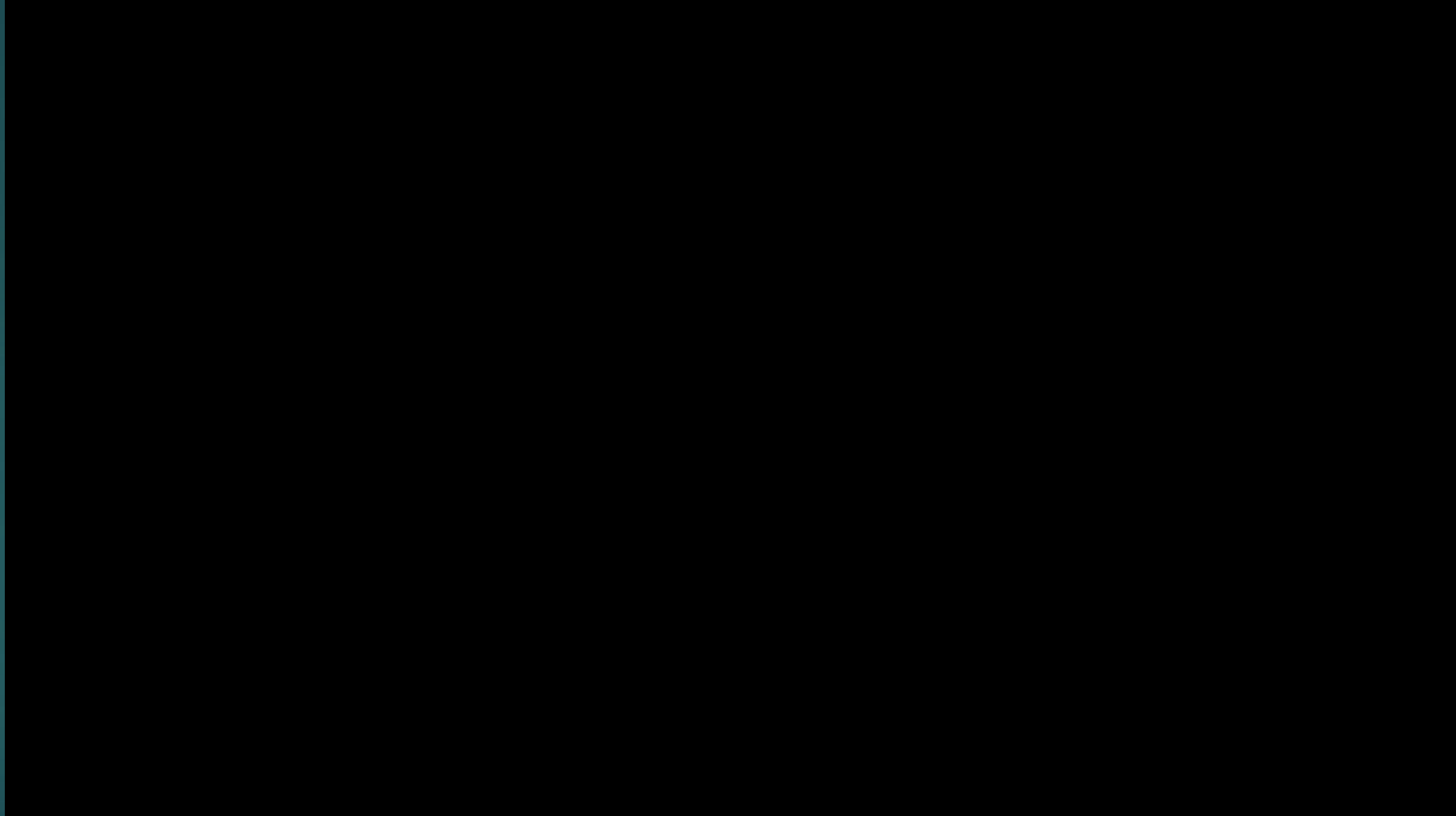


This is the PDF version of an animated slide presentation

SOME FIGURES MIGHT LOOK ODD AND VIDEOS WILL NOT WORK
TO OBTAIN THE FULL MATERIAL, PLEASE CONTACT ME

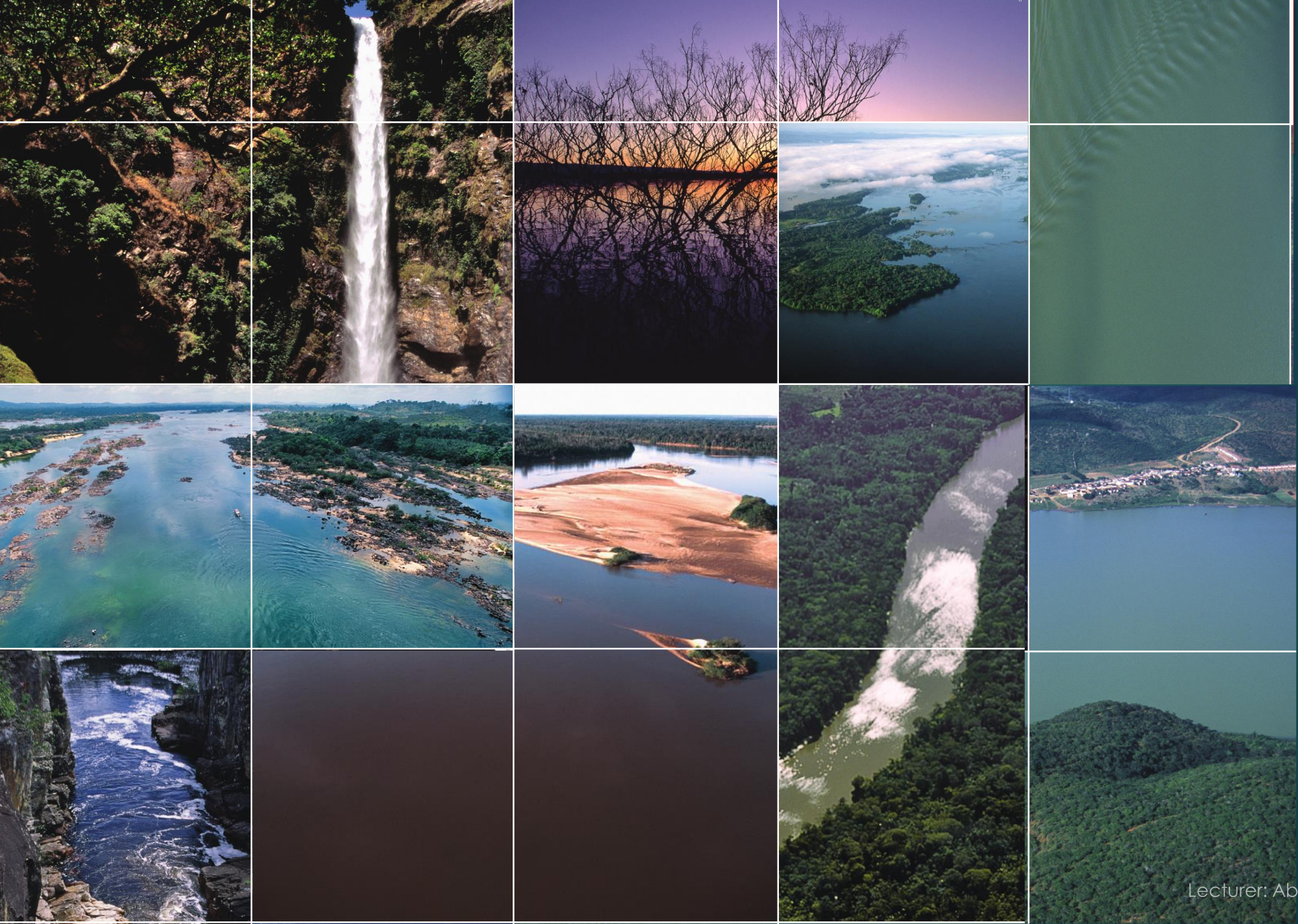
Introduction to Global Change



<https://www.youtube.com/watch?v=ifrHogDujXw>

Introduction to Global Change & Pollution Science course

- Group activity:** Let's introduce ourselves
