#### **UF/IFAS Extension**

The Journey to Sustainability Begins with Education





UF/IFAS Sarasota County Extension 6700 Clark Road Twin Lakes Park Sarasota, Florida 34241 (941) 861-5000



# WACKY WEATHER? WHAT'S UP WITH THAT?... Impacts and Responses: Agriculture and Food Systems

CHANGE

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UF/IFAS Extension Sarasota County

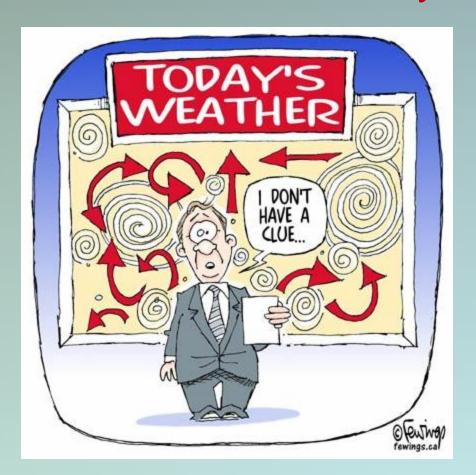
## WACKY WEATHER WHAT'S UP WITH THAT? Climate Change Series

#### Topics In This Series:

- 1) Updates of Science of Climate Change
- 2) Impacts and Responses: Social Systems
   Human Health and Resilient
   Communities
   Topic
- 3) Impacts and Responses: Agriculture and Food Systems
- 4) Impacts and Responses: Biodiversity and Ecosystems

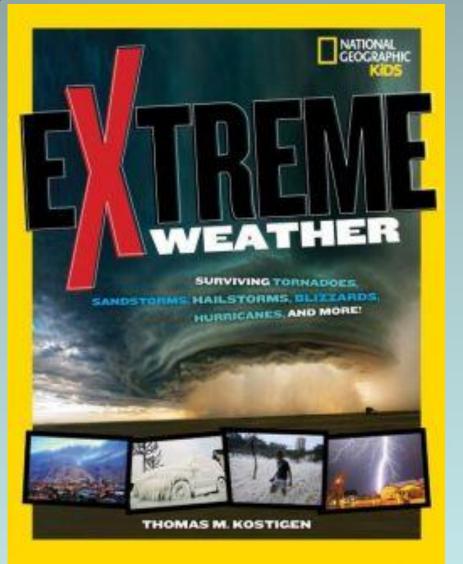
## WACKY WEATHER? What Do You Mean?

Wacky . . . as in eccentric, crazy, erratic



## "Extreme Weather" Events Are Wacky Weather

➤ By definition, extreme weather events are rare and based on a long record of observations and data to establish definitive links between severe events and Climate Change.

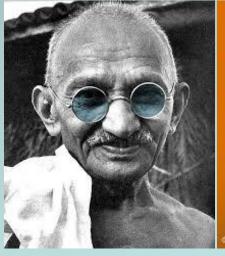


#### **WACKY WEATHER?**

WAIT A MINUTE! AREN'T WE SUPPOSE TO BE SERIOUS HERE?

WELL YES! BUT WHO SAYS THAT WE CAN'T MAINTAIN A SENSE OF HUMOR ABOUT SERIOUS MATTERS?





If I had no sense of humor, I would long ago have committed suicide.

re Inspire Quotes - http://ehd-eh-spkeidistes-fibbleddid

#### **WACKY WEATHER?**

Who Else Calls It 'Wacky Weather'?



**SCIENTISTS** 



#### **EDUCATORS**

#### The New York Times

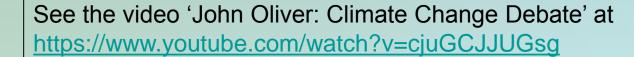


"Making Sense of the Wacky Weather"
By JUSTIN GILLIS MARCH 30, 2012



#### The Wacky Side of Climate Change...







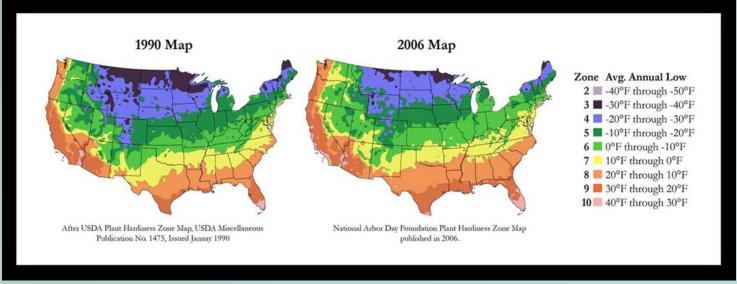


See the video 'Drought on the Ranch' – see https://www.youtube.com/watch?v=BfkIFqezYw8



Hardiness zone is a geographically-defined zone in which a specific category of plant life is capable of growing, as defined by temperature hardiness, or ability to withstand the minimum temperatures of the

zone.



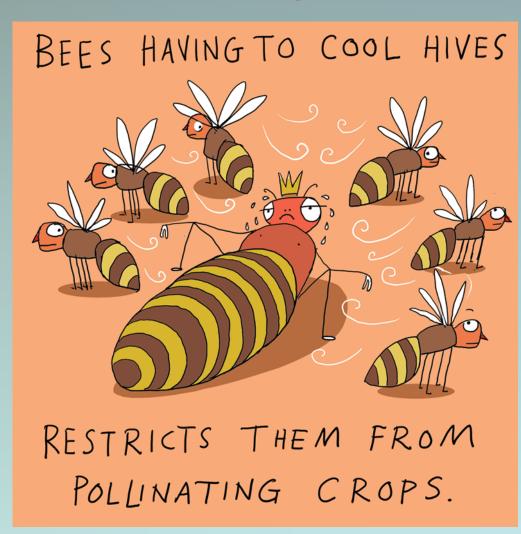
See the webpage 'Hardiness Zone Changes' – see <a href="http://www.arborday.org/media/mapchanges.cfm">http://www.arborday.org/media/mapchanges.cfm</a>



