

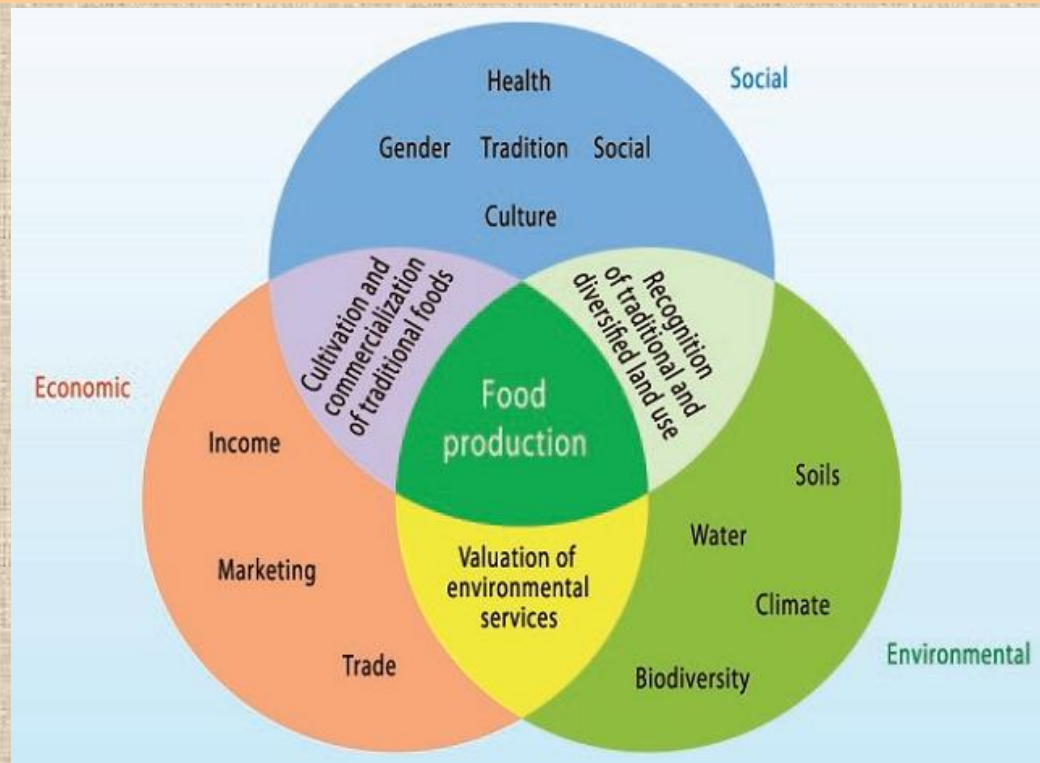
UF/IFAS Extension

The Journey to Sustainability Begins with Education



AGROECOLOGY: THE SCIENCE OF SUSTAINABLE AGRICULTURE & FOOD SYSTEMS

Part Three



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UF/IFAS Extension Sarasota County

Outline

❖ Topics of this course

➤ Part 1

- Introductory Activity
- Definitions/History/Pioneers
- Ecosystem and Agroecosystem Science
- Environmental Agroecology
- Instructor Introduction

➤ Part 2

- Social and Economic Agroecology
- Resilient Food Systems

➤ Part 3

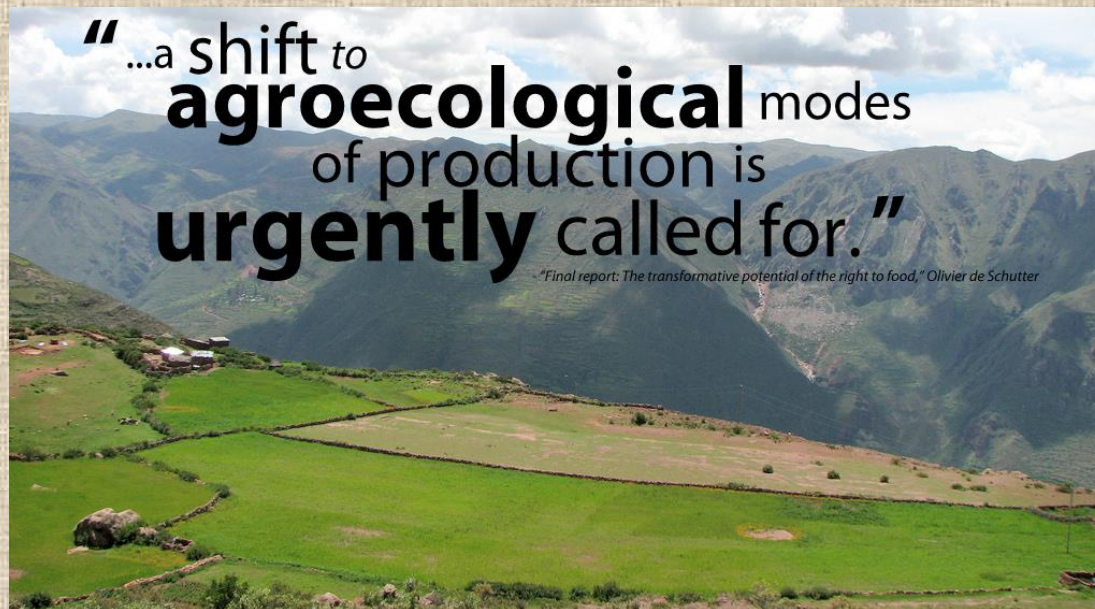
- Agroecology and the Right to Food Report
- Climate Change Resilience

Agroecology and Sustainable Local & Global Food Systems

Reading Take Home Assignment

“Agroecology and the Right to Food”

Report presented at the 16th Session of the United Nations Human Rights Council
March 8, 2011



Participatory Activity (45 min)

❖ World Café Format

- Collaborative
- Respectful

❖ Based on the Reading



Assignment Answer the following:

- What is the status of local & global food systems?
- How are they sustainable or not?
- Who are the stakeholders?
- How will food systems feed a projected world population of 9 billion in 2050?

Agroecology and Climate Change

FOOD, FARMING AND CLIMATE CHANGE- SMALL-SCALE FARMERS AND AGROECOLOGY

Industrial agriculture is a key driver in the generation of greenhouse gases (GHG), accounting for 30-50% of total emissions. Chemical fertilizers, pesticides, heavy machinery, monocultures, land change, deforestation, refrigeration, waste and transportation all contribute to a food system that generates significant emissions and affects global climate change. However, small-scale farmers and pastoralists could sequester a significant amount of CO₂ emissions by switching to widely available and inexpensive organic management practices. In fact, recent studies demonstrate that small-scale farmers already feed the majority of the world with access to less than a quarter of all farmland, while actively sequestering CO₂. Even though small farms are by and large more productive than big farms, we are fast losing small farms in many places, while big farms are getting even bigger and generating more GHG emissions.

Sources: GRAIN, Food First and Rodale Institute

Learn more and take action at: fairworldproject.org

INDUSTRIAL AGRICULTURE AND CLIMATE CHANGE



Agricultural activities are responsible for 11% to 15% of GHG emissions.

Land clearing and deforestation are responsible for 15% to 18% of GHG emissions.



Food processing, packing and transportation are responsible for 15% to 20% of GHG emissions.

Decomposition of food waste is responsible for 3% to 4% of GHG emissions.



SMALL-SCALE FARMERS COOL THE PLANET AND FEED THE WORLD



Small-scale farmers feed the majority of the world with access to less than a quarter of all farmland.

Small-scale, integrated organic farms are more resilient in the face of intensifying climate change events, like hurricanes, than are plantations and monoculture operations.

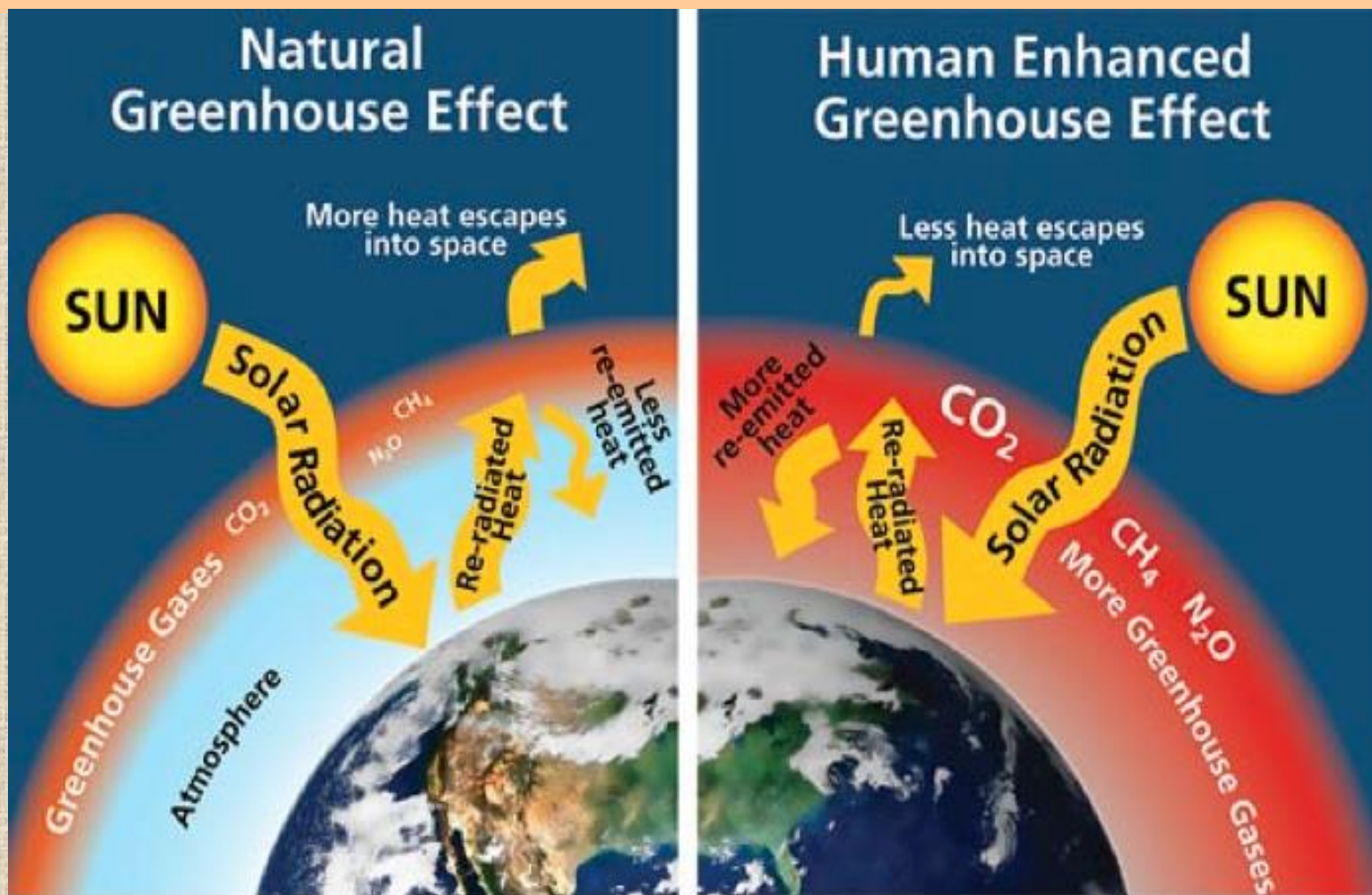


Regenerative organic farming could sequester more than 100% of current annual CO₂ emissions via a switch to widely available and inexpensive organic management practices.

