
UNIT 6 CONSEQUENCES OF AGRICULTURE*

Structure

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6.1 OBJECTIVES

In Units 1 to 5 we discussed the changes from the origin of humans to the stage of settled agriculture and sedentary societies. In this Unit we will discuss the consequences of the coming of agriculture on humans and their habitats. After going through this Unit, you should be able to:

- Explain the shifts in the diet and physiology of humans;
- Identify the impact of agriculture on their social structure; and
- Outline the correlation between agriculture and new material culture.

6.2 INTRODUCTION

The transition from a hunting-gathering lifestyle to agricultural production is one of the most important events of human history. The transition to agriculture, often referred to as the **Neolithic** Revolution, had far reaching consequences for human societies. It concerns us because almost all the food we eat is made up of domesticated plants and animals. It was also a prerequisite for the emergence of cities and civilizations. It spawned patterns of demographic change that led to the expansion of the culture and languages of the agriculturists at the cost of foraging groups. For example, about 88% of all humans speak a language belonging to one of the language families confined in the early **Holocene** to two small areas of Eurasia, **the Fertile Crescent** and parts of China. The inhabitants of these areas acquired this extraordinary power because they had a head start in agriculture. While foragers regarded themselves as part of an inherently productive nature, farmers saw environment as something that could be manipulated, tamed and controlled. But bending an environment to your needs requires a lot of hard work on land. Production of food is directly proportional to the amount of energy you invest. This required a more aggressive attitude towards nature and other human communities. Consequently, such investment resulted in significant consequences for the humans and their surrounding environment.

6.3 IMPACT OF AGRICULTURE ON HUMAN BIO-SYSTEMS

The coming of agriculture meant that our ancestors began to eat cereals and plants in larger quantities. This had significant impact on human physiology. Changes in the food regime also led to significant impact on population and human attitude towards nature.

6.3.1 Changes in the Human Diet

An immediate consequence of the advent in agriculture was the change in human diet. In the **Palaeolithic** age, meat was important and, in many regions, the primary component of human diet. With investment in agriculture, human diet became more diverse and cereals became an important component of their diet. Wheat, for instance, was a primary diet component in West Asia and Europe while South and East Asia relied largely on rice. Africa, on the other hand, had millet and America had maize. The replacement of meat diet by a largely vegetable one necessitated the use of salt which quickly became an item of local trade, and sometimes of long-distance trade as was the case in Neolithic Europe.

The introduction of ceramic pottery (detailed later in this Unit) which was durable in quality further allowed humans to easily boil and cook their food. Along with this, the domestication of animals added milk and its derivatives to the human diet. These radical changes in human diet certainly affected their metabolism, resistance, life-span and were the reasons for the onset of certain human diseases – areas of research which are still being explored.

6.3.2 Craniofacial Changes in Humans

With the coming of agriculture and the associated changes in diet, humans witnessed a significant change in their jawline. The hunter-gatherers are associated with larger skulls than Neolithic people due to their more mobile and active lifestyle. Moreover, foragers consumed tougher foods, requiring a larger chewing apparatus. With the advent of agriculture, new people preparation and processing methods were adopted and food became softer and easier to chew. This change in masticatory (chewing) function created

less mechanical demand on the bones of the face and jaws and gradually contributed to an overall reduction of bone mass in the human skull. These changes finally resulted in a smaller human face with reduced jaws and teeth.

Reduction of the face had a negative effect on the human oral health because smaller jaws compressed the size of teeth, led to crowding and consequently led to increase in tooth decay and many periodontal diseases (affecting the structures around the teeth) in humans.

6.3.3 Changes in Attitudes of the Humans

The coming of agriculture was connected with major changes in attitudes and orientations of humans. That hard work is a virtue and possession of stores of grains is a reflection of merit, is an idea completely foreign to foraging communities. The ability to grow food and control its distribution became a path to power and influence. Agriculture also transformed the way humans think about time. Seeds are planted in one season and harvested in another. Thus, agricultural societies created economies of hope and aspiration, in which we focus on the future.

