Mapping World Hunger

Directions: Write down the countries with *very high* and *high* hunger rates.

Prevalence of undernourishment in developing countries (2005–2007)

Very high
(undernourishment 35% and above)

High
(undernourishment 25–34%)

Moderately high
(undernourishment 15–24%)

Moderately low
(undernourishment 5–14%)

Very low
(undernourishment below 5%)

Missing or insufficient data

0   1000   2000 mi.
0   1000   2000   3000 km
Scale at latitude 35°

Flat Polar Quartic
equal area projection

Mapping hunger worldwide. *(Source: UNFAO.)*

Mapping World Hunger

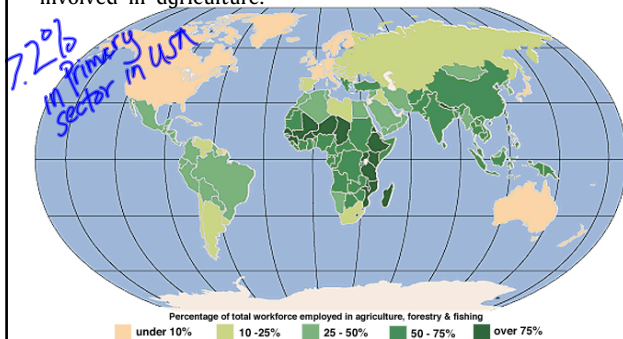**Directions: Write down the countries with *very high* and *high* hunger rates.**

Agriculture Labor

1. Write down the regions/countries with 50–100% of workers involved in agriculture.

7.2% in Primary sector in USA

Percentage of total workforce employed in agriculture, forestry & fishing
under 10%   10 -25%   25 - 50%   50 - 75%   over 75%

2. Which regions/countries have both high hunger rates and % of workers involved in agriculture?

What are some pros and cons of the globalization of agriculture and Green Revolution?

PROS	CONS

Green Revolution:

✱ Hybrid, genetically engineered crops will increase yield. Uses HYV, or High-Yield Varieties of seeds. Started with rice in the Philippines.
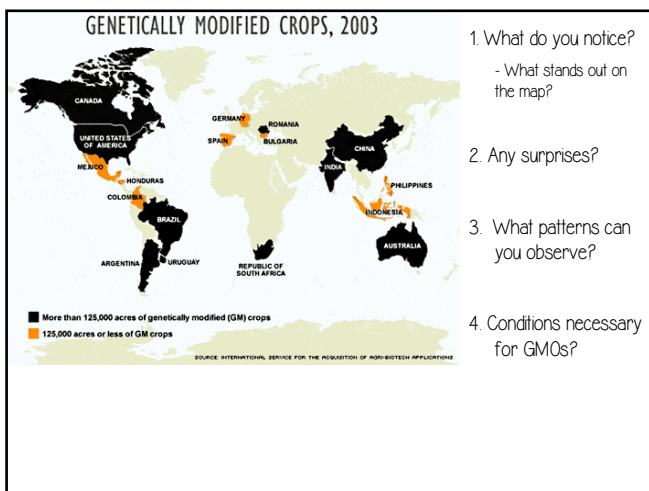
PROS:

✱ Increase the yield of crops!

✱More adaptive to soil, climate, etc.

✱ Can increase profits!

✱ More food!

✱ Higher standards of living

✱ Spin-off industries (fertilizer manufacturing)

Green Revolution:

CONS:

–More expensive to produce b/c of need to buy pesticides, fertilizers & seeds!

–Less resistant to pests and disease.

–Increase gap between rich & poor (only those with $ can afford seeds, pesticides & fertilizers.

–Poor displaced and push factor to cities, like in India

–Chemicals & poisons used increased environmental damage.

–Loss of plant diversity & genetic variety. Before farms had distinctive seeds.

–Before could save seed from best plants & use again. Now purchased seeds – no diversity and can't reuse again & again.

