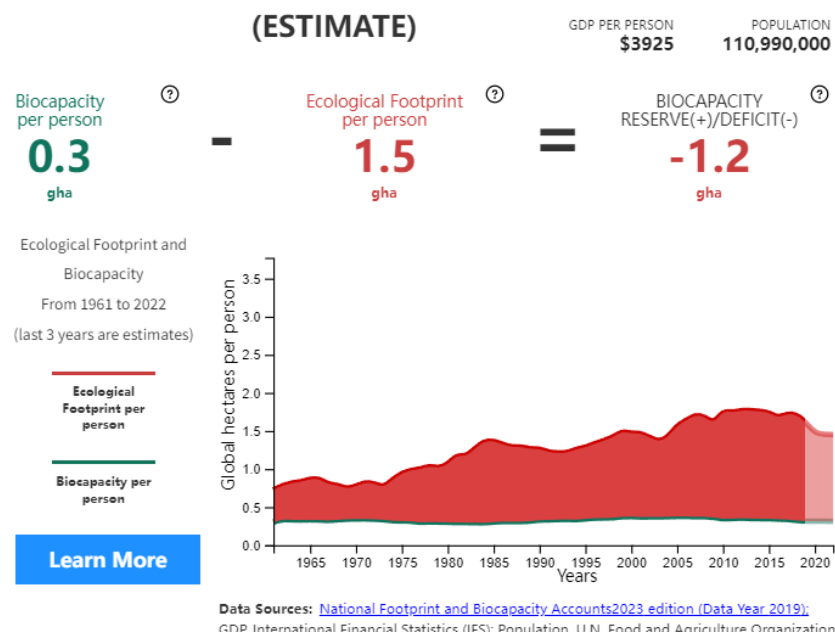
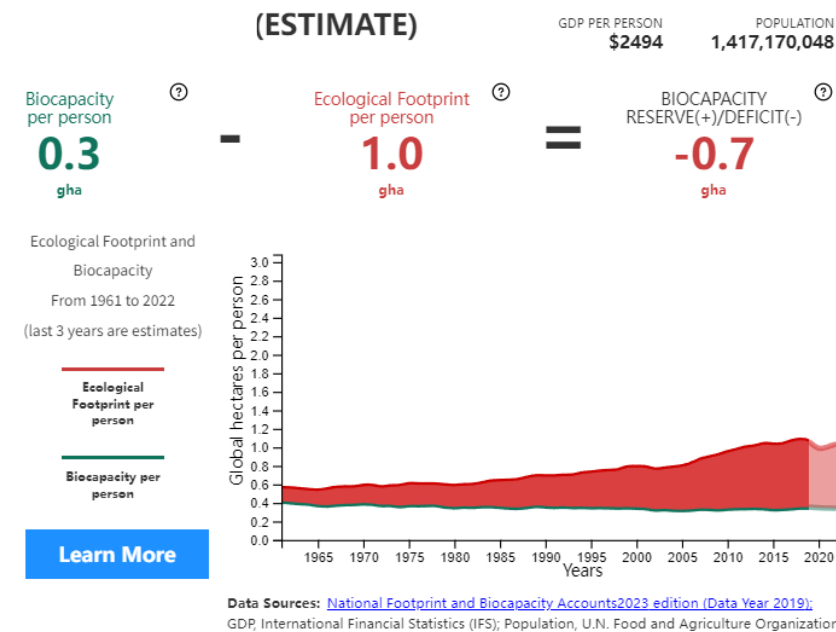
