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In Niger, Trees and Crops Turn Back the Desert

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(Page 2 of 3)

"The benefits are so many it is really astonishing," Dr. Larwanou said. "The farmers can sell the branches for money. They can feed the pods as fodder to their animals. They can sell or eat the leaves. They can sell and eat the fruits. Trees are so valuable to farmers, so they protect them."

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Michael Kamber for The New York Times
A market in Droum is bountiful, thanks to increased crop yields, largely because newly planted trees have helped retain the soil and water.

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They also have extraordinary ecological benefits. Their roots fix the soil in place, preventing it from being carried off with the fierce Sahelian winds and preserving arable land. The roots also help hold water in the ground, rather than letting it run off across rocky, barren fields into gullies where it floods villages and destroys crops.

One tree in particular, the *Faidherbia albida*, known locally as the gao tree, is particularly essential. It is a nitrogen-fixing tree, which helps fertilize the soil.

Its leaves fall off during the rainy season, which means it does not compete with crops for water, sun or nutrients during the growing period. The leaves themselves become organic fertilizer when they fall.

"This tree is perfectly adapted for farming in the Sahel," said Dr. Larwanou. "Yet it had all but disappeared from the region."

That is because for generations local farmers had simply cleared their fields of all vegetation, including trees, before sowing neat rows of sorghum, millet, peanuts and beans. When a field became less productive, the farmer would move on to another.

Wresting subsistence for 13 million people from Niger's fragile ecology is something akin to a puzzle. Less than 12 percent of its land can be cultivated, and much of that is densely populated. Yet 90 percent of Niger's people live off agriculture, cultivating a semiarid strip along the southern edge of the country.

Farmers here practice mostly rain-fed agriculture with few tools and no machinery, making survival precarious even in so-called normal times. But when the rains and harvest fall short, hunger returns with a particular vengeance, as it did in 2005 during the nation's worst food crisis in a generation.

Making matters worse, Niger's population has doubled in the last 20 years. Each woman

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bears about seven children, giving the country one of the highest growth rates in the world.

The regrowth of trees increases the income of rural farmers, cushioning the boom and bust cycle of farming and herding.

Ibrahim Idy, a farmer in Dahirou, a village in the Zinder region, has 20 baobab trees in his fields. Selling the leaves and fruit brings him about \$300 a year in additional income. He has used that money to buy a motorized pump to draw water from his well to irrigate his cabbage and lettuce fields. His neighbors, who have fewer baobabs, use their children to draw water and dig and direct the mud channels that send water coursing to the beds. While their children work the fields, Mr. Idy's children attend school.

In some regions, swaths of land that had fallen out of use are being reclaimed, using labor-intensive but inexpensive techniques.

In the village of Koloma Baba, in the Tahoua region just south of the desert's edge, a group of widows have reclaimed fields once thought forever barren. The women dig small pits in plots of land as hard as asphalt. They place a shovelful of manure in the pits, then wait for rain. The pits help the water and manure stay in the soil and regenerate its fertility, said Dr. Larwanou. Over time, with careful tending, the land can regain its ability to produce crops. In this manner, more than 600,000 acres of land have been reclaimed, according to researchers.

Still, Koloma Baba also demonstrates the limits of this fragile ecosystem, where disaster is always one missed rainfall away. Most able-bodied young men migrate to Nigeria and beyond in search of work, supporting their families with remittances. The women struggle to eke a modest crop from their fields.

"I produce enough to eat, but nothing more," said Hadijatou Moussa, a widow in Koloma Baba.

The women have managed to grow trees on their fields as well, but have not seen much profit from them. People come and chop their branches without permission, and a village committee that is supposed to enforce the rights of farmers to their trees does not take action against poachers.

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