- My Name
 - My background
 - What I expect from this course











Professional Background: Water Pollution & Ecotoxicology

BSc: Oceanography
FURG- Brazil | 2006- 2010

MSc: Biological Oceanography
FURG- Brazil & McMaster- Canada | 2010- 2012

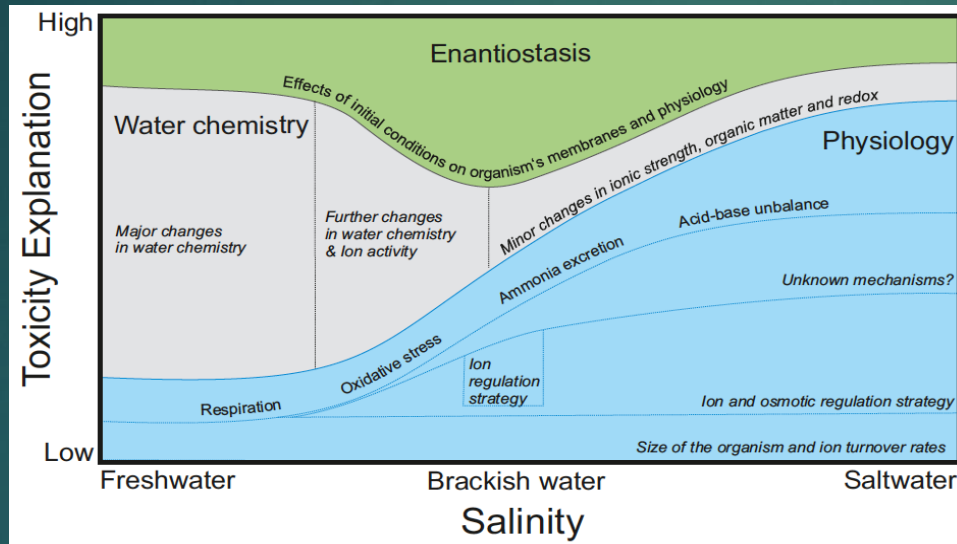
PhD: SMART- River Science
FUB- Germany, QMUL- UK, UniTN- Italy, Deltares –
Netherlands | 2013- 2016

