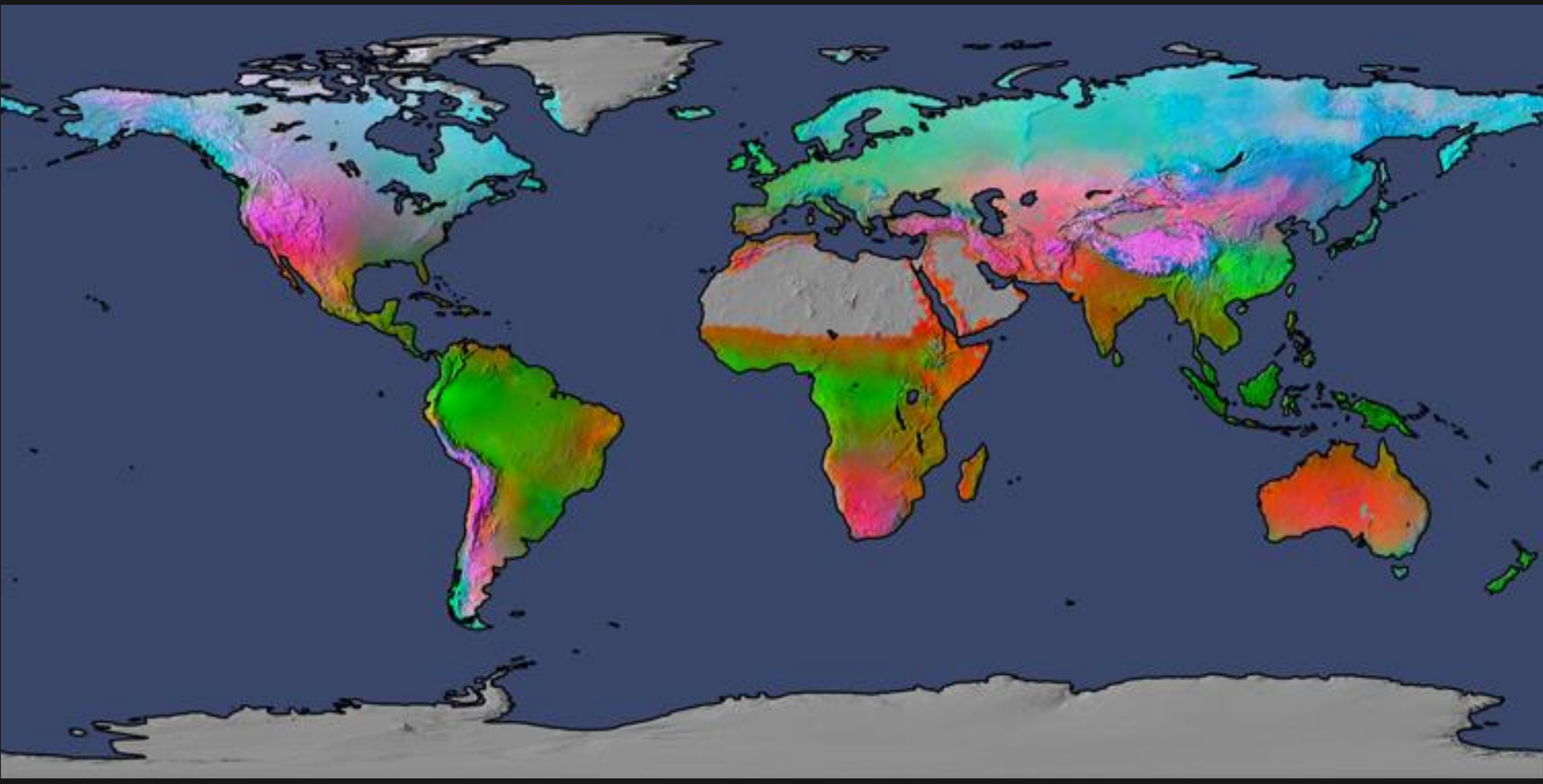
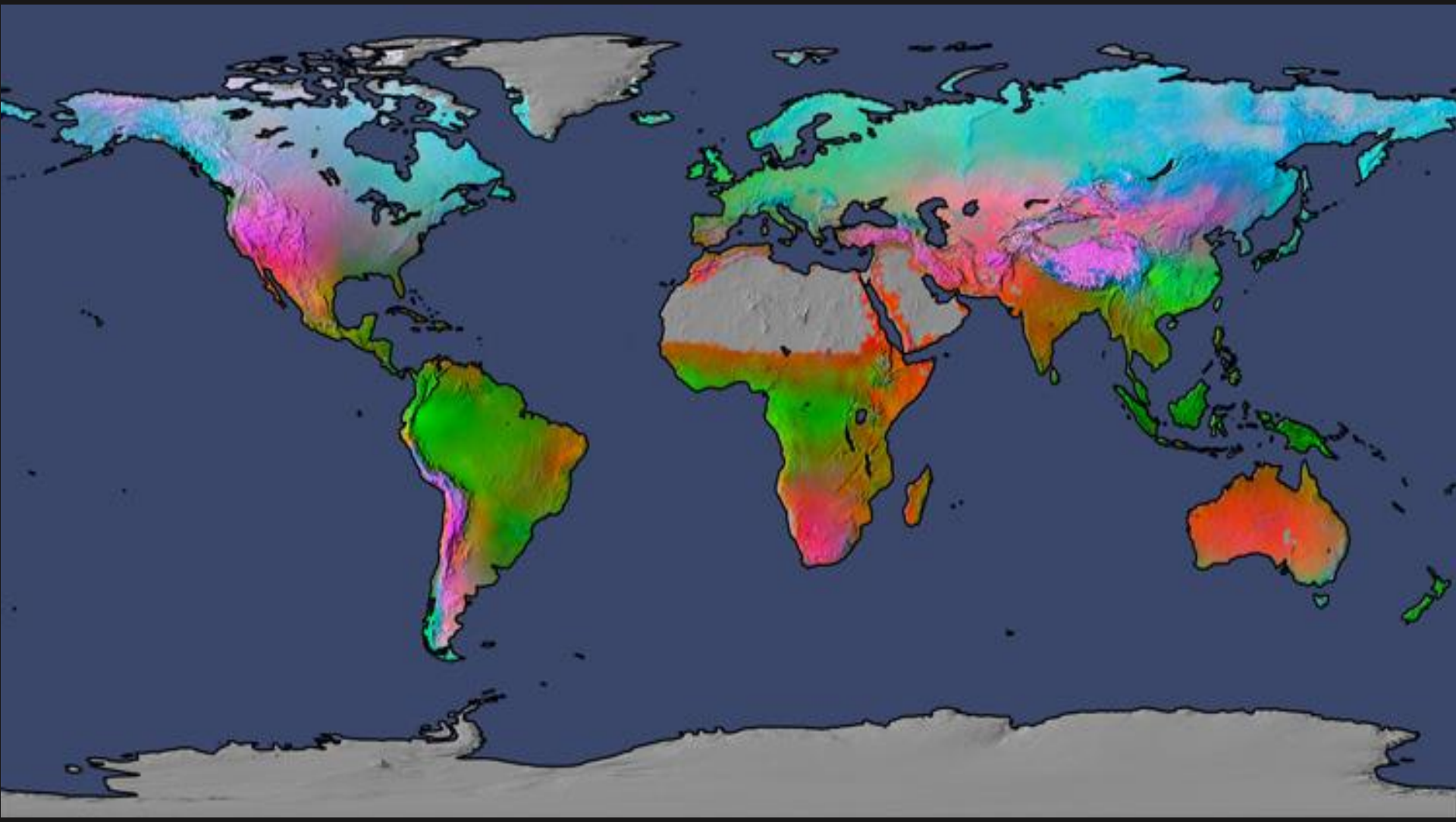


UNIT 5: Agricultural and Rural Land Use Patterns and Processes



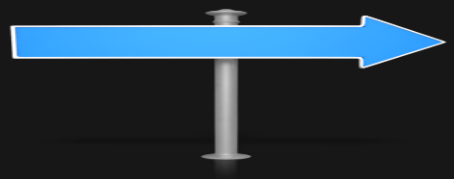
5.1 Introduction to Agriculture

Agriculture

- The purposeful tending of crops and raising of livestock in order to produce food and fiber.

The First Agricultural Revolution

- Occurred over 12,000 years ago
- Also called the Neolithic revolution
- The growth of seed crops like wheat and rice and the use of animals such as goats and sheep, replaced hunting and gathering.
- Humans could now stay in one place, grow their populations and build communities – It is the birth of civilization.



Vegetative Agriculture

- **The** growing of plants by simply cutting off a stem and planting it or dividing up the roots of a plant.

- Geographer Carl Sauer believes that this is how hunters and gather first started to grow food.

Seed Agriculture

- Seed Agriculture is farming through planting seeds rather than simply planting a part of the parent plant
- Leads to higher crop yields
- The use of seed agriculture would kick off the First Agricultural Revolution

Subsistence Agriculture

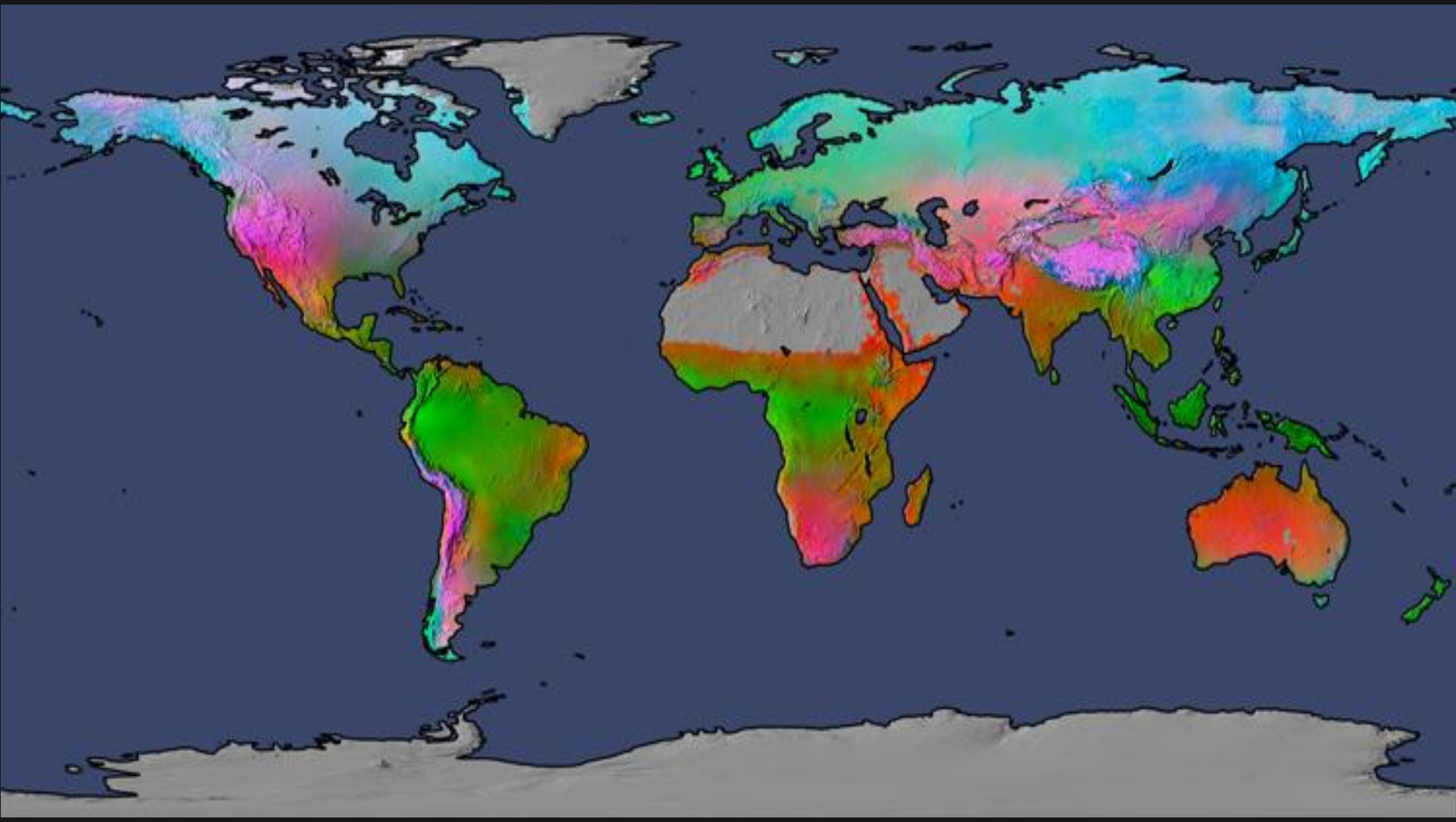
- Farmer grows enough food to feed him/herself and family.
  - Low-tech, labor intensive.
  - Any excess sold in local markets – low profit.

