The Evolution of Agriculture

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This presentation is based on the theory of Ester Boserup as presented in *The Conditions of Agricultural Growth*. A summary of this and other macro-social theories can be found in *Macrosociology: The Study of Sociocultural Systems*, by Frank W. Elwell.
Ester Boserup 1909-1999
Population Growth and Food Production

What is the interrelationship between population growth and food supply?

- Can look at how changes in food production affect population growth.
- Or, you can look at how population change affects agriculture.
Population Growth and Food Production

Malthus and his followers believed that food supply can only grow slowly, and that the supply of food is the main factor governing the rate of population growth.
Population growth is therefore seen as the result of previous changes in agricultural productivity. Changes in the availability of arable land, agricultural innovation, invention or other changes that increase agricultural production will lead to population increases.
“In other words, for those who view the relationship between agriculture and population in essentially Malthusian perspective there is at any given time in any given community a warranted rate of population increase with which the actual growth of population tends to conform” (Boserup, 1965, p. 11).
Boserup approaches the problem from the opposite direction. She sets out to demonstrate that the primary stimulus to agricultural development and productivity is population growth. In other words, agricultural development is caused by previous growth in population rather than the other way around.
Population Growth and Food Production

The classical economists were misled because they were writing at the time of the expansion of agriculture in the Americas by European settlers.
Population Growth and Food Production

They made a distinction between two different ways to raise agricultural output: expansion into new land by creating new fields, and more intensive cultivation.
Population Growth and Food Production

But primitive agriculture does not make use of permanent fields; it shifts cultivation from plot to plot, allowing a fallow period in order to give the land time to regenerate.
Population Growth and Food Production

“In primitive agriculture there is no sharp distinction between cultivated and uncultivated land, and it is impossible to distinguish clearly between the creation of new fields and the change of methods in existing field” (1965, pp. 12-13).
“Once the time-honored distinction between cultivated and uncultivated land is replaced by the concept of frequency of cropping, the economic theory of agricultural development becomes compatible with the theories of changing landscape propounded by natural scientists” (1965, p. 13).
Soil fertility is not simply a gift of nature, a given quality that never changes. Rather, soil fertility is highly variable and closely associated with agricultural methods.
Population Growth and Food Production

Boserup groups land use into five different types, in order of increasing intensity:

- Forrest-fallow
- Bush-fallow
- Short-fallow
- Annual cropping
- Multi-cropping
Forrest-fallow

Plots of land are cleared in the forest and planted for a year or two. The land is then left fallow in order for the forest to regenerate, from 20-25 years.
Bush-fallow

The fallow period is only six to ten years in which time the land is covered in bush and small trees.
Short-fallow

A system in which the fallow is one or two years. In the fallow period the land is invaded by wild grasses.
Annual Cropping

The land is left uncultivated for only several months between harvest and planting. Within this group Boserup also includes crop rotation systems.
Multi-cropping