Postdoctoral Researcher
FUB- Germany | 2016- Current



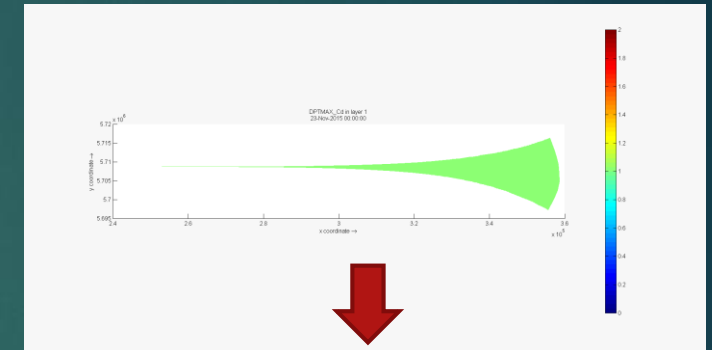
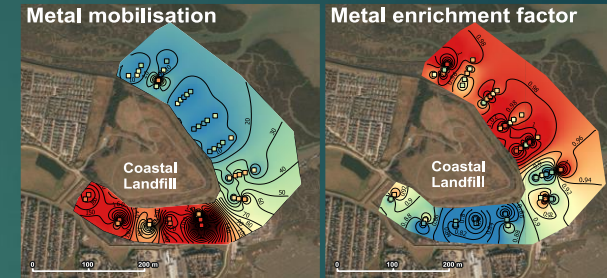
Lecturer: Abel Machado

From a water researcher to Rillig Lab



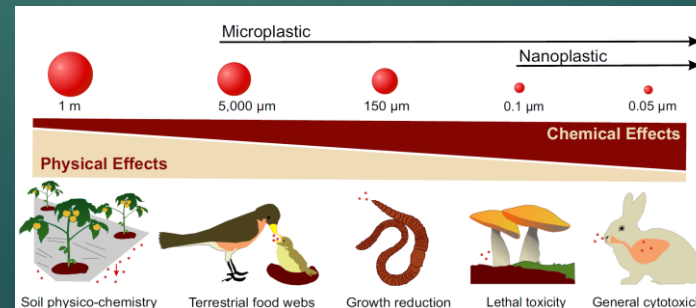
(STOTEN 2016)

Metal fate & effects



Rillig Lab

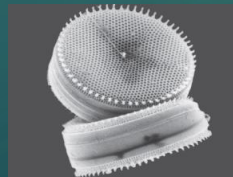
Soil & Microplastics



(Aqua. tox. 2013a)
(Aqua. tox. 2013b)
(Mar. Env. Res. 2014)



(Ecotoxicology 2014)
(STOTEN 2015)



(PANAMJAS 2014)



(ES&T 2016)



Lecturer: Abel Machado

The background of the slide features a dramatic sunset sky with vibrant orange and red hues. In the foreground, several silhouettes are visible: a hiker with a walking stick on a ridge, a person walking on a lower slope, a tree on the left, and a city skyline on the right.

Anthropocene

Global change & Pollution science

Freie Universität Berlin, October 1st - 11th 2018

Altensteinstr 6, room 1

THE MAIN EVALUATION CRITERIA TO SUCCESSFULLY CONCLUDE THIS COURSE IS TO BE ABLE TO:

Critically rethink the **diverse range of known impacts** that human activities caused **on the environmental health** and elaborate on whether microplastic contamination should be regulated or not.

Introduction to Global Change

WHAT IS IT ABOUT?

Skills you gain:

- 1- Understand the concept of Global Change
- 2- Learn about the causes of environmental change
- 3- Get familiar with the physical signs of change
- 4- Critically evaluate the consequences of changes

References:



Global Footprint Network
Advancing the Science of Sustainability

OUR WORK TOOLS & RESOURCES ABOUT US NEWS

Ecological Footprint

The Ecological Footprint is the only metric that measures how much nature we have and how much nature we use. The Footprint helps:

- COUNTRIES** improve sustainability and well-being
- LOCAL LEADERS** optimize public project investments
- INDIVIDUALS** understand their impact on the planet



Global Change Biology

WILEY



GlobalChange.gov
U.S. Global Change Research Program

Our Changing Planet

USGCRP's annual report looks back (and ahead) at building the knowledge base needed to respond to global change.