GENETICALLY MODIFIED CROPS, 2003

CANADA
UNITED STATES OF AMERICA
MEXICO
HONDURAS
COLOMBIA
BRAZIL
ARGENTINA   URUGUAY
GERMANY   ROMANIA
SPAIN   BULGARIA
REPUBLIC OF SOUTH AFRICA
CHINA
INDIA
PHILIPPINES
INDONESIA
AUSTRALIA

■ More than 125,000 acres of genetically modified (GM) crops
■ 125,000 acres or less of GM crops

SOURCE: INTERNATIONAL SERVICE FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS

1. What do you notice?
   - What stands out on the map?

2. Any surprises?

3. What patterns can you observe?

4. Conditions necessary for GMOs?

Conditions for GMOs:

Limits success with GMOs:

Food Shortages:

–Population growth, desertification & urbanization have threatened global food security (the accessibility, usability and availability of food).

The Food and Agriculture Organization (FAO) and UN argue we have the capacity to sustain the inevitable population growth by:

  –optimized labor practices   –water conservation

  –crop yield   –waste reduction

*1/3 of food world–wide is wasted by consumers or along the supply chain. Examples of waste: premature harvesting, unsafe handling and processing, a lack of processing capabilities, or poor storage.

From: "Failure Modes For Agricultural Technology Ventures In Developing Countries". Jerrell Gilliam, Abdalla Nassar & Khanjan Mehta. Penn State. 2014.

Food Shortages:

*Poverty, not food shortage, causes hunger.

  Developing nations:

    Do not grow enough food for their people – cash crops (often owned by large multi–national corporations left over from imperialism)

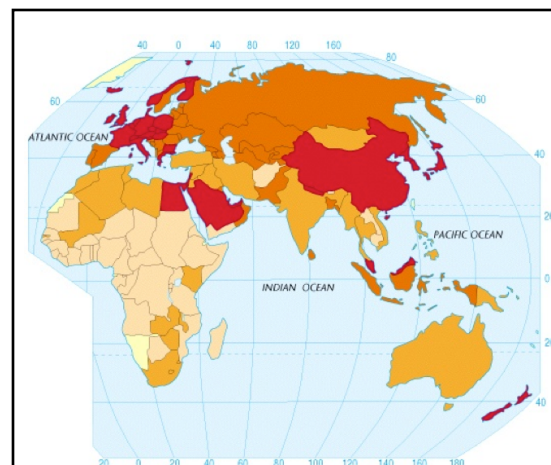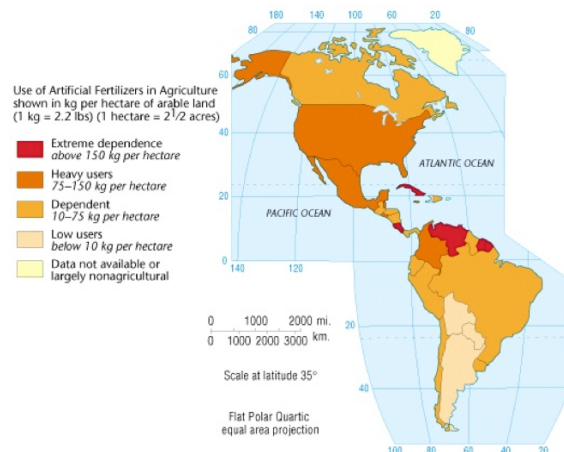   Do not have the money to buy enough imported food

    Lack of an infrastructure in developing countries. Poor transportation prevents food given by wealthy countries to distributed

    Political instability can disrupt food shipments

    Donated food often falls into hands of corrupt local officials

Increasing contamination of the land by fertilizers and pesticides

  -Used mainly by commercial farmers in Western cultures and first used in Germany in the middle 1800s

  -Central Europeans still remain very dependent on chemicals today

  -Chemicals diffused widely with the Green Revolution and neo-plantations

  -Along with the use of large machines, chemicals allow drastic reductions in labor

  -In some areas, serious contamination problems have appeared

Use of Artificial Fertilizers in Agriculture shown in kg per hectare of arable land (1 kg = 2.2 lbs) (1 hectare = 2 1/2 acres)

Extreme dependence *above 150 kg per hectare*
Heavy users *75–150 kg per hectare*
Dependent *10–75 kg per hectare*
Low users *below 10 kg per hectare*
Data not available or largely nonagricultural

ATLANTIC OCEAN
PACIFIC OCEAN

0   1000   2000 mi.
0 1000 2000 3000 km.