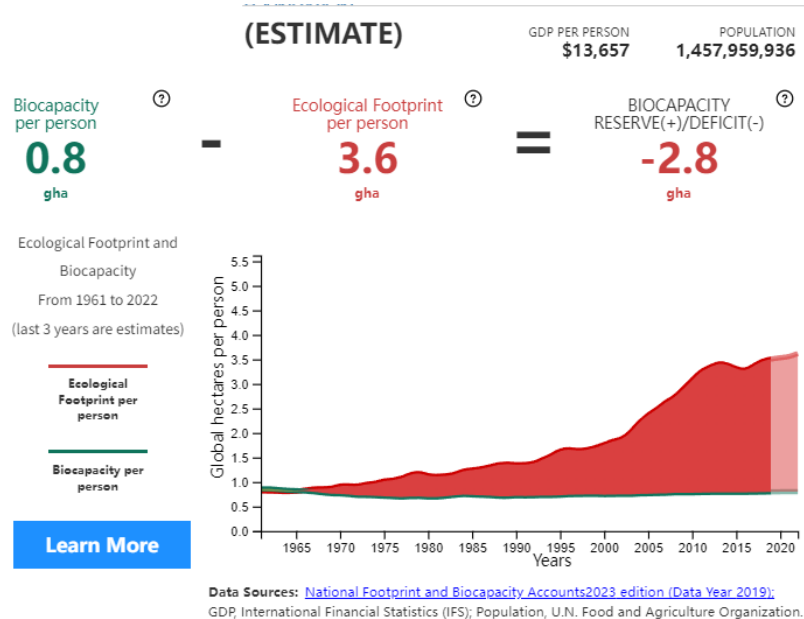
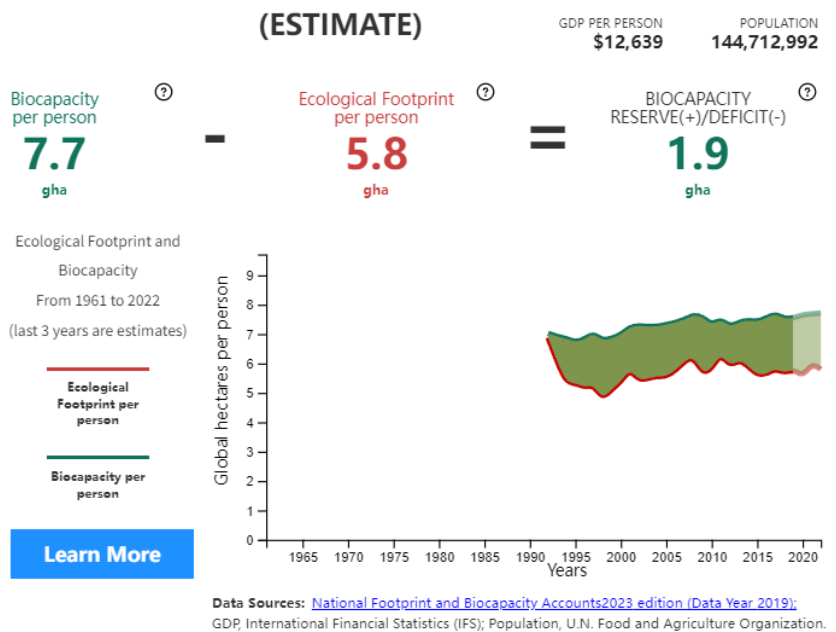
Net Ecological Footprint of Trade