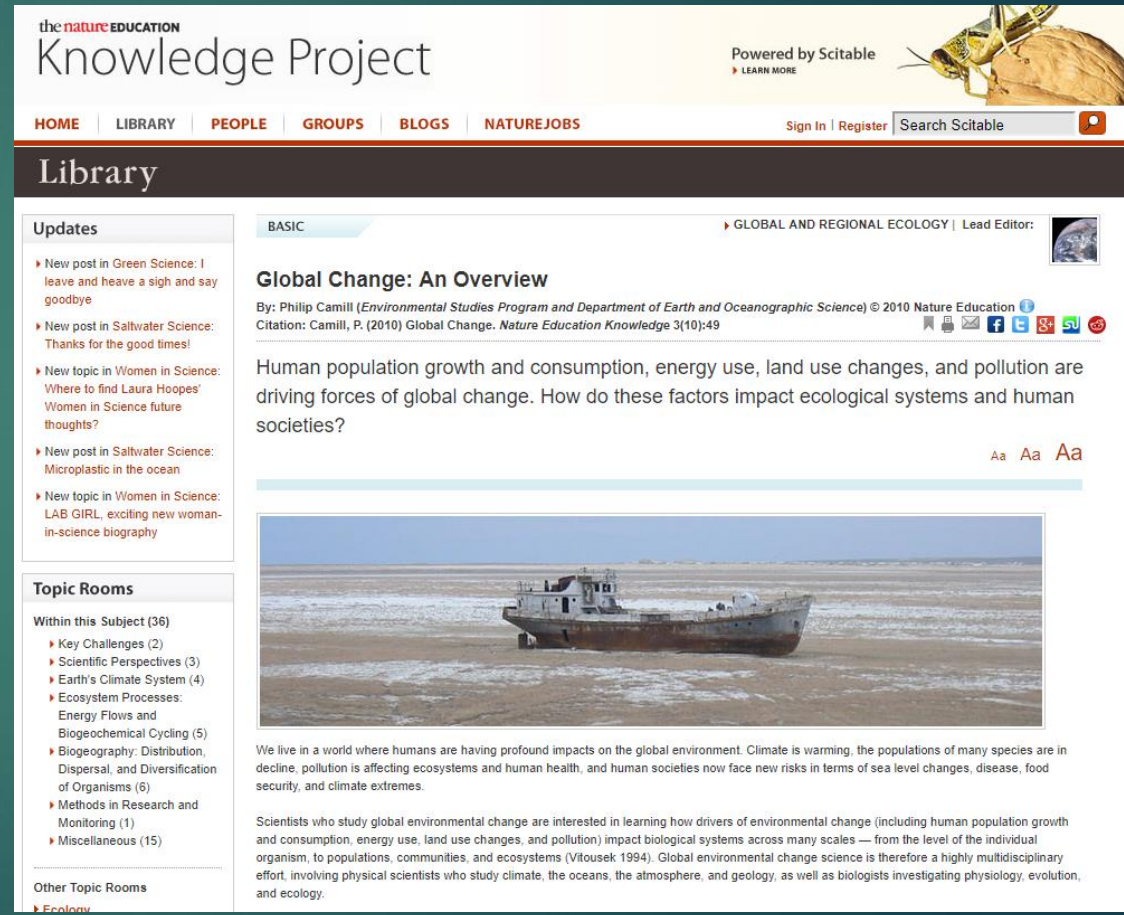
READ THE REPORT BROWSE ALL REPORTS

Understand Climate Change | Explore Regions & Topics | Browse & Find Resources, Lists, & Multimedia | Follow News & Updates | Engage Conferences & Participate

GLOBAL IGBP CHANGE
International Geosphere-Biosphere Programme

ESSP DIVERSITAS IGBP IHP WCRP

Homepage About IGBP IGBP Science Earth System Science Partnership Resource Room Contacts Join the IGBP network




the nature EDUCATION Knowledge Project

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Library


GLOBAL AND REGIONAL ECOLOGY | Lead Editor: 

Global Change: An Overview

By: Philip Camill (*Environmental Studies Program and Department of Earth and Oceanographic Science*) © 2010 Nature Education
Citation: Camill, P. (2010) Global Change. *Nature Education Knowledge* 3(10):49

Human population growth and consumption, energy use, land use changes, and pollution are driving forces of global change. How do these factors impact ecological systems and human societies?

Aa Aa Aa



We live in a world where humans are having profound impacts on the global environment. Climate is warming, the populations of many species are in decline, pollution is affecting ecosystems and human health, and human societies now face new risks in terms of sea level changes, disease, food security, and climate extremes.

Scientists who study global environmental change are interested in learning how drivers of environmental change (including human population growth and consumption, energy use, land use changes, and pollution) impact biological systems across many scales — from the level of the individual organism, to populations, communities, and ecosystems (Vitousek 1994). Global environmental change science is therefore a highly multidisciplinary effort, involving physical scientists who study climate, the oceans, the atmosphere, and geology, as well as biologists investigating physiology, evolution, and ecology.

Updates

- New post in Green Science: I leave and heave a sigh and say goodbye
- New post in Saltwater Science: Thanks for the good times!
- New topic in Women in Science: Where to find Laura Hoopes' Women in Science future thoughts?
- New post in Saltwater Science: Microplastic in the ocean
- New topic in Women in Science: LAB GIRL, exciting new woman-in-science biography