The UN Special Rapporteur on the Right to Food estimates that small farms produce up to 80% of the food in the non-industrialized world.



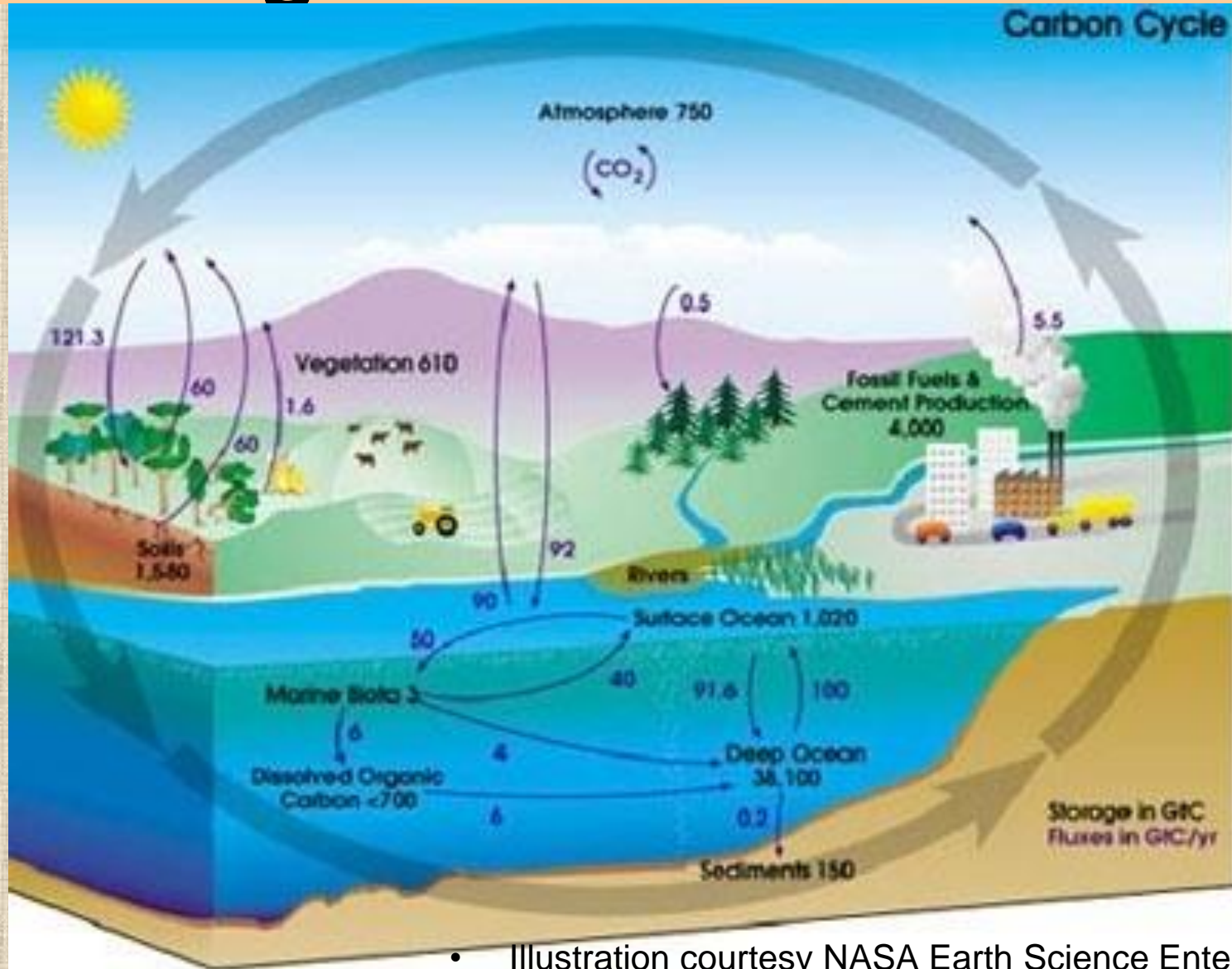
Climate Change Science



Watch the video 'Neil DeGrasse Tyson's Simple Explanation of Climate Change' – see <https://www.youtube.com/watch?v=6VUPIX7yEOM>