Scale at latitude 35°

Flat Polar Quartic equal area projection

Chemical dependency may be no more sustainable in agriculture than in the human body
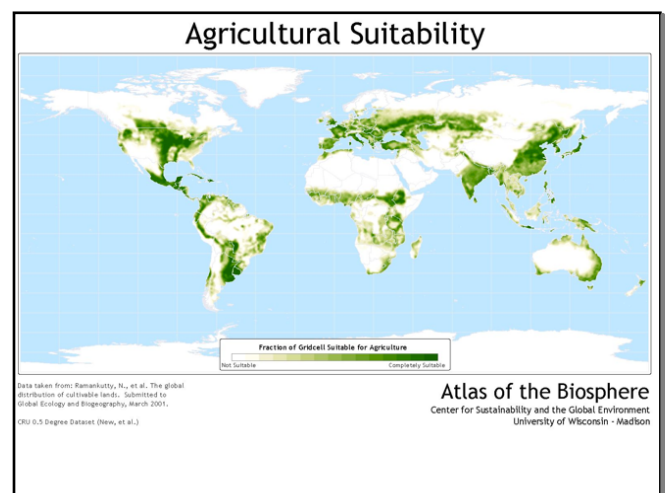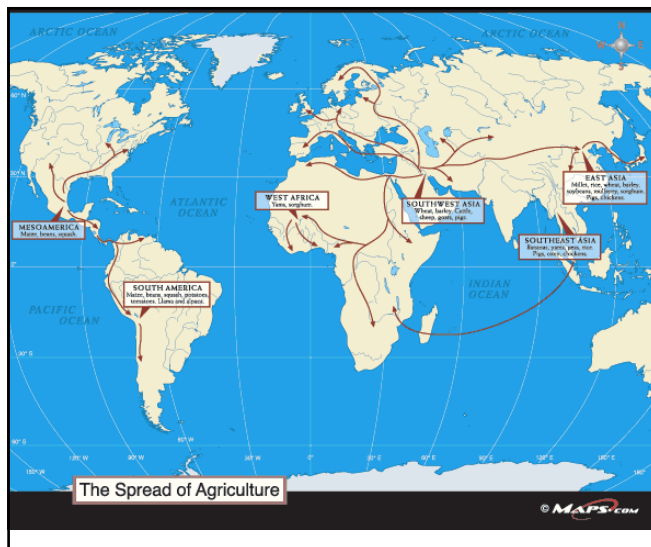
World Agriculture:

-Climate partially determines where things grow.

-Also taken into consideration is transportation factors. For example, the Caribbean grows tropical products to sell to nearby U.S.
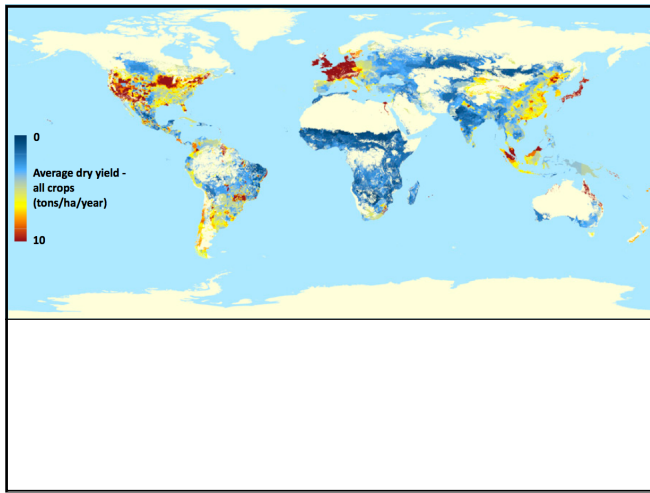
Mediterranean Agriculture:

The Mediterranean has a mild, moist winter with very little frost. Winter is the rainy season and Summer is hot, dry and a drought season. Can grow a great range of plants all year!!!