6.3.4 Growth in Human Observation and Questioning Faculties

The domestication of plants and animals is an indicator of the power of human observation in the pre-Neolithic communities. This grew further once humans began farming, for they were led to observe, raise and resolve questions such as: Why seeds germinate? Which season would lead to better crops? What type of soil was suited to which crop? Such and similar questions would have promoted cultivation of a variety of crops in different seasons.

6.3.5 New Epidemics and Diseases

In addition to the negative impact on human dental health, the coming of agriculture had many other important consequences for the health and hygiene of people. While a regular supply of food seems to have increased their longevity (Australopithecus lived for 25 years only), sedentary life created ideal environments for mosquitoes especially when they started storing water, irrigating crops, or settling near swampy or marshy land. These mosquitoes were the carriers of diseases like malaria. The trash that accumulated around villages attracted pests, some of which were hosts for diseases. A famous example from a later period is that of the medieval spread of bubonic plague through the infestation of rats whose fleas carried the disease.

Many pathogens jumped from domesticated animals to humans. Diseases like small pox and measles are a result of this. In the old world, agriculturalists developed immunity to these diseases. In the period when Europeans discovered America, the Red Indian population did not have immunity to these diseases. Infectious diseases like smallpox and measles wiped out an estimated 95% of the New World's native population.

6.3.6 Increase in Population and Expansion of Settlements

Settled agricultural populations tend to expand both numerically and territorially. Population growth is higher among sedentary communities. Crops provided farmers with more dependable supplies of grain based weaning foods such as gruel and porridge, as well as milk, once goats and sheep began to be milked. Average interval between births was reduced, leading to increase in population. It has been estimated that in the Fertile Crescent the size of settlements increased tenfold in the transition to food

production. Hunter-gatherers lived in groups of twenty or thirty because large numbers could create food shortages. Farmers could grow more food than hunter-gatherers could collect. They could support more people on small plots of land. Unlike the hunter-gatherers, farmers could grow food which they could store for a long time. Thus, villages with population of hundreds of people came into existence. The coming of agriculture meant that crops were sown in areas where they did not grow naturally. Since 99% of natural vegetation cannot be consumed by humans, creation of artificial niche meant that edible plants covered most of the space around villages. Thus, there was an artificial extension of the production niche. Excavations in Cayonu, Jericho and Jarmo have revealed successive levels of occupation at the same site. A cluster of about 24 houses made of baked mud were found in the Neolithic village of Jarmo. The elevated areas created about 12 distinct levels of occupancy.

While hunter-gatherers depended on nature to provide them food, agriculturists actively created new landscapes of cultivated crops. But farmers also discovered that soil got exhausted after supporting few crops. So they needed to cultivate another clearing. Thus, cultivators colonized many new areas inhabited earlier by foraging population. Agriculture also led to an increase in the carrying capacity of land. Various calculations suggest that a hunter-gather would need roughly four-square kilometers of land to feed him in an year's time. A very small chunk of land could support large number of agriculturists.

Predictable availability of food enabled a much greater degree of role differentiation within farming societies. Craftsmen to make tools, priests to pray for rains, fighters to protect farmers from rivals, chiefs to transform economic power into social capital, characterize agricultural societies. In the **Upper Palaeolithic** there was one specialist, the sorcerer-shaman. Whereas in the Neolithic villages, a variety of activities such as farming, stock-breeding and pottery-making demanded a greater role differentiation. The coming of agriculture also meant slavery for many people. Social conflicts resulting from sedentary life required individuals with centralized powers who would act as arbiters in disputes. These people could have emerged as chiefs. Chiefs hungry for power and wealth forced other members of the community to take up cultivation and give them a part of the produce.