#### Honey Bee Pollinators of Crops



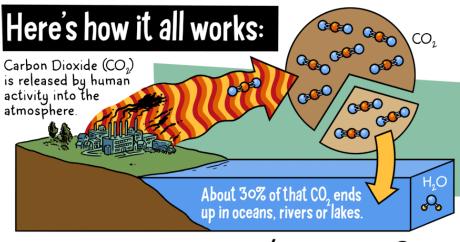
See the video 'Busy Bees' – see http://climate.nasa.gov/blog/176



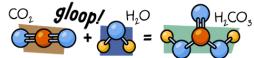
## Ocean Acidification and Fisheries

#### Washington State

See the video 'Pete, a local fisherman in Pudget Souung' - see http://yearsoflivingdangerously.com/clips/



The CO<sub>2</sub> dissolves in the ocean and reacts with seawater to form Carbonic Acid (H<sub>2</sub>CO<sub>2</sub>).



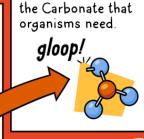
That lowers the pH, increasing the acidity of the ocean. But it doesn't stop there

Oceans are already saturated with another compound called Carbonate (CO<sub>3</sub><sup>2</sup>-). Organisms use Carbonate to create shells and structures.



#### The problem is this:

When Carbonic Acid from the CO<sub>2</sub> breaks down, it releases hydrogen ions (H<sup>+</sup>).



Those hydrogen ions then bind with

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

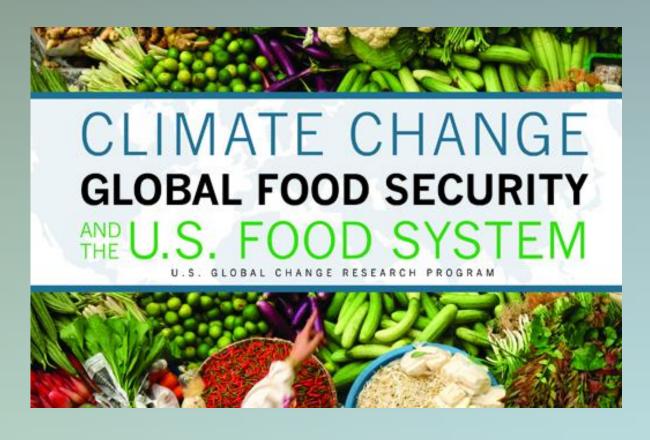


And existing shells can actually dissolve.

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



#### Food System Impacts





See the video 'Climate Change, Global Food Security, and the U.S. Food System' at https://www.youtube.com/watch?v=v24wT16OU2w

Food shortages caused by Climate Change have national and worldwide political consequences





Watch the video 'Why I Care' - Thomas Friedman – see https://www.youtube.com/watch?v=GqGjz3kdcCM

#### Community Agrarian Action in South Africa



See the videos 'From Science to Action' at <a href="https://www.youtube.com/watch?v=efoAPalsvKY">https://www.youtube.com/watch?v=efoAPalsvKY</a>



#### Climate Change & World Agriculture

#### 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.



#### First, Some Definitions . . .

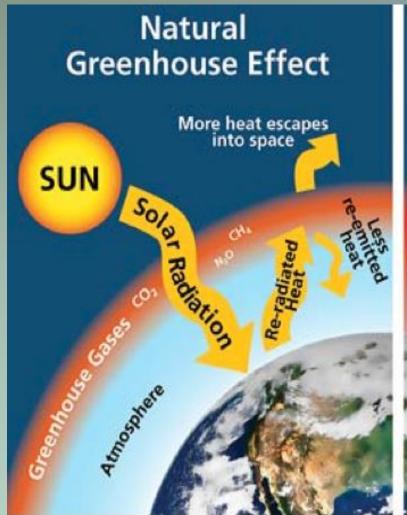
#### Global Warming

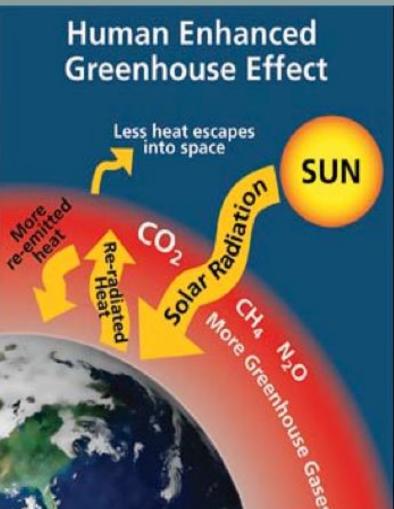
- an increase in average global temperature as influenced by increased greenhouse gas concentrations without regard to other factors that may cause climate change