Commercial Farming

- Commercial farmers produce crops to sell in the marketplace

Ultimate Guide – The First Agricultural Revolution

- A. Describe the first agricultural revolution
    - Two paragraphs
- B. List and explain two benefits of the first agricultural revolution.
    - Two paragraphs: One explaining each benefit.
- C. List and explain two disadvantages of the first agricultural revolution.
    - Two paragraphs: One explaining each disadvantage.



5.2 Settlement Patterns and Survey Methods

Rural Settlement Patterns

- Two types of settlement patterns
  - Clustered
  - Dispersed

Clustered

- A group or cluster of homes located near each other in a hamlet or village.

  + Strong sense of community and sharing of services – schools, churches and common defense.

  - Farmers had to walk to and from fields and watching over livestock was difficult.

- Common in Europe

Dispersed

- Farmers live in homes spread throughout the countryside.
- Common in North America and Canada.

Linear

- Farmers homes spread along a linear land feature – river, roadway, coastline.

Open Lot System

- Before 500 CE farming took place in one large community plot that a village shared.

Enclosure Movement:

- After 500 CE individual farmers own their own plots.

Cadastral System or Land Survey Systems

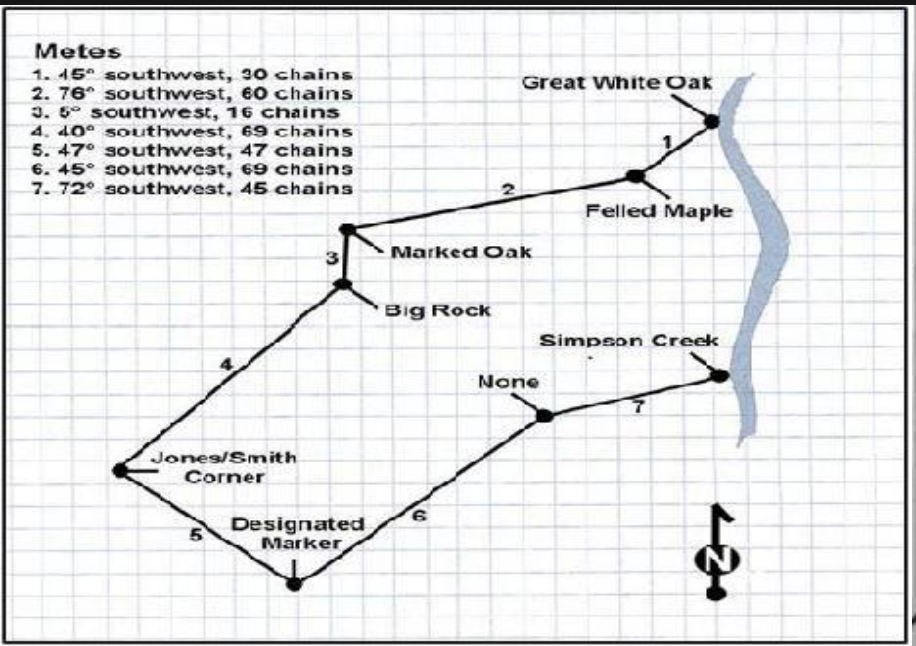
- System to determine the extent, value, and ownership of land within a district for taxation. The word comes from the Latin word cadastre referring to a registry of lands.

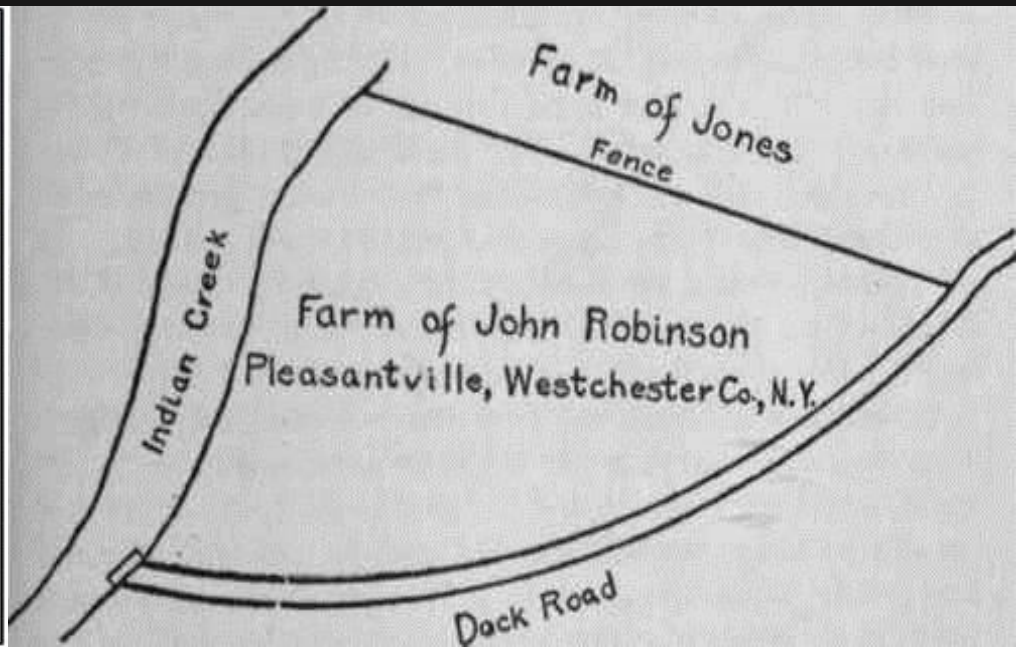
- Major Cadastral (land survey) Systems used in US.
    1. Rectangular Survey System
    2. Metes and Bounds Survey
    3. Longlot Survey System

Metes and Bound System

- A land survey system using natural features (streams, rocks, trees, etc.) to trace and define boundaries between parcels of land.

- Used in Eastern United States – primarily during the colonial era.





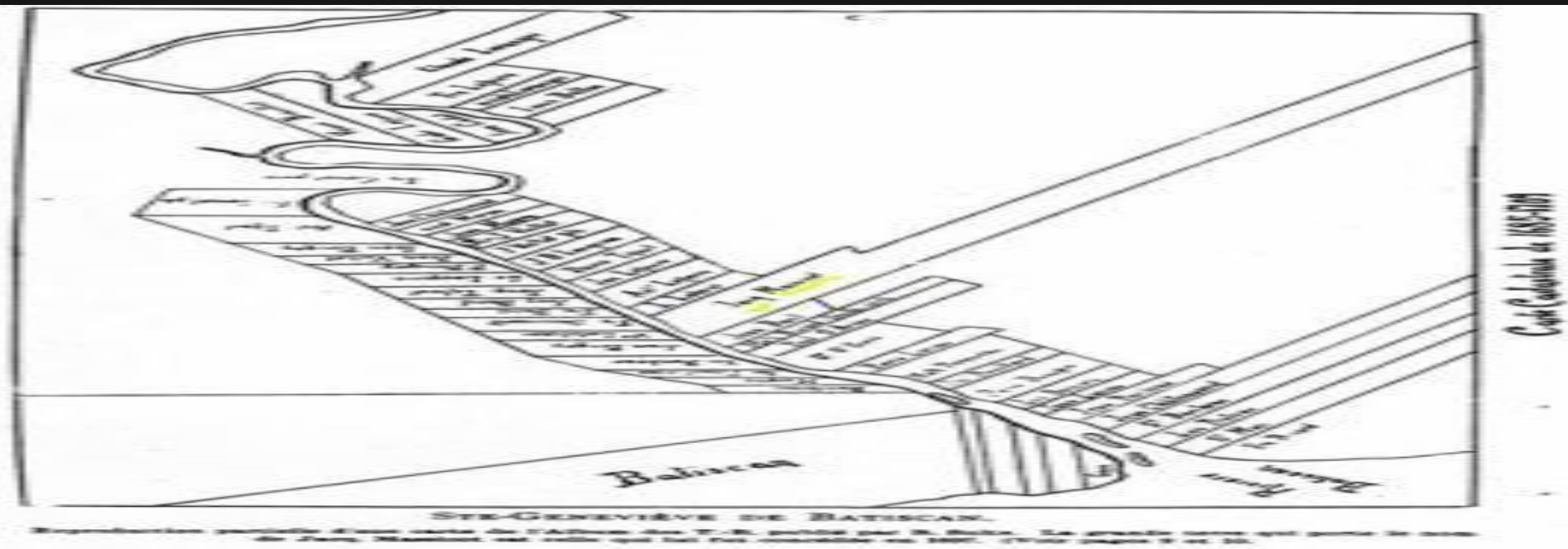
Long Lot System

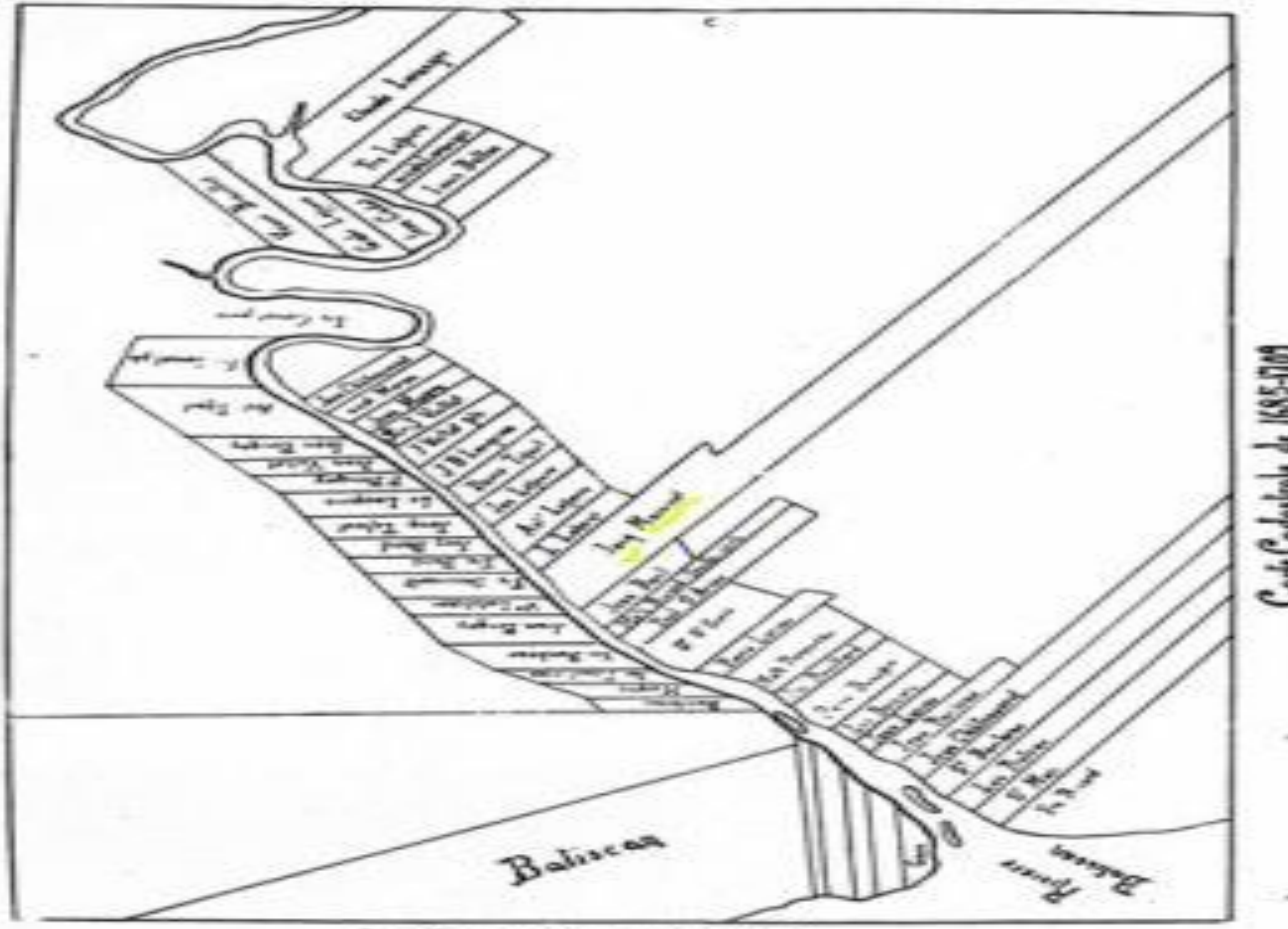
- A survey system that creates a long, narrow plot of land that extends back from a river or road. The lots are typically 10 times longer than they are wide.