-Temperate plants (potatoes, celery, etc.) grow in the winter to early summer

-Tropical plants grown in the summer with a little irrigation of water.

**Advantages over other areas?

The Spread of Agriculture

Agricultural Suitability

Atlas of the Biosphere
Center for Sustainability and the Global Environment
University of Wisconsin - Madison

Jared Diamond - <u>Guns, Germs & Steel</u>

Diamond's East-West Axis

Definition- Jared Diamond's East-West Axis Theory was established in reference to Eurasia general east-west orientation. It stated that for a given country, having an elongated shape in an east-west orientation was more beneficial toward agricultural endeavors.

Explanation- Diamond's theory is based in the reasoning that in an elongated state, an east-west orientation results in uniform climate where the same crops could be grown throughout and thus create a staple food source that was readily available.

Example- The example used by Jared Diamond was Eurasia, whose primary beneficiary of its east-west orientation was Europe, which saw relative climate homogeneity and the ability to grow crops that were uniform throughout the region.

Elongated in an East-West Orientation
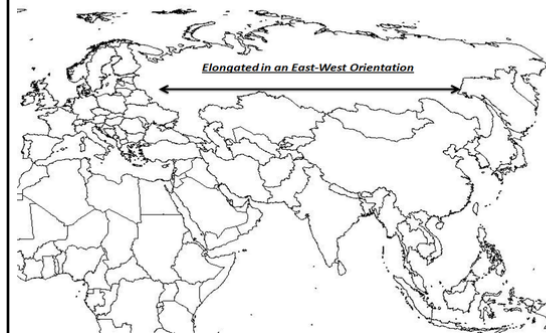
<u>Animal Domestication:</u>

Why is it so important?

- Increase food (no hunting, more secure source of food)

-Dairy, fertilizer, leather, fur & other products from animals

-Work!! (Plowing, etc.)

-Transportation

-$$$$$

-Germs!

Animal Domestication

- Genetic change that makes animal more amenable to human control
- Not the same as:
  - Taming
  - Training
  - Captive Breeding
- A lot more complicated than just capturing and taming animals

Unsuitable for Domestication

Ferocity (Zebras, Rhinos, Hippos)

High Trophic Level (Carnivores)

Picky Diet (Pandas, Koalas)

Slow Growth (Elephants)

Territoriality (Deer, Antelope)

Large Range

Solitary Habits

Reclusive Breeding or Elaborate Courtship (Cheetahs)

Tendency to Panic (Gazelles)

Suitable for Domestication

Docile (or selectable for docility)

Non-territorial

Dominance Hierarchy (Humans co-opt leadership role)

Uninhibited Breeding

Rapid Growth a plus

The Big Five Domesticated Animals:

Sheep, Goat, Cattle (& Oxen), Pig and Horse

**All are Eurasian

The Lesser Nine:

In Eurasia: Arabian & Bactrian Camels, Donkey,

Water Buffalo, Yak, Bali Cattle, Mithan and Reindeer

In South America: Llama (including Alpaca)

Why Eurasia?

-Only Land Mass with east-west axis

-Other barriers: Panama and Caribbean; Rain Forest (Africa); Trypanosome Belt (Africa)

-Extinction of Megafaunas: Not adapted to humans and vice versa; Possible candidates for domestication wiped out?