The Ecological Footprint of imports and exports indicate the use of biocapacity within international trade.

Embedded in trade between countries is a use of biocapacity, the net Ecological Footprint of trade (the Ecological Footprint of imports minus the Ecological Footprint of exports). If the Ecological Footprint embodied in exports is higher than that of imports, then a country is a net exporter of renewable resources and ecological services.

Conversely, a country whose Footprint of imports is higher than that embodied in exports depends on the renewable resources and ecological services generated by ecological assets from outside its geographical boundaries.

Comparing national footprints: Russia, India, China, Egypt



X

WORLD (1970)

GDP PER PERSON

-

POPULATION

3,695,389,952

Biocapacity
per person

?

2.7

gha

Ecological Footprint
per person

?

2.7

gha

BIOCAPACITY
RESERVE(+)/DEFICIT(-)

?

0.0

gha

Ecological Footprint and

Biocapacity

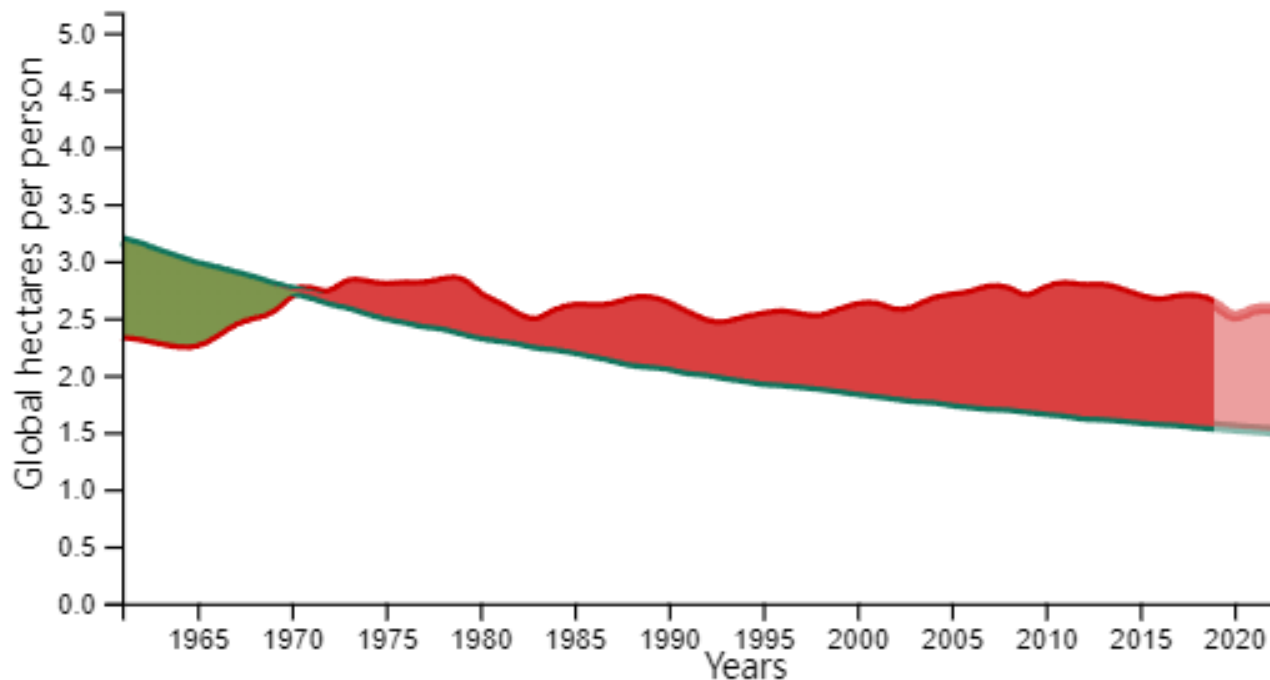
From 1961 to 2022

(last 3 years are estimates)

