PLANTING TREES AND MANAGING SOILS TO SEQUESTER CARBON

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As of 2007, the shrinking forests in the tropical regions were releasing 2.2 billion tons of carbon per year. Meanwhile, expanding forests in the temperate regions were absorbing 0.7 billion tons of carbon annually. On balance, a net of some 1.5 billion tons of carbon were being released into the atmosphere each year, contributing to global warming.

The tropical deforestation in Asia is driven primarily by the fast-growing demand for timber. In Latin America, by contrast, it is the growing demand for soybeans and beef that is deforesting the Amazon. In Africa, it is mostly the gathering of fuelwood and the clearing of new land for agriculture as existing cropland is degraded and abandoned. Two countries, Indonesia and Brazil, account for more than half of all deforestation. The Democratic Republic of the Congo, also high on the list, is a failing state, making forest management difficult.

Included in the Plan B blueprint to stabilize climate are plans to end net deforestation worldwide and to sequester carbon through a variety of tree planting initiatives and the adoption of improved agricultural land management practices. Today, because the earth's forests are shrinking, they are a major source of CO_2. The goal is to expand the earth's tree cover, growing more trees to soak up CO_2.

Although banning deforestation may seem farfetched, environmental reasons have pushed three countries—Thailand, the Philippines, and China—to implement complete or partial bans on logging. All three bans were imposed following devastating floods and mudslides resulting from the loss of forest cover. After suffering record losses from several weeks of nonstop flooding in the Yangtze River basin, Beijing noted that when forest policy was viewed not through the eyes of the individual logger but through those of society as a whole, it simply did not make economic sense to continue deforesting. The flood control service of trees standing, they said, was three times as valuable as the timber from trees cut. With this in mind, Beijing then took the unusual step of paying the loggers to become tree planters—to reforest instead of deforest.

Other countries cutting down large areas of trees will also face the environmental effects of deforestation, including flooding. If Brazil's Amazon rainforest continues to shrink, it may also continue to dry out, becoming vulnerable to fire. If the Amazon rainforest disappears, it would be replaced largely by desert and scrub forestland. The capacity of the rainforest to cycle water to the interior, including to the agricultural areas to the south, would be lost. At this point, a fast-unfolding local environmental calamity would

become an economic disaster, and because the burning Amazon would release billions of tons of carbon into the atmosphere, it would accelerate global warming.

Just as national concerns about the effects of continuing deforestation eventually eclipsed local interests, now global interests are beginning to eclipse national ones as deforestation has become a major driver of global warming. Deforestation is no longer just a matter of local flooding, but also rising seas worldwide and the many other effects of climate change. Nature has just raised the ante on protecting forests.

Reaching a goal of zero net deforestation will require reducing the pressures to deforest that come from population growth, rising affluence, the construction of ethanol distilleries and biodiesel refineries, and the fast-growing use of paper. Protecting the earth's forests means halting population growth as soon as possible, and, for the earth's affluent residents who are responsible for the growing demand for beef and soybeans that is deforesting the Amazon basin, it means moving down the food chain. A successful deforestation ban may require a ban on the construction of additional biodiesel refineries and ethanol distilleries.

Against this backdrop of growing concern about the forest-climate relationship, a leading Swedish energy firm, Vattenfall, has examined the large-scale potential for foresting wasteland to sequester carbon dioxide. They begin by noting that there are 1.86 billion hectares of degraded land in the world—land that was once forestland, cropland, or grassland—and that half of this, or 930 million hectares, has a decent chance of being profitably reclaimed. Some 840 million hectares of this total are in the tropical regions, where reclamation would mean much higher rates of carbon sequestration.

Vattenfall estimates that the maximum technical potential of these 930 million hectares is to absorb roughly 21.6 billion tons of CO_2 per year. If, as part of a global climate stabilization strategy, carbon sequestration were valued at $210 per ton of carbon, the company believes that 18 percent of this technical potential could be realized. If so, this would mean planting 171 million hectares of land to trees. This area—larger than that planted to grain in India—would sequester 3.5 billion tons of CO_2 per year, or over 950 million tons of carbon. The total cost of sequestering carbon at $210 per ton would be $200 billion. Spread over a decade, this would mean investing $20 billion a year to give climate stabilization a large and potentially decisive boost. This global forestation plan to remove atmospheric CO_2, most of it put there by industrial countries, would be funded by them. An independent body would be set up to administer, fund, and monitor the vast tree planting initiative.

Aside from the Vattenfall forestation idea, there are already many tree planting initiatives under way that are driven by a range of concerns, from climate change to desert expansion, to soil conservation, to making cities more habitable. In late 2006, the U.N. Environment Programme, inspired by

Nobel Peace Prize winner Wangari Maathai, announced plans for a worldwide effort to plant 1 billion trees in one year to fight climate change. This initial target was easily exceeded and by mid-2008, more than 2 billion trees had been planted in more than 150 countries. The new goal is to have 7 billion trees planted by the end of 2009 – just over one tree for every person on the planet.

A number of agricultural practices can also increase the carbon stored as organic matter in soils. Farming practices that reduce soil erosion and raise cropland productivity usually also lead to higher carbon content in the soil. Among these are shifting from conventional tillage to minimum-till and no-till, the more extensive use of cover crops, the return of all livestock and poultry manure to the land, expansion of irrigated area, a return to more mixed crop-livestock farming, and the forestation of marginal farmlands.

Rattan Lal, a Senior Agronomist with the Carbon Management and Sequestration Center at Ohio State University, has calculated the range of potential carbon sequestration for each of many practices, such as those just cited. For example, expanding the use of cover crops to protect soil during the off-season can store from 68 million to 338 million tons of carbon worldwide each year. Calculating the total carbon sequestration for the practices he cites shows a potential for sequestering 400 million tons of carbon each year at the low end, and 1.2 billion tons of carbon per year at the more optimistic high end. For our carbon budget we are assuming, perhaps conservatively, that 600 million tons of carbon can be sequestered as a result of adopting these carbon-sensitive farming and land management practices.

Ending net deforestation and sequestering carbon as described above will put us on the path to the Plan B climate stabilization goal of cutting net carbon emissions 80 percent by 2020. To see how raising energy efficiency and harnessing renewable sources of energy complete the picture, see Earth Policy Institute's carbon cutting blueprint.