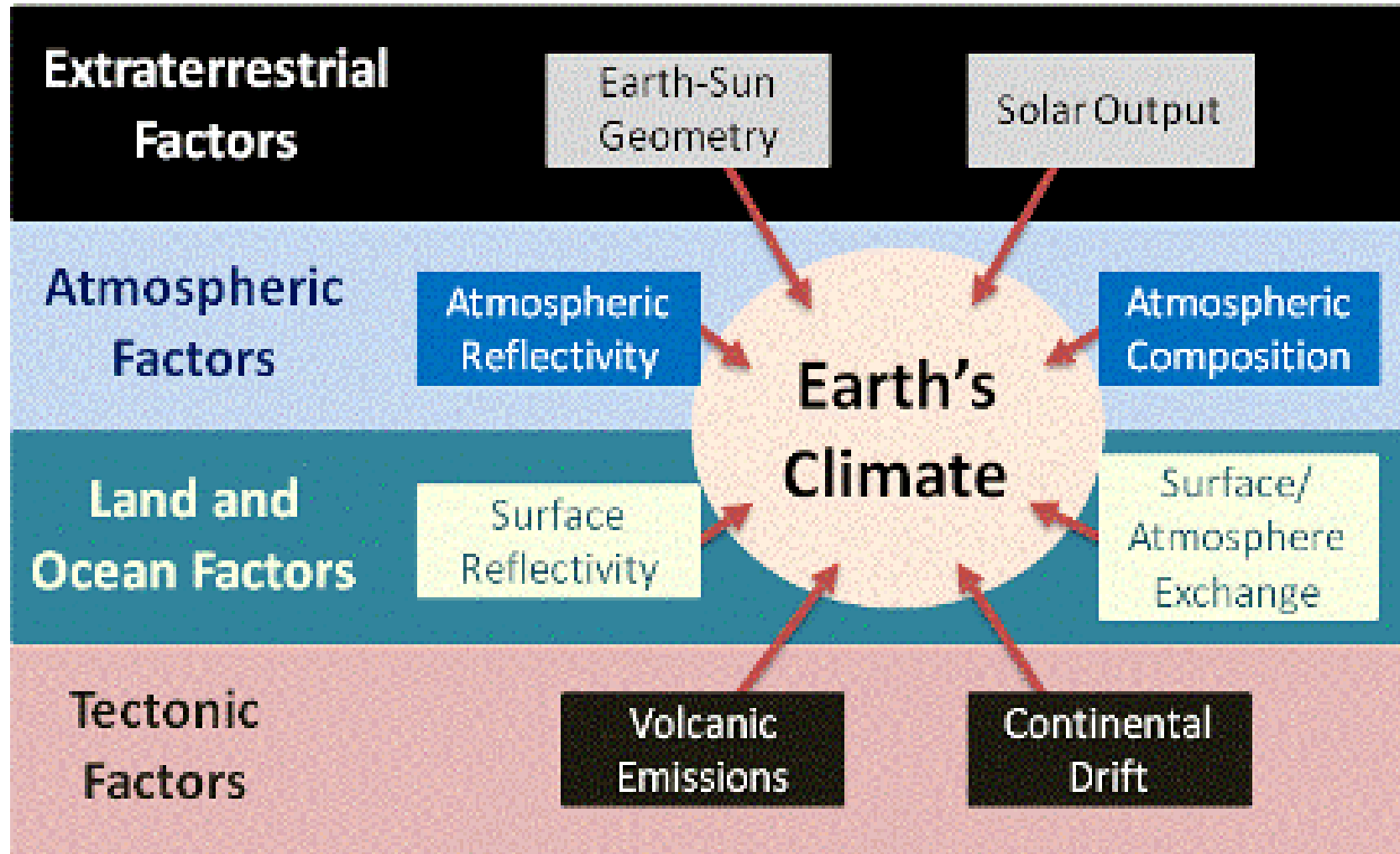


Climate Change Science: Tracking the Global Carbon Cycle



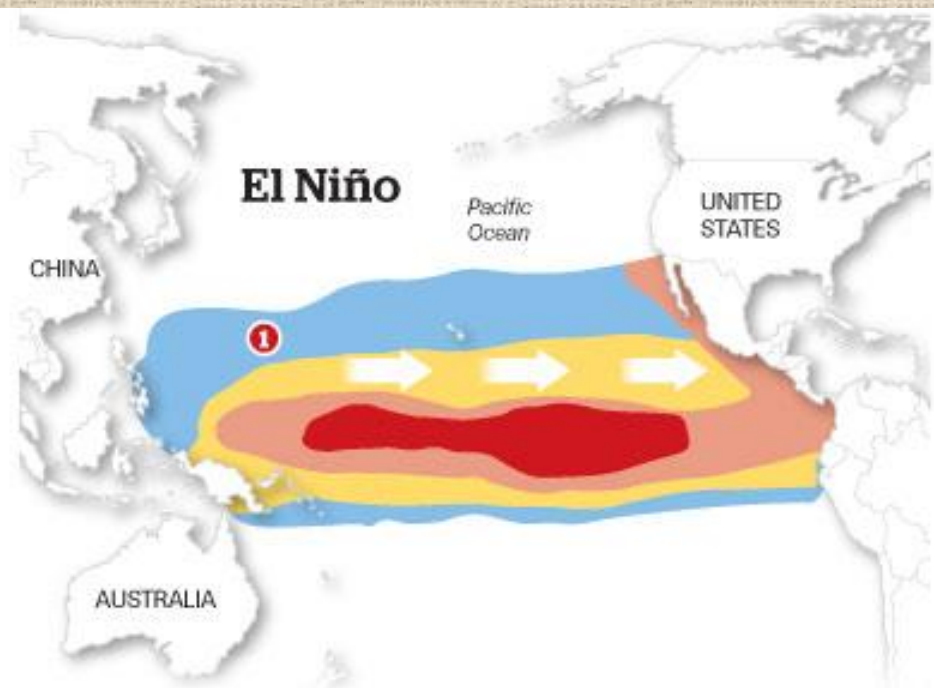
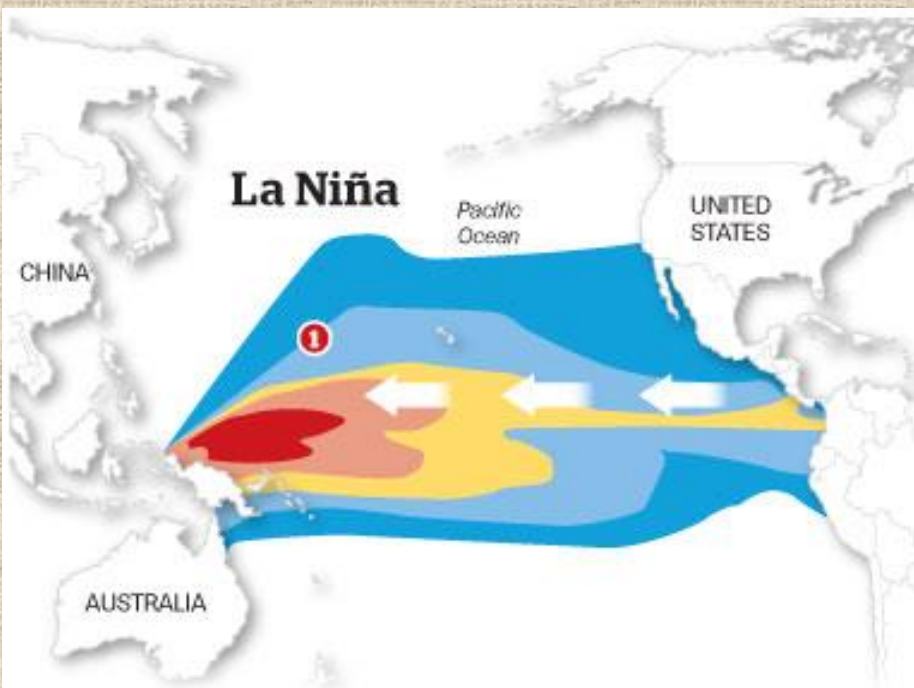
• Illustration courtesy NASA Earth Science Enterprise

Climate Change Science: Tracking the Multiple Factors



Climate Change Science: Global Weather Systems

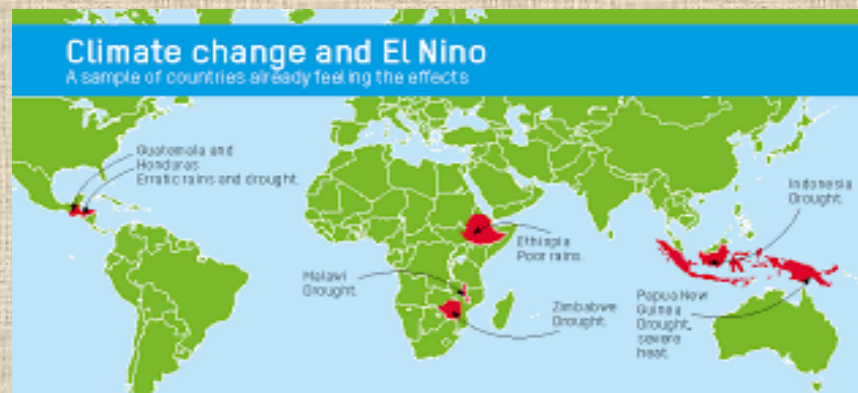
- ❖ Weather worldwide is heavily influenced by certain cycles, e.g., El Niño and La Niña
- ❖ What is El Niño and La Niña? – see the video at <https://www.youtube.com/watch?v=7FVZrw7bk1w>



Climate Change Science

Global Weather Systems

- ❖ What are the 2016-17 El Nino/La Nina predictions?
– watch the video at
https://www.youtube.com/watch?v=KF8YwYUcB_E
- ❖ Is there a connection between Climate Change and El Nino? – watch the video at
<https://www.youtube.com/watch?v=AeVPccX-v8M>
and at
<https://www.youtube.com/watch?v=80vdUW5MIqQ>



Climate Change Science

First, Some Definitions . . .

- ❖ **Weather**
 - basically the way the atmosphere is behaving, mainly with respect to its effects upon life and human activities over a short period of time.
- ❖ **Climate**
 - the average of weather over time and space over relatively long periods of time.
- ❖ **The difference between weather and climate is a measure of time.**

Watch the short video 'Weather vs Climate Change' – see https://www.youtube.com/watch?v=cBdxDFpDp_k



Climate Change Science

Some More Definitions . . .

- **Global Warming**

- an increase in average global temperature as influenced by increased greenhouse gas concentrations without regard to other factors that may cause climate change

- **Climate Change**

- changes in the atmosphere over time scales ranging from weeks to decades to millions of years.
- vary by natural processes internal to the Earth (e.g., continental drift), external forces (e.g., solar energy), and human activities which affect global wind patterns, rainfall, and temperatures.

Climate Change Science Report



- Intergovernmental Panel on Climate Change (IPCC)
- Scientific body under auspices of the U.N.
- Currently 195 countries have scientist panel members
- Reports endorsed by Science Academy & government of all panel member countries
- Fifth Assessment Report (AR5) released in 2014

<http://www.ipcc.ch/>

What Does the AR5 Say?



Watch the video 'Climate Change: The State of the Science'
- see <https://www.youtube.com/watch?v=EWOrZQ3L-c>



What Does the AR5 Say?

- The AR5 provides a clear and up to date view of the current state of scientific knowledge relevant to climate change.
- It consists of three Working Group (WG) reports:
 - ❖ Mitigation of Climate Change – options & their underlying technological, economic and institutional requirements
 - ❖ Impacts, adaptations & vulnerability – exposure and future risks of human and natural systems, and the potential for and limits to adaptation
 - ❖ Physical Science Basis - a comprehensive assessment including a detailed climate change observations throughout the climate system
- And a Synthesis Report (SYR) which integrates and synthesizes material in the WG reports for policymakers

What Does the AR5 Say ?

Partial Summary of Impacts

- Total anthropogenic GHG emissions have continued to increase from 1070 to 2010 with largest increases at end of this period
- CO₂ emissions from fossil fuel combustion & industrial processes contributed about 78% of these increases
- Without additional efforts to reduce GHG emissions beyond those in place today, emissions growth is expected to increase driven by population growth and economic activities

What Does the AR5 Say ?

Partial Summary of Impacts (Cont.)

- Such a scenario will result in CO₂ equivalent concentrations in 2030 of > 450 ppm and in 2100 of 750-1300 ppm compared to 430 ppm in 2011.
- Such a scenario will result in global mean surface temperature increases in 2100 of 3.7° to 4.8° C (6.7° to 8.6° F) compared to pre-industrial levels (i.e., before 1750)

What Does *this* Change in Climate Mean?

“Many of the world's climate zones may disappear by 2100, leaving new ones in their place unlike any that exist today”

“..we are going to be seeing climates that certainly are completely outside the range of modern human experience..”

Source 2007 Articles: 26 March *Scientific American*; 27 March *Guardian*; 27 March IOL Reuters

Extreme Weather Events

Extreme weather and climate events are events that:

- typically don't happen very frequently, such as droughts or floods that have historically occurred on average only once in 100 years
- vary from "the norm" in severity or duration, like heat waves
- have severe impacts, like hurricanes.

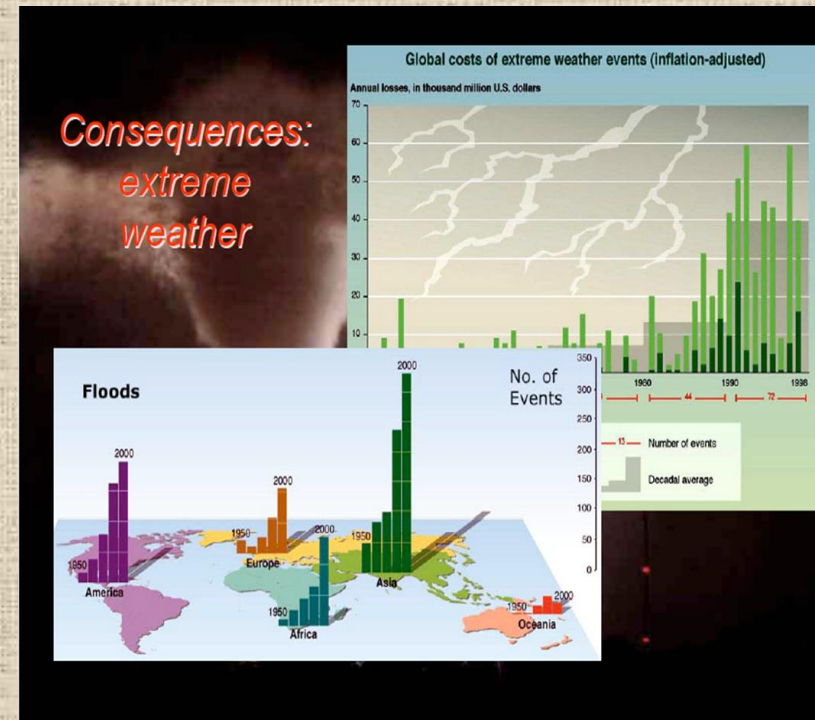


<https://www.epa.gov/climate-change-science/understanding-link-between-climate-change-and-extreme-weather>

Extreme Weather Events

➤ IPCC's 2012 special report, *'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation'* (SREX)

- indicates that scientists have enough confidence in the data collected since 1950 to definitively link extreme events to global climate change.