Ecological
Footprint per
person

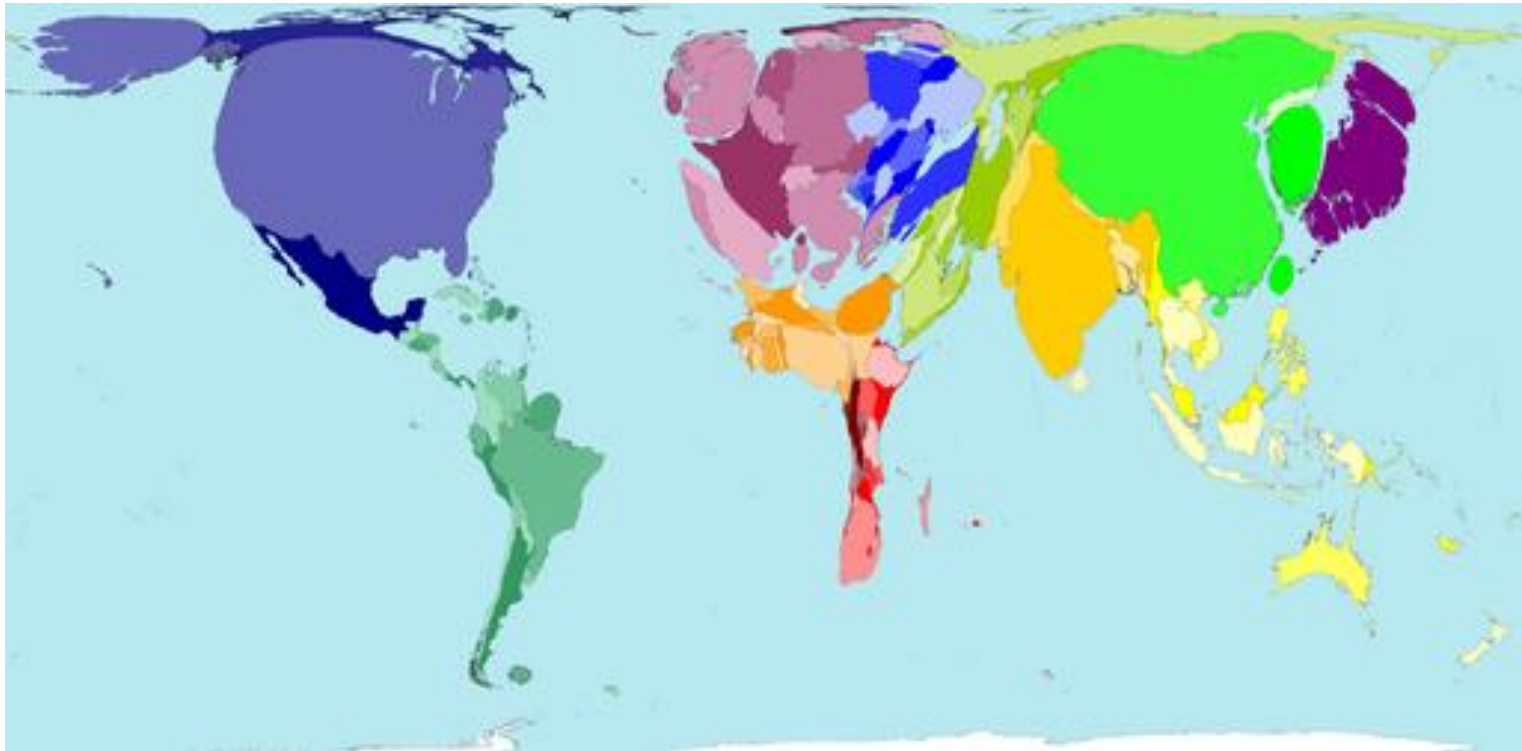
Biocapacity per
person

Learn More



Data Sources: [National Footprint and Biocapacity Accounts 2023 edition \(Data Year 2019\)](#); GDP, International Financial Statistics (IFS); Population, U.N. Food and Agriculture Organization.