- Limited use in United States – Was used in areas colonized by the French and Spanish.

  French – Mississippi Valley, Detroit, Louisiana

  Spanish – Rio Grande valley of New Mexico and Texas.



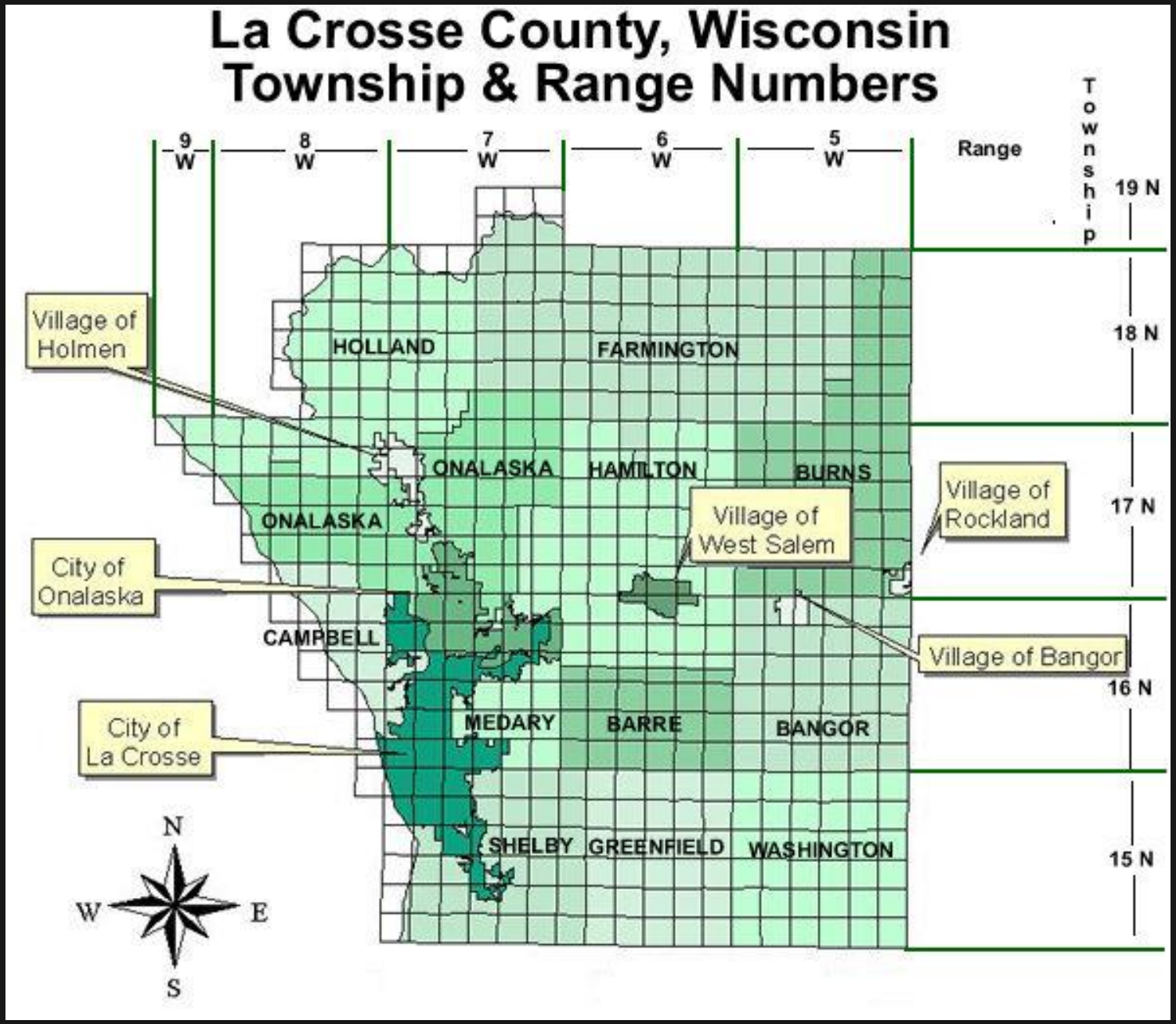


STE-GENEVIÈVE DE BATISCAN.

Reproduction partielle d'une carte de l'Album des T.-R. publié par B. Sulte. La grande terre qui porte le nom de Jean Massicot est celle qui lui fut concédée en [illegible]. (Voir pages 9 et 10.

Rectangular Survey System

- Also known as Township and Range System
- A more systematic approach used after US becomes independent
- Divided land into six mile squares called townships. The townships were than sub-divided into one mile squares.
- Created the square block patterns seen in county road systems, city streets and layout of farms and fields
- Used throughout the Midwest and Western States (everywhere except east coast)

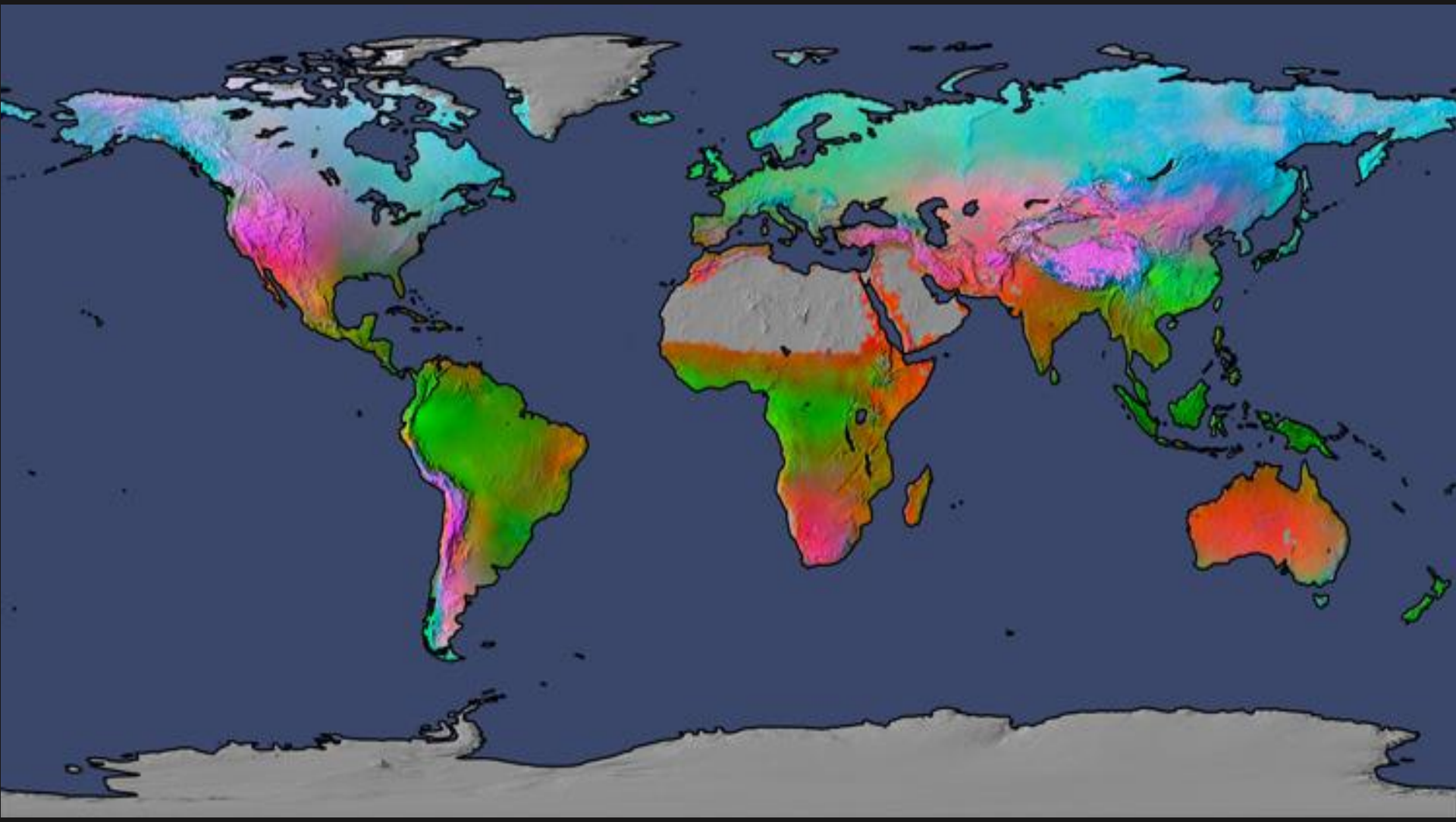

La Crosse County, Wisconsin
Township & Range Numbers
Range
Township
9 W
8 W
7 W
6 W
5 W
19 N
18 N
17 N
16 N
15 N
Village of Holmen
HOLLAND
FARMINGTON
ONALASKA
HAMILTON
BURNS
ONALASKA
Village of West Salem
Village of Rockland
City of Onalaska
CAMPBELL
Village of Bangor
City of La Crosse
MEDARY
BARRE
BANGOR
SHELBY
GREENFIELD
WASHINGTON
N
W
E
S

Ultimate Guide – Land Survey Systems

1. Identify 2 advantages and 2 disadvantages of using the metes and bound system to create property boundaries. Choose one of your advantages or disadvantages and explain why it is an advantage or disadvantage.

2. Identify 2 advantages and 2 disadvantages of using the long lot system to create property boundaries. Choose one of your advantages or disadvantages and explain why it is an advantage or disadvantage.

3. Identify 2 advantages and 2 disadvantages of using the rectangular survey system to create property boundaries. Choose one of your advantages or disadvantages listed and explain why it is an advantage or disadvantage.



5.3 Agricultural Origins and Diffusions

Animal Domestication

- Occurred between 14,000 and 8,000 years ago.
- The first use of both domesticated plants and animals happened in the fertile crescent of Southwest Asia
- Benefits = source of meat, source of milk, waste fertilized crops and pulled plows.
- Only 40 of the worlds animal species have been successfully domesticated

Plant Domestication

- Occurred sometime after animal domestication. Started as vegetative planting and moved later to seeds.

Agricultural Hearths

- Area where an agricultural innovation first appeared or originated.

- Hearths tended to develop along major rivers.

Fertile Crescent

Time Period	Crops	Early Diffusion
10,000 to 12,000 years ago	Barley Wheat Lentils Olives Oats Rye	North Africa Southern Europe Central Asia

Southeast Asia

Time Period	Crops	Early Diffusion
10, 000 years ago	Mango Taro Coconut	Southeastern Asia

East Asia

Time Period	Crops	Early Diffusion
9,500 years ago	Rice Soybean Walnut	North Central Asia Korean Peninsula

Sub-Saharan Africa

Time Period	Crops	Early Diffusion
7,000 years ago	Yams Sorghum Cowpeas Coffee African Rice	Western Africa North Africa

Mesoamerica

Time Period	Crops	Early Diffusion
5,500 years ago	Squash Peppers Maize (Corn) Potato Sweet Potato Cassava	North America South America

Columbian Exchange

- During the late 15th and 16th centuries, agricultural products were shipped both ways across Atlantic and Pacific Oceans.