#### 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.

#### **Global Warming System Definition**





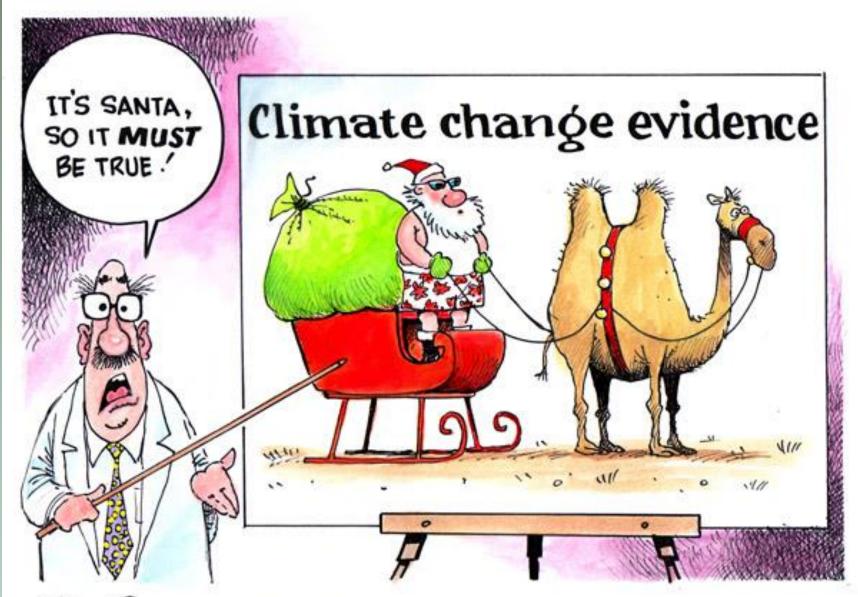


#### Who Says So?



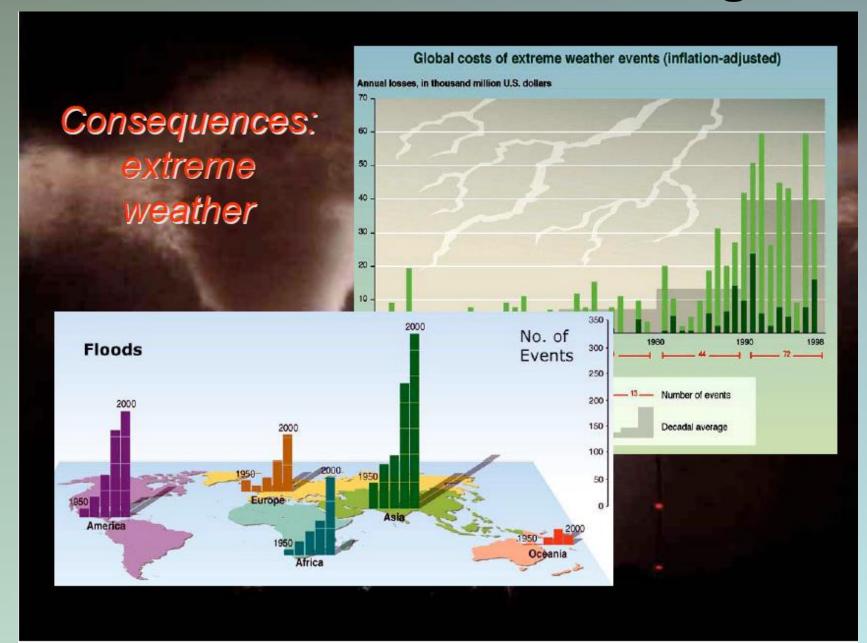
- ➤ Intergovernmental Panel on Climate Change (IPCC)
- Scientific body under auspices of the U.N.
- Currently 195 countries have scientist panel members
- ➤ Reports endorsed by Science Academy & government of all panel member countries
- ➤ Fifth Assessment Report (AR5) released in 2014

http://www.ipcc.ch/



DAVE GRANLUND @ www.davegranlund.com

#### What does this Global Warming mean?



## 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

### Climate Change Impacts and Global Weather Systems

- Weather worldwide is heavily influenced by certain cycles, e.g., El Nino and La Nina
- What is El Nino? see https://www.youtube.com/watch?v=7FVZrw7bk1w
- What are the 2015-16 El Nino/La Nina predictions see http://www.theweathernetwork.com/us/news/articles/winter-preview-el-nino-contributes-to-a-tale-of-two-seasons/56531/
- Is there a connection between Climate Change and El Nino? – see https://www.youtube.com/watch?v=AeVPccX-v8M

# What Food System-Based Connections to Climate Change Are We Talking About?

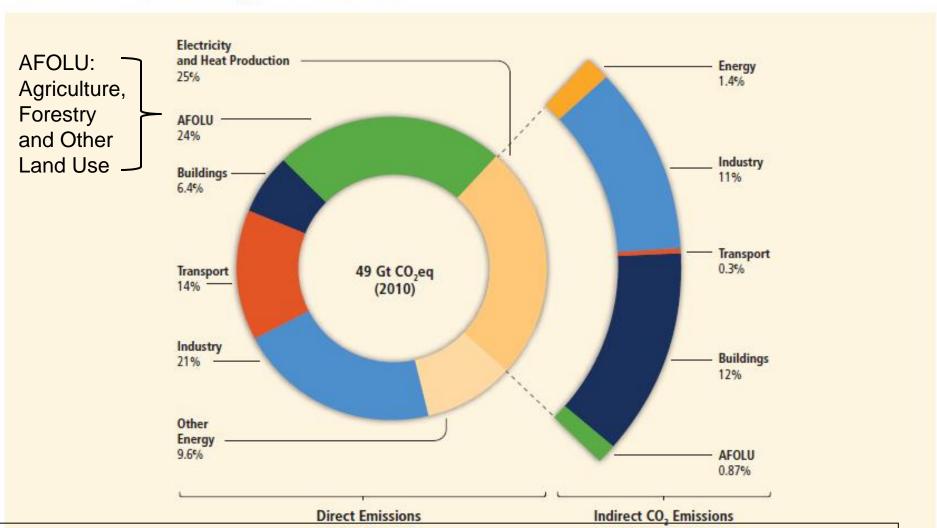
## Food Has A Carbon Footprint That Contributes to Global Warming

- What's a 'Carbon Foodprint'?
  - the amount of CO<sub>2</sub>
     equivalent gasses that are given off from burning fossil fuels for food-related activities