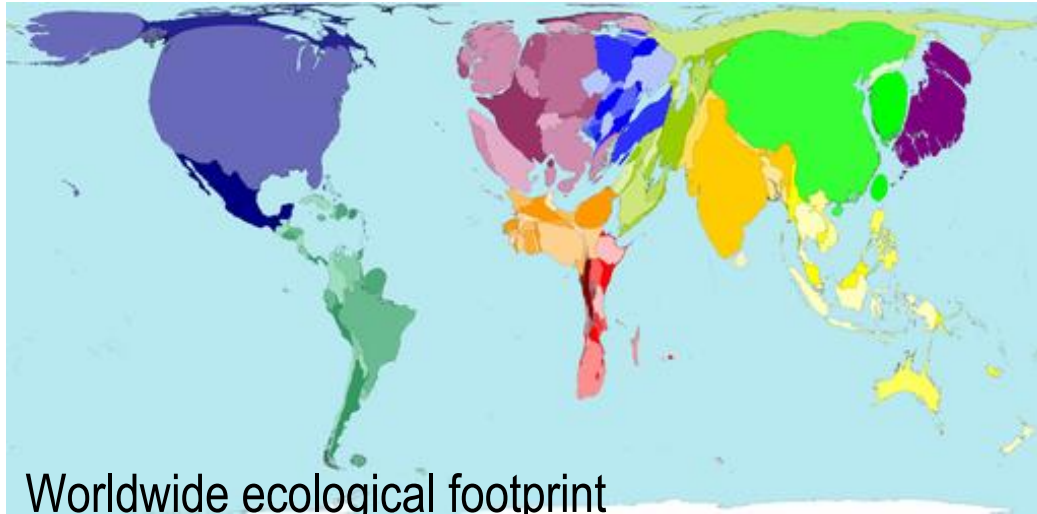
Worldwide ecological footprint



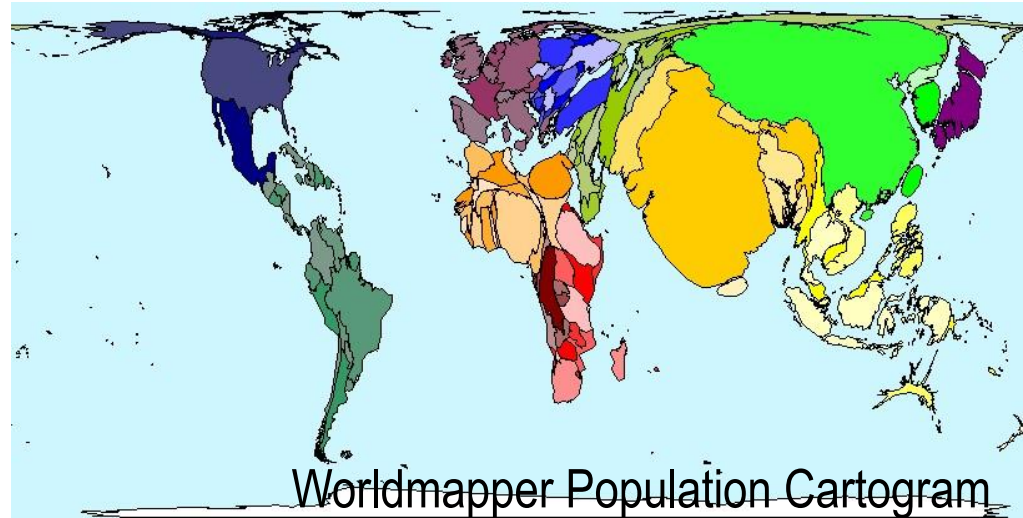
- Territory size shows the proportion of the worldwide ecological footprint which is made there.
- **This includes the consumption of food, fuel, wood, and fibres. Pollution, such as carbon dioxide emissions, is also counted as part of the footprint**

Source: <http://www.worldmapper.org/>

Worldwide ecological footprint VS Population



Worldwide ecological footprint



Worldmapper Population Cartogram

Source: <http://www.worldmapper.org/>

- Ecological Footprint: is it a SCIENTIFIC CONCEPT or PSEUDO-CONCEPT?
- *The clue is in its methodology*
- [For more information see:
https://journals.plos.org/plosbiology/article?id=10
.1371/journal.pbio.1001700](https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001700)

Formal Comment

The Ecological Footprint Remains a Misleading Metric of Global Sustainability

Linus Blomqvist^{1*}, Barry W. Brook², Erle C. Ellis³, Peter M. Kareiva⁴, Ted Nordhaus¹, Michael Shellenberger¹

1 Breakthrough Institute, Oakland, California, United States of America, **2** The Environment Institute and School of Earth and Environmental Sciences, The University of Adelaide, Adelaide, South Australia, Australia, **3** Department of Geography and Environmental Systems, University of Maryland Baltimore County, Baltimore, Maryland, United States of America, **4** The Nature Conservancy, Seattle, Washington, United States of America

The Formal Comment by Rees and Wackernagel [1] raises our concern that this exchange will confuse readers. For this reason, we aim to emphasize a few key points that we believe cannot be disputed. First, the entire global ecological overshoot (footprint of consumption in excess of biocapacity) results from carbon dioxide emissions reframed as the hypothetical forest area needed to offset these emissions. Plantations of fast-growing trees would, by-the-numbers, eliminate the global overshoot. Second, the ecological footprint's (EF) assessments for cropland, grazing land, and built-up land are unable to capture degradation or unsustainable use of any kind. Finally, we conclude from the above and the points made in our original paper [2] that we would be better off discussing greenhouse gas emissions directly in terms of tons of CO₂-equivalent (and thus focus on solutions to emissions), and developing a more ecological and ecosystem process framework to capture the impacts humans currently have on the planet's natural systems. The appropriate scale for these indicators will, in many cases, be local and regional. At this level, the EF is a measure of net exports or imports of biomass and carbon-absorptive capacity [3]. Any city, for example, would show a deficit, as it relies on food and materials from outside. That in itself, as Robert Costanza has

noted, "tells us little if anything about the sustainability of this input [from outside the region] over time" [4].

Author Contributions

The author(s) have made the following declarations about their contributions: Wrote the paper: PK LB EE BB TN MS.

