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The World's First Web of Sustainable Agriculture: Causeways, Terra Preta and a Nameless People

Amazonian tribes have long been described as "stone age savages frozen at the dawn of time… like us 10,000 years ago, as if they had no history."

– Michael Heckenberger (9:27)

Introduction

The 16th century Spanish explorer Francisco de Orellana's account of the Amazonian interior may indeed be the single most important account in human history. The discovery of terra preta, or biochar, the causeways that connected the Amazonian tribes, and their shared cultural and linguistic ancestry reflect many attributes today associated with globalization.

The Technology

Until recently, it was assumed that Orellana's 1541 account of large scale populations residing along the Amazon River was no more than fantasy. This conclusion seemed accurate, for subsequent explorations of the Amazon failed to discover what Orellana had described. There simply were no large populations of indigenous peoples, nor large structures rising above the tree line (The Secret of El Dorado 2009). Furthermore, the nutrient-poor oxisols of the Amazonian floor are unable to support sustainable agriculture. Because large scale civilizations depend upon large scale agriculture, Orellana seemed to be a liar (Meggers 6:45).

In truth, the Amazonian interior was vastly populated due to a techno-agricultural innovation that modern man has yet to replicate: terra preta. Today, sustainable agriculture is the single biggest issue for any region. The amount of nutrients fixed by fertilizers may rival or surpass the amount of nutrients fixed by natural processes (Smil 2002, Chapter 5 & 9), with an estimated 220 Mt worth being dumped into the world's soils in 2011 (Fertilizer Outlook 2011-2015, p5). And demand for fertilizers is only expected to grow as the populations of the world expand (Figure 1).

However, the Amazonian indigenous people's creation of terra preta provided them a rich, regenerative anthropogenic soil that needed no fertilization. Essentially ancient, charred compost, the soil contains pottery sherds, fish and animal bones, animal feces and plant residues with an ability to prevent soil erosion (41:18). Not only is the soil high in nutrients such as nitrogen, phosphorus, calcium, zinc and manganese, it has been shown to regenerate at a rate of about 1 cm a year (45:08). Furthermore, it is estimated that

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indigenous Amazonians were able to transform 10% of the Amazon's infertile soil into terra preta (BBC Online; William Woods 2002)[1]. Amazing!!

The Web

Modern-day dissemination of information and communication are often cited facets of globalization. Examples include the expansion of the English language, television, printed materials, and the internet. However, the ancient Amazonians had their own "world-wide-web": causeways (Image 1). The tribes of the Amazon were once connected by a system of causeways, a technological marvel in a flood plain, which allowed for the free exchange of language[2], culture[3] and commodities[4]. The Amazonian web connected transportation and irrigation canals, raised agricultural fields (Image 2), and pyramid-like mounds (Mann 2000). Such earthworks have been described as "one of the most remarkable human achievements on the continent," and "on par with anything the Egyptians did," (Erickson; Mann 2000).

George Soros (2002) points out that in addition to information and culture (1), a "salient feature of globalization is that it allows financial capital to move around freely" (3)[5]. We can only speculate what indigenous people carried with them while traveling upon the causeways, but it would be a stretch of the imagination to think that they did not carry with them food, ceremonial items, gifts or relics for trade. In fact, these items have been discovered (30:50).

Undoubtedly, to the indigenous Amazonian, the Amazon River basin and forest must have been their complete world. For them to leave the fertility of their Amazon would be an expedition into a dangerous, lifeless void. Indeed, the nameless, ancient people of the Amazon were the first known people to construct a "world-wide-web" and sustainable system of agriculture. Now, questions remain on ***how*** they achieved this great feat. Maybe one day we will also learn lessons from their advanced forms of government, institutions, and social structure which must have constituted this primitive, sustainable web of function.

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[1] http://www.bbc.co.uk/science/horizon/2002/eldorado.shtml retrieved March 2nd, 2012

[2] William Balee has discovered 2,000 year old agricultural words still being spoken in today's isolated tribes, such as the Siriono (18:45).

[3] Michael Heckenberger has shown that complex, hierarchical tribal socio-structures involving chiefly individuals exists within small Amazonian tribes such as the Kuikuro (26:00).