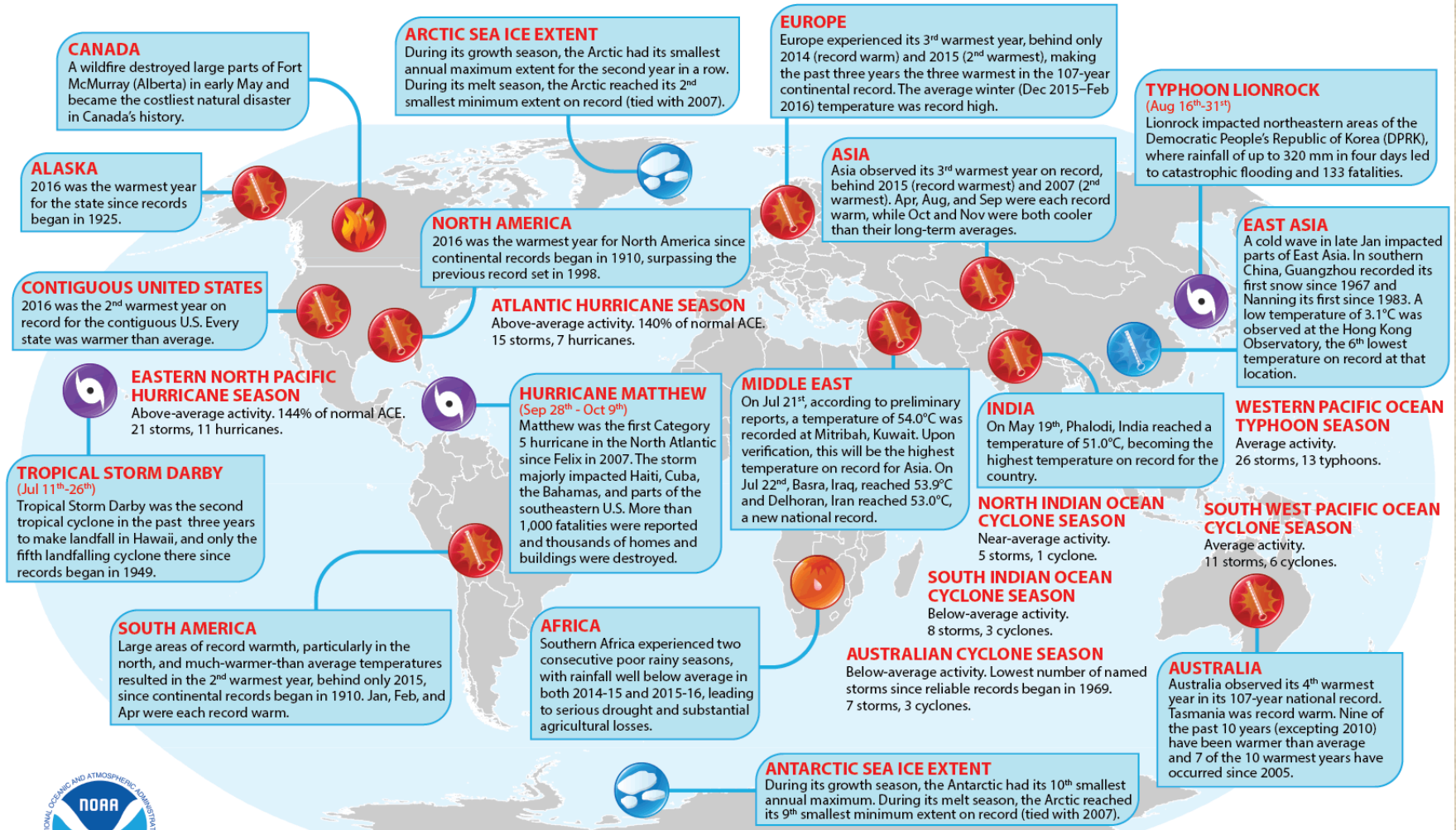


Watch the short video 'SREX Overview' -
see <http://www.ipcc-wg2.gov/SREX/>



Extreme Weather of Climate Change

Selected Significant Climate Anomalies and Events in 2016

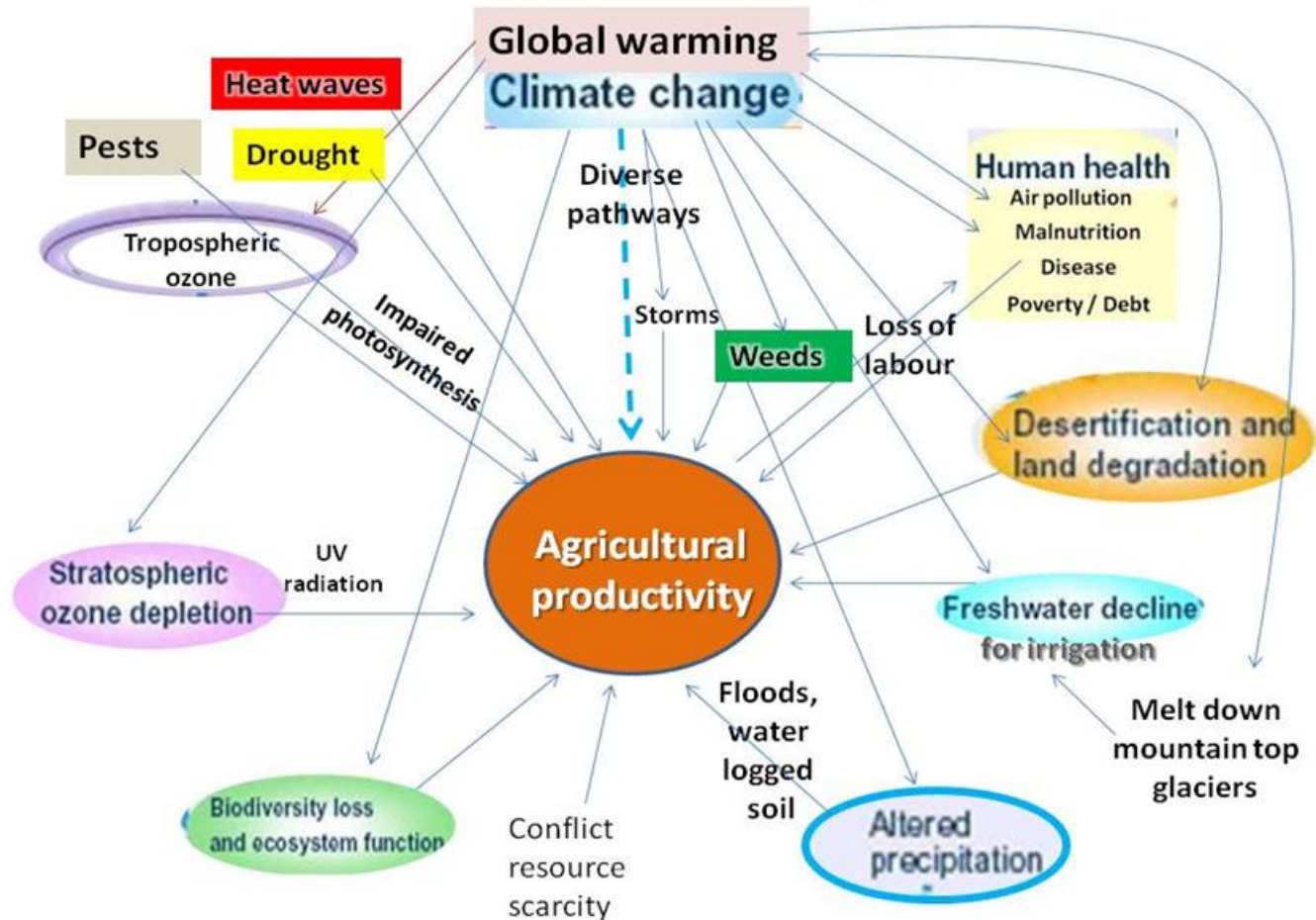


Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports and international partners. For more information please visit: <http://www.ncdc.noaa.gov/sotc>

Agriculture and Food Systems

Impacts of Climate Change

Multiple impacts of global warming and climate disruption on agriculture



Ag Faces of Climate Change

Global Small Farmer Impacts

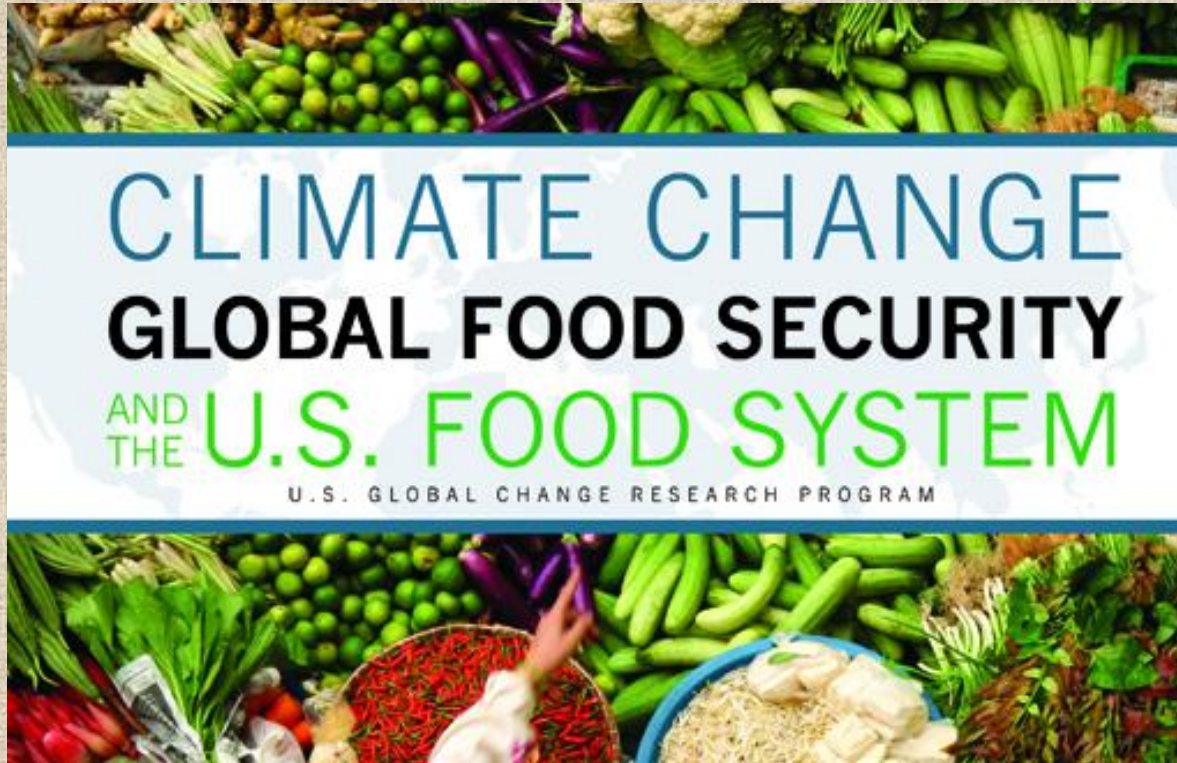


Watch the video 'Mayan Agriculture' - see
<https://www.youtube.com/watch?v=KyAxQGlxZSM>