### Global Agriculture and Anthropogenic GHG Emissions





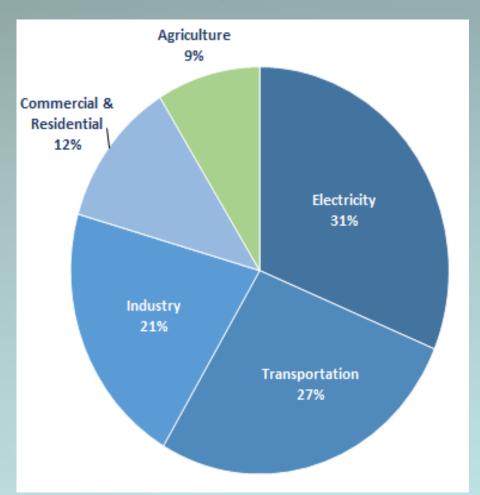
http://report.mitigation2014.org/spm/ipcc\_wg3\_ar5\_summary-for-policymakers\_approved.pdf

### US Agriculture and Anthropogenic GHG Emissions

Total U.S. Greenhouse Gas Emissions by Economic

Sector in 2013

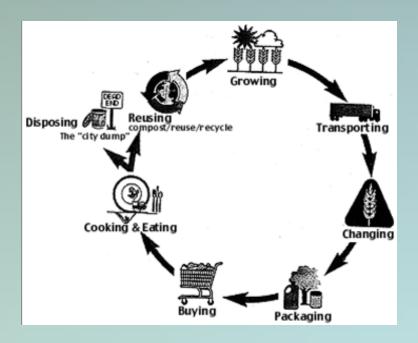
- Greenhouse gas emissions from agriculture production have increased by approximately 17% since 1990
- Land Use, Land-Use Change, and Forestry in the United States is a net sink and offsets approximately 13% of these greenhouse gas emissions.
- Total Emissions in 2013 = 6,673 Million Metric Tons of CO2 equivalent



http://www3.epa.gov/climatechange/ghgemissions/sources/agriculture.html

### Food Carbon Footprint Analysis How Is It Done?

- Calculated at the Food System Level
- In other words, study the Who, What, Where, When, Why and How of Our Food Gets From the Farm to Our Plate



EarthFriends. 1995. The Whole Story of Food

#### **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 (MtCO<sub>2</sub>e) per year, or 19 to 29 percent of total greenhouse gas emissions.

Vermeulen et al., 2012 MtCO,e/year 4,382.5 MtCO,e/year MtCO\_e/year Indirect Direct Preproduction Postproduction emissions emissions (deforestation) 12% PERCENT AND AMOUNT OF FOOD SYSTEM EMISSIONS

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

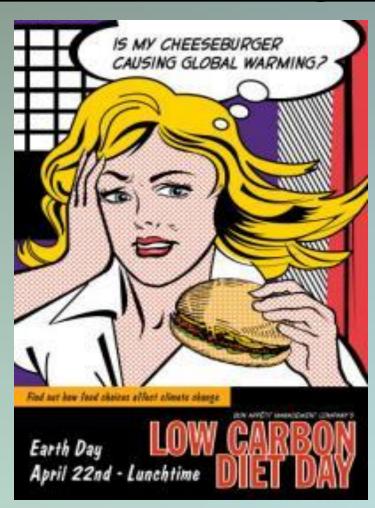
**Big Facts** 

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





## Food Carbon Footprint Analysis: <u>Cheeseburger Example</u>





See video at http://vimeo.com/4709524

## Food Carbon Footprint Analysis: Cheeseburger Example

- 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

Amount Per Serving Kilograms CO2 Equivalent 3.08 Kilograms CO2 243 Kilograms CH4 .123	
Total C: Energy Sources	243
Transportation	
Fossil Fuel (Diesel)	120g
Fossil Fuel (Gasoline) Electricity Production	48g
Fossil Fuel (Natural Gas)	759
Fossil Fuel (Coal) Other	Og
Total C: Non-Energy Sources 2	2840gco <sub>2</sub> e
	(1864gCO <sub>2</sub> E) 3 (656gCO <sub>2</sub> E)
	(120gCD <sub>2</sub> E)
Carbon/Product Ratio	23.7
Localism Rating Sustainable Production Rating	C+

## Food System Carbon Footprint Factors

- "Food miles"
  - number of miles your foodtravels from farm to plate
- Other factors:
  - how is your food produced?



- what are your food category choices?

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

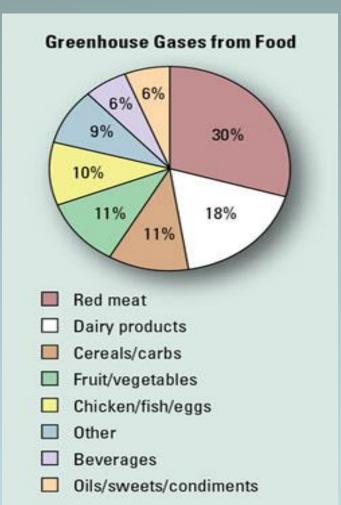
#### Amount

 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



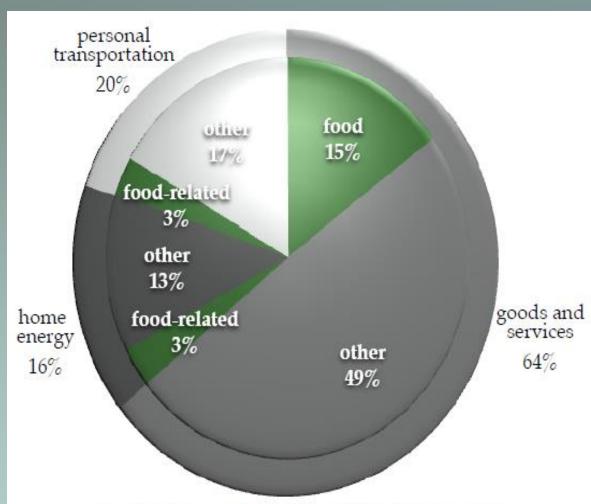
Weber, C. and H. Matthews. 2008. Food-Miles and the Relative Climate Impacts of Food Choices in the United States Environ. Sci. Technol., 42 (10): 3508–3513 – see http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2008/42/i10/abs/es702969f.html