- Brought eastern hemisphere crops to the west and western hemisphere crops to the east

Eastern hemisphere items

- Wheat, rice, citrus fruits, melons, horses, cattle, grapes, bananas, figs, sugar, coconuts, okra, pigs, sheep, goats, chicken, rabbits, rats

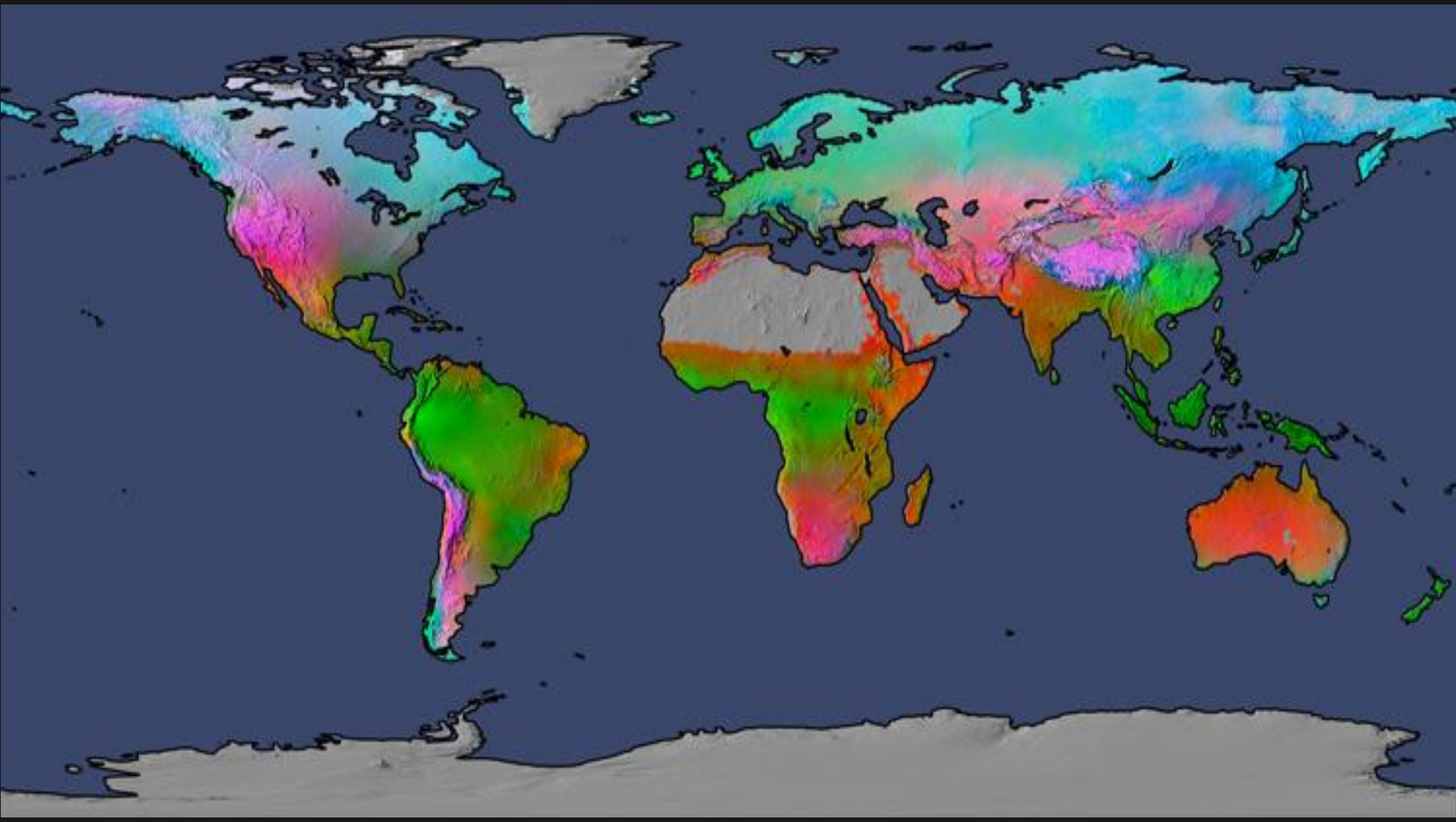
Western hemisphere Items

- Beans, squash, tomatoes, sweet potatoes, peanuts, chilis, chocolate, maize, potatoes, avocados, pineapple, manioc

Ultimate Guide – The Columbian Exchange

- Describe and explain the impact of the Columbian exchange. Include how it impacted;
  - The migration and movement of people
  - Population numbers
  - Cultures on both sides of the exchange
  - Boundaries and politics (think colonialism)

  - 1.5 pages



5.4 The Second Agricultural Revolution

The Second Agricultural Revolution

- Coincided with the Industrial Revolution in the 17th and 18th centuries.
- Massive migration to industrial cities caused huge jump in demand for food
- New farming technology was invented – new fertilizers, irrigation systems, storage systems
- More Food = More People

Major Advancements of the Second Ag Revolution

Advancement	Date	Effect
Iron / Steel Plow	1819	1. Reduced Human Labor 2. Breaks through harder soils 3. Increased amount of crops grown 4. Increased size of farms

Major Advancements of the Second Ag Revolution

Advancement	Date	Effect
Mechanized Seed Drilling	18th Century	1. Planted and covered each seed quickly 2. Increased yield per acre

Major Advancements of the Second Ag Revolution

Advancement	Date	Effect
McCormick Reaper / Harvester	1831	1. Increased harvest 2. Reduced human labor

Major Advancements of the Second Ag Revolution

Advancement	Date	Effect
Mixed Nitrogen and Nitric Acid Fertilizer	1903	Increased crop yields per acre

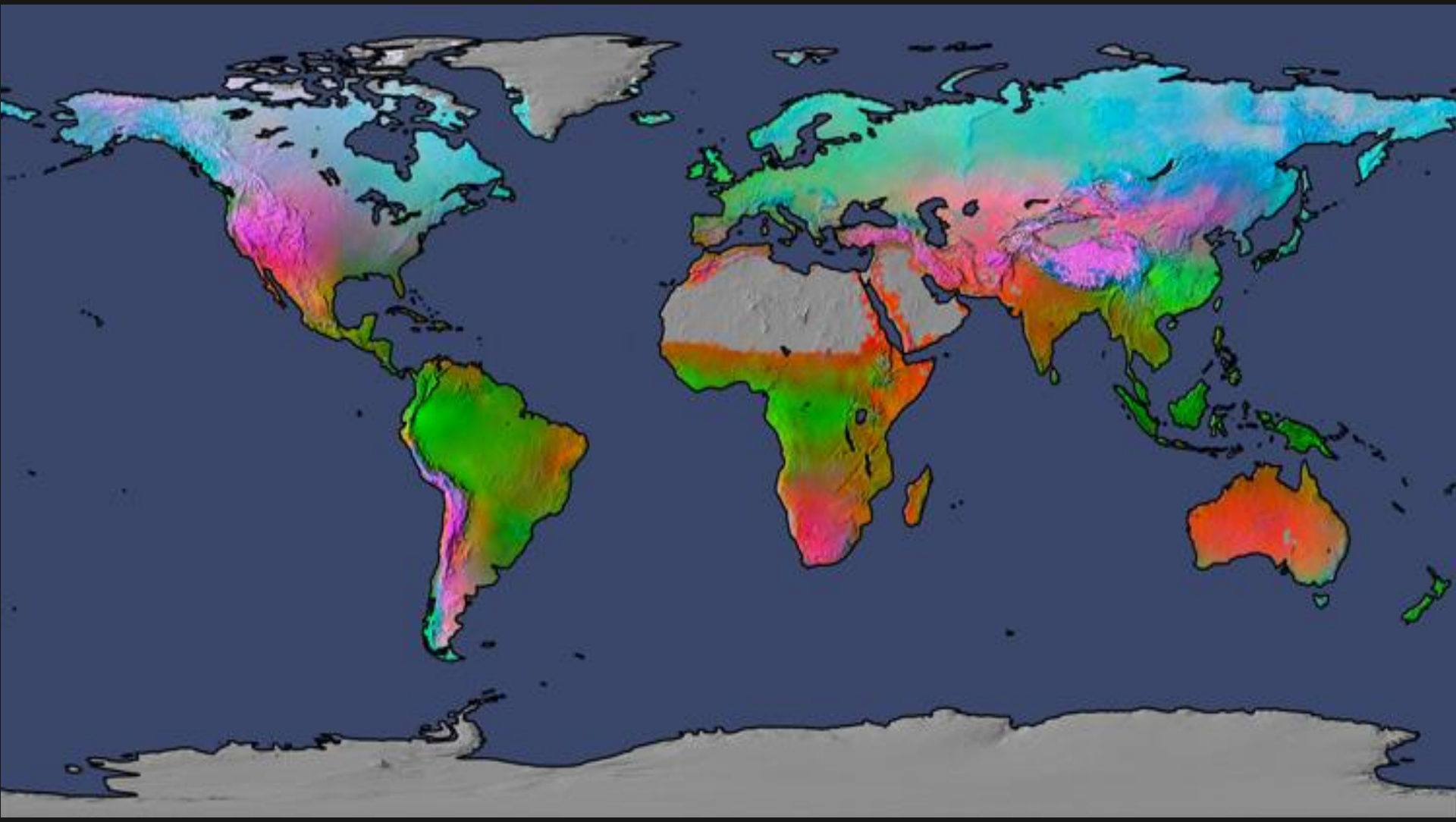
Major Advancements of the Second Ag Revolution

Advancement	Effect
Crop Rotation: Planting a different crop in the same field. Cycle through 2-3 different crops on a seasonal rotation.	1. Reduces soil erosion 2. Increases soil fertility by replenishing nutrients 3. Increases crop yields

Ultimate Guide: Impact of the Second Ag Revolution

- Describe and explain how the second agricultural revolution led to longer life spans and an increase in the population.
- Describe and explain how the second agricultural revolution impacted farm labor and the need for agricultural workers.
- Describe and explain how the second agricultural revolution led to urbanization.

- 1.5 pages



5.5 The Green Revolution

The Third Agricultural Revolution

- Began in the late 1800's
- Was the globalization of industrialized farming
- Globalizes the use of
  - Mechanized Farming
  - Chemical Pesticides
  - Chemical Fertilizers
  - Mechanical Irrigation

Green Revolution

- The invention and rapid diffusion of new agricultural techniques during the 1970's and 1980's.
- Began as agricultural experiments funded by US charities to improve Mexico's wheat grain production and reduce hunger in developing countries
- Introduced new higher yield seeds and expanded the use of fertilizers and pesticides.
- The so called "miracle seeds" increased agricultural production faster than population growth.