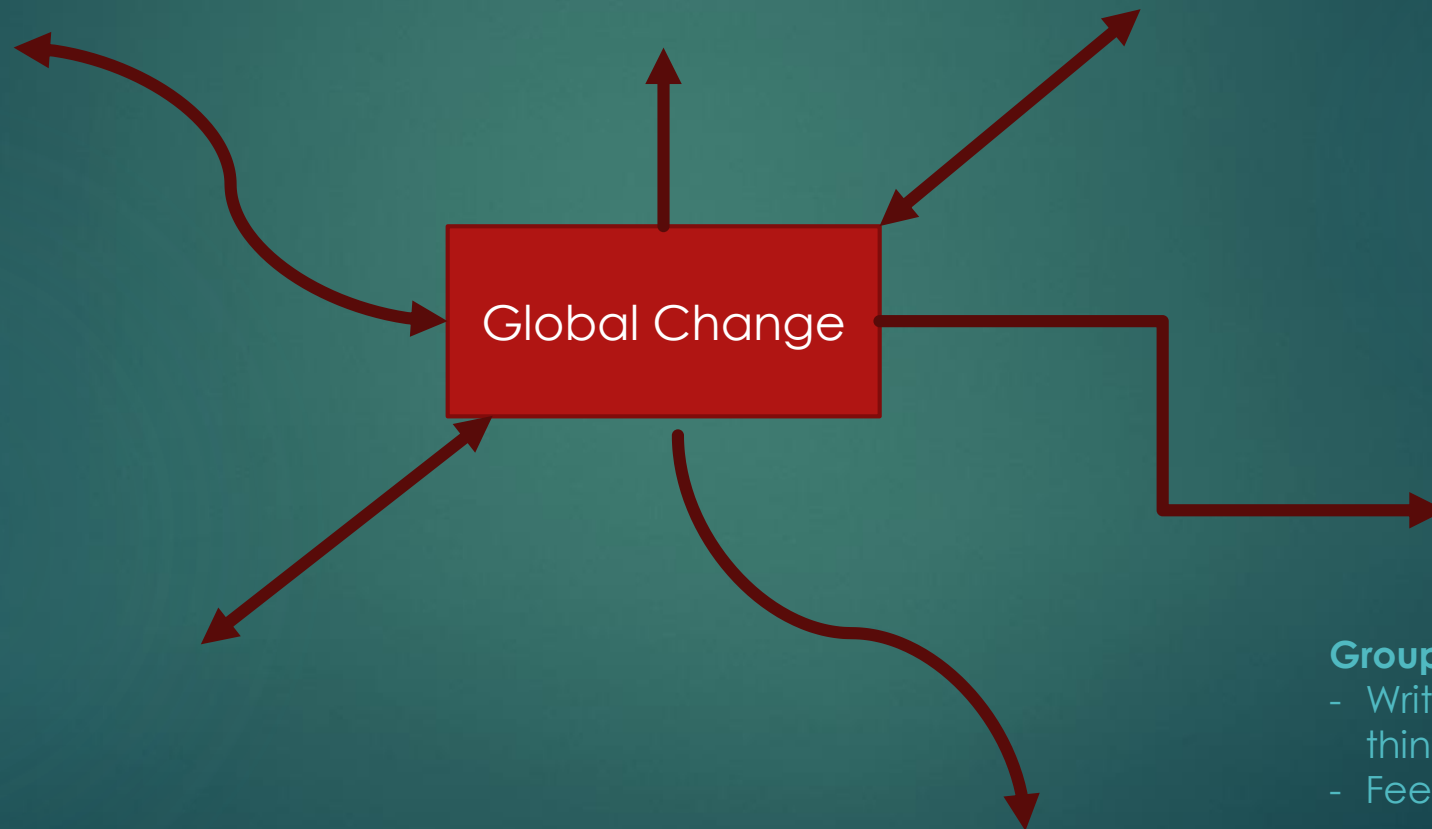
Topic Rooms

Within this Subject (36)

- Key Challenges (2)
- Scientific Perspectives (3)
- Earth's Climate System (4)
- Ecosystem Processes: Energy Flows and Biogeochemical Cycling (5)
- Biogeography: Distribution, Dispersal, and Diversification of Organisms (6)
- Methods in Research and Monitoring (1)
- Miscellaneous (15)

Other Topic Rooms
Ecology

STUDENT ACTIVITY: LET'S BUILD OUR GLOBAL CHANGE MIND MAP



Pollution Science

Group activity:

- Write any words or concepts you think that could relate to the topic
- Feel free to use connectors or not

What is Global Change?

The planetary-scale changes in the Earth system caused by human activities



theconversation.com/what-is-global-change-6447

It includes (but not limited) to processes on human and wildlife populations, climate, economy, natural resources, energy dissipation, transport, communication, land use & cover, globalization, atmosphere, ocean, biogeochemical cycles (e.g. water, C, N, P, S), sea ice, sea-level, food webs, biodiversity, fisheries, etc.

Anthropocene: The era of Global Changes

Shapes of our planet

Flows in our planet

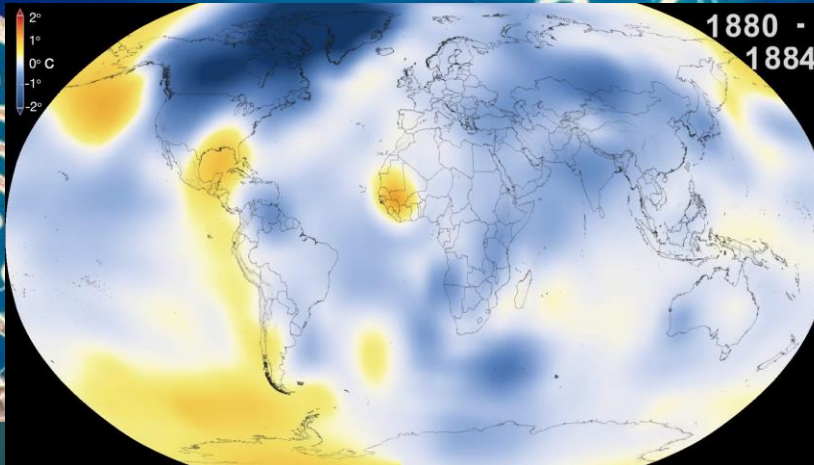


Dubai Artificial Coastal Islands



Honghe hani (Rice terraces, China)