## 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!

# Additional U.S. Carbon Foodprint Facts

http://www.kohalacenter. org/HISGN/pdf/carbofoo dprint.pdf

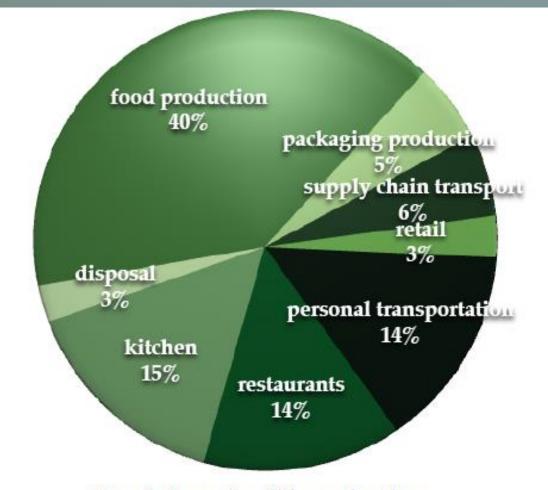


#### Foodprint as fraction of total footprint

Food-related emissions comprise 21% of total emissions, or 6.1 tons out of 28.6 tons per person per year. 15% of personal transportation relates to food, as does 20% of housing energy use, while 23% of the emissions from all other activity are food-related. The other charts on this page look at this pool of food-related emissions from three different angles.

## Additional U.S. Carbon Foodprint Facts

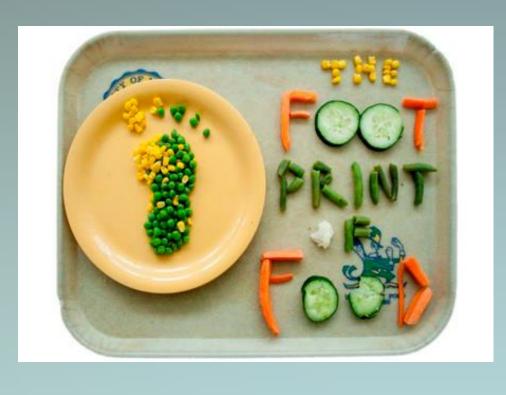
http://www.kohalacenter. org/HISGN/pdf/carbofoo dprint.pdf



#### Breakdown by life cycle phase

54% of food-related emissions are released in the supply chain upstream of the consumption point. A further 14% come from personal transport to grocery stores and restaurants, while 29% are released during the cooking and serving process in restaurants and home kitchens. The final 3% released downstream via decomposition in the landfill.

## WHAT'S YOUR CARBON FOODPRINT



 Calculate you food carbon footprint - see the website <a href="http://www.eatlowcarbon.org//">http://www.eatlowcarbon.org//</a>

## **Climate** Change **Impacts** and Adaptations for World Agriculture



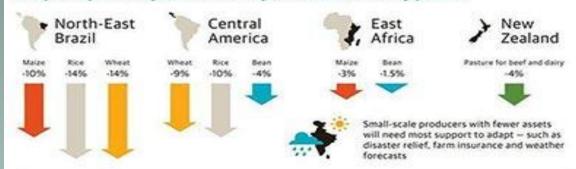
Watch the video 'How to feed the world in 2050: actions in a changing climate' - see https://www.youtube.com/watch?v=gjtII5B1zXI

## The future of food and farming: 2030s

In the 2030s, climate change will affect food and farming more strongly, particularly small-scale producers in poor countries



### Crop and pasture yields are likely to decline in many places



### Adaptation will be key

#### CROPS

Temperate regions will benefit more from adaption than tropical regions



Switching to varieties tolerant to heat, drought or salinity



Optimising irrigation



Managing soil nutrients and erosion

### LIVESTOCK

Key adaptations for small-scale producers include:



Matching animal numbers to changes in pastures



More farms that mix crops and livestock



Controlling the spread of pests, weeds

#### FISHERIES

Key adaptations for small-scale fisheries include:



Switching to more abundant species



Restoring degraded habitats and breeding sites like mangroves



Strengthening infrastructure such as ports and landing sites

SQURCES: Porter, J. R., Kie, L., Challinor, A., Cochrane, K., Howden, M., Ispail, M. M., Lobell, D., Travasso, M. I. 2014. Food Security and Food Production Systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. http://www.ipcc.wg2.gov/ Work data from ECLAC 2009, Lobell et al. 2008, Margails, et al. 2010, Thornton, et al. 2010, Wulter et al. 2008.



Climate Change Agriculture and fixed Security



# Climate Change Adaptation Best Practices for World Agriculture

Climate-Smart Agriculture Program Promotes

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





and development

goals.

Watch the video 'Climate-smart agriculture: what it's all about?'

- see https://www.youtube.com/watch?v=OjhRfvdc7bA

# Climate Change Adaptation Best Practices for Agriculture

North American Climate-Smart Agriculture Alliance Example

- 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 Change & 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 Change Adaptation Best Practices for U.S. Agriculture

### **USDA Climate Change Programs**

- Natural Resources Conservation Service. Climate Change Programs – see http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/climatechange/
- Agriculture and Food Research Initiative: Agriculture and Natural Resource Science for Climate Variability and Change – see <a href="http://nifa.usda.gov/funding-opportunity/agriculture-and-food-research-initiative-agriculture-and-natural-resources">http://nifa.usda.gov/funding-opportunity/agriculture-and-food-research-initiative-agriculture-and-natural-resources</a>
- Animal Agriculture in a Changing Climate Project – see the video at https://www.youtube.com/watch?v=7zG H5fwAaBs



## Climate Change Adaptation Best Practices for U.S. Agriculture

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.

# Agriculture Solutions to Reducing Your 'Carbon Foodprint'

### Sustainable Agriculture

- Satisfy human food and fiber needs
- Enhance environmental quality and the natural resource base
- Efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls
- Sustain the economic viability of farm operations
- Enhance the quality of life for farmers and society as a whole.