Hybrids

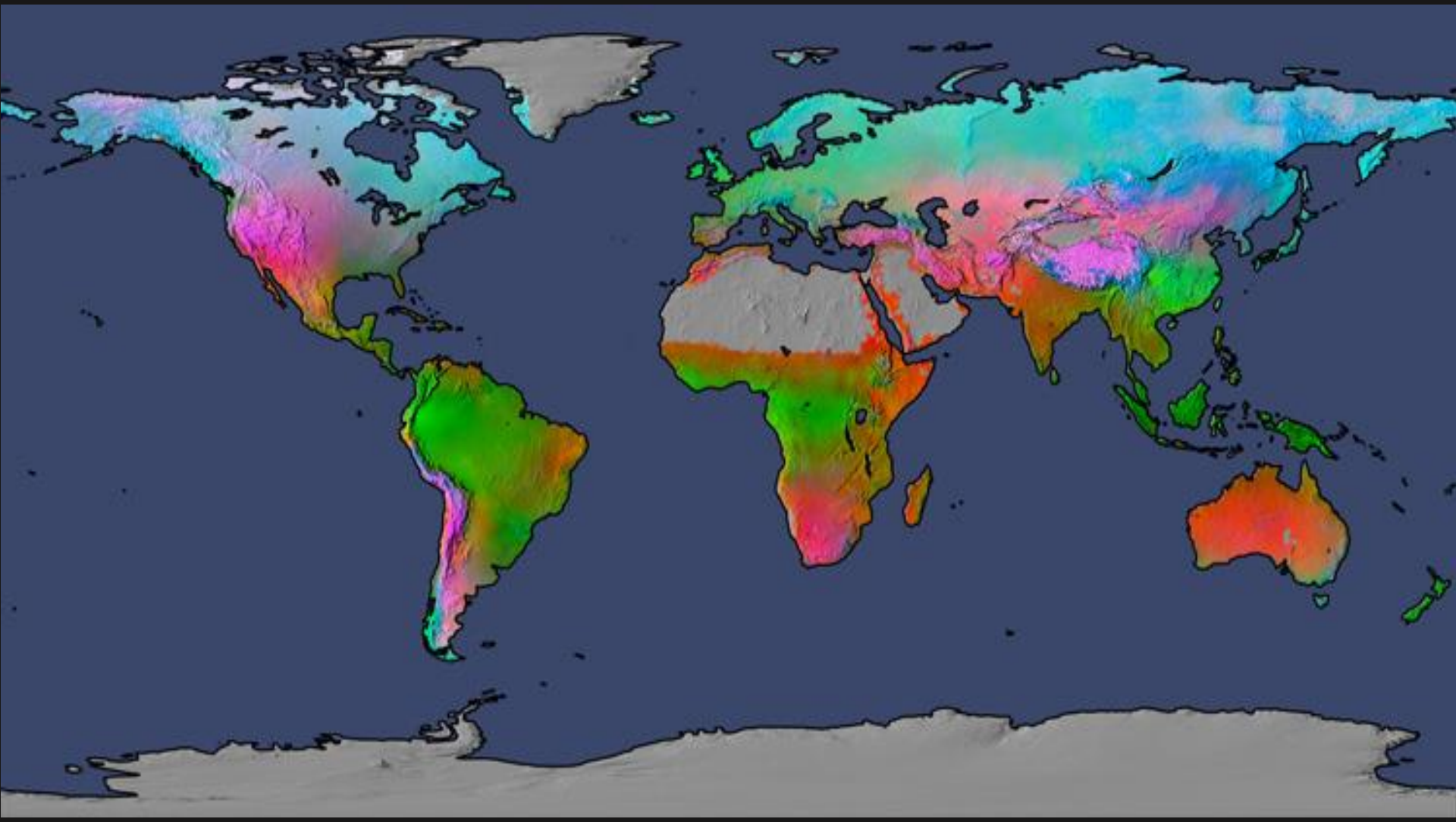
- The process of breeding together two plants that have desirable characteristics.
- Example: Created a new strain of rice – using long grain Indonesian rice and the denser Taiwan dwarf rice. Created a longer and denser hybrid.

GMO's

- Use engineering techniques to change the DNA of a seed.
- Most corn, soybeans and cotton grown in USA are now GMO varieties.
- GMO varieties have been developed to increase yield, resist disease and to resist the chemicals used to kill weeds or pests.

Machinery

- The use of machinery such as tractors, tillers, seeders and grain carts spread to developing countries.



5.6 Agricultural Production Regions

Agricultural Practices, Regions and Bioclimatic Zones

- Crops and livestock thrive best in specific types of bioclimates. So each bioclimatic zone is home to different types of agriculture.

Pastoralism

- The breeding and herding of animals to produce food, shelter, and clothing for survival.
- May be sedentary or nomadic.
- Practiced in areas Arid and Semi-Arid zones.

Shifting Cultivation

- Farmers rotate the fields they cultivate to allow the soil to replenish its nutrients, rather than farming the same plot over and over again.

- Practiced in tropical zones (rainforests).

Plantation Farming

- **Plantation or estate that specializes in one or two high demand crops for export**
- **Introduced by European colonizers**
- **Common crops – coffee, tea, pineapples, palms, coconuts, tobacco, sugarcane and cotton**
- **Practiced in tropical and subtropical zones**

Mixed Crop and Livestock Farming

- **Growing both crops and raising animals.**
- **Most of the crops are used to feed the livestock.**
- **Most income comes from selling animal products.**
- **Usually found near large urban areas where land is not available for more extensive farming.**
- **Practiced in cold and warm mid latitude zones.**

Large-Scale Grain Production

- **Grains are grown to be exported to other places for consumption**
- **Wheat is most common large scale crop**
- **Production Dominated by US and Canada – Growing more than half the world's wheat.**
- **Practiced in Cold mid latitude zones**

Spring Wheat

- Planted in early spring and harvested in early Autumn. Grown in colder regions including Montana, North Dakota and South Dakota.

Winter Wheat

- Planted in the fall and harvested in early summer. Grown in warmer regions including Kansas, Oklahoma and Colorado.

Dairying

- **Production of milk based products for the marketplace.**
- **Practiced in cold and mid latitude zones.**

Milkshed

- Zone around a city center which milk can be produced and shipped to the marketplace without spoiling.

Mediterranean Agriculture

- A form of specialized agriculture that is known for producing grapes, olives, citrus and figs
- Crops require a warm year-round climate
- Practiced in warm mid latitude zones

Transhumance

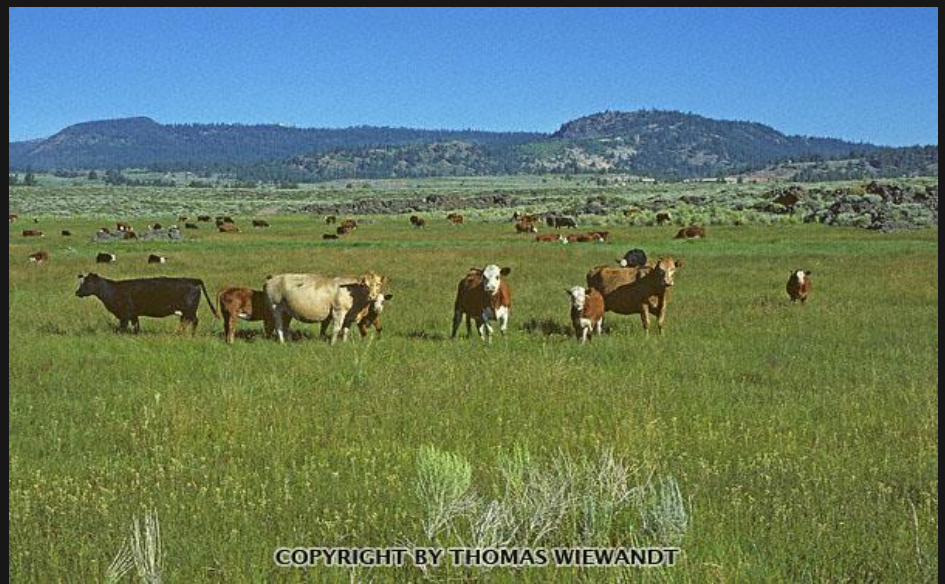
- Herders in Mediterranean zones often practice transhumance – Seasonal herding of livestock form higher to lower elevations. Commonly goats and sheep.

Livestock Ranching

Commercial grazing – raising animals on a plot of land on which they graze

Requires extensive land

Practiced in Dryland zones



Intensive Subsistence Agriculture

- Farmers cultivate a small plot of land, very efficiently, to produce food for their families.
- Found in regions that are highly populated – land is relatively scarce.
- Rice is the primary intensive subsistence agricultural crop.
- Practiced in warm mid latitude zones.

Extensive Land Use Agriculture

- An agricultural production system that uses small inputs of labor, fertilizers, and capital, relative to the land area being farmed.

- Extensive farming most commonly refers to sheep and cattle farming in areas with low agricultural productivity, but can also refer to large-scale growing of wheat, barley and other grain crops

Intensive Land Use Agriculture

- A method of farming in which as much use is made of the land as possible by growing crops close together, growing several crops in a year or using large amounts of fertilizer. The goal is to get the most yield possible per acre.

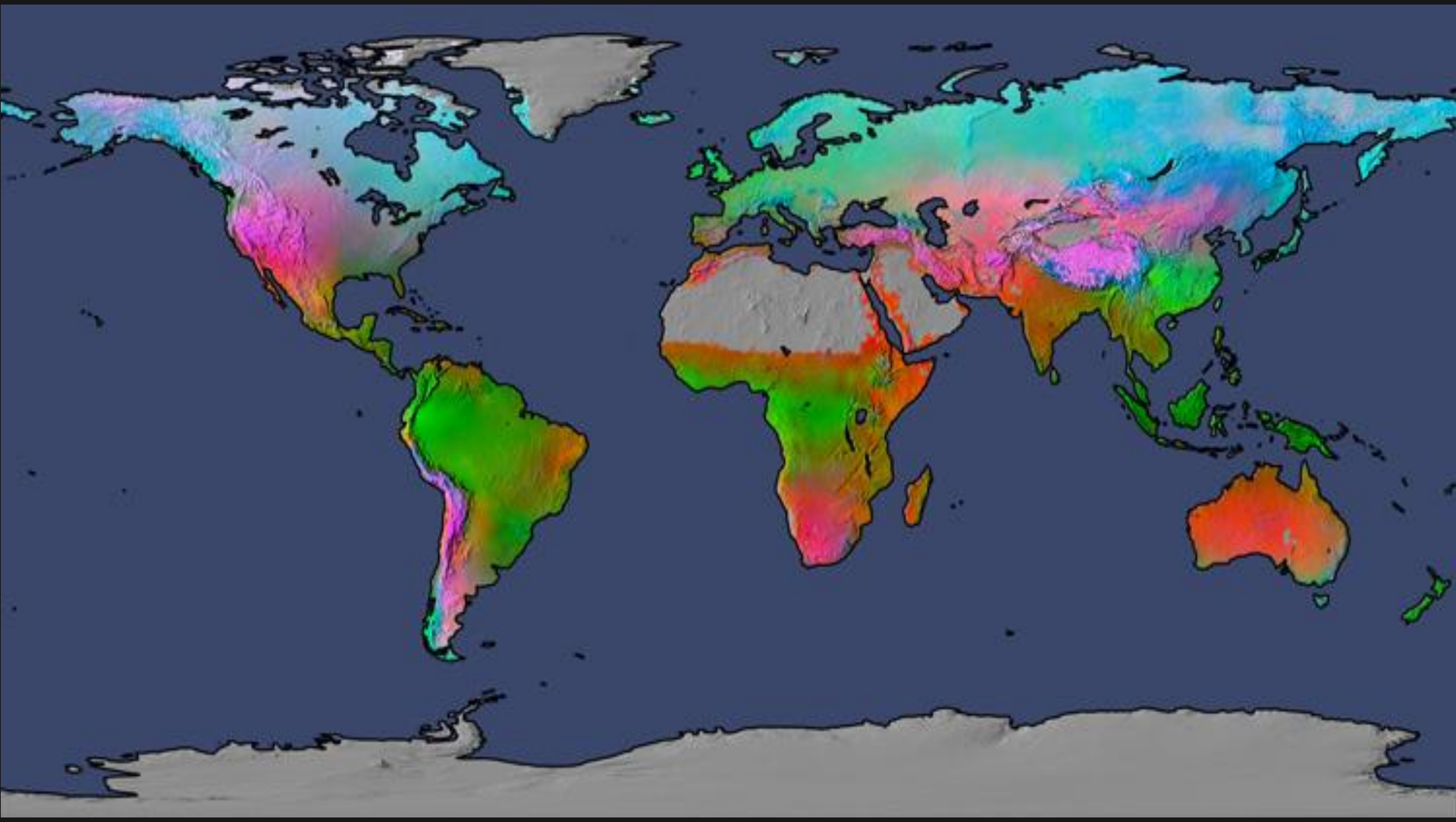
Double cropping

- **An intensive land use practice**

- **A second crop is planted after the first has been harvested.**

Intercropping

- Growing two or more crops on the same land at the same time.
- Example – planting a legume (bean) crop alongside a cereal crop (grain).



5.7 Spatial Organization of Agriculture

Increasing Intensity

- Regions of the world that traditionally practiced extensive agriculture are under pressure to use land more intensely.
- Increases in population, demand for food and global competition have driven the change.