Ag Faces of Climate Change

Food System Impacts

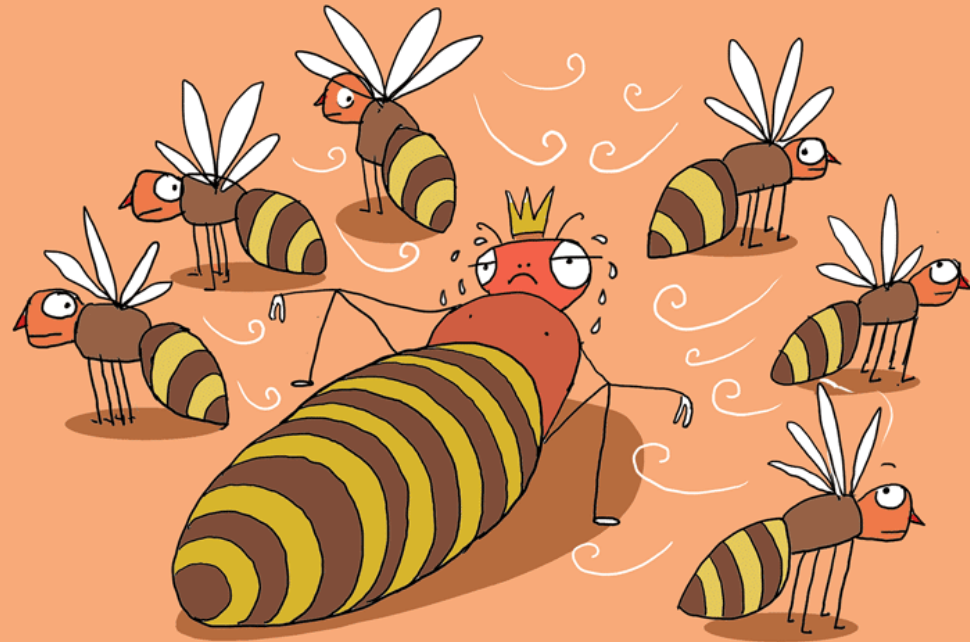


Watch the video 'Climate Change, Global Food Security, and the U.S. Food System' - see <https://www.youtube.com/watch?v=v24wT16OU2w>

Ag Faces of Climate Change

Honey Bee Pollinator Impacts

BEEES HAVING TO COOL HIVES



Watch the video 'Busy Bees' – see <http://climate.nasa.gov/blog/176>

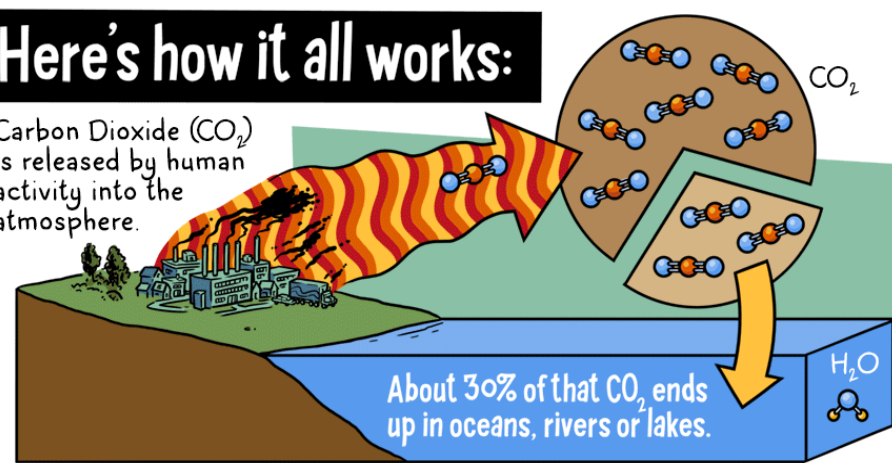
Ag Faces of Climate Change

Ocean Acidification and Fisheries Impacts

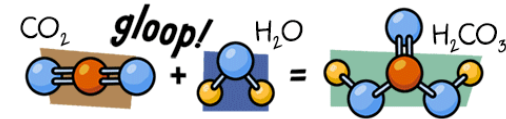
Washington State

Here's how it all works:

Carbon Dioxide (CO_2) is released by human activity into the atmosphere.



The CO_2 dissolves in the ocean and reacts with seawater to form Carbonic Acid (H_2CO_3).



That lowers the pH, increasing the acidity of the ocean. But it doesn't stop there

Oceans are already saturated with another compound called Carbonate (CO_3^{2-}). Organisms use Carbonate to create shells and structures.

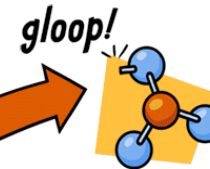


The problem is this:

When Carbonic Acid from the CO_2 breaks down, it releases hydrogen ions (H^+).



Those hydrogen ions then bind with the Carbonate that organisms need.



That makes Carbonate unavailable, which means that it can't be used to build new shells.



And existing shells can actually dissolve.

Oceans are about **30% more acidic** now than when the industrial revolution began.



Watch the video 'Pete, a local fisherman in Puget Sound' - see <https://www.youtube.com/watch?v=23WnPGX7liA>

Ag Faces of Climate Change

Food shortages have national/worldwide political consequences producing environmental refugees



Watch the video 'Drought & Syria Civil War– see <https://www.youtube.com/watch?v=a5G5jg5l2E8>



Food Systems Have A Carbon Footprint That Contribute to Global Warming

- What's a 'Carbon Foodprint' ?
 - the amount of CO_2 equivalent gasses that are given off from burning fossil fuels for food-related activities



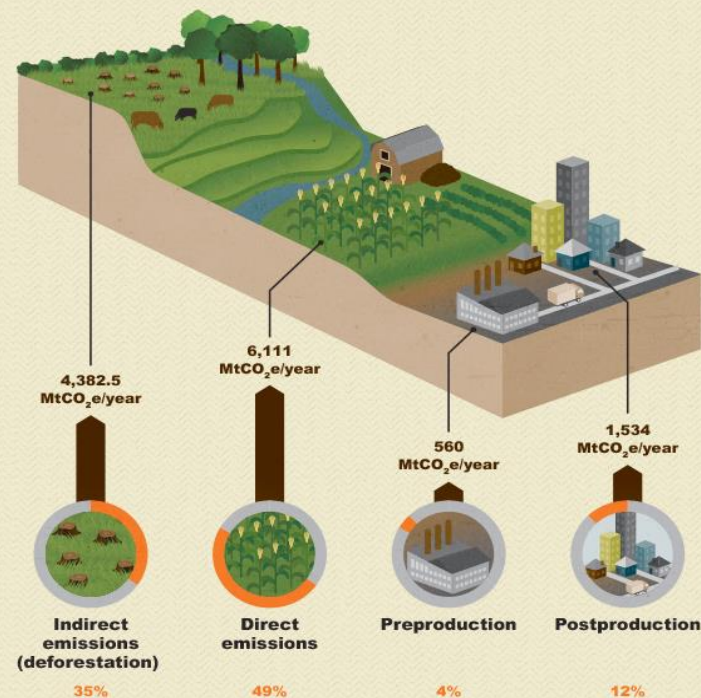
Food Carbon Footprint Facts

- Food systems produce large carbon emissions due to dependence on fossil fuels
- Food Carbon Footprint is part of the total carbon footprint of an individual, organization, and/or country
- Food choices are changing globally and impacting total carbon footprints

Food system emissions

Food system emissions—from production to consumption—contribute 9,800 to 16,900 million metric tonnes of carbon dioxide equivalent (MtCO₂e) per year, or 19 to 29 percent of total greenhouse gas emissions.

Vermeulen et al., 2012



PERCENT AND AMOUNT OF FOOD SYSTEM EMISSIONS

Data from Vermeulen et al. 2012; US-EPA, 2011; and Blaser and Robledo, 2007

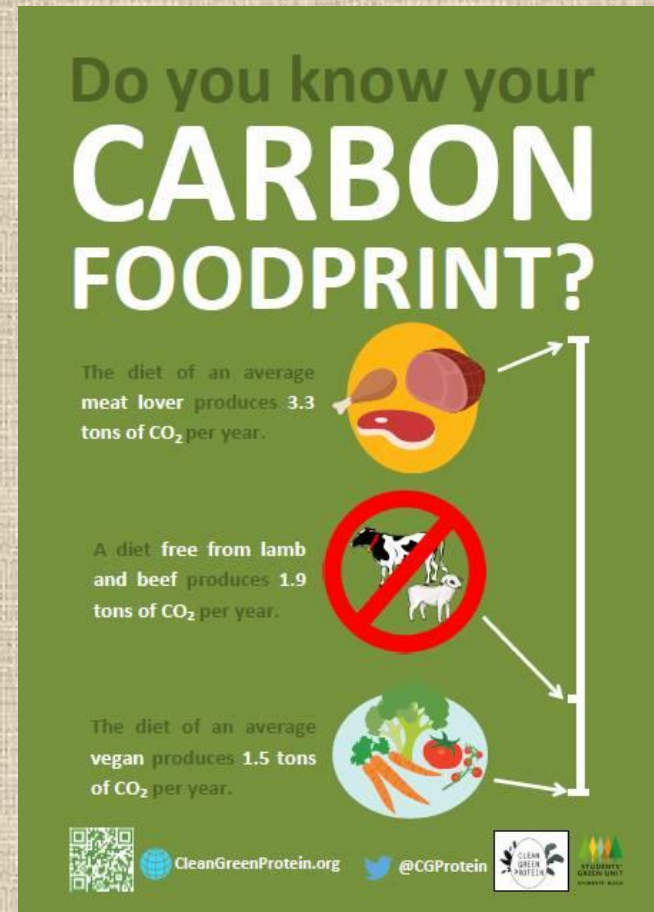
Big Facts

Where agriculture and climate change meet
ccafs.cgiar.org/bigfacts

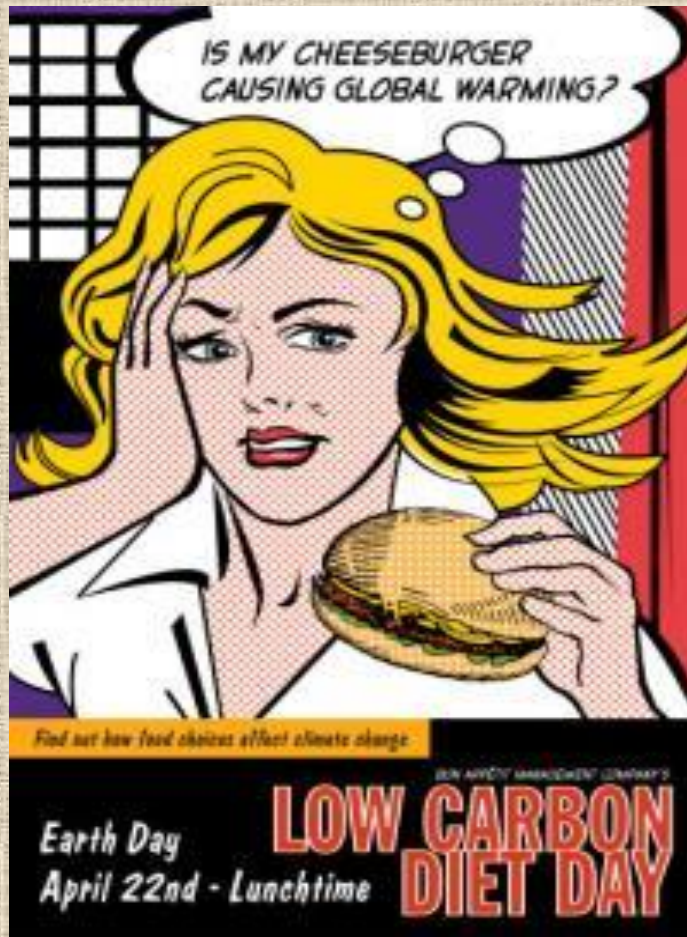
Food System

Carbon Footprint Factors

- “Food miles”
 - number of miles your food travels from farm to plate
- Other factors:
 - how is your food produced?
 - what are your food category choices?



