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Boricuá work party building terraces in Puerto Rico. Photo by Leonor Hurtado

Ground Shaking? Assessing the FAO's 2015 International Year of Soils

By Eric Holt-Giménez and Katherine Mott

> "The multiple roles of soils often go unnoticed. Soils don't have a voice, and few people speak out for them. They are our silent ally in food production [the] foundation of vegetation and agriculture. Forests need it to grow. We need it for food, feed, fiber, fuel and much more… We need healthy soils to achieve our food security and nutrition goals, to fight climate change and to ensure overall sustainable development… There are many ways to do this. Crop diversification which is used by most of the world's family farmers is one of them…"
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> José Graziano da Silva, FAO Director-General

When the Food and Agriculture Organization of the United Nations declared the International Year of Soils (IYS) in 2015, they took a position on the future of soil, water, the climate, the environment, farmers and global food security. An international campaign to attract resources and facilitate networking and awareness, the IYS 2015, resulted in a slew of informational materials and events, the inclusion of soil in the United Nation's Sustainable Development Goals, a revision of the 31-year old *World Soil Charter,* a *Global Soil Partnership* and a massive report on the *Status of the World's Soil Resources*.

The report concluded,

> "[While] there is cause for optimism in some regions, the majority of the world's soil resources are in only fair, poor or very poor condition. Today, 33 percent of [cultivated] land is moderately to highly degraded due to the erosion, salinization, compaction, acidification and chemical pollution of soils."

The imperative of soil conservation and restoration is obvious: The world is losing about 75 billion tons of crop soil every year—a loss valued at US$400 billion.[1] Soil erosion, degradation and desertification have reduced agricultural productivity by 50% in Africa and 20% in Asia. Not only soil is being affected—the global loss of soil-based ecosystem services is valued between US$6.3 and $10.6 trillion annually. The two billion poor rural dwellers farming on marginal, rain-fed land are the farmers most affected by these losses.[2]

The *Status of the World's Soil Resources* lists drivers of soil degradation as population growth and urbanization, land markets and land grabs, war and civil strife, climate change, and farming practices like intensive tillage without adding enough organic matter. This accelerates soil erosion by causing a net loss of soil carbon as CO_2 ,making soil susceptible to erosion, Nitrous oxide (N_2O), emission resulting from excessive nitrogen fertilizer use is also a contributor to climate change. But the report also identifies agricultural land use intensity as a primary driver, resulting from growing food, fiber and fuel demands, an increase in global meat consumption, and the spread of agrofuels. On one hand, the FAO assumes these global trends are inevitable. On the other, the report suggests that the current model of food production is unsustainable. To resolve the contradiction between unsustainable production and the need to restore soil fertility and ecosystem services, the IYS proposes systems of "sustainable soil management."

The IYS is a crucially important initiative. But to change things on the ground they need to ask: *What's driving the drivers of soil degradation?* If the solution is sustainable soil management—hardly a new concept—why haven't farmers been doing it? The answer to this puzzle goes back to the origins of industrial agriculture.

Soil, the metabolic rift and capitalist agriculture

First documented by the ancient Greeks, soil erosion has plagued many agricultural societies.[3] However, with the Industrial Revolution and the onset of modern agriculture in the 19th century, the problem assumed new dimensions.

In *Organic Chemistry in its Applications to Agriculture and Physiology* (1840) Justus von Liebig identified the importance of chemical compounds for soil fertility. His work led to the production of synthetic fertilizer and became the foundation for chemical agriculture. But von Liebig also argued for recycling of nutrients. "Rational agriculture," he claimed, would give "back to the fields the conditions of their fertility." In his *Letters on the Subject of the Utilization of the Municipal Sewage Addressed to the Lord Mayor of London* (1865) von Liebig claimed that pollution of cities with human and animal excrement and the depletion of the natural fertility of the soil were connected. He insisted that organic recycling to return non-synthetic nutrients to the soil was an indispensable part of a rational urban-agricultural system.[4]

Karl Marx (whose environmental analyses are not commonly known) agreed with von Liebig. He believed that capitalist agriculture was biologically and socially irrational, stemming from the "metabolic rift" created by capitalism as it drove people from the countryside into the cities. Urban concentration led to a one-way flow of nutrients out of the countryside into the city where they were consumed as food and goods. These nutrients were not returned to the countryside, but were sloughed into the rivers and oceans as waste. Marx saw both the flow of nutrients and the flow of people as an essential—but destructive and exploitative—part of capitalism:

> Capitalist production collects the population together in great centers, and causes the urban population to achieve an ever-growing preponderance. This… prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil... *All progress in capitalist agriculture is a progress in the art, not only of robbing the worker, but of robbing the soil* (emphasis ours); all progress in increasing the fertility of the soil for a given time is a progress toward ruining the more long-lasting sources of that fertility...Capitalist production, therefore, only develops the techniques and the degree of combination of the social process of production by simultaneously undermining the original sources of all wealth—the soil and the worker.[5]

Early capitalist agriculture addressed declining soil fertility by digging up graveyards and mining old battlefield sites from the Napoleonic wars for bones to grind up and use as phosphate fertilizer. Classical economists like David Ricardo and Thomas Robert Malthus believed that declining fertility required population control to avoid mass starvation.

The "solution" was soil imperialism. Europe's colonies provided a bounty of natural resources and nutrients. When *guano* was discovered, empires annexed hundreds of islands and used slave labor to mine thousands of tons of the nitrate-rich fertilizer. These measures—and the eventual commercialization of synthetic fertilizer—postponed the impoverishment of agricultural soils, but did nothing to resolve the rural-urban metabolic rift.

