

## **Chapter 8 – Agriculture and Food Production**

### **Traditional Agricultural Geography**

- Last four decades have been characterized by major changes occurring in agriculture worldwide
- One of the most dramatic changes has been the decline in the number of people employed in farming in both the core and the periphery
- Farming practices have been significantly intensified through the use of chemical, mechanical and biotechnological innovations and applications
- Agriculture has become increasingly integrated into wider regional, national and global economic systems at the same time it has become more directly linked to other economic sectors, such as manufacturing and finance
- Changes have been profound and have had repercussions
- **Agrarian** – Referring to the culture of agricultural communities and the type of tenure system that determines access to land and the kind of cultivation practices employed there
  - Also refers to the type of tenure (or landholding) system that determines who has access to land and what kind of cultivation practices will be employed there
- **Agriculture** – A science, an art, and a business directed at the cultivation of crops and the raising of livestock for sustenance and profit
- The unique and ingenious methods by which humans have learned to transform the land through agriculture are an important reflection of the two-way relationship between people and their environment
- **Hunting and Gathering** – activities whereby people feed themselves through killing wild animals and fish and gathering fruits, roots, nuts and other edible plants
- Subsistence agriculture replaced hunting and gathering activities in many parts of the globe when people came to understand that the domestication of plants and animals could enable them to remain settled in one place over time rather than having to hunt and gather frequently
- **Subsistence Agriculture** – Farming for direct consumption by the producers, not for sale
- **Commercial Agriculture** – Farming primarily for sale, not for direct consumption
- Traditional practices are increasingly being abandoned or modified as peasant farmers convert from a subsistence and barter economy to a cash economy
- **Shifting Cultivation** – A system in which farmers aim to maintain soil fertility by rotating the fields within which cultivation occurs.
- Globally distributed in the tropics – especially in the rainforests of Central and West Africa; Amazon in South America and much of Southeast Asia
- Practices involved in shifting cultivation have changed very little over thousands and thousands of years
- As a land rotation system, shifting cultivation requires less expenditure of energy than modern forms of farming, though it can successfully support only low population densities
- **Swidden** – Land that is cleared using the slash-and-burn process and is ready for cultivation
- Existing plants are cropped close to the ground and left to dry for a period before being burned
- This process recycles potash back into the soil and is then recultivated
- **Intensive subsistence agriculture** – Practice that involves the effective and efficient use –

usually through a considerable expenditure of human labour and application of fertilizer – of a small parcel of land to maximize crop yield.

- This is used to help support large rural populations
- Reflects high agricultural density and occurs in parts of the world with large populations
- Intensive Subsistence agriculture involves constant human labour to achieve high productivity from a small amount of land via adjustments to the landscape such as raised fields and hillside farming
- **Pastoralism** – Subsistence activity that involves the breeding and herding of animals to satisfy the human needs of food, shelter, and clothing
- Usually practiced in the cold and dry climates of deserts, savannas (grasslands) and steppes where subsistence agriculture is impracticable
- Can be either sedentary or nomadic
- Pastoralism is largely connected to parts of North Africa and the savannas of central and southern Africa, the Middle East and central Asia
- Generally graze cattle, sheep, goats, and camels, although reindeer are herded in parts of Eurasia
- Nomadism involves the systematic and continuous movement of groups of herders, their families and their herds in search of forage
- **Transhumance** – The movement of herds according to seasonal rhythms: warmer, low land areas in the winter and cooler, highland areas in the summer
- The distinguishing characteristic of pastoralists is that they depend on animals, not crops, for their livelihood

### **Agricultural Revolution and Industrialization**

- Ester Boserup in her book “The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure”
- The most important difference among the pre-industrial world's agricultural systems is the frequency of cropping.
- The principal difference between shifting civilization and sedentary agriculture and between patterns of annual cropping and “multicropping” is the frequency with which the land itself is cultivated
- Boserup's “model” shows that societies are not free of all limitations
- Extra labour needed to sustain ever-increasing frequencies of agriculture is high
- First agricultural revolution is commonly recognized as having been founded on the development of agriculture and the use of the plow and draft animals
- The knowledge and skill underlying seed agriculture and the domestication of plants using other means had a revolutionary impact throughout the world
- Second agricultural revolution had occurred historically and geographically alongside the Industrial Revolution in England and Western Europe
- Subsistence peasant agriculture was predominant, though partial integration into a market economy was underway
- Peasants were utilizing a crop-rotation system that improved soil productivity and led to increased crop and livestock yields