Food Carbon Footprint Analysis: Cheeseburger Case Study




Watch the video "Cheeseburger Footprint - from Six Degrees" - see <http://vimeo.com/4709524>

Food Carbon Footprint Analysis: Cheeseburger Case Study Summary

- ❖ Annual greenhouse gas emissions from the production and consumption of cheeseburgers is estimated as the amount emitted by 6.5 million to 19.6 million SUVs. 16 million SUVs are on US roads (2006)
- ❖ The Cheeseburger Footprint is about much more than raw numbers. It's about how we live our lives, and the recognition that every action we take, even the most prosaic, can have unexpectedly profound consequences.

http://www.openthefuture.com/cheeseburger_CF.html

Carbon Facts	
Product Size 1 Cheeseburger (130g)	
<hr/>	
Amount Per Serving	
Kilograms CO₂ Equivalent 3.08	
Kilograms CO ₂	.243
Kilograms CH ₄	.123
<hr/>	
Total C: Energy Sources	243g
<i>Transportation</i>	
Fossil Fuel (Diesel)	120g
Fossil Fuel (Gasoline)	48g
<i>Electricity Production</i>	
Fossil Fuel (Natural Gas)	75g
Fossil Fuel (Coal)	0g
<i>Other</i>	
<hr/>	
Total C: Non-Energy Sources	2840gCO ₂ E
Enteric Fermentation	81.0g (1864gCO ₂ E)
Manure	25.8g (656gCO ₂ E)
Other	5.2g (120gCO ₂ E)
<hr/>	
Carbon/Product Ratio	23.7
<hr/>	
Localism Rating	C+
Sustainable Production Rating	D+
<hr/>	
overall carbon code: orange	
	

Statistics of Average U.S. Food Carbon Footprint Per Household

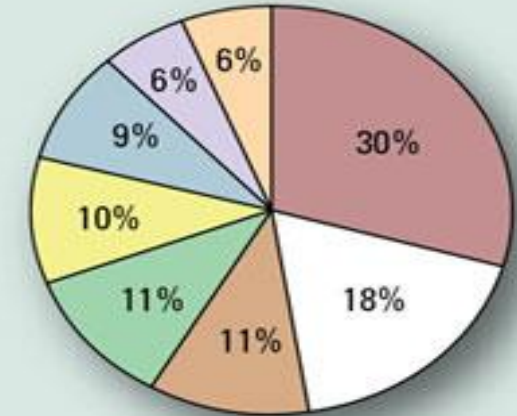
- **Amount**

- 8.1 metric tons of greenhouse gases annually from food consumption choices

- **Sources**

- Food industry
 - ✓ transportation - 11%
 - ✓ conventional production & processing - 83%
 - ✓ final delivery from producer to retail – 4%
- Food types are different – see chart

Greenhouse Gases from Food



Weber, C. and H. Matthews. 2008. Food-Miles and the Relative Climate Impacts of Food Choices in the United States *Environ. Sci. Technol.*, 42 (10): 3508–3513 – see

<http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2008/42/i10/abs/es702969f.html>

Statistics of Average U.S. Food Carbon Footprint Per Household

- **What are the conclusions of the food carbon footprint facts from this report?**
 - Are “food miles” the greatest factor?
 - **No!**
 - **Purchasing local foods is only a partial solution.**
 - What is the greatest factor?
 - **How the food is produced!**
 - **The carbon footprint of the entire food system!**

WHAT'S YOUR CARBON FOODPRINT ??

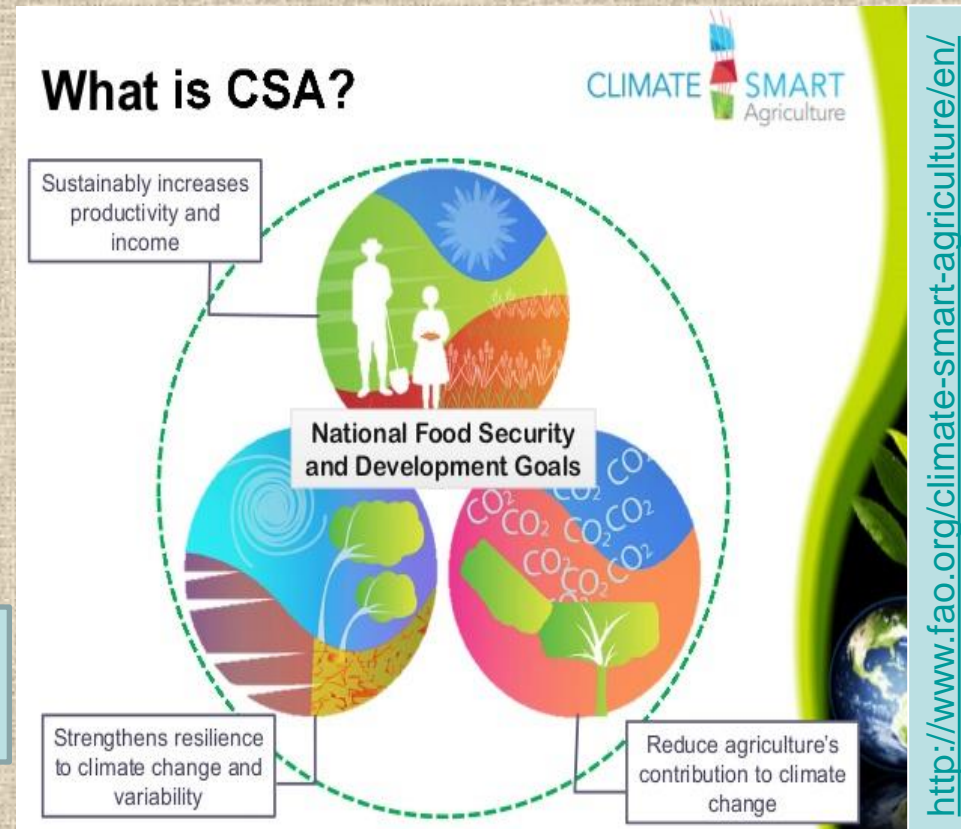


- ❖ Calculate your personal food carbon footprint
- see the website <http://www.eatlowcarbon.org//>

Climate Smart Agriculture

International Program of Best Practices Promotes:

- ❖ production systems that sustainably increase
 - productivity,
 - resilience (adaptation),
 - reduces/removes GHGs (mitigation),
 - enhances achievement of national food security and development goals.



Watch the videos “Climate Smart Ag: The Road We’ve Traveled” – see <https://www.youtube.com/watch?v=8D-ORGjnf0s> and ‘Climate Smart Ag: What It’s All About?’ – see <https://www.youtube.com/watch?v=OjhRfvd7bA>

Climate Smart Agriculture Programs for U.S. Agriculture



Update on USDA Climate Change Activities



Climate Change Program Office

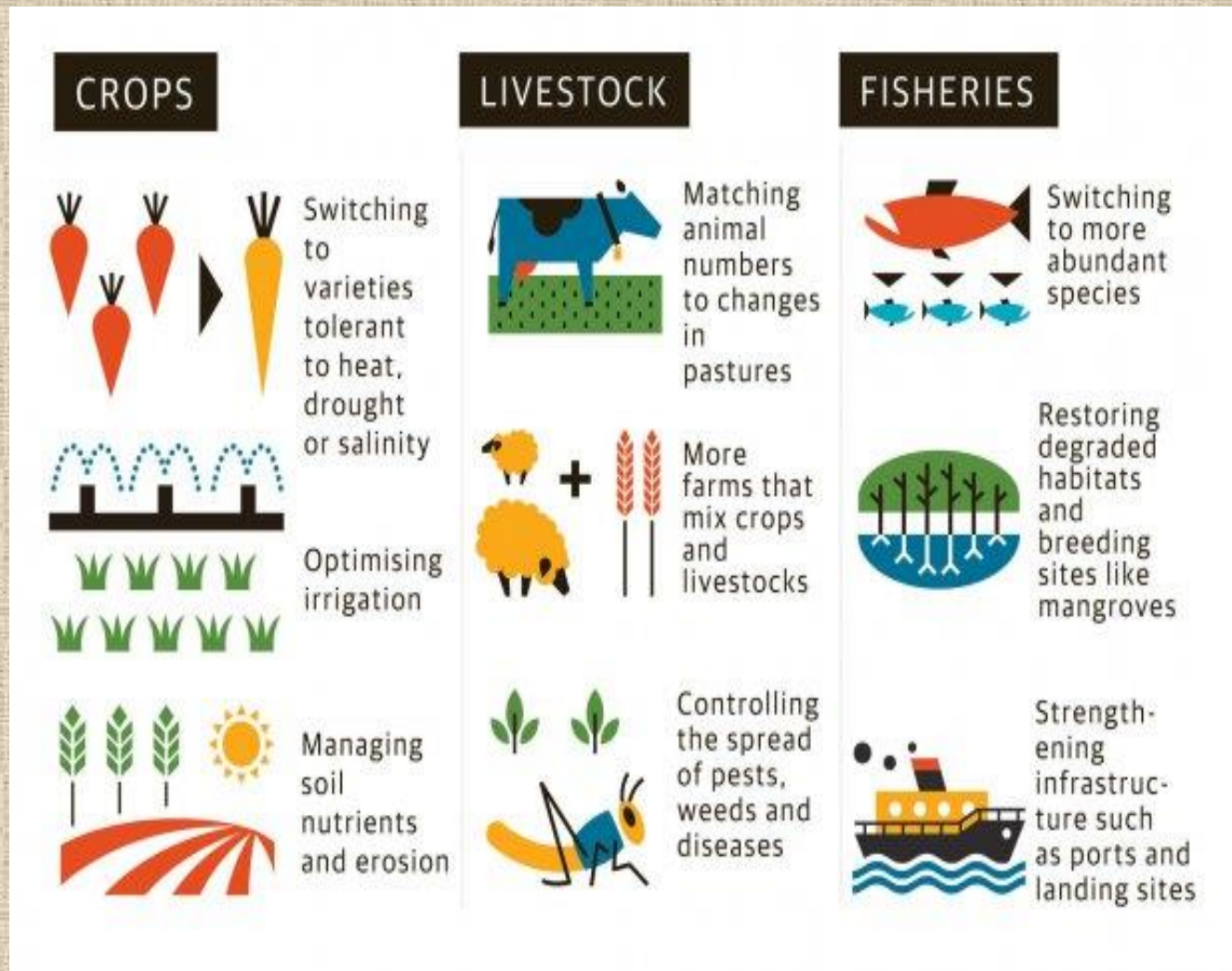
Watch the video 'USDA Reports Say Climate Change Will Affect Agriculture, Forests' – see

<https://www.youtube.com/watch?v=v3y0qW4tXos>



Climate Smart Agriculture

Example Guidelines for Agriculture



Climate Smart Agriculture Resources

North American Alliance

❖ This new Alliance provides North American agricultural and forestry leaders with several platforms for shaping an integrated approach for simultaneously pursuing the three pillars of climate-smart agriculture:

- 1) sustainably increasing agricultural productivity and livelihoods (i.e. sustainable intensification)
- 2) adapting and building more resilience; and
- 3) delivering ecosystem services and reducing and/or removing greenhouse gas emissions.



