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Reviews
Perspectives from Gene Anderson's bookshelf

The Biodemography of Subsistence Farming: Population, Food and Family. By James W. Wood. 2020. Cambridge University Press, Cambridge. 502 pp.

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Subsistence agriculture is a long-standing focus of anthropological and ethnobiological research. Studies include some of the great classics of anthropology, such as the work of Malinowski and his students Raymond Firth and Audrey Richards. A comprehensive review of this literature can be found in in Robert Netting's (1993) classic work *Smallholders, Householders*. However, there have been no such reviews in some years. James Wood has provided a stunning fulfillment of that need—an encyclopedic review that is also a thorough and creative elaboration of models of demography and household economics in small-scale agriculture.

Wood begins with a limiting assumption: he models a family farm, isolated, without much community involvement, far from markets, and safe from the tax collector and landlord. "*Beyond the normal surplus, there is little incentive to produce in excess of the household's own needs*" (p. 29, his italics). He admits on the very next page that this does not happen and repeats near the end of the book that the image of "every household for itself" is "never true" (p. 420); but he uses the simplifying assumption to allow easy modeling and use of existing models. After that admission, he does consider the community, but restricts it largely to the kindred and the village. I have studied such communities in Quintana Roo, Mexico 30 years ago, but none exist there today, and few do worldwide. For better or worse, markets and governments are well-nigh universal. However, the simple models are so useful even now, and so established in the literature, that they cannot be ignored. The book is highly number-conscious, but the math is not difficult. Statistics are deployed at every point, and Wood has made a careful search for sources with good data.

Beginning with Malthus is almost inevitable, and Wood does so. He has investigated Malthus' background, life, and theories in detail, as he does with all other theorists cited. Although he was indeed wrong about the generality of population growth outpacing food production growth, Wood shows that Malthus was far more nuanced and widely competent than his critics allege. He had a place for voluntary population control, though he called it "vice," and was not dogmatic about the impossibility of food production keeping up with population growth. The next modeler to receive serious attention is Ester Boserup (1965), who countered Malthus by stating that population growth would force people to intensify their farming. She investigated colonial-era changes in Africa, where increase led to shortening fallow, gathering, and burning brush to create fertile ash in swiddens (*chitimene* farming) and, in general, harder work. Boserup saw people as intensifying agriculture only when forced by rising population impacting food supply more and more. This would predict that Haiti would be the most advanced agricultural nation in the world, the United States the least, and the rest in due proportion—exactly the reverse of what we actually observe.

Malthus lived in a world of limited land and not very productive food crops. Boserup had a lightly populated African realm to study. Wood is able to

synthesize their models and go well beyond them, by looking at other ways people can intensify. People can always figure out some way to deal creatively with food problems, though Malthusian checks such as war, drought, flood, and pestilence are all too often operated in subsistence-agriculture societies.

Part of advancing the models involves demolishing those bugbears, "population pressure" and "carrying capacity." Wood absolutely devastates those old clunkers. "Populations" do not "press." Individuals may have many children and then have trouble finding food, but we can go even beyond Boserup in pointing out that people do all kinds of things when there are lots of them. They can move; work harder or more efficiently; use famine foods (Minnis 2020); use new crops; learn better and more efficient techniques; kill each other off; or simply starve. Wood discusses all these alternatives. They reduce "population pressure" to a meaningless concept. The question is: what do people actually do when food runs short? "Carrying capacity" is even less worthy of attention. It is a concept derived from animals that can do nothing about increasing numbers except move or starve. Humans, of course, immediately change their behavior and environment when food is scarce. As long pointed out by Kenneth Laland and colleagues (Odling-Smee et al. 2004), humans, like beavers and leafcutter ants, are niche constructors. Even hunter-gatherers alter the environment, often massively (as by burning and by extensive planting of wild food sources), to improve production. Even the "carrying capacity" of a given farming system cannot be calculated accurately, because people are always fine-tuning it. This book should drive those two terms out of use in studies of agriculture and human ecology.

From here, a book that is already a blockbuster becomes even more impressive. Wood points out that Malthus and Boserup were talking at a high level of abstraction. Populations grow, people intensify, all is reduced to lines on a graph. The rest of the book brings subsistence farming models down to reality: the family farm and its individuals. Wood makes use of the great Russian scholar Chayanov, murdered by Stalin like so many other original thinkers in the USSR. Chayanov pointed out the importance of the developmental cycle in domestic groups, the reproduction and training of labor, and the ways in which farming for subsistence differs from farming for markets. For one example, subsistence agriculture requires diversification of crops, for insurance and for nutrition, while market farming tends toward monocropping.