Domestication of plants is continuing in modern times too. Many of the colourful flowers growing in our gardens were brought from the Himalayas in the twentieth century. Similarly, many plants with medicinal properties have been discovered and domesticated in the present century. Everyday some botanist discovers some useful property in a plant and in many cases such discoveries are followed by growing those plants artificially. Unfortunately, because of the large-scale destruction of forests many plants are destroyed even before their medicinal properties are discovered.

Check Your Progress Exercise-1

- 1) In what ways did settled agriculture affect the food habits of humans during the Neolithic period?
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2) What was the negative impact of agriculture on the physiology and health of humans?

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3) Discuss the impact of agriculture on the demographic patterns in Neolithic period.

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6.4 IMPACT OF AGRICULTURE ON THE SOCIAL STRUCTURE OF EARLY FARMING COMMUNITIES

The coming of agriculture brought about radical changes in the social world of human communities. Larger number of humans living together over a long period of time presented new problems of order and dispute, kinship, sharing of work and produce. It was these challenges that led to the emergence of new social structures having greater centralization. Such restructuring is visible in the field of religion too.

6.4.1 Emergence of a Village Culture

Sedentarism was one of the important consequences of agriculture which led to the growth of village settlements. In the Upper Palaeolithic and **Mesolithic** period, hunter-gatherers moved their homes according to the seasonal migration of animals and availability of fruits and roots. Some Mesolithic groups did possess permanent dwellings where marine resources were available in plenty, but these were rare. The pattern of settlement transformed over a period of time. The remains of the Yang-shao culture reveal the fact that the competence in house building had reached a high level.

Unlike hunting-gathering, agriculture requires that the farmer stays in one place for a long period. They had to sow seeds, water the plants and protect the saplings from birds and animals. Only after four to six months are the plants ready for harvesting. This means that unlike hunting-gathering, agriculture encourages settling down in one place. Farmers began to build houses, barns and stables of wattle and daub, sometimes with dry-stone, that were more durable than the simple huts of earlier period. Multiple settlements at one area gradually led to the emergence of villages. These village settlements were relatively small. For instance, in CatalHoyuk – a village in Turkey – was home to a small population.

That is why the beginning of agriculture is connected with the emergence of villages. Although, foraging communities found villages and towns in some places where plentiful supply of food was available all the year round, such places were rare. In domesticating

animals and plants, humans necessarily domesticated themselves. The present world covered with roads and paths, huts and houses, hamlets, villages and towns are a creation of our agricultural ancestors. These are the places archaeologists dig up.

6.4.2 Emergence of Tribal Communities

Coming of agriculture is also related to the emergence of long term patterns of cooperation. Hunting-gathering groups needed cooperation for organizing hunt. Once the hunt was over and game had been shared, the group ceased to exist. Agriculturists needed cooperation from sowing to harvesting. Unlike a typical hunting expedition which might last a day or a week, agriculturists had to cooperate in the production process lasting at least four months. While agriculturists waited for the crops to grow, they survived on the food produced by farmers in the previous season. So, there was a need for cooperation among food producing groups across the year. No wonder agricultural societies are characterized by large kinship networks which are the institutional frame for cooperation among the farmers.

6.4.3 Complexity in Social Structure

Permanent settlement in a village led to social and occupational divisions. In the Upper Palaeolithic period, there was only one specialist, the sorcerer-shaman, while all the other members of the community shared similar activities of hunting, fishing and manufacturing of artefacts. With the emergence of a village settlement in the Neolithic period, the occupation of people got diversified as farmers, breeders, herdsman, potters, weavers, stoneworkers, and carpenters. In the following centuries, further specialization emerged with people practicing as wheelwrights, traders and as early metallurgists. Sedentism thus paved the way for craft specialization. Regional centres of pottery manufacturing emerged in Merimde and Fayum in North Africa.

There probably also existed a division of labour between sexes and activities such as pot making and basket making being reserved for women. In the initial stages, even farming and stock-raising was exclusively done by women. With the development of agricultural techniques such as the invention of plough, drainage and irrigation, which required greater physical strength, these activities came to be dominated by men. According to Clark Larsen (1984), men carried on hunting and fishing after the adoption of agriculture, whereas women took on the taxing field and household chores.

