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WHY WAS AGRICULTURE SO IMPORTANT?

The first evidence of farming dates back to about 11,000 years ago. In this video, David Christian explains how more and more people gave up their nomadic lifestyles to settle in villages. This happened because warming global temperatures at the end of the last ice age made farming possible in more regions and competition for foraging resources caused by increased human population made farming an attractive source of food resources. As people learned how to clear land and to irrigate their fields, they found they could produce all they needed to survive within a relatively small area. Soon permanent communities began to form and foraging became a less popular lifeway. At the end of this lecture, you should be able to explain the significance of agriculture.

Key questions

- 1 In what nongenetic ways do humans evolve?
- 2 What's the connection between farming, climate change, and overpopulation?
- 3 Why is agriculture the seventh major threshold of increasing complexity?

Transcript: Part 1

Imagine you woke up one morning and there were no grocery stores, no restaurants, no supermarkets, no problem — you'd probably go out and forage for your food like a traditional forager. Could you do it? Well the truth is, in today's world, with 7 billion humans to feed, foraging couldn't come near to providing enough food. Farming, like what you see around me in this rice paddy near Cheongju in South Korea, is absolutely essential to the survival of the modern world.

0:11-1:12

But what is farming anyway? To understand farming, it may help to go back to the world of foragers. Remember, foragers travel around their environments selecting the plants, the animals, and the other raw materials they need and using them without processing them too much. Farmers are very different. They select a small range of species, they tend to them very, very carefully as in this paddy field, and they keep them in protected environments.

1:12-2:06 Now, we humans are not the only species that do this. For example, honeypot ants herd aphids. They protect them, they feed them, they help them reproduce, and in return they get nutritious honeydew. When species get dependent like this in the natural world, over time they tend to change very, very rapidly indeed. For example, the ants after a time get so dependent on the aphids that if all the aphids died the ants would starve to death. And the aphids get so dependent that they cannot reproduce without the honeypot ants. Biologists refer to such relations between species, such relations of close dependency, as **symbiosis** , but when humans are involved in such relations, we tend to call it farming or agriculture.

SYMBIOSIS

2:05-2:56 When humans started **farming** , the species they tended to began to change quite dramatically. This was because humans selected the most nutritious wheat grains, or rice grains, or corn grains, or the most docile and fattest animals. And the result was that within a few generations, new domesticated species began to appear and they were created not by natural selection, but by artificial selection. You can see the difference very, very clearly if you compare a modern corn cob, which is fat and nutritious and tasty, with its ancestor, **teosinte** , which is a rather pathetic looking weedy plant. Or if you compare a modern sheep, domesticated sheep, which tends to be fat, and docile, and frankly not too smart, with its ancestor, a mountain goat, a very intelligent, athletic creature.

ARTIFICIAL VS.
NATURAL SELECTION

Humans change too, but they tended not to change genetically so much as technologically, socially, and culturally. They learned to clear trees, to build paddy fields like this, to divert rivers, to protect their crops and animals from pests, such as rats or wolves. The result of all of this was that humans found that they could produce more of what they wanted from a given area, from a small area, than they had before. That meant that humans could now live in sedentary villages rather than being nomadic.

But to get a real sense of what's going on with farming, we need to think about it from a big history perspective. Remember, all the energy that supports the biosphere, or most of it, comes from sunlight through **photosynthesis** . So what farmers were really doing was diverting more of that energy into species that they could use and away from other species. The result was a sort of **huge energy grab** by one species, our own. No wonder with farming human populations began to grow so rapidly.

2:56-4:09

FARMING ENABLES
PEOPLE TO SETTLE
IN VILLAGES

FARMING CONVERTS
SOLAR ENERGY
INTO HUMAN FOOD

Transcript: Part 2

4:09-5:23

FIRST EVIDENCE
OF FARMING

So where and when did farming and agriculture begin? At the moment, it looks as if farming really began about 11,000 years ago in the highlands east of the Mediterranean that we know as the **Fertile Crescent**. Here they grew wheat. It may have appeared at about the same time in the **Nile Valley**, slightly further south. Then from about 8,000 years ago, we have evidence of **rice** growing in **China** and at about the same time, we have the evidence of the growing of taro and yams in the highlands of **Papua New Guinea**, though it took several thousands of years for agriculture to really flourish here.