Wood tests the Chayanovian idea that subsistence farmers have large numbers of children and finds it somewhat wanting. The tradeoff of poor life expectancies and chances, given sparse food, is too daunting. (The "Wizard of Id" comic strip once made a memorable comment on this: the knight is talking with a peasant, outside his hut, where his wife is trying to deal with a mass of scruffy kids. The conversation, as I recall it, goes: "Yes, lots of children are a great help around the farm." "Uh, and what does your wife say about that?" "I don't know, she won't talk to me." Enough said about why farm families don't always maximize labor production.) Still, farm families are notoriously large, and the sons and daughters work hard.

Most of the book, in fact, is taken up with the question of family labor—reproducing it, allocating it, and managing it. Labor is not only in the field, but also in the household, and in transporting farm produce, manure, and other goods. Wood reviews and comments on a vast range of sources that provide real numbers on the issue. He misses some—he does not cite the stunning work of James Lee and associates (see e.g., Tsuya et al. 2010) on China, for instance, though he has found the Lee group's work on Europe. Lee and colleagues have extensive details on voluntary population limitation in the old days, as well as on yields and other details. Wood draws more on Geertz and others, and especially on Robert Netting.

Finally, in the last 30 pages, Wood expands his vision to look at the community and the wider context. Since he is limiting "subsistence agriculture" to realms relatively remote from markets and state authorities, he can neglect those two troublemakers, but he knows he cannot neglect community. The problem is that the models get exponentially more complex as more households and villages must be taken into account. Models must be fairly general to succeed at that level. Wood points out that most villages that are genuinely outside the market-and-state world are largely kinship villages; they are made up of relatives and in-marrying spouses, and even those spouses are apt to be more distant relatives. He misses the enormously important role of folk experts. Maya villages generally have a best beekeeper whom everyone consults on that side of farming, a best crop expert, a best hunter, a best ritualist (the local *hmeen*,

"doer"), and so on. Every adult Maya farmer already has an encyclopedic knowledge of farming in that difficult environment; the experts often rank with academic scientists in the sheer quantity and quality of knowledge they can deploy, though it is often localized; it includes the exact locations of every flowering tree, every pocket of good soil, and every game animal for miles around. This local expertise faces an uncertain future; suffice it to say that our village beekeeping expert in Chunhuhub has three daughters, who went to town and became computer experts—the kind of mind it takes to manage beehives turns out to be perfect for managing computers. (And my father left the wretched little cotton farm where he was raised, went to town, and became a historian. Such is the fate of small-scale farming in the modern world.)

In short, this is a major synthesis of an important area. It also comes to conclusions that go far beyond its focus. The world of subsistence agriculture (by his restricted definition) is now definitively dead; there are almost no such isolated communities left. The book's "envoi" (p. 446) is in fact a lament for the loss. But Wood's book is not of purely historical interest. His demolition of "population pressure" and "carrying capacity," his exhaustive collection of statistics on how much physical labor people can do and how they deploy it, his similar collection of statistics on inputs and yields, and many other data banks not only advance the field of subsistence agriculture studies but are highly relevant to all agricultural research and modeling.

No book so wide-ranging and comprehensive can be without errors, especially if it is also a brilliantly original contribution in modeling and analysis. This book has its share. To begin with minor ones: 1) Wood sees rest for a minute or two as frequently necessary when doing sustained hard work (p. 320); this is not the case if one paces oneself carefully, as is necessary—since one must keep moving and keep up with others—in transplanting rice, burning milpa, and many other jobs. 2) Wood seems to think that draft animals must compete with humans for food, either directly (oats…) or indirectly, by requiring land (p. 340). However, water buffaloes can exist happily on sawgrass, rice husks, field weeds, and other fare that costs nothing in time or land. Other draft animals can sometimes be equally cost-free.