Beef Industry

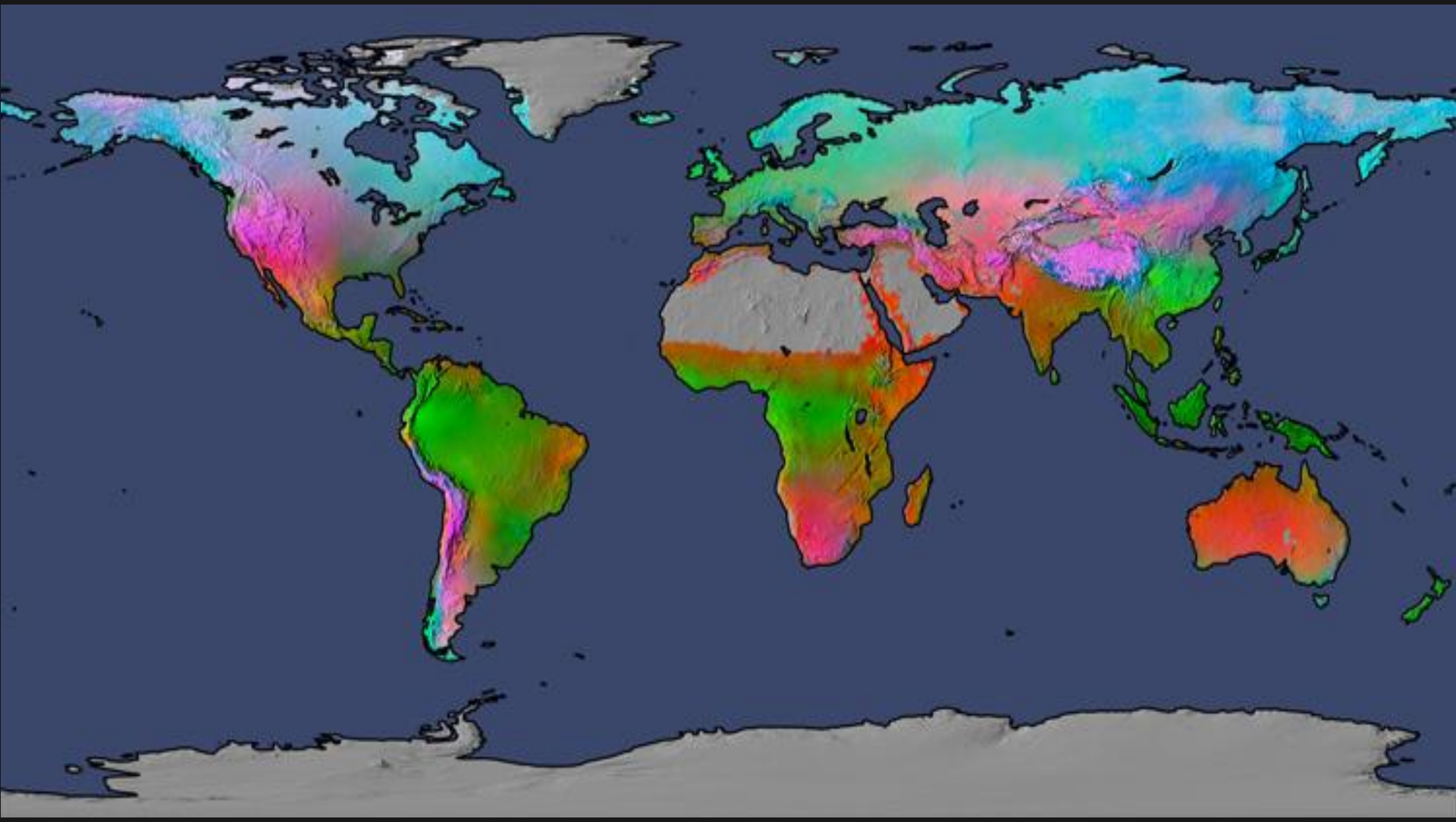
- Combines extensive and intensive practices.
  - Extensive phase – Cattle are born and raised on large ranches, free to roam and graze.
  - Intensive phase – As cattle reach maturity they are transferred to feedlots to be fattened before slaughter.
- Global expansion of fast food and demand for meat has led to more factory farms and processing centers. Extensive phase is being eliminated.

Feedlot

- An area or building where livestock are fed and fattened up.

Large Scale Farming vs. Small Family Farms

- Family and subsistence farmers cannot compete with large scale farming operations, thus eliminating many small scale operations.
- Large scale operations can produce food at a much cheaper per unit cost.
- Large scale farming is buying land to grow luxury crops and non-food items (timber, rubber, cotton), pushing subsistence farmers out.

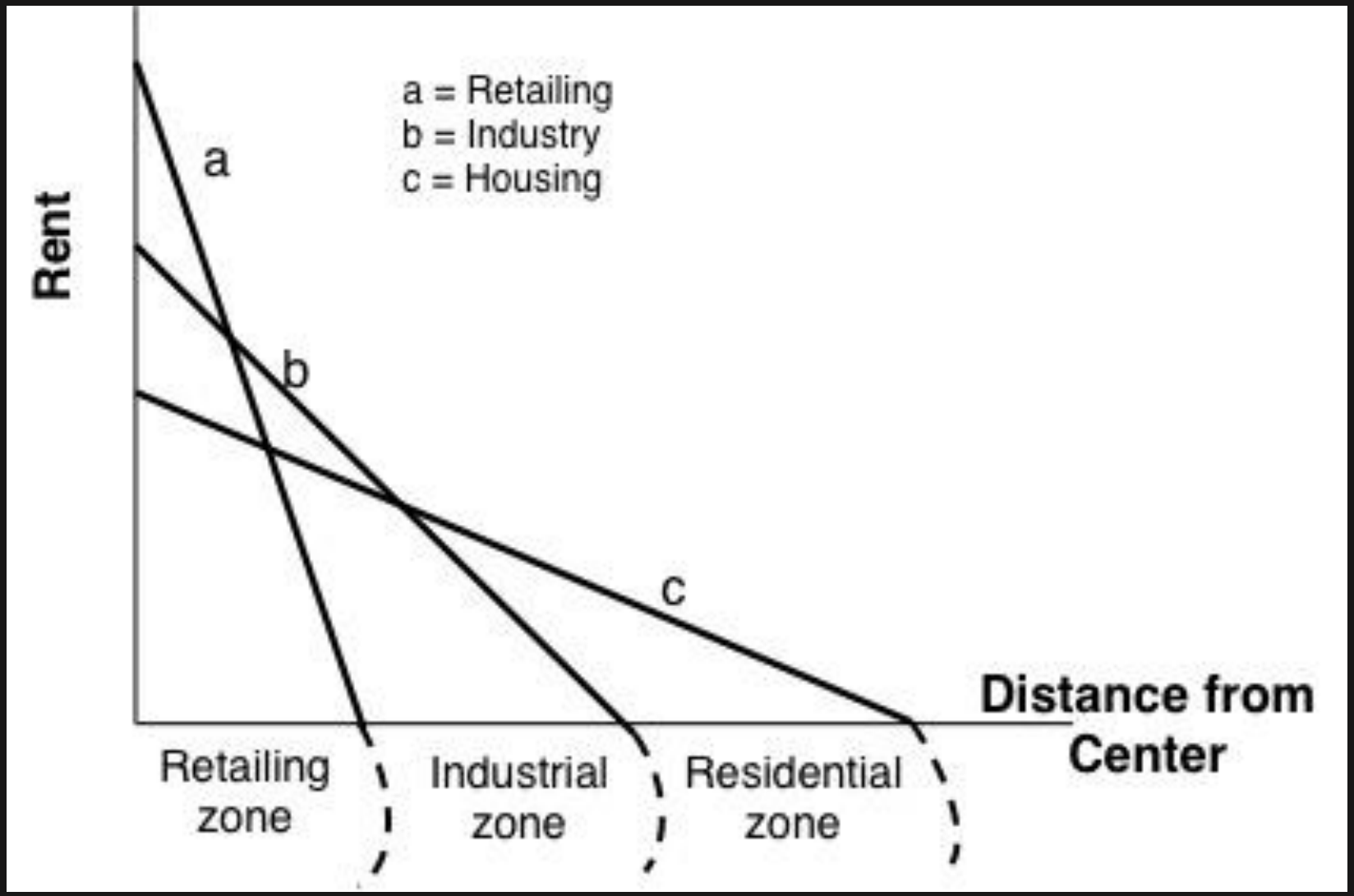


5.8 The VonThunen Model

Bid-Rent Curve

- Predicts and explains real estate prices in and around an urban area
- Land in CBD has the highest accessibility and visibility and will have the highest rent prices
- Land decreases in value moving away from the CBD

Bid-Rent Curve



Von Thunen's Agricultural Location Theory

- Model explains and predicts where different agricultural activities would take place around a city's market place

Model Basics – A central marketplace is surrounded by agricultural activity zones that are in concentric rings.

Each ring represents a different type of agricultural land use.

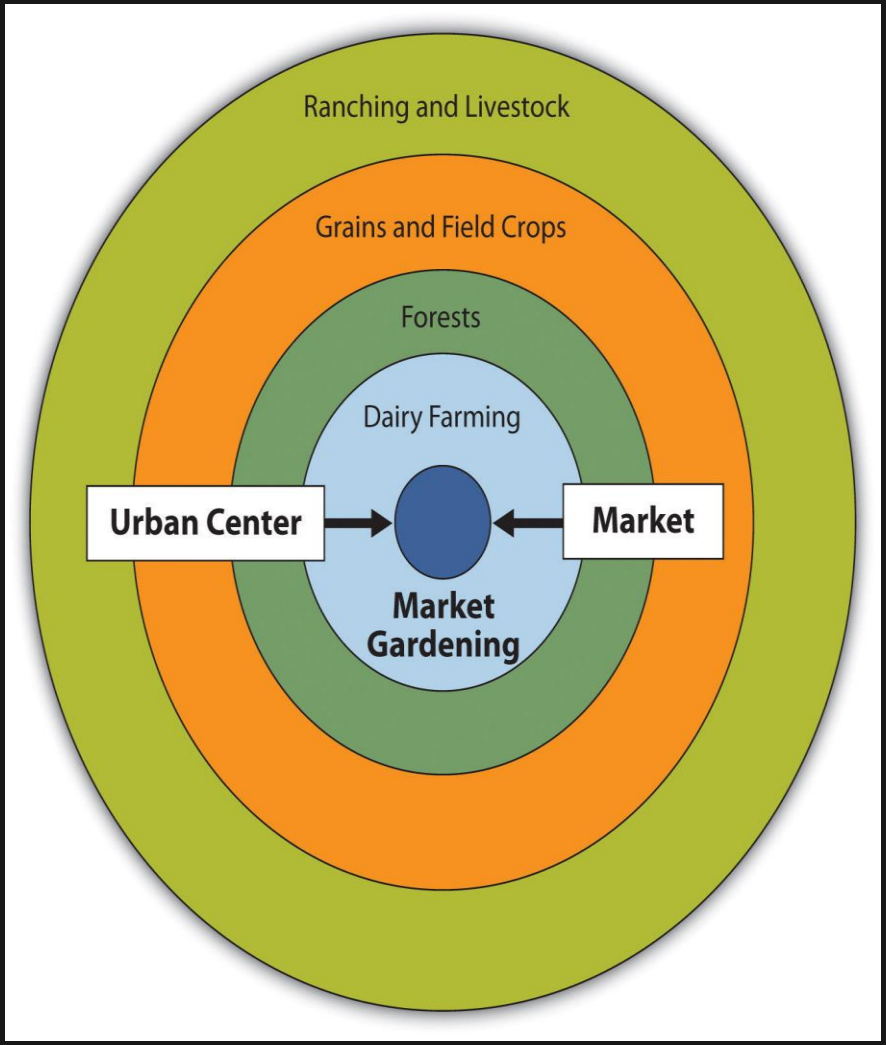
Center = CBD (marketplace)

Ring 1 = Horticulture

Ring 2 = Forestry

Rings 3 = Extensive farming – Grains

Ring 4 = Ranching and Livestock



Horticulture

- Type of agriculture that includes market gardening, truck-farming and dairying. Horticulture produces crops that are perishable (spoil relatively quickly) and there is a need to get them to the market quickly. Considered an intensive form of agriculture.

Market Gardening

- A relatively small-scale production of fruits, vegetables and flowers as cash crops, frequently sold directly to consumers and restaurants.

Von Thunen's Big Ideas

- **Agriculture that requires less land (intensive) will be located closer to the city.**
- **Agriculture that requires more land (extensive) will be located farther from the city**
- **Products that spoil easily will be located closer to the marketplace**
- **Products that are cheaper and easier to transport will be located farther away from the marketplace**

Ultimate Guide – Von Thunen

Define and explain the type of farming taking place in each ring. After defining the type of farming, explain WHY that type of farming is located in the ring it is associated with.

When determining WHY consider factors such as:

The types of crops grown (advantages or disadvantages to growing them closer or further to market).

Type and amount of land needed.

Costs associated with that type of crop – land and transport.