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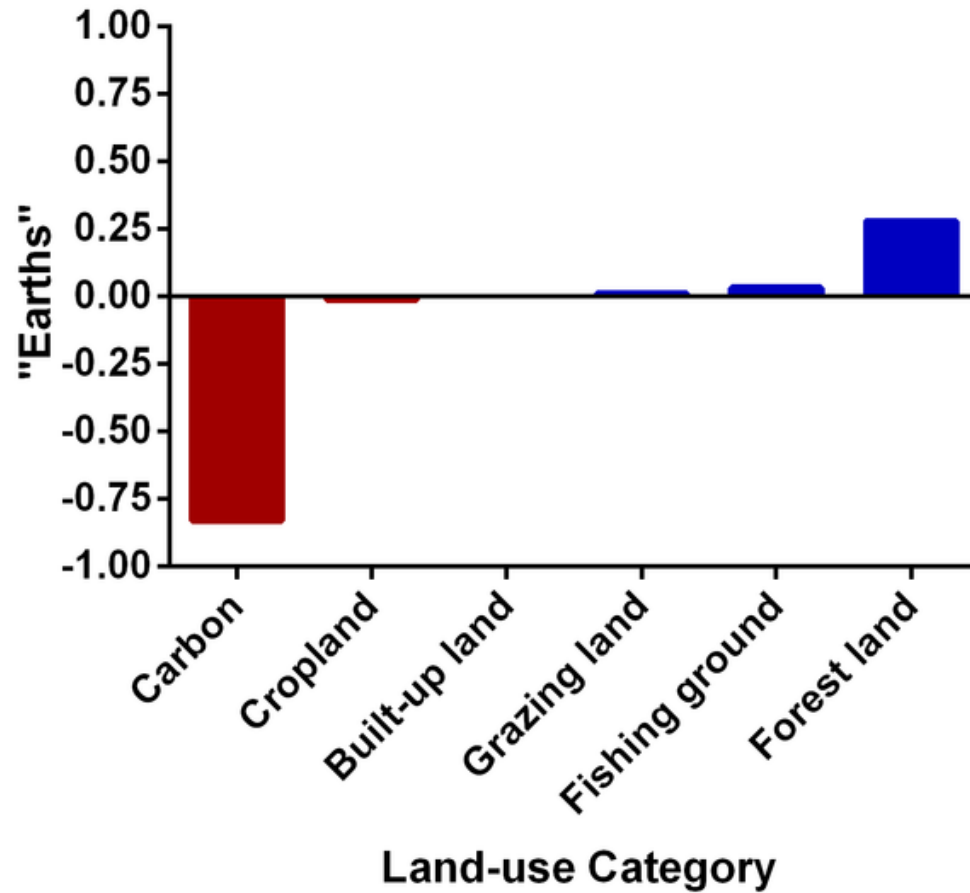
* E-mail: linus@thebreakthrough.org

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Figure 1. Net biocapacity (biocapacity minus footprint of consumption) by land-use category, shown as a fraction of total global biocapacity (one "Earth") in 2008.



Blomqvist L, Brook BW, Ellis EC, Kareiva PM, Nordhaus T, et al. (2013) Does the Shoe Fit? Real versus Imagined Ecological Footprints. PLOS Biology 11(11): e1001700. <https://doi.org/10.1371/journal.pbio.1001700>
<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001700>

Pre-Reading and Food-for-Thought Assignment

3. Calculate your **ecological (CO₂) footprint** for the last 1 year using the following websites:

- <http://www.carbonfootprint.com/calculator.aspx> (calculator 1)
- <http://www.carbonify.com/carbon-calculator.htm> (calculator 2)

You can also look for any another footprint calculator and use it too. Take notes of your results. How can you compare calculators used?

- <http://www.carbonfootprint.com/calculator.aspx> (calculator 1)



- <http://www.carbonify.com/carbon-calculator.htm> (calculator 2)

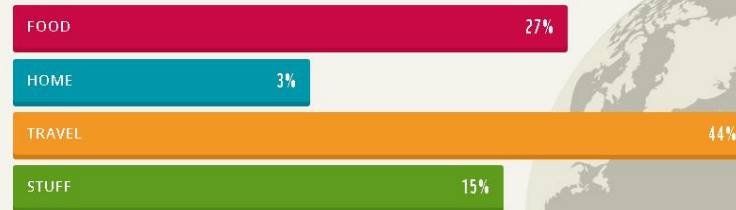


Ecological Footprint Calculations



YOUR LIVING HABITS MAKE UP YOUR FOOTPRINT

We calculate your footprint score using the answers you provide to our 5 minute questionnaire



1. Your results in comparison with the country's average
2. Spheres of life mostly contributing to the CO2 footprint
3. What else could be included into CO2 footprint calculators?
4. Ways of minimizing CO2 footprint