[4] Clark Erickson has revealed ancient "forest islands" with pottery large enough to feed thousands, which may have served as large gathering centers (14:45-15:47).

[5] Soros illustrates globalization as a purely recent phenomenon that "distinguishes the present day from 50 or even 25 years ago," (2).

References

Heffer, Parick; Prud'homme, Michel. (2011). *Fertilizer Outlook 2011 – 2015*. Paris, France: International Fertilizer Industry Association. Retrieved March 2nd, 2012 from http://www.fertilizer.org/ifacontent/download/59953/875110/version/2/file/2011_montreal_ifa_summary.pdf

Mann, Charles C.; *Earth Movers of the Amazon;* Science Magazine; February 4th, 2000; Vol. 287; 786-789; retrieved March 3rd, 2012 from http://www.sas.upenn.edu/~cerickso/baures/Mann2.html

Smil, Vaclav. (2002). *The Earth's Biosphere: Evolution, Dynamics, and Change*. MIT Press.

Soros, George. (2002). *George Soros on Globalization*. New York, NY: PublicAffairs, Perseus Books Group.

The Secret of El Dorado [video]. (available online 2009). Retrieved 2/2012 from http://video.google.com/videoplay?docid=8993313723654914866

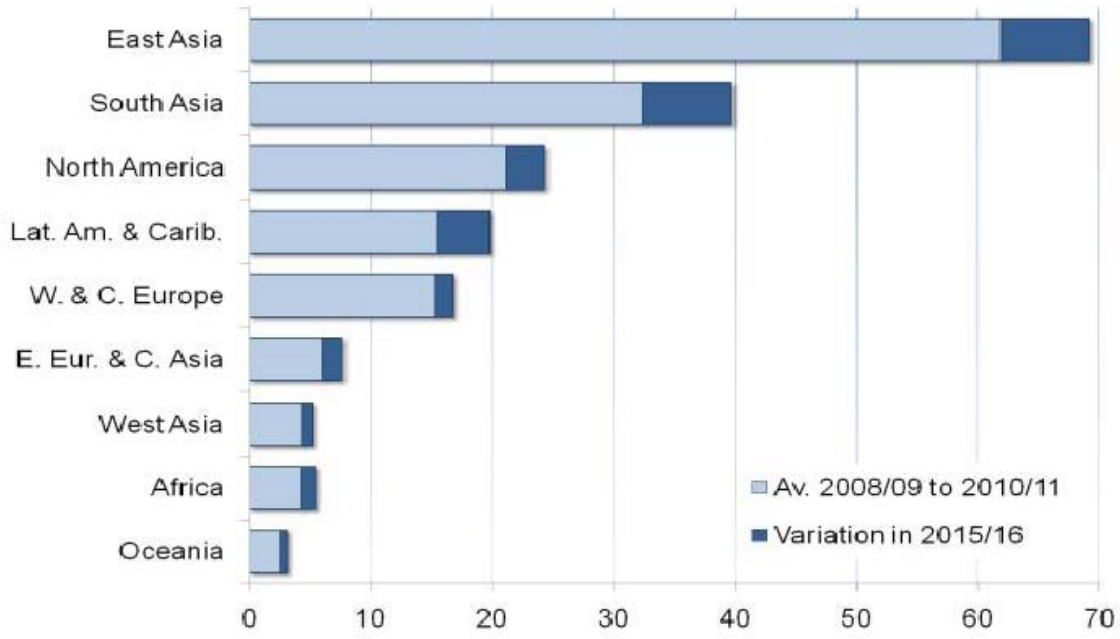


Figure 1 - Projected Medium-Term Evolution of Regional Fertilizer Demand (Mt nutrients). (Fertilizer Outlook 2011-2015, p4)



Image 1 - Lines in a landscape. Three pre-Columbian causeways run between raised mounds in Baures, Bolivia. Trees grow on the causeways and mounds, protected from the savanna's seasonal fires and floods (photography by C. Erickson). (Mann 2000).



Image 2 - A patchwork of ancient raised fields (photograph by C. Erickson). (Mann 2000)