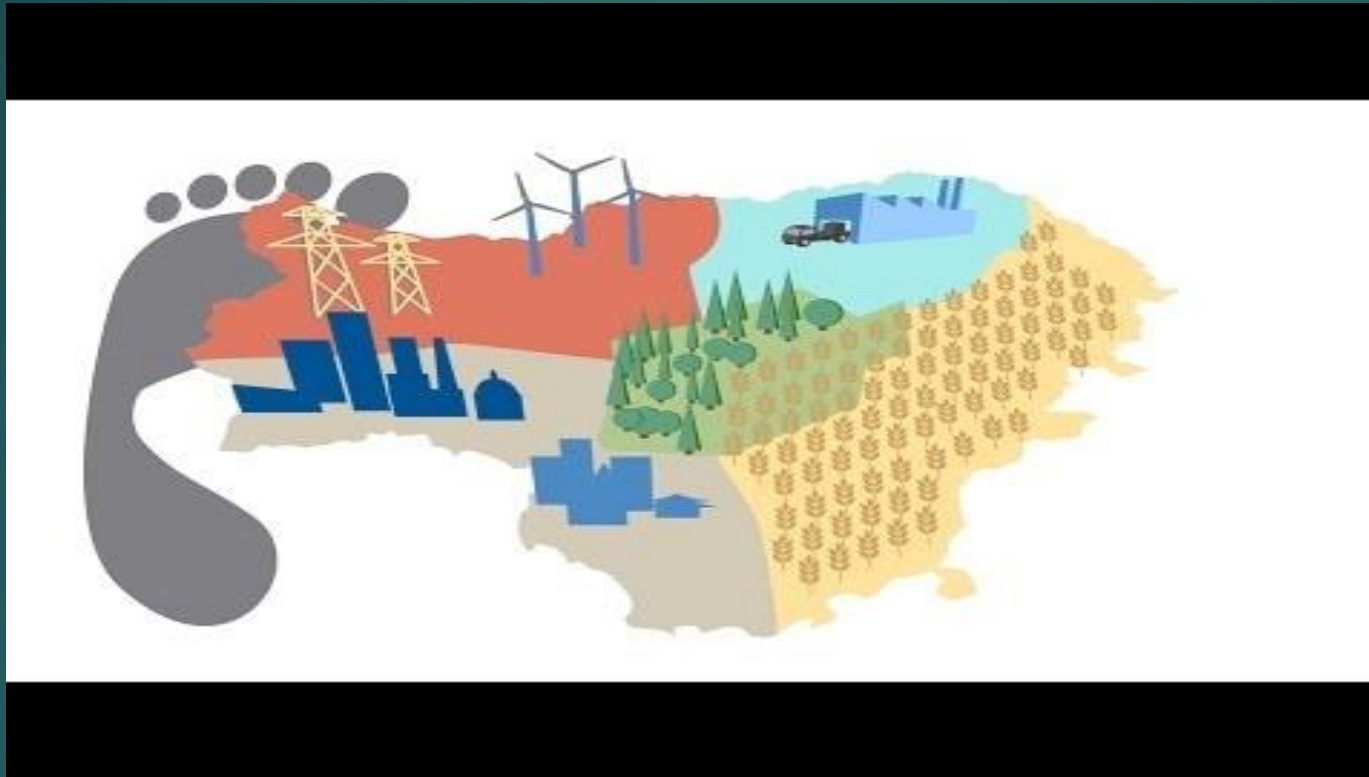
Function of our planet



NASA: Temperature Anomalies



What are the causes of Global Change?



https://www.youtube.com/watch?v=_T5M3MiPfw4

Results: We need annual planetary resources to live!