FARMING APPEARS IN
DIFFERENT REGIONS

Then, from about 5,000 to 4,000 years ago agriculture pops up in several different parts of the world. In **West Africa**, farmers start growing sorghum and millet. Farming also appears in the **Americas** right across the Atlantic. In Mesoamerica where they're growing maize and squash, and also in the Andes, where potatoes are a very important crop. From these core regions agriculture then spreads to neighboring regions, but there's a real puzzle here, because none of the core regions seem to have been connected. So what was really going on?

5:27-6:22

So why, after almost 200,000 years of living as foragers, did humans in so many parts of the world that had no connection between each other begin to behave in such similar ways, in such a brief period of time? Well, there seem to be two main reasons. One factor is **overpopulation**. The other is **climate change**. These factors operated in many different parts of the world.

Let's take overpopulation first. During the Paleolithic era, if populations grew too much, you could generally solve the problem by migrating into a new region. But after the settlement of the Americas from about 15,000 years ago, there were no large areas left to migrate into. So from now on, if populations began to grow, you had to try to get more resources from a given area. In other words, you had to farm. Now, that's the first factor.

LARGER
POPULATIONS
DEMANDED MORE
EFFICIENCY

The second, climate change, is subtler. Most of the Paleolithic era was dominated by the ice ages. During the ice ages, for the most part, climates were so cold and so unpredictable that farming was more or less impossible. Then, from about 18,000 years ago, global climates began to change. They began to get warmer. Glaciers began to retreat, sea levels began to rise, and in area after area you began to get warmer and wetter climates. There was a brief period between 13,000 and 12,000 years ago when climates were cold again, but then from about 12,000 years ago climates became warmer and wetter, and we entered the interglacial period that we're still living in today.

6:22-7:12

A WARMER, WETTER
CLIMATE MADE
FARMING EASIER

7:12-8:25

Now, as a result of global climate change, humans and animals and plants everywhere in the world had to start changing their behaviors. In some areas, such as the Fertile Crescent east of the Mediterranean, as climates changed, resources became more abundant. There were more plants and more animals. In these regions, particularly favored regions, some foragers began to settle down because they found that they could live in one place for most of the year without traveling around. They began to form villages. They became sedentary.

NATUFIANS: FERTILE
CRESCENT SETTLERS

In the Fertile Crescent, archeologists refer to the people who settle in these villages as **Natufians**. They've excavated many of their villages. But as they settled down, their behaviors changed. In particular, populations began to grow. We're not sure why, but one reason may be that if you're a villager you don't have to carry children around so there's less pressure to reduce the number of children. In any case, populations grew and that posed a problem. Within a few generations, they found they didn't have enough resources to feed everyone in what had once seemed an area of abundance. So what are they to do?

AS POPULATIONS
GREW, FOOD
SUPPLIES WERE
INSUFFICIENT

Well, perhaps they could go back to foraging. The problem was they'd probably forgotten many of the old techniques of foraging, and, besides, neighbors probably occupied those lands now. So what can they do? Well, they can start tending their crops and animals more carefully. They can start providing the plants they like with extra water. They can start clearing away weeds. They can start penning particular animals in enclosures. In fact, they can start **farming**.

Now, something like what happened to the Natufians seems to have happened in many other areas. In the case of the Natufians, we have lots of evidence about this expansion of villages and population growth. But something like this happened in many areas, and everywhere the same two factors seem to have been involved. First, global climate change, which made agriculture possible, and secondly, overpopulation, which made it necessary.

Agriculture is our **seventh major threshold of increasing complexity**. As we've seen, these are pivotal events that allow the creation of new more complex things with new emergent properties. Agriculture is not just a matter of tastier fruit or fatter cows. Agriculture unlocked forces much more powerful than that and they would transform human history. How and why?

8:25-9:23

CLIMATE CHANGE
+ OVERPOPULATION
= FARMING

9:23-9:52

AGRICULTURE:
THRESHOLD 7