Source: 1990 Farm Bill Definition – see <a href="http://www.usda.gov/oce/sustainable/definitions.htm">http://www.usda.gov/oce/sustainable/definitions.htm</a>

# Agriculture Solutions to Reducing Your 'Carbon Foodprint'

### Sustainable Agriculture

- A whole-systems approach to food, feed, and fiber production that balances environmental soundness, social equity, and economic viability among all sectors of the public, including international and intergenerational peoples.
- Inherent in this definition is the idea that sustainability must be extended not only globally but indefinitely in time, and to all living organisms including humans..

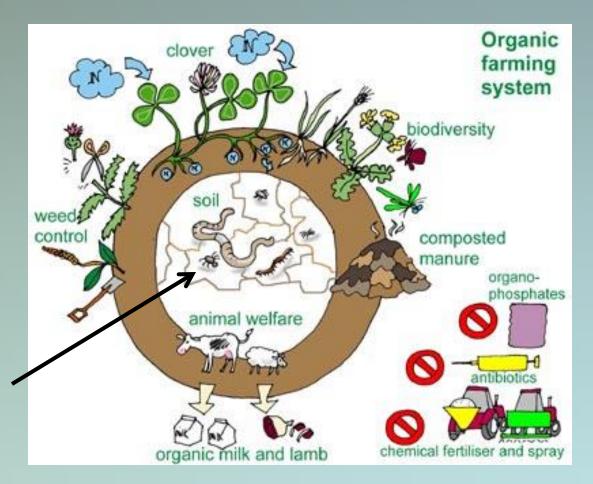
http://www.agroecology.org/Principles\_Def.html

## Sustainable Ag and Climate Change

### Organic Farming Solutions Example

Organic farming approach:

"Feed the soil and not the plants"





See the video 'Soils: our ally against Climate Change' at https://www.youtube.com/watch?v=8\_69vy7ZBxE

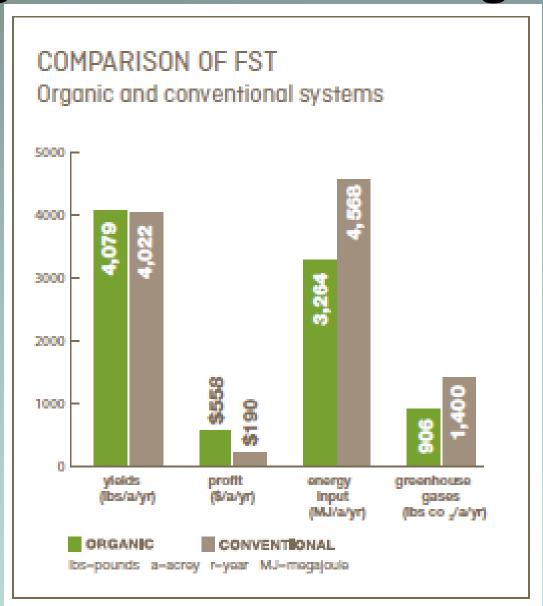
### Sustainable Ag and Climate Change

## Organic Farming Solutions Example



Regenerative Organic Agriculture and Climate Change

A Down-to-Earth Solution to Global Warming

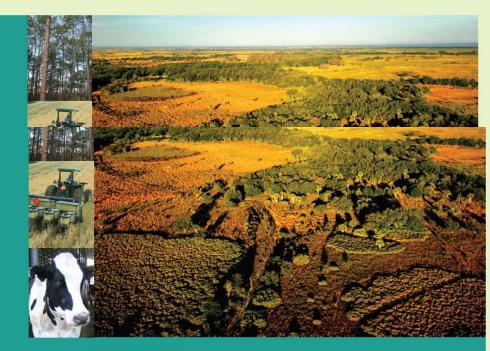


See http://rodaleinstitute.org/assets/WhitePaper.pdf

# Sustainable Agriculture and Climate Change

### Opportunities for Greenhouse Gas Reduction through Forestry and Agriculture in Florida

**APRIL 2008** 



Stephen Mulkey

Janaki Alavalapati

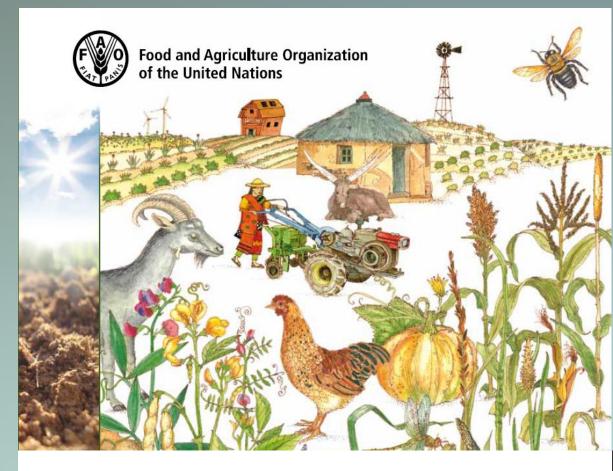
**Alan Hodges** 

Ann C. Wilkie

# Sustainable Agriculture and Climate Change: Agroecology

- In a context of a changing climate and growing concerns for more healthy food systems, agroecology is gaining momentum as a scientific discipline, sustainable farming approach and social movement.
- Agroecology 'the application of ecological concepts and principles to the design and management of sustainable agro-ecosystems' – has three facets. It is:
  - 1. a scientific discipline involving the holistic study of agroecosystems, including human and environmental elements
  - 2. a set of principles and practices to enhance the resilience and ecological, socio-economic and cultural sustainability of farming systems
  - 3. a movement seeking a new way of considering agriculture and its relationships with society.