- Fields were also greatly increased by the adoption of New World crops, such as the potato in European farming
- Feudal landholding system was breaking down and yielding to a new agrarian system, based not on services to a lord but on an emergent system of private-property relations
- Addition of new fodder crops, such as the turnip, enabled much larger herds of sheep and cattle to be developed to feed the growing demands of Europe's increasing population
- The development of an urban industrial workforce created a commercial market for food
- Innovations of the Industrial Revolution had substantial impacts on agriculture
- Geographical pattern of agricultural land use close to cities was often devoted to high-value, perishable products such as milk or fruit and tomato production
- Heinrich von Thünen looked at space and distance as the main determining factors that govern the choice of agricultural production that any farmer chooses to pursue
- Physical factors, government policies and the assumption that land values are always determined by a rigid economics of space, means that the model can now only be of use as a general descriptive tool
- Third agricultural revolution is more modern and utilizes the growth of technology
- **Mechanization** – The replacement of human farm labour with machines
- **Chemical Farming** – the application of synthetic fertilizers to the soil and herbicides, fungicides and pesticides to crops to enhance yields
- **Food Manufacturing** - Adding value to agricultural products through a range of treatments – such as processing, canning, refining, packing and packaging – that occur off the farm and before they reach the market
- First two phases of the third revolution affected inputs to the agricultural production process, whereas the final phase affects agricultural outputs.

### The Industrialization of Agriculture

- **Agricultural Industrialization** – The process whereby the farm has moved from being the centrepiece of agricultural production to becoming one part of an integrated string of vertically organized industrial processes including production, storage, processing, distribution, marketing and retailing
- Agricultural industrialization involves three important developments:
  - Changes in rural labour activities as machines replace or improve human labour
  - The introduction of innovative inputs – fertilizers, hybrid seeds, agrochemicals, and biotechnologies – to supplement, alter or replace biological outputs
  - The development of industrial substitutes for agricultural products
- Changes to the global economic system affect different places and different ways as different countries and social groups respond to and shape these changes
- Core countries exported a technological package of fertilizers and high-yielding seeds to regions of the periphery in an attempt to boost agricultural production
- **Green Revolution** – The export of a technological package of fertilizers and high-yielding seeds, from the core to the periphery, to increase global agricultural productivity

### **Global Restructuring of Agricultural Systems**

- **Globalized Agriculture** – a system of food production increasingly dependent on an economy and a set of regulatory practices that are global in scope and organization

### **Forces of Globalization**

- Three related processes play a role in the globalization of agriculture:
  - The forces – technological, economic, political and so on – that shape agricultural systems are global in their scope
  - The institutions – trade and finance especially – that most dramatically alter agriculture are organized globally
  - The current form of agriculture reflects integrated, globally organized agro-production systems
- Globalization of agriculture has led to eventual elimination of some forms of agriculture or the erosion or alteration of systems as they are re-integrated into the global economy
- Two examples include the current decline of traditional agricultural practices, such as shifting cultivation, in many parts of the world and the erosion in Canada of a national agricultural system based on family farms

### **The Organization of the Agro-food System**

- **Agribusiness** – A set of economic and political relationships that organizes agro-food production from the development of seeds to the retailing and consumption of the agricultural product
- It is not meant to suggest that corporations are not critically important to the food production process
- In core economies, the transnational corporation is the dominant player operating at numerous strategically important stages of the food production process
- **Food Chain** - Five central and connected sectors (inputs, production, product processing, distribution, and consumption) with four contextual elements acting as external mediating forces (the state, international trade, the physical environment, and credit and finance)
- Concept illustrates the complex connections among and between producers and consumers and regions and places

### **Food Regimes**

- **Food Regime** – The specific set of links that exist between food production and consumption, as well as capital investment and accumulation opportunities
- This concept also indicates the ways in which a particular type of food item is dominant during a specific temporal period
- Decades surrounding the turn of the nineteenth century were the ones in which an independent system of nation-states emerged and colonization expanded
- Forces of political and economic changes were critical to the fostering of the first food regime, in which colonies became important sources of exportable foodstuffs
- Expansion of the colonial agriculture sectors created a crisis in production
- Was the result of higher cost-efficiency of colonial food production, which undercut the prices

of domestically produced food, put domestic agricultural workers out of work and forced members of the agriculture sector in Europe to look for new ways to increase cost efficiency

- A fresh fruit and vegetable regime has taken over the former regime of wheat and livestock because of the rise of the postmodern diet
- Networks of food chains using integrated networks of refrigeration systems, deliver fresh fruits and vegetables from over the world to the core regions of Western Europe, North America and Japan
- Consumers in core regions have come to expect the full range of fruits and vegetables to be available year round in their produce sections
- Emergence of a new food regime has been helped by retailers, who provide symbolic cues and incentives to shoppers to consume the more exotic products
- The concept of “food miles” is a measure of the distance travelled by food items from the farm to the consumer
- Highlights how much we have come to depend on non-local foods – one important indicator of the sustainability of our food production systems

### **Social and Technological Change in Global Agriculture Restructuring**

#### **An Example of Social Change**

- The Gambia River Basin was converted into a rice paddy
- The Gambian government, with the help of the West African Rice Development Association, launched this program to grow rice along the banks of the Gambia River
- Objective of the project was for Gambia to develop its own rice-producing sector and thereby decrease its dependence on imported rice
- Government distributed a package of high-yielding rice varieties, fertilizers and pesticides with the hope that 2000 peasant families among 70 villages could attempt a double-cropping rice cultivation program
- Issues that had risen were gender equality and decisions with the crop