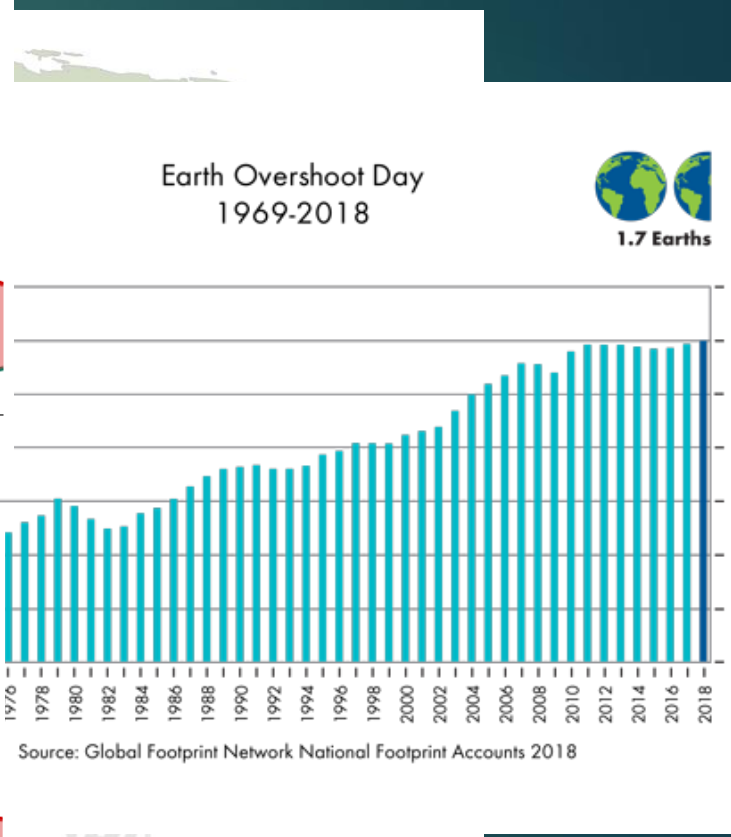
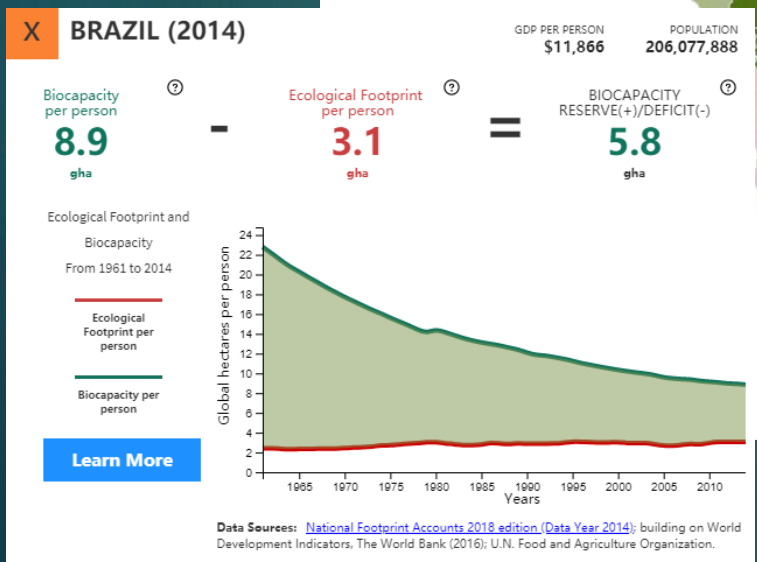
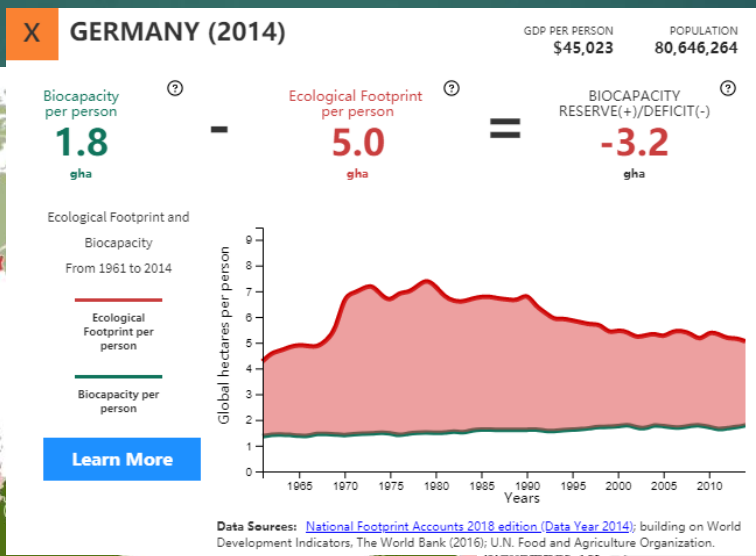
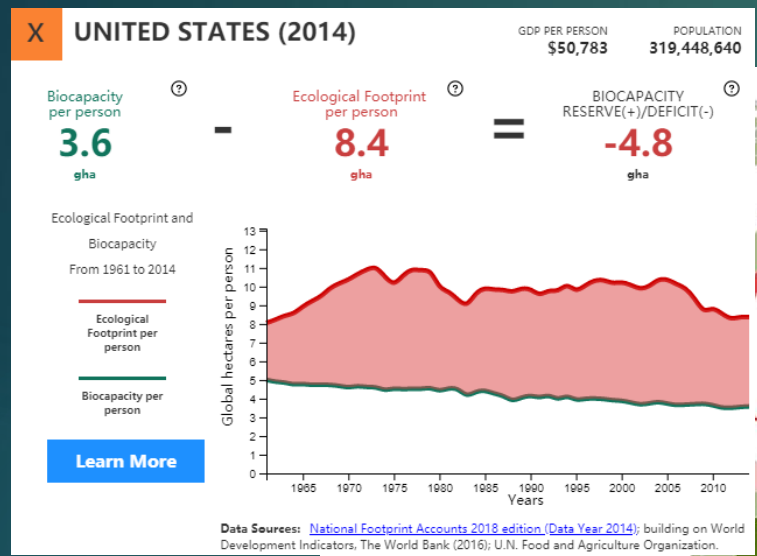


Group activity:

- Go to: www.footprintnetwork.org
- Calculate your ecological footprint
- Write the number in a paper (no name)
- We will compute our average ecological footprint

Tip: Germany has an average of 36 % of energy annually from renewable sources

What are the causes of Global Change?