Your results in comparison with the country's average

Welcome

House

Flights

Car

Motorbike

Bus & Rail

Secondary

Results



Welcome to the web's leading carbon footprint calculator

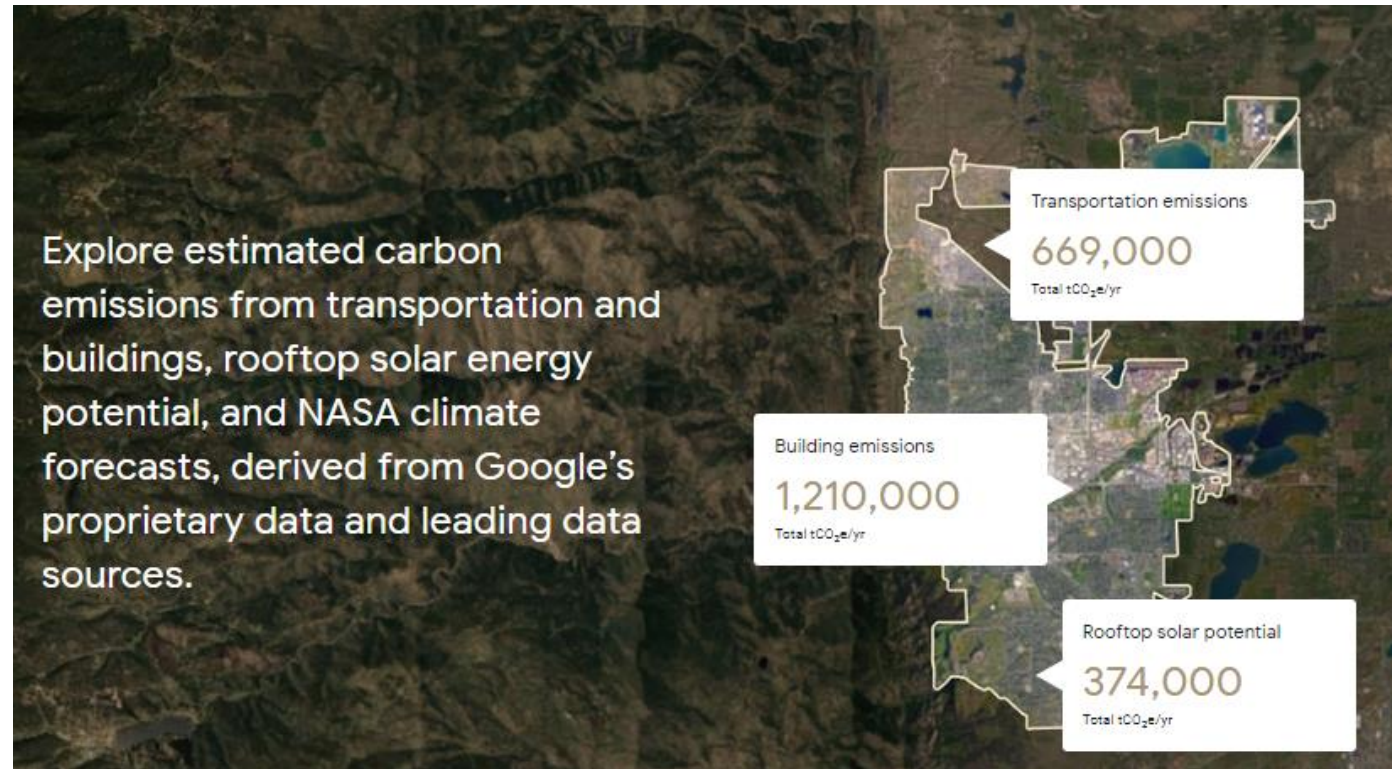


- <http://www.carbonfootprint.com/calculator.aspx>
- Your footprint is _____ tonnes per year
- The average footprint for people in Russian Federation is
- The average footprint for people in China is
- The average footprint for people in India is
- The average footprint for people in Egypt is
- The average for the European Union is about
- The average worldwide carbon footprint is about



Google Environmental Insights Explorer

- Calculating a city's carbon footprint
- The Environmental Insights Explorer calculates emissions from buildings, car trips, and public transport to illustrate how a city's sustainability efforts are faring.



<https://insights.sustainability.google/>

<https://www.fastcompany.com/90233731/a-new-use-for-google-maps-calculating-a-citys-carbon-footprint>