Other errors are more serious. Starting on p. 17, Wood stresses the very low yields of subsistence farming, especially compared with modern agriculture. While this is true for many areas of the world, it is not true for traditional Japan and China; he even cites sources (King 1911, Ruddle and Zhong 1988) that show traditional paddy-rice agriculture yielded as much as western commercial agriculture of the early twentieth century. From another end of the scale, Yucatec Maya agriculture yields less than Iowa maize farming, but it yields better alternatives in Yucatan's harsh climate and thin limestone soils. Modern industrial-style agriculture has never done well in the Yucatan, and the peninsula has been left to traditional Maya farming. There are many other such cases. One problem is that Wood does not take enough account of knowledge of plants and animals, and the degree to which traditional farmers learn and experiment. He leaves this major form of intensification entirely out of his final statement on how farmers intensify (pp. 371–372). In areas I know best—south China and Maya Mexico—this is an enormous factor. People constantly experiment, seek out experts for advice, and work to learn more. Wood apparently worked in areas of the world where subsistence farming was less skill-intensive, less constrained by the environment, and less informed by constant knowledge-seeking. This makes him miss the importance of induced development, as I will argue below.

Another problem of a different kind occurs on p. 115: "all farming, by its nature, inflicts ecological disturbance on the local environment…and creates an ecological disequilibrium…" that is inevitably damaging to biodiversity, soil, and environment in general. This is usually but not necessarily true. Good managers at low population densities maintain all those things, admittedly not in "virgin" form, but without causing serious decline; there is a large body of literature on this subject (Anderson 2005).

More serious is a real lapse: "rapid and often cataclysmic change" like that of today "did not exist in the distant past" (p. 243). I had thought that the image of the peasant, changeless since time immemorial, was long dead; apparently not so. China's dynastic cycles, famines, floods, earthquakes, droughts, epidemics, and so forth guaranteed that every year brought a cataclysm somewhere, and every farmer who lived a long life saw three or four of them. Balancing this was a continual introduction of new crops, new techniques, and new forms of capital (mobile and fixed), leading to steady improvement of farming. None of these latter changes occurred with

revolutionary speed, but some, such as the introduction of good wheat milling in the Han Dynasty, high-yield rice in Song, and new world crops in the 16th-17th centuries, had revolutionary effects over a relatively short time. The same could be said for many other areas of the world.

Moving to higher levels of abstraction, Wood's theories, hypotheses, and models are sound and thoroughly worked out, but he neglects a large chunk of the relevant literature: the various approaches sometimes referred to as "induced development" (Hayami and Ruttan 1985; North 1990). This is the idea that people will change in the direction of more intensive and efficient use of resources when they are constrained by bottlenecks of some sort. If, for example, land and labor abound but capital is short (as it always is in subsistence farming), people will apply more labor, use more land, and invest in landesque capital. If labor is abundant but land is short, people will lavish vast supplies of labor on the limited land, and if they have wet-rice agriculture they can always support one more hand (Hayami and Ruttan 1985); there are photographs of fields where no more people can fit into the transplanting or harvesting line. If land opens up, people will use it more extensively, as Wood notes for such cases as Ukara (or Ukora) Island in Tanzania and its shore long colonies, and as Hayami and Ruttan (1985) noted for frontier America. In Denmark, land and labor are a constraint, but capital is abundant, leading to technology-intensive agriculture (Hayami and Ruttan 1985). If land, labor, and capital are all short, people will invest in knowing as wide a range of things about farming and the environment as they possibly can. That is the Maya case. Similar bottlenecks often occur in transport and communication, and people work to improve those situations.

In short, people do not wait for "population pressure" or the "Malthusian squeeze" to motivate them. They innovate wherever an obvious need or want, especially a bottleneck, presents itself. It can be as simple and straightforward as a need to produce food close to the home because of fear of raids, a serious problem in much of the premodern world. It can be because of nutritional needs for specialized high-nutrient crops. It is often driven in subsistence societies by ritual obligations.

Since all change and improvement requires some investment of time and energy, and usually capital (which in nonmonetized societies means surplus production over immediate need), the induced-development model correctly predicts that development will be fastest in societies with a comfortable margin. In the modern world, it is the downright rich societies that develop and change their agriculture most rapidly. It thus predicts correctly, exactly the opposite of Boserup's model. In fact, the induced development theory works reasonably well across the board for predicting technological change. Wood surely knew of this body of theory but seems to have assumed it applied only for monetized, market-oriented societies, and that traditional societies rarely changed in such ways. This is not the case, as Hayami and Ruttan, and also Douglass North (1990), point out.

These various criticisms do not detract greatly from a book that will stand for years as a great work of synthesis and theory-building. It is an absolute must-read for anyone studying traditional subsistence-oriented farming. Human ecologists and agricultural development workers, in particular, must seriously study this book.

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