Climate Smart Agriculture Resources

USDA Sustainable Ag & Research Education

- ❖ implementing sustainable agriculture to reduce greenhouse gas emissions & improve environmental conditions while sustaining local economies.
- ❖ recognize the important role that our nation's farmers, ranchers, & agricultural educators can play in addressing climate change and achieve USDA's strategy, released in April 2015, to reduce net emissions and enhance carbon sequestration from agricultural & forestry practices by over 120 million metric tons of CO₂ equivalent by 2025.



Agroecology and Climate Change

Organic Farming Solutions Example

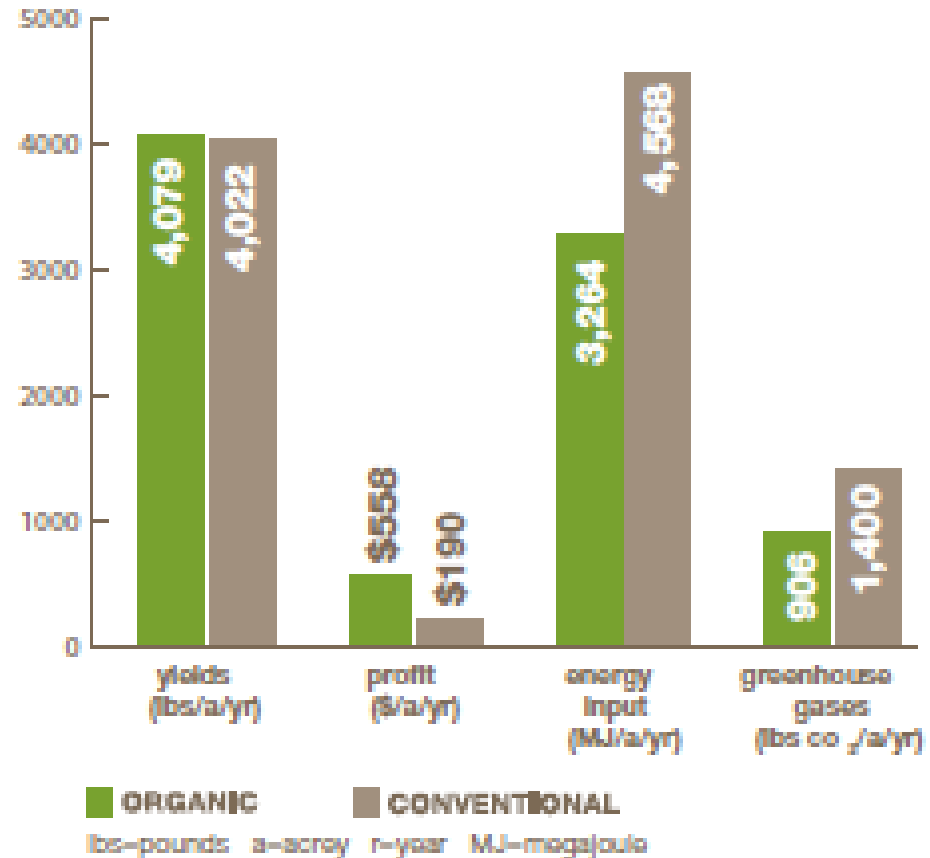


Regenerative Organic Agriculture
and Climate Change

A Down-to-Earth Solution to Global Warming

Research tested to be Climate Smart, high yielding, and profitable.

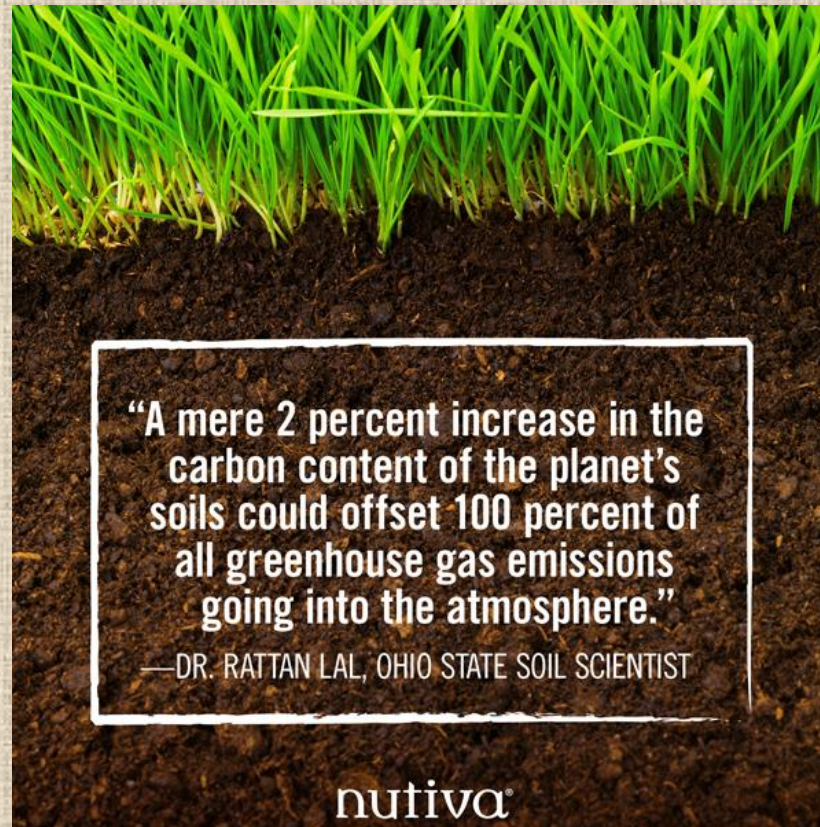
COMPARISON OF FST
Organic and conventional systems



<http://rodaleinstitute.org/assets/WhitePaper.pdf>

Agroecology and Climate Change

Organic Farming Solutions



Watch the video ‘Soil Solutions to Climate Problems - #Film4Climate’ - see <https://www.youtube.com/watch?v=Khh-IUautgU>

Agroecology and Climate Change

Agroforestry Farming Solutions Example



<http://nac.unl.edu/>

Watch the video ‘Agroforestry in Kenya is supporting both climate change adaptation and mitigation’ – see <https://www.youtube.com/watch?v=a-tKhowsbns>



Agroecology and Climate Change

Cover Crops Farming Solutions Example



USDA IS AN EQUAL OPPORTUNITY PROVIDER AND EMPLOYER.

Healthy
SOIL SECRETS

unlock the
SECRETS
IN THE
SOIL

KEEP IT HAPPY, KEEP IT **COVERED.**

SOIL SHOULD BE **COVERED ALL THE TIME**, PREFERABLY WITH LIVING PLANTS. KEEPING THE SOIL COVERED ALL THE TIME MAKES PERFECT SENSE WHEN YOU REALIZE THAT HEALTHY SOILS ARE FULL OF LIFE. THE MICROORGANISMS LIVING IN THE SOIL NEED FOOD AND COVER TO SURVIVE – JUST LIKE OTHER LIVING CREATURES.

WANT MORE?
SOIL SECRETS

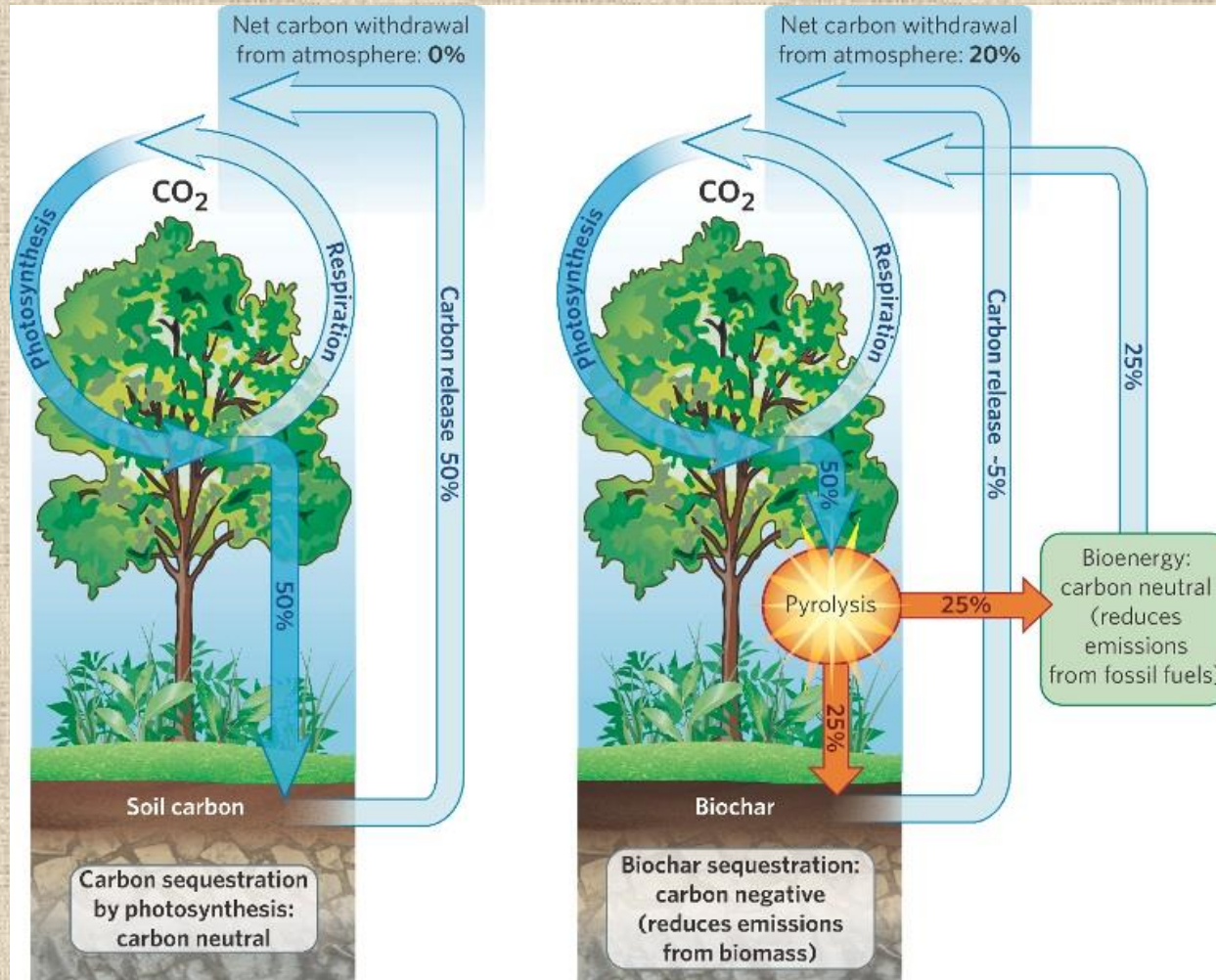
CHECK OUT
WWW.NRCS.USDA.GOV



Watch the video 'Building Resilience to Climate Risk thru Cover Cropping' - see <https://www.youtube.com/watch?v=7lodcD6tUUJo>