Social stratification, which was hardly evident in the hunting-gathering societies, took a complex form. The position of chief became hereditary in this period and it became synonymous with the power of a ruler combining military control and religious sanction for his authority. There also emerged the position of a 'priest', whose religious authority was combined with secular, economic and political power.

Ethnographic evidence from Africa has revealed that hunting-gathering communities shared the products of their hunts equally among themselves. Such solidarity however faded away with the transition to food production wherein ownership of resources became a point of competition. While the concept of property was present even in earlier period in the form of marking the hunting territories, with agriculture it became more pronounced with the farmers competing to possess their own fields, tools and cattle. The need for private resources promoted crimes such as theft and pillaging, especially in situations when the fields of a neighbouring village were prospering. Sometimes this resulted in inter-village conflicts which explains the presence of fortifications as security in many Neolithic villages. Besides Jericho, where a stone wall surrounding the closely clustered houses is found, defensive walls were found in early Mesoamerica.

6.4.4 New Forms of Order and Dispute

Permanent houses meant substantial investments in labour. Similarly, agricultural fields too required considerable investment of labour. Agricultural communities would defend their fields and homes much more than the foraging groups. Anthropological literature suggests that in case there is a conflict among foragers the losing side simply leaves the place. Agriculturists tend to stay in their villages even if the victors take away part of their produce or give them a subordinate status. Thus, coming of agriculture changed the significance of war. It also paved the way for the creation of societies based on inequality. The presence of certain precious goods in the graves of a few in Abu Hureyra and CatalHoyuk is an indication of inequality in society.

6.4.5 Structuring of Rituals and Religious System

Agriculture and its associated social changes also brought changes in the religious system. The changes were not so much in the human belief system, rather they took the form of new forms of rituals and religious structure. Such organization is evident in the demarcation of specific spaces for religious purposes. For example, megalithic monuments and stone tools found at the site of Gobelki Tepe in Modern Turkey have been interpreted to symbolize ceremonial structures. The absence of a water resource near this site and the missing artefacts necessary for habitation indicate that it was a ritual space. Similarly, CatalHoyuk in Turkey has revealed buildings that are believed to have been used for religious or ceremonial purposes.



Figure 6.1 : The site of Gobelki Tepe in Modern Turkey

Credit: Zhenan, 2012

Source: https://upload.wikimedia.org/wikipedia/commons/c/c4/Göbekli_Tepe_site_%281%29.JPG

As for the belief system, early farmers were increasingly concerned with fertility and procreation. In tandem with the agricultural practices and associated environment, there emerged a renewed reliance on the reproductive abilities of plants, animals and human beings. The religious belief in fertility cult was based on a dual (male and female) principle, both of which were worshipped as supernatural powers. The large sized plaster reliefs, projections of bull heads from the walls and the elaborate frescoes in the buildings of

CatalHoyuk are indicators of an elaborate religious system and symbolism during this period.

The dead were buried with grave goods with the belief that these goods would accompany the dead in their afterlife. These goods were simple in the early stages of farming, but as social complexity grew, grave goods as also the size of the graves became a symbol for the display of power and social rank. There coexisted the practice of individual and collective burials. At sites such as Jericho and Ain Ghazal in Jordon, plaster figurines modelled after the deceased have been recovered which indicate the presence of some form of ancestor worship amongst the early village communities.

Check Your Progress Exercise-2

- 1) How did agriculture lead to the emergence of a village culture?

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- 2) How did the beginning of agriculture influence the social structure?

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- 3) Explain the influence of agriculture on the belief system.

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6.5 NEW FORMS OF MATERIAL CULTURE

The coming of agriculture brought significant introductions and changes in the material culture. The major ones include pottery, weaving and metallurgy. Introduction of these materials also brought to fore an economy of exchange.