After WWII the huge stockpiles of nitrates used for explosives were converted into cheap fertilizer. Synthetic inputs quickly became the norm that, along with cheap oil and new farm machinery, fueled the rapid expansion of industrial agriculture. When farms in industrialized countries were no longer able to buy all the fertilizer and farm machinery being produced by the agrichemical industries, the Green Revolution (financed by the Ford and Rockefeller foundations) spread the reductionist model of industrial agriculture to the developing world. This opened up markets for the export of surplus chemicals and machinery and new hybrid seed products. The widespread application of nitrogen, phosphorous and potassium (NPK) to agricultural soils eliminated the practices of cover cropping, inter-cropping and relay-cropping with legumes. The elimination of work animals also meant that less land was needed to produce legume-based forages. Thus, less reason to grow legumes. This separated grain cultivation from livestock production, leading to simplified rotations, including monocultures and feedlots. This also eliminated the use of animal manure as soil conditioner and a supplementary source of organic matter and nutrients, especially important micro-nutrients that helped plants resist damage from insects and disease.

The history of the global soil crisis makes clear that the simple techno-fixes, micro-doses and free markets proposed by institutions like the Bill and Melinda Gates Foundation or USAID will not solve the problems of degradation and erosion. To restore our planet's soils, we must transform our agricultural system.

Agroecological basis for soil restoration

> "One day I decided to go take a look at my land. I did a careful study and measured the depth of the topsoil. I took five samples. In one it was 25 inches deep, in another it was 19, in another 20 and in another 18… I told my son, we have soil here for many years. I will die and this soil will be yours. He understood the value of the land… When I got this land it was bare pasture. Now I have a forest… that is where life is. If it were not for these trees the wind would blow all my crops down. This happens in many other fields, but not in mine. Why? Because I have a cover. I have windbreaks. I plant them for multiple reasons: firewood, organic matter for the soil, protection of the environment… I work with two hands: protection and production."
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> *Orlando Martinez, Campesino a Campesino Movement, Ometepe, Nicaragua.*[6]

The key to restoring soil is the restoration of the agroecosystem. The key to restoring the agroecosystem is working with the world's smallholders—the farmers who produce most of the world's food.

Contrary to received wisdom, the intrinsic nature of peasant, indigenous and smallholder agriculture is neither productively inefficient nor degrading to soils and the environment. It is true that these farmers have been pushed higher onto unstable hillsides, deeper into the forest frontiers, and steadily onto smaller and smaller

Campesino a Campesino movement lays out contour lines with rustic transit in Nicaragua. Photo by Eric Holt-Giménez

parcels of land. This process has led to an unsustainable condition in which soil is often the first resource to suffer. Poor soil—often devoid of organic matter thanks to years of chemical agriculture—is the most limiting factor to production in smallholder agriculture worldwide. This is why soil restoration and conservation—rather than chemical fertilization—is often the first step in the agroecological restoration of smallholder farms.

Present day agroecology developed as smallholders struggled to restore their soils and extricate themselves from the Green Revolution's chemical "treadmills" driving them bankrupt. With agroecology, farmers

Photo by Leonor Hurtado

use animal manures, compost, legumes and cover crops to provide nutrients while increasing organic matter levels, thus helping to maintain soil moisture and protect soil surfaces. Swales, terraces and alternating contour strips are used to conserve soil and water. Weeds are controlled by cultivating, rotations, cover-cropping, inter-cropping and mulches. Insect pests are managed by attracting predators with companion planting, interrupting pest cycles and vectors with rotations, alley cropping and the use of trap and repellant crops. Management of microclimates, different forms of agroforestry and diversified animal husbandry, along with polycultures and a strong reliance on a rich array of locally-adapted land races are all used in combination to distribute risk and ensure a stable supply of food despite droughts, frosts or floods. All of this not only restores soil and produces an abundance of food, it captures carbon and builds climate resilience in our food system.

Agroecology today is not only a science and a practice, but a social movement integrally linked to food sovereignty. In a report from the International Forum for Agroecology in 2015, the international peasant movement La Via Campesina stated,

> "Agroecology practiced by small scale producers generates local knowledge, promotes social justice, nurtures identity and culture and strengthens the economic viability of rural areas… [It] is political; it requires us to challenge and transform structures of power in society. We need to put the control of seeds, biodiversity, land and territories, waters, knowledge, culture and the commons in the hands of the peoples who feed the world."

To advance the recommendations and mobilize the political will generated by the United Nations International Year of Soils, the world's governments and development institutions need to help smallholders stay on the land and develop agroecology. This would begin to reverse the historical trend in the metabolic rift and build climate resilience at the same time. To do this, they need to support smallholder's social movements for agroecology and food sovereignty.

That would be truly ground-shaking.

Yoke with oxen: Sustainable tilling technique at Vivero Almar, Cuba. Photo by Leonor Hurtado

Endnotes

[1] Noel, Stacey, Friederike Miculcak, Naomi Stewart, and Hannes Etter. Report for policy and decision makers: Reaping economic and environmental benefits from sustainable land management. ELD Initiative, September 2015. http://eld-initiative.org/fileadmin/pdf/ELD-pm-report_05_web_300dpi.pdf.

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[3] Carter, Vernon Gill, and Tom Dale. *Topsoil and Civilization*. Norman: University of Oklahoma Press, 1955.

[4] Magdoff, Fred, and John Bellamy Foster. "Liebig, Marx and the Depletion of Soil Fertility: Relevance for Today's Agriculture." In *Hungry for Profit: The Agribusiness Threat to Farmers, Food and the Environment*. New York: Monthly Review Press, 2000.

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[6] Holt-Giménez, Eric. *The Campesino a Campesino Movement: Farmer-led, Sustainable Agriculture in Central America and Mexico*. Oakland, CA: Institute for Food and Development Policy, 1996.

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