Occurs when the same plot of land bears two or more crops every year; in such a system there is no real fallow period.
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Boserup does not mean for the land-use typology to be a classification only; rather, it is meant to broadly characterize the main stages of the evolution of agriculture from prehistoric times to the present.
“Even if we cannot be sure that systems of extensive land use have preceded the intensive ones in every part of the world, there seems to be little reason to doubt that the typical sequence of development of agriculture has been a gradual change—more rapid in some regions than others—from extensive to intensive types of land use” (1965, pp. 17-18).
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Once you use “frequency of cropping” as your measure of intensification, theories of the economic development of agriculture can be directly linked with changes in local landscape, flora, and fauna.
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For example, as people shorten the fallow period, forests deteriorate and bushes take over the land. Further intensification still will bring wild grasses.
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“The invasion of forest and bush by grass is most likely to happen when an increasing population of long-fallow cultivators cultivate the land with more and more frequent intervals” (1965, p. 20).
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In this way, many forest and bush areas gradually become savannah as a result of the intensification of agriculture. She believes that a large share of the open grasslands of the world originated in this way.
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These new grasslands provide food for cattle, horses, and other animals suitable for domestication, as well as bringing potential domesticates into closer contact with human settlements.
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Boserup’s theory runs counter to traditional theory which held that nomadic tribes turned to agriculture only when their herds could no longer support their population.
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“The sequence is now supposed to be the reverse: tribes which previously cultivated short-lived plots in the forest and bush land have come to rely on the grazing of animals only after they cultivated forest plots for a very long period ending in the transformation of the forest into grassland” (1965, 20-21).
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Other tribes used the animals attracted to the new grasslands to help cultivate and fertilize the fields.
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As population increases, most of the land brought under more frequent cultivation in a given area was already used for something: fallow, hunting ground, or grazing areas.
“It follows that when a given area of land comes to be cropped more frequently than before, the purpose which it was hitherto used must be taken care of in a new way, and this may create additional activities for which new tools and other investments are required” (1965, pp. 13-14).
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Thus, population changes often have direct effects upon agricultural technology. For this reason even primitive agricultural output can be increased significantly by additional inputs of labor.
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The traditional view is that the main cultivation tool is the chief criterion for classifying primitive agricultural systems. Thus we have Simple Horticulture (digging stick), Advanced Horticulture (hoe and irrigation), and Agrarian societies (plow and animal power).
“This theory is apt to mislead because it ignores the fact that the kind of agricultural tool needed in a given context depends upon the system of land use: some technical changes can materialize only if the system of land use is modified at the same time, and some changes in land use can come about only if they are accompanied by the introduction of new tools” (1965, 23).
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In forest fallow cultivation, the burning of undergrowth frees the land of weeds and hoeing is completely unnecessary.
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When the fallow is shortened, bushes and weeds take root, burning is not an effective method of clearing the land, so the hoe is needed.
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As the fallow shortens, grasses take root and these are difficult to remove through hoeing, thus the plow becomes necessary. Not only that, but with the disappearance of the roots of bushes and tree, the plow also becomes possible.
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Finally, as grass lands replace forests with the shortening of fallow, they are often invaded by nomads seeking to feed their herds. Thus animals suitable for cultivation and fertilization appear “around the time when the local cultivators need them and become able to use them” (1965, p. 25).
With the shortening of the fallow period, new methods of regaining fertility must also be developed and employed:

- Forest-fallow—ashes left after burning natural vegetation
- Bush-fallow—ashes and organic material from surrounding lands
- Short fallow—manure from animals and humans
- Intensive systems—compost, silt, manure, household waste, chemical fertilizers
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Both the methods of cultivation and fertilization become more labor intensive with the shortening of fallow. While such methods produce more crops per acre, they also require far more human labor to produce these yields.
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Far more work is needed to produce food; with population increase a household has to work far harder to maintain its standard of living. The short term effect of intensification is necessarily to lower output per hour of work.
“But sustained growth of total population and of total output in a given area has secondary effects which—at least in some cases—can set off a genuine process of economic growth” (1965, p. 118).
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These secondary effects of intensification include a compulsion to work harder and more regularly, changing work habits and raising overall productivity; intensification also facilitates the division of labor and the spread of urbanization, education, and communication which further stimulates the growth of agriculture.
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Thus intensification can only take place in response to population pressures within a given area. Even when people have access to more intensive techniques and tools, the investments in labor are often so large that they are not likely to be made unless population increase makes them necessary.
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Unless population pressures are keenly felt, people will reject more intensive methods of cultivation as being a bad bargain—far more work for only marginally more food.
Note:

For a more extensive discussion of Boserup’s theory, as well as a fuller discussion of its implications for understanding human behavior, refer to *Macrosociology: the Study of Sociocultural Systems*. For an even deeper understanding of Boserup’s thought read from the bibliography that follows.
Bibliography