#### **Biotechnology Techniques in Agriculture**

- **Biotechnology** – A technique that uses living organisms (or parts of organisms) to make or modify products, to improve plants and animals, or to develop microorganisms for specific uses
- Recombinant DNA techniques, tissue culture, cell fusion, enzyme and fermentation technology, and embryo transfer are some of the most talked-about aspects of the use of biotechnology in agriculture
- Common argument for applying biotechnology to agriculture is the belief that it helps reduce agricultural production costs as well as acting as a kind of resource-management technique
- Has been hailed as a way to address growing concerns for the rising costs of cash crop production, surpluses and spoilage, environmental degradation from chemical fertilizers and overuse, soil depletion and other related sources of challenges
- Biotechnological research is responsible for the development of super plants that produce their own fertilizers and pesticides, can be grown on nutrient-lacking soils, high yielding varieties and are resistant to disease

- Cloned plants are more susceptible to disease than are natural ones, probably because they have not developed tolerances
- Susceptibility leads to an increasing need for chemical treatment
- Biotechnology has enabled the development of plants that can be grown outside of their natural or currently most suitable environment.
- Cash crops are critical to economic stability for many peripheral nations

<b>Characteristics</b>	<b>Green Revolution</b>	<b>Biorevolution</b>
Crops affected	Wheat, rice, maize	Potentially all crops, including vegetables, fruits, agro-export crops, and speciality crops
Other sectors affected	None	Pesticides, animal products, pharmaceuticals, processed food products, energy, mining and warfare
Territories affected	Some developing countries	All areas, all nations, all locations, including marginal lands
Development of technology and dissemination	Largely public or quasi-public sector, international agricultural research centres, R&D millions of dollars	Large private sector, especially corporations, R&D billions of dollars
Proprietary Considerations	Plant breeders' rights and patents generally not relevant	Genes, cells, plants, and animals patentable as well as the techniques used to produce them
Capital costs of Research	Relatively Low	Relatively High for some techniques, relatively low for others
Access to information	Restricted because of privatization and proprietary considerations	Relatively easy because of public policy of IARCs
Research Skills Required	Conventional plant breeding and parallel agricultural sciences	Molecular and cell biology expertise as well as conventional plant-breeding skills
Crop Vulnerability	High-yielding varieties relatively uniform; high vulnerability	Tissue culture crop propagation produces exact genetic copies; even more vulnerability
Side Effects	Increased monoculture and use of farm chemicals,	Crop substitution replacing Third World exports; herbicide

	marginalization of small farmer, ecological degradation; increased foreign debt due to decrease in biomass fuels and the increasing reliance on costly, usually imported petroleum	tolerance; increasing use of chemicals; engineered organisms might affect environment; further marginalization of small-farm worker
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- Availability of technology to these peripheral nations is limited because most advances in biotechnology are the property of private companies.
- Patents protect both the process and the end products of biotechnological techniques
- Utilizing biotechnological techniques requires paying fees for permission to use them, and the small-farm workers of both the core and the periphery are unlikely to be able to purchase or use the patented processes
- Private ownership of biotechnological processes has resulted in control over food production being removed from the farmer and put into the hands of biotechnology firms
- Refinement and specialization of plant and animal species, women who are currently employed in ancillary activities could face the loss of their jobs

### **The Environment and Agricultural Industrialization**

#### **The Impact of the Environment on Agriculture**

- The widespread use of fertilizers, irrigation systems, pesticides, herbicides and industrial greenhouses suggests that agriculture has become an economic practice that can ignore the limitations of the physical environment
- Agriculture destroys, depletes or degrades the environmental resources on which its existence and profitability depend

#### **The Impact of Agriculture on the Environment**

- Though the ban of DDT has been widespread, industries have continued to produce DDT for less developed countries
- Though some of the pesticides were effective in combating malaria and other insect-borne diseases, many were applied to crops that were later sold in the markets of developed countries
- Most forms of agriculture tend to increase natural erosion, and the losses are more severe in peripheral countries
- Soil erosion because of mismanagement in the semi-arid regions of the world has led to desertification, whereby topsoil and vegetation loss have been extensive and largely permanent
- Desertification is the spread of desert-like conditions in arid or semi-arid lands resulting from climatic change or human influences
- Not only means the loss of topsoil but can involve the deterioration of grazing lands and the decimation of forests
- Agriculture affects water quality and quantity through the overwithdrawal of groundwater and the pollution of the same water through agricultural runoff contaminated with herbicides, pesticides and fertilizers

- Deforestation can also result from poor agricultural practices
- In the 1980's, an innovation called a “debt-for-nature” swap saw core environmental organizations retire some part of the foreign debt of a peripheral country
- The debt was made contingent on the peripheral country agreeing to implement a conservation program to save ecologically sensitive lands from abuse
- It did not really work, as it did not address the fundamental causes of environmental degradation in peripheral regions
- They were seen as bandage solutions