

Dirt: The Erosion of Civilization.

David R. Montgomery. University of California Press, 2120 Berkeley Way, Berkeley, CA 94704. Paperback, 295 pp., \$24.95. ISBN 978-0-5202-4870-0.

The author uses a combination of anthropology, history, geology, and soil science along with very readable prose to document the boom and bust cycles in agriculture that have plagued mankind since before recorded history. The picture that he paints is one of improvements in technology that lead to increases in population followed by an expansion of agriculture into marginal areas that are prone to erosion followed by a collapse of the resultant society and its population. The book, *Dirt: The Erosion of Civilization*, is intended as and is appropriate as a reference for undergraduate and graduate crops and soils students.

The first two chapters serve as an introduction and a basic primer on principles of soil development. Throughout, the author uses a historical perspective to show how and where soil science developed. Chapters three through seven give a history of agriculture from the stone age through the twentieth century. The author uses a combination of archeological, anthropological, geological, and historical data to piece together a picture of the consequences of agricultural development.

A consistent pattern emerges. With a few exceptions, each advance in agricultural technology is followed by an increase in population resulting from more food production. This increase in population is followed by expansion of agriculture onto steep slopes which results in accelerated erosion. After a few generations, erosion results in loss of productivity and a subsequent crash in the population. Until construction of the Aswan Dam, the Nile valley was one of the few sustainable agricultural systems in the world because erosion from upstream replenished the soil.

Other patterns that have been consistent throughout history are absentee landowners and export crops lead to more rapid declines in the soil than small farms worked by a landowner. In the United States, cheap land and expensive labor made it more economical to produce crops such as tobacco and cotton on new land rather than maintain the soil on existing farms. This in part led to the drive to expand the United States from coast to coast.

There were three major advances in the late 19th and 20th centuries in agriculture. First was the development of

fertilizer technology. This allowed farmers to substitute fertilizer for lost soil fertility, or in other words, substitute oil for soil. The second was mechanization, which allowed a single farmer to farm much larger tracts of land. Finally, the third was the green revolution, which gave farmers cultivars that could use the fertilizer they were applying to the land. The argument was that we could end hunger with cheap food. As Dr. Montgomery points out, we are repeating the same boom and bust cycle. Erosion in developing countries is undermining yields, while populations are increasing.

In the final chapters, island cultures are examined. These isolated societies provide insights into how erosion can be dealt with on a societal basis and the consequences of failing to do so. The advent of reduced tillage systems holds out the promise of controlling erosion and still maintaining agricultural productivity on the scale needed to sustain industrialized societies. There are caveats to the solution, however. Politicians need to recognize the importance of soil loss before it becomes a crisis. The slow loss of soil is a creeping problem that will not be apparent to most of the general population until it is too late. In addition, population control is necessary, but it is counter to long held social traditions. Population control also constrains economic growth, which is counter to the concept of never ending growth that we adopted during the depression of the 1930s.

Overall, this an excellent book that I recommend for all levels of soils knowledge. Montgomery does an excellent job of linking the science with the social and political realities of the world based on data and personal experience. The potential crisis that he sees will make the perceived problems of global warming look trivial.

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