6.5.1 Pottery

Evidence of terracotta figurines from the Upper Palaeolithic period in Moravia (Czech Republic) indicates that groups of foragers were already familiar with the phenomenon that clay hardens on contact with fire. However, pots and vessels of terracotta came to be made only with storage needs posed by the process of producing durable food

grains. Given the largely raw food diet in the previous period, hunter-gathers used materials such as hide and wood to make containers which had limited utility and could not be used for cooking.

The Neolithic pottery was also superior in quality compared to the simple, cruder and non-diverse earthenware of the Mesolithic period. The strength of the Neolithic pottery resulted from the mixing of materials such as sand and wood to clay which was done by early farmers to prevent the shrinkage and breakage of clay during the process of its drying and firing. Since there is no evidence of a furnace or a kiln from this phase, early pottery was supposedly sun dried or fired in a bonfire or in hearths at homes. Although clay pottery had gained prominence with farming, it did not spread uniformly across cultures and many farming communities, especially in places like West Asia, Greece and South America, were **aceramic** (did not produce pottery). Those producing pottery, over time introduced diverse designs, shapes and styles. For example, the early ceramic ware from CatalHoyuk in Anatolia (Modern Turkey) consists of oval bowls, jars with handles and vessels with flat bases. Some farmers also decorated their pots with symbols and artistic patterns which are believed to have held a ritual, magical or ethnic significance. The undecorated pots seemingly served the everyday needs of cooking and storage in the households.



Figure 6.2 : Neolithic Painted Earthenware Basin from Yangshao Culture (c. 5000 – c. 3000 BC) China. The basin was excavated from Miaodigou culture site in Shaanxian county, Henan province in 1956

Credit: Prof. Gary Lee Todd, 2011

Source: https://upload.wikimedia.org/wikipedia/commons/e/e7/Neolithic_painted_pottery_basin%2C_Yangshao_Culture%2C_Miaodigou_type%2C_Henan%2C_1956.jpg

While the early farmers made pots with hand, with the introduction of wheel in the sixth millennium BCE, wheel pottery became prominent in places like West Asia. It is for such developments and diversity offered by pottery that it stands as a crucial archaeological artefact for identifying a culture and its facets.

6.5.2 Weaving

Weaving is also connected with sedentary life. Once farmers put the fleece (woolly covering) of the early domesticated animals, such as the goat and sheep in West Asia

and llama, guanaco and vicuña in the region of the Andes (South America), through a round of mutations, the wools became suitable for spinning and led to the beginning of weaving. However, as pointed out in Unit 4, the woolliness of sheep was not the reason for their domestication in the first place. Gradually, farmers of West Asia, Egypt and Europe also learned the techniques of using plants like flax for weaving while India and Mesoamerica had begun to grow cotton in the Neolithic period. Bone needles, awls and fishhooks are some of the tools associated with early weaving.

6.5.3 Metallurgy

One of the initial consequences for the emergence of metallurgy was the desire of early agricultural and pastoral communities to adorn themselves. Around the eleventh-ninth millennium BCE, people in Southwest Asia began to use colourful ores and naturally occurring metals to decorate human body in life and death. In the beginning, only native copper which was abundant in West Asia was used to make simple tools and decorative and adorning jewels such as pendants and rings. The first evidence of trinkets (small jewellery) made from copper comes in the form of a perforated pendant was found from the Shanidar caves in the Zagros mountains. Copper trinkets dating to seven thousand BP have also been found in Ali Kosh (Zagros mountains), Yarim Tepe (north-eastern Iran) and Hacilar in Turkey. Copper was however not indigenous to all sites where these artifacts were made which affirms the presence of an exchange economy along with the transition to agriculture.