What are the causes of Global Change

Population growth & Consumption



www.nature.com

- Population size
- Affluence
- Culture

Energy use



<http://www.freepressjournal.in>

- Fossil fuels ~ 85 %
- 8.5 billion T of C year⁻¹
- Affluence & Culture

Land use



www.pinterest.ca

- 13 Mi ha year⁻¹
- 8.5 billion T of C year⁻¹
- Affluence & Culture

Pollution



www.straitstimes.com

- Water, Air, Soil
- $F(x) \sim$ Economic growth
- Affluence & Culture

Global change scientists study how drivers of environmental change impact biological systems across many scales - from the level of the individual organism, to populations, communities, and ecosystems. It is a highly multidisciplinary effort, involving physical scientists who study climate, the oceans, the atmosphere, and geology, as well as biologists investigating physiology, evolution, and ecology.

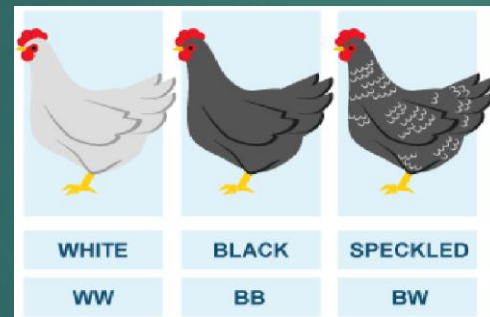
What are the consequences of Global Change to Biosphere?

Population Declines & Extinction



www.nature.com

Phenology Changes & Range Shifts



<http://www.bbc.co.uk>

Community Responses



www.estadao.com.br

Ecosystem Responses



www.youtube.com

As many as 2000 species may have gone extinct, representing 20% of all known bird species, and an extinction rate 100–1000 times greater than natural rate of species loss over geological history. As a result of industrialized fishing, the populations of many seafood species, including marlins, tunas, swordfish, codfish, sailfish, and sharks have declined 80-90%, pushed to the brink of extinction over the past half century.

What are the consequences of Global Change to Humans?

Health



medium.com

Natural Disturbances



www.today.com

Food Security



www.pinterest.ca

Peace



youtube.com/watch?v=b6QEDbl5zrg

Global change scientists are interested in understanding several potential impacts of climate warming on human societies, including human health, natural disturbances, food security, and peace.

Summary: Global Change

The planetary-scale changes in the Earth system caused by human activities

Main causes

Population growth & Consumption



www.nature.com

Energy use



<http://www.freepressjournal.in>

Land use



www.pinterest.ca

Pollution



www.straitstimes.com

Biosphere impacts

Population Declines & Extinction



www.nature.com

Phenology Changes & Range Shifts



WHITE	BLACK	SPECKLED
WW	BB	BW

<http://www.bbc.co.uk>

Community Responses



www.estadao.com.br

Ecosystem Responses



www.youtube.com

Human impacts

Health



medium.com

Natural Disturbances



www.today.com

Food Security



www.pinterest.ca

Peace



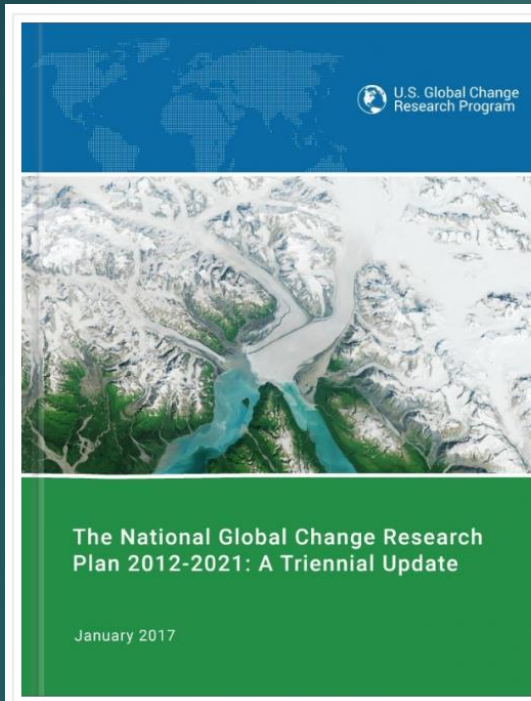
youtube.com/watch?v=b6QEDbl5zrg

Keep calm, we are improving! Check out lecture on Cases of Success.

**Towards a
Pollution-Free
Planet**



STUDENT ACTIVITY: A-B MONOLOGUE



This report was developed by the Strategic Plan Integration and Writing Teams, which report to the Subcommittee on Global Change Research and the National Science and Technology Council's Committee on the Environment, Natural Resources, and Sustainability. This report is published by the National Coordination Office for the U.S. Global Change Research Program. It meets the requirements set forth in the U.S. Global Change Research Act of 1990 (Section 102, P. L. 101-606) to provide a triennial update of the decadal National Global Change Research Plan. It does not express any regulatory policies of the United States or any of its agencies, or make any findings that could serve as predicates for regulatory action.

www.globalchange.gov/browse/reports/national-global-change-research-plan-2012-2021-triennial-update

USING THE CONCEPTS WE DISCUSSED SO FAR, EXPLAIN TO YOUR COLLEAGUE WHAT WAS THE MOST INTERESTING ABOUT THE CONCEPT OF GLOBAL CHANGE THAT YOU LEARNED TODAY. TOMORROW WE WILL REPEAT THE MONOLOGUE, YOU ARE ENCOURAGED TO LEARN SOMETHING ELSE AT HOME

<http://www.futureearth.org/>

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Thanks

SEE YOU LATER FOR OUR INTRODUCTION INTO POLLUTION SCIENCE