Have one paragraph defining and explaining each ring

1. Horticulture
2. Forestry
3. Extensive agriculture
4. Ranching and Livestock

Identify 2 weaknesses or criticisms of Von Thunen's model. Describe and explain each weakness.

2.+ pages

Ultimate Guide – Von Thunen

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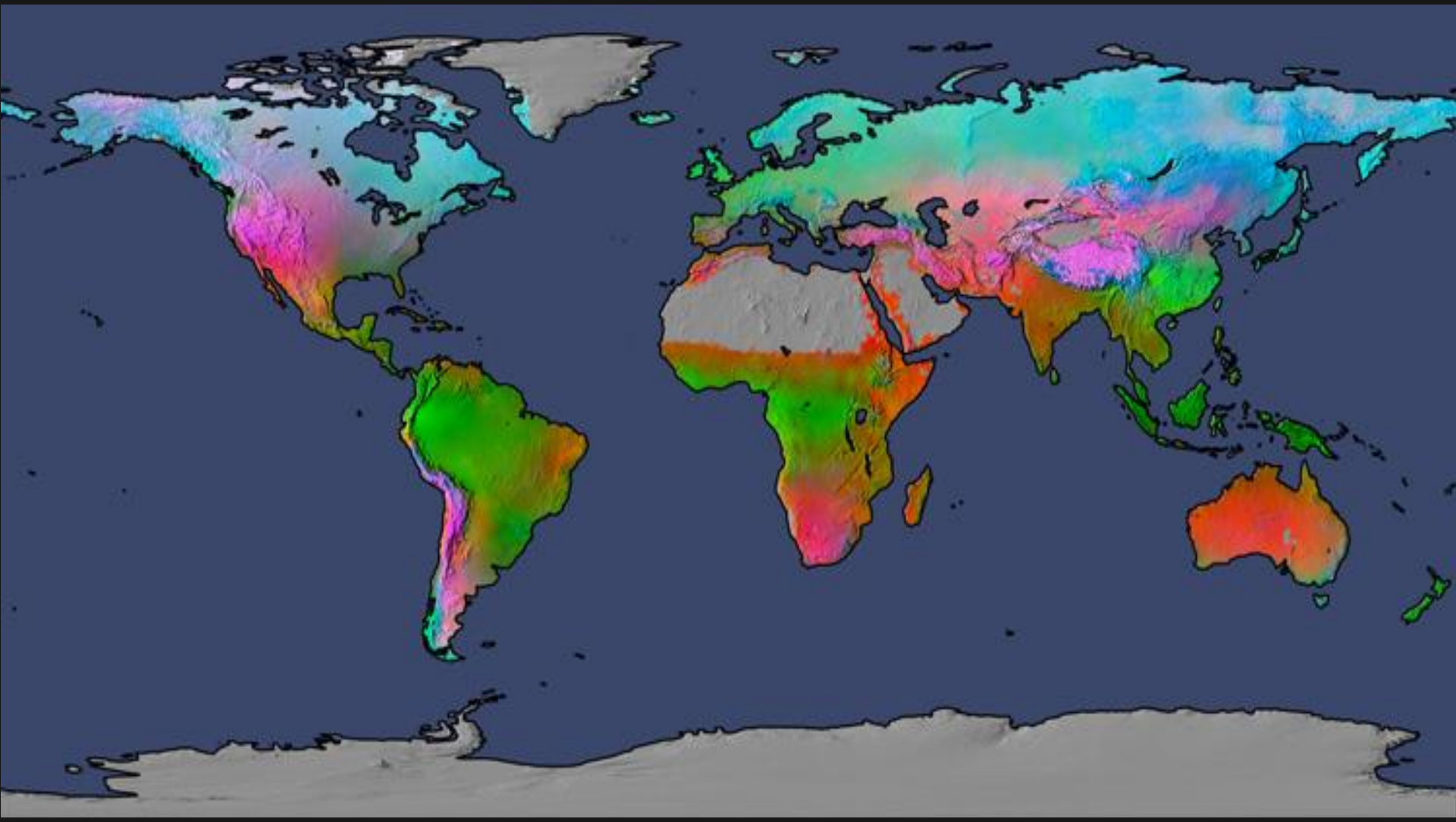
2.+ pages



5.9 The Global System of Agriculture

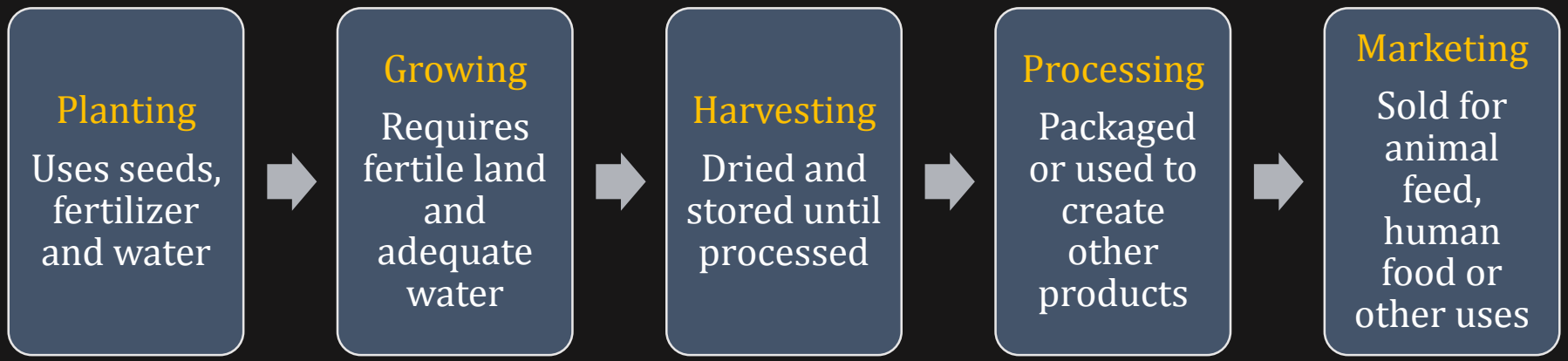
Global Supply Chain

- The transformation of large scale agribusiness has led to a complex global system connecting producers and consumer.

- System allows someone living in small town America to buy bananas from Ecuador, coffee from brazil and chocolate from Switzerland.

Commodity Chain

- The process used by corporations to gather a resource, transform them into goods and transport them to consumers.



Luxury Crops

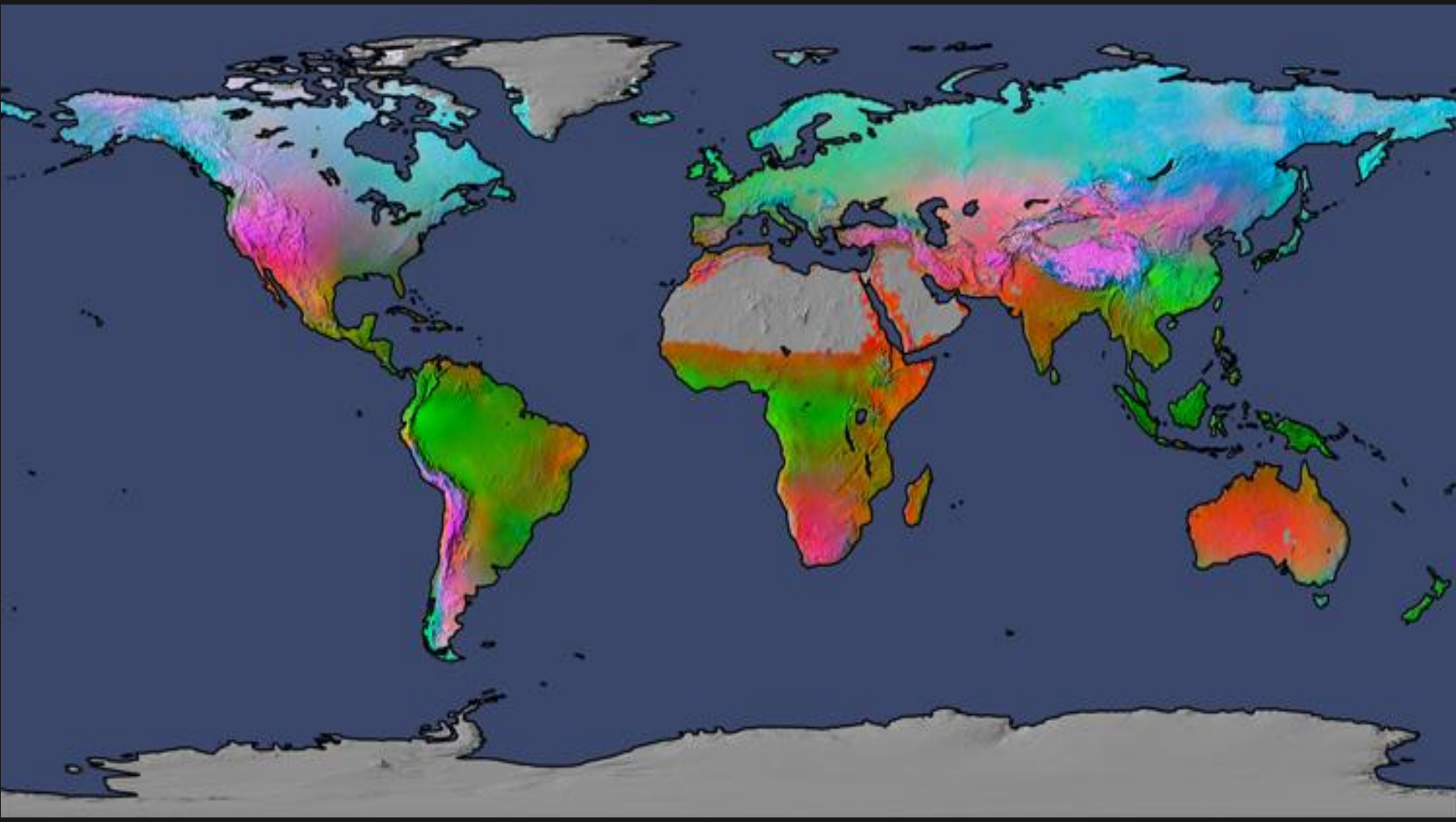
- Specialized crops typically not essential to human survival.
- Historically grown on plantations by European colonial powers
- Examples: tea, coffee, tobacco and cocoa.

MonoCulture

- The cultivation of a single crop in a given area.

Suitcase Farm

- A grower of wheat or other crops who lives outside the community except during the plowing, seeding, and harvesting seasons, often has a farm without buildings, and does much of the farming by hired custom operators.



5.10 Consequences of Agricultural Practices

Environmental Effects of Modern Farming

- Agricultural Chemicals
- Fossil Fuels
- Loss of Biodiversity
- Depletion of Water
- Land Cover Change
- Desertification
- Salinization
- Animal Waste

Agricultural Chemicals

- Excess fertilizers run off and contaminate water sources and producing algal blooms.
- Pesticides and herbicides (designed to kill weeds and pests) when used or disposed of incorrectly cause significant damage to other life forms including humans.
- Antibiotics and hormones given to livestock are potentially harmful to humans.

Fossil Fuels

- Modern farm machinery runs on fossil fuels, resulting in air pollution and leaks and spills contaminate soil and water.

Loss of Biodiversity

- Industrial farms often specialize in one crop (monoculture), which reduces the diversity insects, animals and other organisms that depend on other varieties of plants.

- Also puts food supply at risk – if one pest or disease hits a crop the losses will be significant.

Depletion of Water

- Excessive irrigation can increase the level of salts in the soil, a process known as salinization, this reduces yields.
- Irrigation has significantly reduced the amount of water underground in aquifers.
- Also reduced surface water in lakes and rivers.
  - The Aral Sea has shrunk more that 60% over the past 5 decades.

Land Cover Change

- Overgrazing damages grasslands to the point that vegetation will not return even after the animals leave.
- Catastrophic levels of soil erosion may occur.

Desertification

- The transition of land from fertile to desert.

Soil Salinization

- Increase levels of salt in the soil leading to lower yields and potentially infertile land.

Animal Waste

- Large amount of waste produced by animals before slaughter can produce gases such as ammonia, methane, and hydrogen sulfide that pollute the air and liquid wastes that pollute the water.