6.5.4 Material Exchanges

As the foragers, the early farmers also depended on an economy of exchange. Items exchanged included seeds and other food products, textiles, salt, rare stones, ceramic vessels and raw materials such as flint. Food was often exchanged for stones, tools or other raw materials, or to meet the needs of a local or neighbouring settlement. Obsidian, which was traded in an earlier period as well, was one of the prominent items of Neolithic exchanges. Similarly, grains, fruits and pottery were bartered and exchanged. People exchanged by walking to neighbouring areas on foot or boating across water channels. Tools made from obsidian have been found in the Natufian sites like Jarmo in the Levant. In the Neolithic site of CatalHoyuk both obsidian and flint were used for making daggers and knives.

Obsidian is a hard-volcanic glass which produces a sharp cutting edge. It was primarily used for making knives and scrapers and was found near regions of volcanic activity such as Italy, some islands in the Aegean Sea, Taurus (the mountainous region around Modern Turkey) and Armenia. The abundance of tools of obsidian, far away from areas of occurrence, is a clear indication that the Neolithic economy was connected in networks of exchange .

While promoting economic contacts between people in different areas, such exchanges also encouraged interactions, social ties and exchange of ideas among Neolithic communities. It is believed that such exchanges promoted the early diffusion of the invention of pottery and eventually that of copper and bronze metallurgy across the major sites of Neolithic period.

Check Your Progress Exercise-3

- 1) Explain the relationship between the advent of agriculture and pottery.

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2) Were the early farming communities self-sufficient?
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6.6 SUMMARY

The advent of agriculture is an important phase in human history. Some of its effects such as greater sedentism were immediate and long drawn, while others such as increase in population, effects on human health came about gradually. Advent of agriculture also led people to think about newer ways and strategies to cope with the surroundings. Certainly, beginnings in agriculture did not immediately revolutionize the life and lifestyle of early farmers, but it was definitely a harbinger of several significant social and economic changes that paved the way for more complex social formations.

Transition to agriculture was not universal as many communities chose to retain a hunting gathering lifestyle. Moreover, as the ongoing excavations at CatalHoyuk in Turkey seem to indicate, production of food was not the reason for the transition to agriculture in all the regions. At CatalHoyuk, for instance, evidence suggests that people numbering in tens of thousands settled down there not for cultivation but for some still mysterious cultural reason (See www.catal.arch.cam.ac.uk/catal/catal.html for details). Thus, in this Unit you learnt about the impacts of early agriculture in different regions across the world.

6.7 KEY WORDS

- Aceramic communities** : communities or societies that did not produce pottery
- Fertile Crescent** : it is the arc of the fertile land that is covered by the mountains and foothills of Israel, Jordan and Syria to the west, Turkey to the north and Iran to the east.
- Holocene** : the present geological epoch that set in with the end of the Pleistocene epoch (beginning about 1.6 million years ago and ending about 10,000 years ago)
- Lower Palaeolithic** : the earliest phase of the Old Stone Age (palaios+lithos=Palaeolithic). It lasted from around 3.3 million years ago to 300,000 years ago
- Mesolithic** : relating to the period in prehistory immediately following the Ice Age when people still lived by

hunting and food gathering but, in some places, had begun very basic farming practices.

- Neolithic** : relating to the New Stone Age or period of prehistoric farming before the introduction of metal-working.
- Upper Palaeolithic** : relating to that part of the Old Stone Age that lasted from approximately 40,000 to 12,000 years ago.

6.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise-1

- 1) See Sub-section 6.3.1
- 2) See Sub-sections 6.3.1, 6.3.2 and 6.3.5
- 3) See Sub-section 6.3.6

Check Your Progress Exercise-2

- 1) See Sub-section 6.4.1
- 2) See Section 6.4 (including all its Sub-sections, especially 6.4.3)
- 3) See Sub-section 6.4.5

Check Your Progress Exercise-3

- 1) See Sub-section 6.5.1
- 2) No, See Sub-section 6.5.4

6.9 SUGGESTED READINGS

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6.10 INSTRUCTIONAL VIDEO RECOMMENDATIONS

Mankind: The Story of All of Us: Birth of Farming

<https://www.youtube.com/watch?v=bhzQFIZuNFY>



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