Agroecology and Climate Change

Biochar Farming Solutions Example



Watch the video 'Science and Global Change Search for Solutions: Biochar' - see <https://www.youtube.com/watch?v=8jxfDIpyDcM>

Agroecology and Climate Change

Programs in Participatory Research for Global Small Farmers:



Watch the video “Food Security and Climate Change’ – see https://www.youtube.com/watch?v=C_ydvspJcbQ



Agroecology and Climate Change

Programs in Community Action for Global Small Farmers



Watch the video 'From Science to Action' – see
<https://www.youtube.com/watch?v=efoAPalsvKY>




Agroecology and Climate Change

Building Climate Change Resilient Food Systems



Watch the videos “Climate Listening Project Feature: Cultivating Resilience”
- see <http://daynareggero.com/projects-i-love/cultivating-resilience-tour/>

What Are The Next Steps?

- Continue to follow inspiring agroecology-based initiatives from around the world and bring them to your community - 
 - watch the video “Agroecology initiatives in Australia, India, Japan” at <https://www.youtube.com/watch?v=iJ1C98Qw4f8>
 - watch the short video “Judy Wicks on building a sustainable food system” at <https://www.youtube.com/watch?v=qFckW3tygFQ> 
- Learn about action steps to take to promote agroecology and sustainable food systems from national & global organizations:
 - the National Sustainable Agriculture Coalition – see <http://sustainableagriculture.net/blog/farm-bill-climate-recs/>
 - La Via Campesina – see <https://viacampesina.org/en/>
- Continue your reading and courses in the concepts and principles in agroecology and sustainable food systems

Agroecology & Sustainable Food Systems Education Resources

FLORIDA

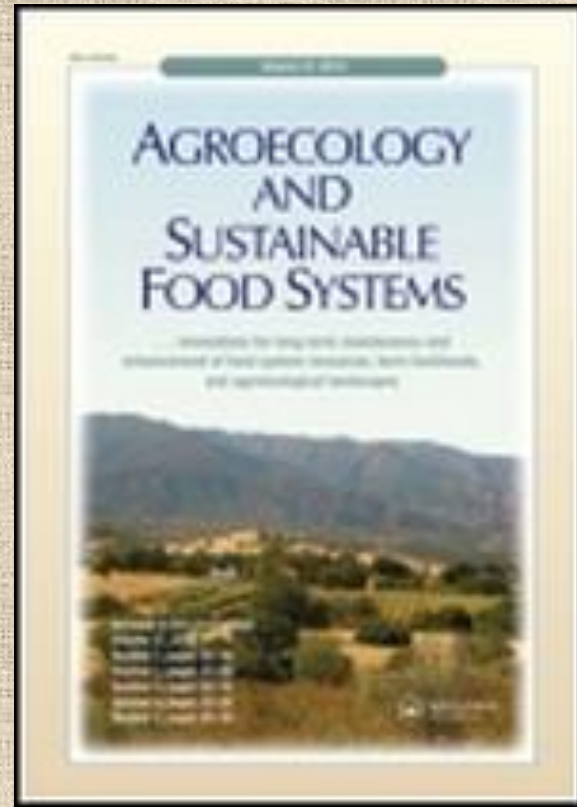
- FL International University: Agroecology Program – see <https://agroecology.fiu.edu/>
 - UF/IFAS
 - Agroecology Program – see <http://uf-agroecology.com/>
 - McArthur Agro-Ecology Program at Buck Island – see <http://www.maerc.org/>
 - Institute for Sustainable Food Systems –see <http://isfs.institute.ifas.ufl.edu/>
- Watch a short video at <https://www.youtube.com/watch?v=lbsl0Y9YwYc>

USDA National Library Directory

- See <https://www.nal.usda.gov/afsic/categories/agroecology>



THANK-YOU !!



Online Resources

- Brighter Planet. 2010. The American Carbon Foodprint – see <http://www.kohalacenter.org/HISGN/pdf/carbofoodprint.pdf>
- Colorado State University. 100 Views of Climate Change – see <http://changingclimates.colostate.edu/index.html>
- Cooking Up A Story. Online Resources for Sustainable Food and Agriculture – see <http://cookingupastory.com/distinctive-voices-and-authorative-online-resources>
- EPA Victoria. Ecological Footprint – see <http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/completed.asp>
- Institute of Science in Society. No to Climate Smart Agriculture – see <https://popularresistance.org/agroecology-not-climate-smart-agriculture/>
- Kloeke, E. van Ommen. 2014. How Will Climate Change Affect Food Security. Elsevier Press – see <https://www.elsevier.com/connect/how-will-climate-change-affect-food-security>
- NASA. Climate Change and Global Warming: Vital Signs of the Planet – see <http://climate.nasa.gov/>

Online Resources

- National Sustainable Agriculture Coalition. Agriculture & Climate Change: Impacts & Opportunities at the Farm Level – see http://sustainableagriculture.net/wp-content/uploads/2008/08/nsac_climatechange policypaper_final_2009_07_161.pdf
- Permaculture Solutions to Climate Change – see <http://www.permacultureclimatechange.org/>
- Rodale Institute. Regenerative Organic Agriculture and Climate Change – see <http://rodaleinstitute.org/assets/WhitePaper.pdf>
- S.A.R.E. Sustainable Agriculture Course – see <http://www.sare.org/Learning-Center/Courses-and-Curricula/National-Continuing-Education-Program/Course-1-Sustainable-Agriculture>
- Union of Concerned Scientists, Agroecology – see <http://www.ucsusa.org/food-agriculture/advance-sustainable-agriculture/counting-on-agroecology#.WIpDFIMrJpg>

Online Resources

- University of FL
 - FL Climate Institute. Agriculture Projects – see <http://www.floridacclimateinstitute-uf.org/projects/uf-projects/>
 - Borisova. T., et.al. Economic Impacts of Climate Change in FL – see <https://edis.ifas.ufl.edu/fe787>
 - Mulkey, S., et.al. Opportunities for Greenhouse Gas Reduction Through Forestry & Agriculture in FL – see <http://snre.ufl.edu/research/files/FloridaGHG-report-WEB.pdf>
- USDA
 - Climate Change Program Office – see http://www.usda.gov/oce/climate_change/
 - Webinar Portal for Climate Science – see <http://www.climatewebinars.net/>
 - Modern Solutions for Environmental Problems – see <http://www.usda.gov/wps/portal/usda/usdahome?navid=climate-change>
- World Agroforestry Center. Climate Change – see http://worldagroforestry.org/research/climate_change

Online Video Resources

- AgriComm. Trees Can Help Save The World video series – see <https://www.youtube.com/playlist?list=PLeR2DZtnITQtik4SxT9unDrVP5Gu2aEPb>
- BBC. The Truth About Climate Change – see <https://www.youtube.com/watch?v=2JmrmwlyhAE> and <https://www.youtube.com/watch?v=HK47Pnx46rM>
- Centre for Agroecology, Water and Resilience - MSc Agroecology and Food Security – see <https://www.youtube.com/watch?v=Arb-XGHiP8o>
- CGIAR. Research Program on Climate Change, Agriculture and Food Security (CCAFS) – see <https://www.youtube.com/user/CCAFS>
- Commonwealth Club. Anna Lappe & Frances Moore Lappe w/ Raj Patel – see https://www.youtube.com/watch?v=7OD80V_0ZVI
- Fair Trade. Small Scale Farmers Cool The Planet – see <http://www.truth-out.org/speakout/item/30255-new-video-on-combating-climate-change-with-organic-agriculture>

Online Video Resources

- Global Footprint Network. How Big Is Your Footprint Video Series – see http://www.footprintnetwork.org/en/index.php/GFN/blog/how_big_is_your_footprint_watch_our_video_series
- IFOAM. Sustainable Food Systems and Agro-Ecological Resilience – see <https://www.youtube.com/watch?v=xT6BGrDVi9E&t=24s>
- Landline. Climate Change and Agriculture – see <http://www.abc.net.au/landline/content/2013/s3682086.htm>
- McKibben, W. Local Food Systems and Climate Change – see https://www.youtube.com/watch?v=ITu_afGzVJg
- National Geographic.
 - Climate and Weather – see <http://video.nationalgeographic.com/video/climate-weather-sci>
 - Six Degrees Could Change The World – see https://www.youtube.com/watch?v=R_pb1G2wloA
- PBS. The Lexicon of Sustainability. Know Your Food Series – see <http://www.pbs.org/food/shows/the-lexicon-of-sustainability/>

Online Video Resources

- Pollan, M. The Great Challenge: Farming, Food and Climate Change. New York Times Conference Food For Tomorrow, 2014 – see <https://www.youtube.com/watch?v=eSjHN8zefak>
- Regeneration International. Videos on Regenerative Agriculture and Climate Change – see <http://regenerationinternational.org/category/video/>
- Saur, T. Agroforestry for Climate Change Adaptations. National Agroforestry Center – see <https://agroforestry.adobeconnect.com/p5gfd4o6jg7/?launcher=false&fcContent=true&pbMode=normal>
- Savory, A. How to Green the World's Deserts and Reverse Climate Change. Ted Talk – see <https://www.youtube.com/watch?v=vpTHi7O66pI>
- Sustainable World. The Soil Solution to Climate Change – see <https://www.youtube.com/watch?v=BxiXJnZraxk>