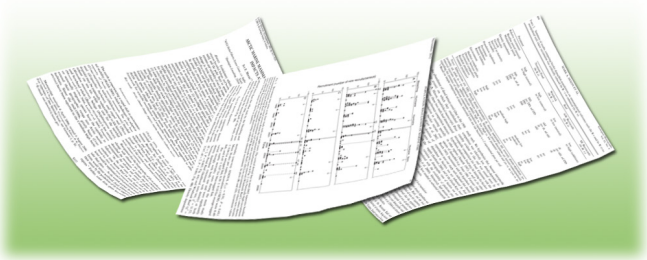
The Paper Trail



Illiterate Sources, Illustrious Sinks

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The decade from the mid-1950s to the mid-60s was the heyday of major monographs on tropical shifting agriculture: Conklin (1957) on the Hanunoo of the Philippines (209 pages); Freeman (1955) on the Iban of Sarawak (148 pages); Cowgill (1961) on the ancient Maya (56 pages) . . . the list could go on. These detailed studies changed perspectives on swidden agriculture, a land use system that had previously been described as "primitive." It may be noteworthy that none of these works would likely find a publication outlet in today's world of the four-page sound bite.

In 1965 I was fresh back in the United States to begin graduate studies after a three-year stint in the tropics. My mentor, soil scientist Hugh Popenoe, immediately put me on to the most comprehensive of those monographs: The Soil Under Shifting Cultivation, by P. H. Nye and D. J. Greenland. I knew I was on the road to being educated when, on page 41, I encountered ". . . *the leaching of cations is not directly countered by their uptake, but only indirectly, by removal of anions from the soil solution. If a cation alone were taken up . . . it would simply be replaced by another from the well buffered exchange complex.*" Obvious? With the advantage of hindsight, yes. But in 1965, this was an eye-opener for me, and I read on to find many more.

I regret that I never met Nye (1921–2009) or Greenland (1930–2012), as they must have been a formidably capable duo. Both were Oxford-trained chemists, followed by graduate work in

international agriculture at Cambridge (Nye) and soil chemistry at Oxford (Greenland). Nye then spent 13 years in West Africa, where he and Greenland overlapped from 1955 to 1959. There they partnered to produce their insightful monograph that remains highly cited more than 50 years later.

What distinguishes the Nye and Greenland monograph from a lot of other excellent work on tropical soils and vegetation? It is comprehensive in its synthesis of data, yet soundly grounded on first principles. Nutrients don't drain independently through the soil: ionic balance is maintained; clay minerals and soil organic matter aren't independent compartments: the two are chemically linked and exchange matter at their interface; plants aren't passive suction pumps, pulling essential elements out of the ground: uptake is demand driven, as well as source driven. The monograph invokes data on almost every topic addressed (citing more than 300 references), or identifies holes where there were no data, then summarizes in crisp text or elegantly simple equations.

Why should any or all of this be of interest to today's ecologists? I still turn to Nye and Greenland when I have a query about succession; nutrient inputs, loss, and uptake; savannization; nitrogen stock recovery; soil organic matter dynamics; organic phosphorus; fire effects on biogeochemistry; grass and tree fallows; tropical agriculture; and more. Better than any other work of which I am aware, Nye and Greenland's monograph demonstrates unequivocally that the boundary between basic and applied research is a myth. Good science can inform understanding of real-world problems while adding to foundational understanding of how nature works.

Literature cited

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