# Sustainable Agriculture and Climate Change: Agroecology



### FINAL REPORT for the

International Symposium on Agroecology for Food Security and Nutrition

18 and 19 September 2014, Rome, Italy



Watch video 'International Symposium on Agroecology. Summary Video' – see http://www.fao.org/about/meetings/afns/en/

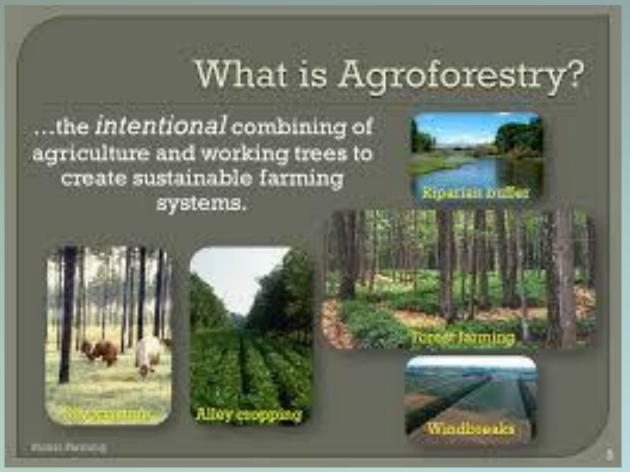
### Sustainable Ag and Climate Change



http://www.jessicasorganicfarm.com/jessicas-stand-on-youtube.html

## Sustainable Ag and Climate Change

### Agroforestry Farming Solutions Example





See the video 'Reducing greenhouse gases in Canadian farm fields' at https://www.youtube.com/watch?v=C\_J51vzeWSs

### What Can I Do?

- Support sustainable agriculture and food system programs
  - > International agriculture development
  - >US Farm Bill
  - > FL agriculture and food systems
- Learn about action steps to take from the National Sustainable Agriculture Coalition see <a href="http://sustainableagriculture.net/blog/farm-bill-climate-recs/">http://sustainableagriculture.net/blog/farm-bill-climate-recs/</a>

## What Can I Do in Sarasota County?

- Let your voice be heard on the sections of the Comprehensive Plan Update Process (see <a href="https://www.scgov.net/compplanupdate/Pages/default.aspx">https://www.scgov.net/compplanupdate/Pages/default.aspx</a>) about:
  - > climate change planning & action
  - > food policies for a sustainable local foodshed
- Learn about local action steps to take from the Office of Sustainability of Sarasota County – see

http://sarasota.ifas.ufl.edu/Sustain/climate.shtml

# Where Else Can I do In Sarasota County?

- √ Start Your Own Backyard Food Garden
- √ Start/Join a Community Food Garden





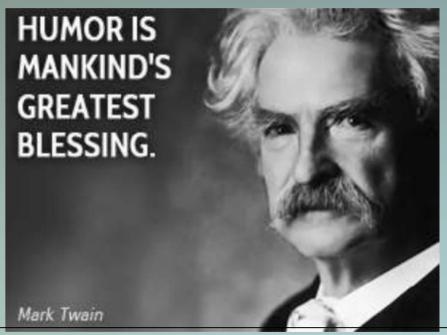


### What Can I Do in General?

- 1) Green your commute
- 2) Be energy efficient
- 3) Choose renewable power
- 4) Eat wisely
- 5) Trim your waste
- 6) Let polluters pay
- 7) Fly less
- 8) Get informed
- 9) Get involved
- 10) Support and donate

## Climate Change Requires Actions Now Tempered With A Sense of Humor

THANK YOU!!



- Imagination was given to man to compensate him for what he isn't.
- A sense of humor was provided to console him for what he is.
  - Horace Walpole

### **Online Resources**

- Brighter Planet. 2010. The American Carbon Foodprint see <a href="http://www.kohalacenter.org/HISGN/pdf/carbofoodprint.pdf">http://www.kohalacenter.org/HISGN/pdf/carbofoodprint.pdf</a>
- Colorado State University. 100 Views of Climate Change see <a href="http://changingclimates.colostate.edu/index.html">http://changingclimates.colostate.edu/index.html</a>
- Cooking Up A Story. Online Resources for Sustainable Food and Agriculture – see <a href="http://cookingupastory.com/distinctive-voices-and-authorative-online-resources">http://cookingupastory.com/distinctive-voices-and-authorative-online-resources</a>
- EPA Victoria. Ecological Footprint see
   <a href="http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/completed.asp">http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/completed.asp</a>
- International Institute of Environment and Development. Agroecology: What It Is And What It Has To Offer – see
   <a href="http://pubs.iied.org/14629IIED.html">http://pubs.iied.org/14629IIED.html</a>
- NASA. Climate Change and Global Warming: Vital Signs of the Planet
- see <a href="http://climate.nasa.gov/">http://climate.nasa.gov/</a>

### **Online Resources**

- National Sustainable Agriculture Coalition. Agriculture & Climate Change: Impacts & Opportunities at the Farm Level see <a href="http://sustainableagriculture.net/wp-content/uploads/2008/08/nsac\_climatechangepolicypaper\_final\_2009\_07\_161.pdf">http://sustainableagriculture.net/wp-content/uploads/2008/08/nsac\_climatechangepolicypaper\_final\_2009\_07\_161.pdf</a>
- Permaculture Solutions to Climate Change see <a href="http://www.permacultureclimatechange.org/">http://www.permacultureclimatechange.org/</a>
- Rodale Institute. Regenerative Organic Agriculture and Climate Change – see <a href="http://rodaleinstitute.org/assets/WhitePaper.pdf">http://rodaleinstitute.org/assets/WhitePaper.pdf</a>
- S.A.R.E. Sustainable Agriculture Course see
   <a href="http://www.sare.org/Learning-Center/Courses-and-Curricula/National-Continuing-Education-Program/Course-1-Sustainable-Agriculture">http://www.sare.org/Learning-Center/Course-and-Curricula/National-Continuing-Education-Program/Course-1-Sustainable-Agriculture</a>
- University of FL
  - FL Climate Institute. Agriculture Projects see
     <a href="http://www.floridaclimateinstitute-uf.org/projects/uf-projects/">http://www.floridaclimateinstitute-uf.org/projects/uf-projects/</a>
  - Borisova, T., et.al. Economic Impacts of Climate Change in FL –
     see <a href="https://edis.ifas.ufl.edu/fe787">https://edis.ifas.ufl.edu/fe787</a>