Chickens on plates
Estimated chicken consumption per person, 2012, in kilograms, dressed carcass weight
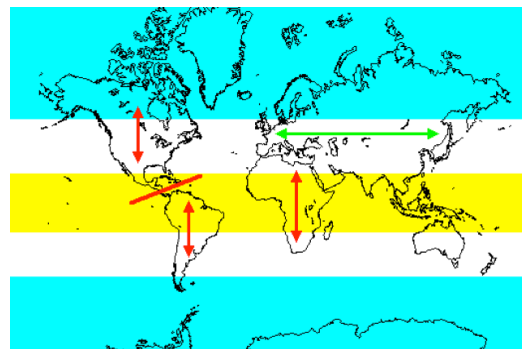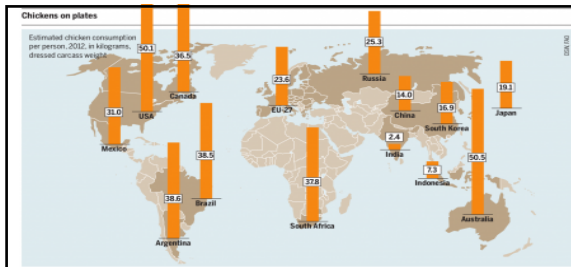
Survey Patterns:

Match the following images with one of the following survey patterns:

-Fragmented / Dispersed

-Unit-blok / Nucleated

-Rectangular

-Long-lot

-Metes and Bounds

Images from earthobservatory.nasa.gov This montage of six images from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) sensor on NASA's Terra satellite shows differences in field geometry and size in different parts of the world.

Minnesota, USA

1500 m

Kansas, USA

1500 m

In Minnesota (first), the very regular grid pattern reflects early nineteenth-century surveying; the size of the fields was determined by the need to have a big enough area to make the use of machinery efficient. Dirt roads separate the fields. In Kansas (second), center-pivot irrigation is responsible for the field pattern. Water is drawn up from a well and fed through a tube attached to metal frames. The metal frames are on wheels, and electric motors roll the frames around in a circle, pivoting around the water source, spraying water as they go.

Northwest Germany

1500 m

In northwest Germany (third), the small size and random pattern of fields is leftover from the Middle Ages. A village or town appears in the left side of the image.

Santa Cruz, Bolivia

Near Santa Cruz, Bolivia (fourth), the pie-shape or radial-pattern fields are part of a planned settlement scheme in a rainforest area. At the center of each unit is a small community, which is surrounded by fields. A small buffer of forest separates the settlements from one another. Outside of Bangkok, Thailand (fifth), rice paddies fed by an extensive network of canals that is hundreds of years old appear as small skinny rectangular fields. Some fields appear flooded (deep purple), which is part of the growing cycle of rice plants. And in the woodland-savanna region known as the Cerrado (sixth) in southern Brazil, the cheap cost of land and its flatness have resulted in enormous farms and large field sizes. In the large image, each ASTER scene covers an area of 10.5 by 12 kilometers.

Bangkok, Thailand

Southern Brazil

V. Agricultural & Rural Land Use

10. Traditional agricultural landscape – South Korea   13. Ecotourism

14. Von Thünen land use patterns   16. Green Revolution (also #70)

18. Truck farming. Nearby fruit and vegetable production 22. Subsistence farming

21. Survey system. Mete and Bounds. Township, Range, Section   24. Hogs in Southwest Asia

25. Vertical integration of agriculture   26. Ranching – land use furthest out. Graph

34. Genetic engineering – for drought and pest resistance 51. Agribusiness

57. Transhumance   66. World Agricultural maps

70. Green Revolution   71. Crop origins – Potato

78. Modern Commercial Agriculture   85. Von Thünen – distance to market

88. Where has the Green Revolution had the least impact 118. Farm size in U.S.

125. Desertification. American Southwest   132. Grain elevators on the Great Plains

127. Map of world distribution of Mediterranean agriculture   133. Indus civilization

138. Township and range promotes dispersed settlement pattern 143. Green revolution. High yield grains

147. Agribusiness – vertical integration   27. Land rent curve

von Thünen
by Minna Yamasaki

ZONES:
1) MARKET
2) DAIRY
3) LIVESTOCK
4) GRAIN
5) Ranching
6) Non-Agriculture

INTENSIVE
EXTENSIVE