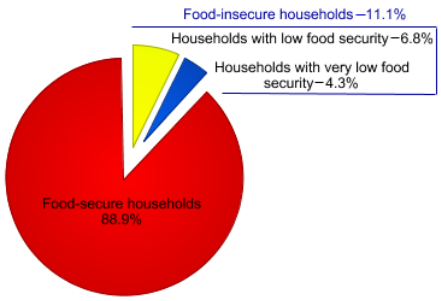
Agriculture and Land Management

Working towards sustainable food systems

Human Nutritional Requirements

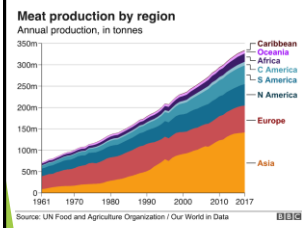
- Humans need to average 2200KCals/day
- Approximately 12% of the world is under or malnourished
  - Numbers were worse, but had improved over the 90s and 00s. Current numbers have been increasing for the past 3 years—hunger is once again on the rise
- Host of health problems from various deficiencies
  - Vitamin A (blindness and immune suppression)
  - Iron (anemia)
- Food security is the state of having reliable access to a sufficient quantity of affordable, nutritious food

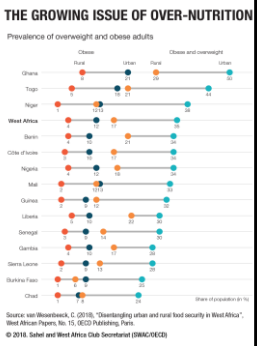
U.S. households by food security status, 2018



Source: USDA, Economic Research Service, using data from the December 2018 Current Population Survey Food Security Supplement.

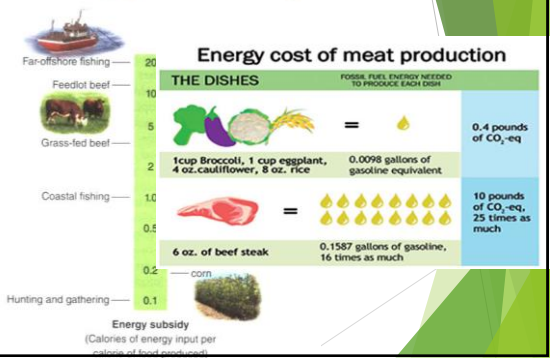
Overnutrition and Meat Consumption





Increasing industrialization is not ideal…

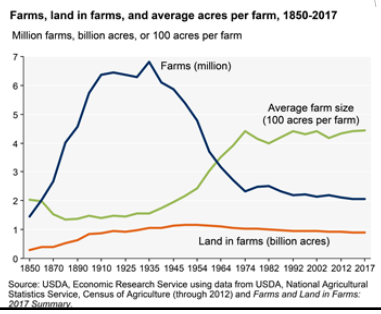
Energy Subsidy



The Green Revolution

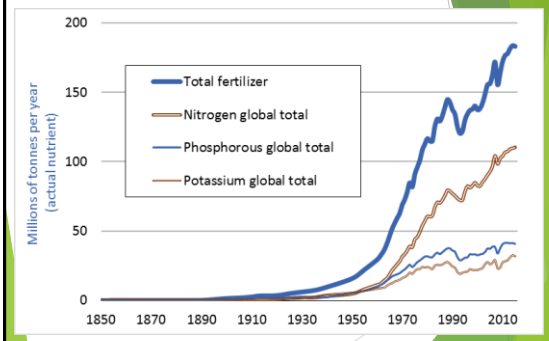
- Not as environmentally friendly as it sounds!
- Increased mechanization
- Irrigation methods
- Fertilizers
- Mono-cropping
- Pesticides
- GMOs

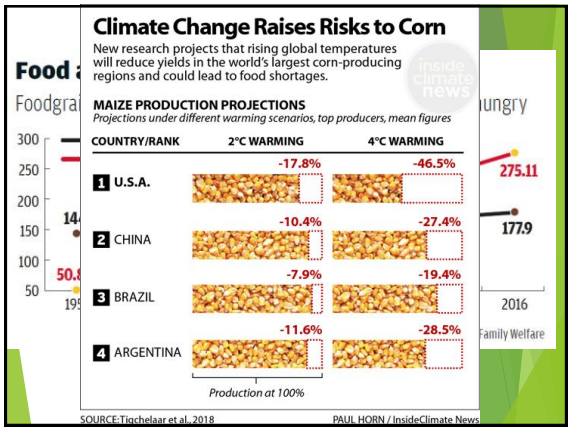
Mechanization promotes bigger farms and makes bigger harvests more profitable…