### **Online Resources**

- University of Florida (cont.)
  - Mulkey, S., et.al. Opportunities for Greenhouse Gas Reduction Through Forestry & Agriculture in FL – see <a href="http://snre.ufl.edu/research/files/FloridaGHG-report-WEB.pdf">http://snre.ufl.edu/research/files/FloridaGHG-report-WEB.pdf</a>

### • USDA

- Animal Agriculture in a Changing Climate see http://animalagclimatechange.org/
- Climate Change Program Office see
   <a href="http://www.usda.gov/oce/climate\_change/">http://www.usda.gov/oce/climate\_change/</a>
- Webinar Portal for Climate Science see <a href="http://www.climatewebinars.net/">http://www.climatewebinars.net/</a>
- Modern Solutions for Environmental Problems see
   <a href="http://www.usda.gov/wps/portal/usda/usdahome?navid=climate-change">http://www.usda.gov/wps/portal/usda/usdahome?navid=climate-change</a>
- World Agroforestry Center. Climate Change see
   <a href="http://worldagroforestry.org/research/climate\_change">http://worldagroforestry.org/research/climate\_change</a>

### **Online Video Resources**

- Agroecology and Climate Change Video see
   <a href="http://www.mp3suara.net/download/list/agroecology-and-climate-change">http://www.mp3suara.net/download/list/agroecology-and-climate-change</a>
- AgriComm. Trees Can Help Save The World video series see <a href="https://www.youtube.com/playlist?list=PLeR2DZtnITQtik4SxT9unDrVP5">https://www.youtube.com/playlist?list=PLeR2DZtnITQtik4SxT9unDrVP5</a>
   Gu2aEPb
- Arizona State University. Feeding the World While the Earth Cooks see <a href="https://live-washington-dc.ws.asu.edu/video/feeding-the-world-while-the-earth-cooks">https://live-washington-dc.ws.asu.edu/video/feeding-the-world-while-the-earth-cooks</a>
- BBC. The Truth About Climate Change see
   <a href="https://www.youtube.com/watch?v=2JmrmwlyhAE">https://www.youtube.com/watch?v=2JmrmwlyhAE</a> and
   <a href="https://www.youtube.com/watch?v=HK47Pnx46rM">https://www.youtube.com/watch?v=HK47Pnx46rM</a>
- CITRIS. Agroecology and Climate Change see https://www.youtube.com/watch?v=Vjx7kWGSFbk
- Commonwealth Club. Anna Lappe & Frances Moore Lappe w/ Raj Patel

   see <a href="https://www.youtube.com/watch?v=70D80V\_0ZVI">https://www.youtube.com/watch?v=70D80V\_0ZVI</a>

### **Online Video Resources**

- Fair World Project. Small Scale Farmers Cool The Planet see
   <a href="http://www.truth-out.org/speakout/item/30255-new-video-on-combating-climate-change-with-organic-agriculture">http://www.truth-out.org/speakout/item/30255-new-video-on-combating-climate-change-with-organic-agriculture</a>
- Global Footprint Network. How Big Is Your Footprint Video Series see <a href="http://www.footprintnetwork.org/en/index.php/GFN/blog/how\_big\_is\_you\_r\_footprint\_watch\_our\_video\_series">http://www.footprintnetwork.org/en/index.php/GFN/blog/how\_big\_is\_you\_r\_footprint\_watch\_our\_video\_series</a>
- Landline. Climate Change and Agriculture see
   <a href="http://www.abc.net.au/landline/content/2013/s3682086.htm">http://www.abc.net.au/landline/content/2013/s3682086.htm</a>
- McKibben, W. Local Food Systems and Climate Change see <a href="https://www.youtube.com/watch?v=ITu\_afGzVJg">https://www.youtube.com/watch?v=ITu\_afGzVJg</a>
- National Geographic.
  - Climate and Weather see
     <a href="http://video.nationalgeographic.com/video/climate-weather-sci">http://video.nationalgeographic.com/video/climate-weather-sci</a>
  - Six Degrees Could Change The World see
     <a href="https://www.youtube.com/watch?v=R\_pb1G2wloA">https://www.youtube.com/watch?v=R\_pb1G2wloA</a>
- PBS. The Lexicon of Sustainability. Know Your Food Series see <a href="http://www.pbs.org/food/shows/the-lexicon-of-sustainability/">http://www.pbs.org/food/shows/the-lexicon-of-sustainability/</a>

### **Online Video Resources**

- Pollan, M. The Great Challenge: Farming, Food and Climate Change. New York Times Conference Food For Tomorrow, 2014 – see <a href="https://www.youtube.com/watch?v=eSjHN8zefak">https://www.youtube.com/watch?v=eSjHN8zefak</a>
- Saur, T. Agroforestry for Climate Change Adaptations. National Agroforestry Center – see <a href="https://agroforestry.adobeconnect.com/p5gfd4o6jg7/?launcher=false&fcscontent=true&pbMode=normal">https://agroforestry.adobeconnect.com/p5gfd4o6jg7/?launcher=false&fcscontent=true&pbMode=normal</a>
- Savory, A. How to Green the World's Deserts and Reverse Climate Change. Ted Talk – see <a href="https://www.youtube.com/watch?v=vpTHi7O66pl">https://www.youtube.com/watch?v=vpTHi7O66pl</a>
- Sustainable World. The Soil Solution to Climate Change see <a href="https://www.youtube.com/watch?v=BxiXJnZraxk">https://www.youtube.com/watch?v=BxiXJnZraxk</a>