Agricultural Practices and the Environment

- Slash and Burn
- Terracing
- Draining Wetlands

Slash and Burn Agriculture

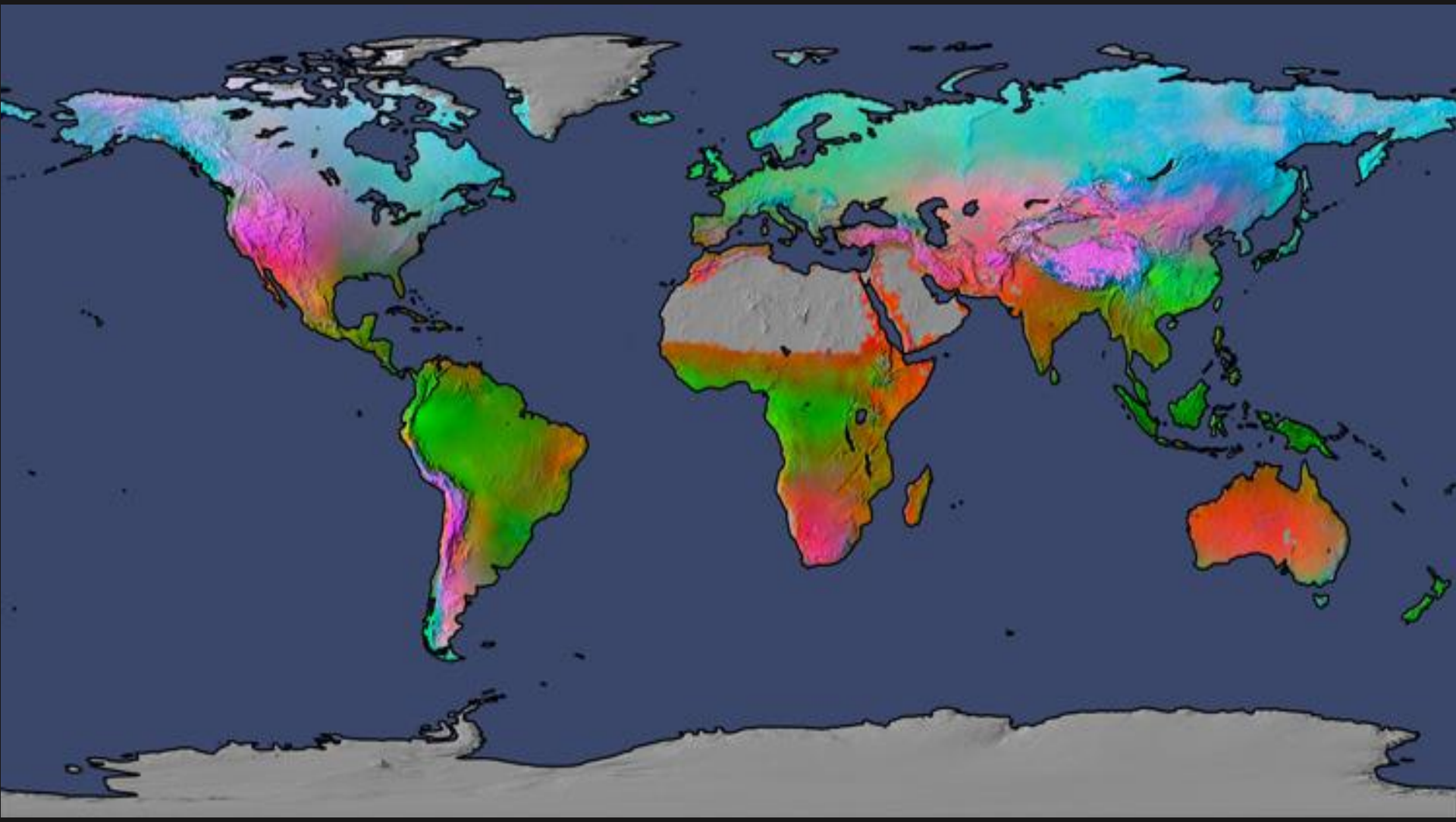
- The Main type of Shifting Cultivation is Slash and Burn
- Land is cleared by cutting down the existing plants on the land and then burning the rest.
- Common in tropical areas

Terraces

- Farmers build a series of steps into the side of a hill.
- Several benefits:
  - Planting and tending crops is easier on flatter surfaces.
  - Terraces collect rainfall for irrigation
  - Reduction on rain running down hillside reduces soil erosion.

Draining Wetlands

- Farmers drain wetlands to provide more farmable land – wetland soils are rich in nutrients.
- Problems
  - Reduces biodiversity
  - Wetlands act as natural filters protecting water quality
  - May make areas more flood prone.



5.11 Challenges of Contemporary Agriculture

Genetically Modified Organisms (GMO's)

- GMO's Challenges
  - Too expensive for poor farmers and must be purchased each year.
  - GMO's resistance to disease and pest may lead to super pests of super weeds.
  - May have potential long term health risks for humans, such as organ problems or reduced immunity to disease.

Aquaculture

- Raising and harvesting fish.
- Practice has dramatically increased.
- Known as the Blue Revolution.

Aquaculture Challenges

- High fish density in enclosures means disease and parasites spread easily
- Diseases and parasites might spread to wild fish.
- Chemicals and antibiotics used pollute the water.
- Excess feed and waste pollute the water.

Urban Farming

- The practice of cultivating, processing, and distributing food in or around a village, town, or city.

Community Supported Agriculture (CSA's)

- Community-supported agriculture is a system that connects the producer and consumers within the food system more closely by allowing the consumer to subscribe to the harvest of a certain farm or group of farms.

Organic Farming

- Producing crops without the use of pesticides, synthetic fertilizers or other unnatural processes.

- Challenge – Does not produce as much food and is more expensive.

Value Added Specialty Crops

- Value added goods have some other product in them or attached to them to make them unique and able to sell at a higher price.
  - Fresh strawberries made into jam sell at a higher price than the original crop.
- Could also be the process used to produce them.
  - “Organic” produce sells at a higher price.

Fair Trade

- Movement which is designed to get more money into the hands of the small farmers in poor countries who actually raise the crops, rather than supporting large transnational corporations.

Local Food Movements

- Trend among some consumers to “eat local” – seeking out food produced nearby.
- Supports local farmers (over corporations) and reduces fossil fuel consumption.

Dietary Shifts

- The industrialization of farming has led to global shift in dietary preferences.
- Increasing demand for processed foods, meat and dairy.
- Demand has significant environmental and health consequences.

Food Access

- The extent to which people have access to healthy and affordable foods in a given area.

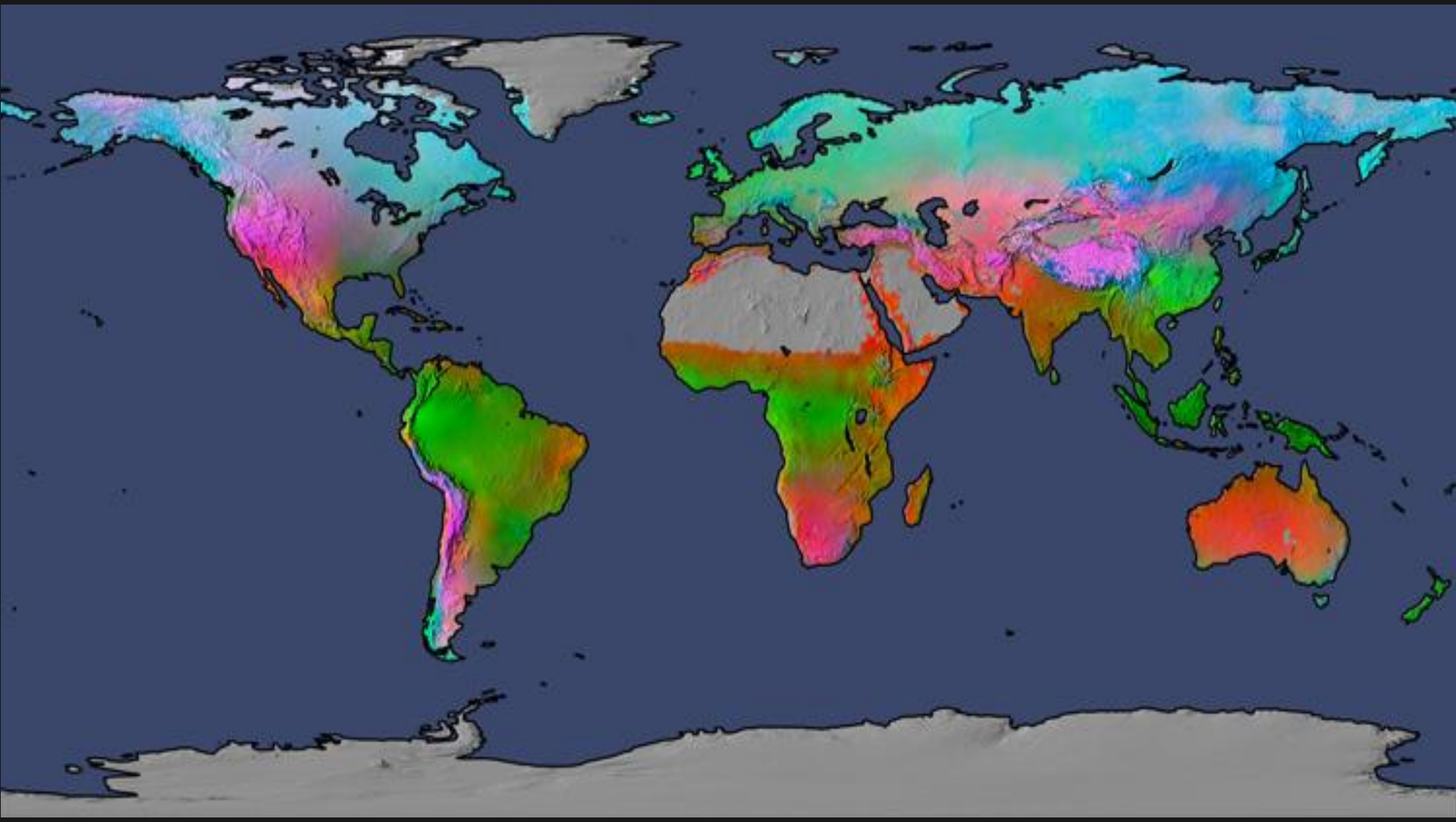
Food Insecurity

- An economic and social condition of limited or uncertain access to adequate food.
- Globally, 2 Billion people are food insecure.
- 17.4 million in the US.

Food Desert

- An urban area in which it is difficult to buy affordable or good-quality fresh food.

- Many poor people live in food deserts—where they have plenty of food but none of it healthy.



5.12 Women in Agriculture

Women's Changing Role in Food Production

- Modernized farming and machinery has led to a decrease in women involved in filed work.
- Women make up 40% of the agricultural workforce.
- In subsistence farming regions the figure is 70%.
  - In developing regions men often migrate to cities looking for work, while women stay at home and farm.

Women's Changing Role in Food Preparation

- Women spend less time preparing food than did women in previous generations – particularly in developed regions.
  - More convenience foods available.
  - More people eat at restaurants than ever before
    - In 2015 Americans spent more money eating out than they did on groceries.

Positive Impacts of the Green Revolution

Higher Yields	**Despite rapid population growth increased food production has prevented famines in some regions.** **80% of the world's developing countries now have an adequate diet.**
Money for Research and Business	Provided investment and government funding for research on hybridization, fertilizers and pesticides.
Food Prices	Higher yields led to lower food prices. More food is now available and more affordable prices.

Negative Impacts of the Green Revolution

- Increased use of fertilizers and pesticides have had negative impacts on the environment.
- Intensive land use, mechanized farming techniques and irrigation have led to soil erosion.
- Intensive farming has drained the land of natural nutrients.
- Machinery that requires fossil based fuels has led to an increase in air, water and sound pollution.

Impact on Women

- In traditional subsistence farming societies women often perform much of the farming labor.
- When machinery was introduced it was usually only men who were trained on how to operate the new technology.
- Women were excluded and further marginalized.

Poor Success in Africa

- Africa's greater diversity of climates made it difficult and expensive to develop seeds and fertilizers for widespread use.
- Harsh environmental conditions and pests proved challenging to green revolution methods.
- Lacking a sufficient transportation infrastructure led to high transportation costs.