Irrigation

Fertilizers





Monocropping

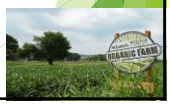
High Density Animal Farming

- Growing animals in CAFOs—concentrated animal feeding operations
- Concentrate animals in small areas to reduce costs and increase the efficiency of feeding
- Usually treat with antibiotics to prevent infections→ promotes antibiotic resistance

Manure runoff causes eutrophication

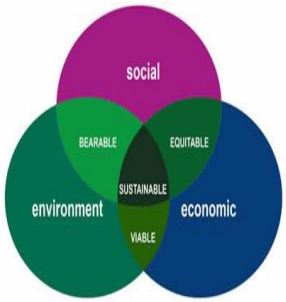
Sustainable Agriculture

- Fulfills needs for food and fiber while minimizing the use of fossil fuels, enhancing soils, and promoting economic resiliency
- Comes in many forms—some are sustainable farming practices while others involve alternative modes of production entirely
- Rodale Institute study: the planet's ***3.5 billion tillable acres*** could sequester nearly ***40 percent of current CO_2 emissions*** if they were converted to "regenerative" organic agriculture practices
  - Organic farming practices in India can increase Carbon absorption by 55% and water retention by 10%.
  - CA study found that organic farms retain 28% more C in soil than industrial farms



Sustainable agriculture integrates three main goals

- ***Environmental health***
- ***Economic profitability***
- ***Social and economic equity.***



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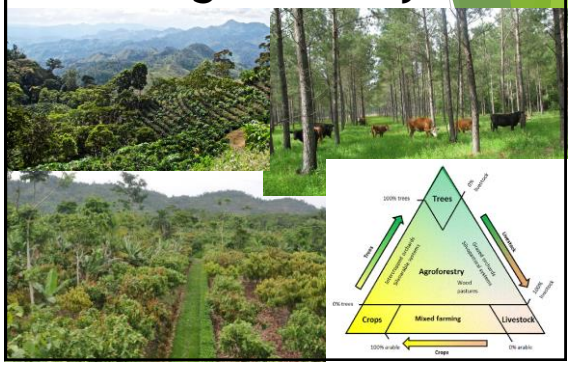
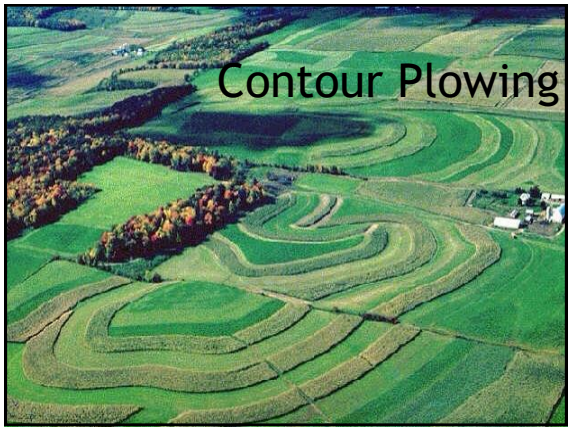
Intercropping

Crop Rotation

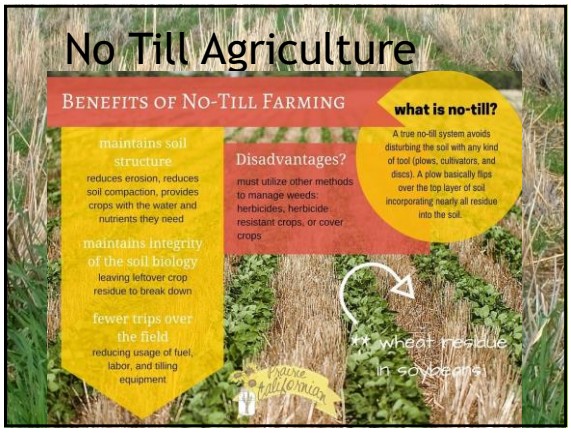
Agroforestry



Contour Plowing



No Till Agriculture



Integrated Pest Management (IPM)

- Minimise pesticide application in favor of more sustainable methods
- Minimise pest exposure, THEN treat