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Pedal Power

Recycled bike-machines give new life to Guatemalan farmers

A FEW YEARS AGO, Everilda Tubac would have winced at seeing the twenty-five sacks of corn sitting in the courtyard of her family farm in Guatemala's arid central highlands. It used to be backbreaking work to grind feed for her pigs, ducks, and chickens. She'd beat the cobs with a stick to loosen the grains, handpick each grain, and grind them in a hand-cranked mill. The process would take more than a week.

These days, she can do the job in a day and a half, thanks to a contraption sitting in the shade of her simple, whitewashed concrete house. The machine, which resembles a primitive exercise bicycle and is known as a *bicimolino*, or "bike mill," allows Tubac to degrain and mill corn with no more effort than a leisurely bike ride.

"The hand mill was so tiring," she says, massaging her arm at the memory. "And we can't afford electric or gas-powered mills. This costs us nothing."

Tubac bought her bike-mill from Maya Pedal, a cooperative enterprise in the small town of San Andres Itzapa, about fifteen kilometers down a potholed highway from the Tubac farm. Since Maya Pedal's inception in 1997, several U.S. and Canadian nonprofit groups, including Boston-based Bikes Not Bombs and Chicago-based Working Bikes, have donated about two thousand bicycles and components—often

outdated, sometimes rusty, always considered trash or too expensive to repair in their countries of origin.

The result, according to several sources, is one of the largest bike-recycling programs of its kind in the world, and the only one wholly run by an indigenous community. The basic bike-machine concept—modifying a bicycle so that stationary pedaling can accomplish a task—has existed for more than twenty years. But Maya Pedal has quietly created the most diverse collection of bicycle-machine designs anywhere.

Maya Pedal specializes in more than a dozen homegrown designs, from a bike irrigation pump that draws water up to five times faster than pumping by hand, to a vibrator that settles concrete for the production of cheap, strong roofing tiles.

Apart from their sheer novelty, all the innovations avoid the use of diesel or electric energy. "This is nonpolluting technology," says Mario Juarez, director of Maya Pedal, which also promotes chemical-free homemade animal feed and the use of bicycle trailers for market deliveries.

But most farmers who buy the machines aren't motivated by ecological concern. "These people are so poor they don't have the luxury of thinking about the environment," Juarez says. "If they get

a bike-machine, it's because of simple economics."

Seventy percent of the world's poor live in rural areas, just over a billion people live on less than a dollar a day, and at least 700 million people don't get enough food. Typical industrial-scale solutions—dams that displace whole communities, hybrid livestock that die when farmers can't afford expensive vaccinations, or diesel machinery that breaks down irreparably—often fail to help.

In the highlands of Guatemala, a scattering of lavish development projects has not alleviated the poverty of the area, which was among the worst ravaged by the country's thirty-six-year civil war. The mainly indigenous Mam and Kakchiquel peoples still scrape by on small-scale subsistence agriculture. Diets consist of tortillas and thin bean gruel, and wages average \$500 a year. Even where modern amenities like electricity exist, most daily tasks—such as shelling corn—are still done by hand.

For several years in the 1990s, Tubac scraped together enough money to buy commercial feed for her animals, until rising prices forced her back to the hand mill. Farmers in a neighboring village invested in a shiny new diesel-powered mill, but the machine soon broke down, and nobody local could fix it.

In 1996, frustrated by the prohibitive costs of irrigation, a farmer near Tubac built a water pump with a gear mechanism driven by hand. Another mated an old bicycle with a grain mill. Since the machines were prone to breaking down, the farmers sought help from a local ecodevelopment

initiative, which contacted a Canadian organization called Pedal Energy Development Alternatives. Its representatives arrived from British Columbia with bike parts, expertise, and new designs. Out of that exchange, Maya Pedal was born.

At first, the area's farmers snubbed the bike mills—which had been offered for free, but still suffered from significant engineering problems. “Farmers would try them out,” Juarez laughs, “and tell us ‘this doesn't work, you've got to change it,’ or ‘strengthen that, it's going to break.’ Together we made them work.”

In the revised version, the operator pedals an old bike crank, which drives a spinning cast-iron plate that rips kernels off corn cobs dropped through a hopper. Then, using a simple box wrench, the operator disconnects the mill and connects another plate to run a grinder.

But even with the kinks worked out, Maya Pedal met resistance from local farmers who were allured by examples of development spending. “They'd ask, ‘Don't you have one that's remote control, or diesel powered?’” Juarez recalls. “I'd say, ‘Yeah, but what are you going to do when it breaks down? With a bike machine, all you need to fix it is this wrench.’”

As Tubac's son Luis pedals away on their bicimolino, she tells how her neighbors scoffed when she first acquired it. Now she charges them five quetzales (about sixty-five cents) a sack to grind their corn—a bargain for the farmers, and a return on investment for Tubac.

According to its proponents, Maya Pedal exposes a flaw of conventional planning: most people in developing countries



A man grinds corn using Maya Pedal's signature machine, a bicimolino.

entirely Guatemalan-run and self-financing.

With volunteer outreach help from half a dozen local non-governmental organizations, the cooperative has distributed eighty bicimolinos and several dozen other machines around the country since 2002. NGOs and farming cooperatives from several Latin American countries have inundated Maya Pedal with requests for assistance in build-

do not need sophisticated, capital-intensive technology. “They need an improvement on traditional technology, something intermediate,” says Andrew Scott of UK-based Intermediate Technology Development Group, a pioneer in simple, low-cost development solutions. “Appropriate technology builds on existing skills and knowledge. It's something that people will use and further develop themselves.”

That's exactly what has happened with Maya Pedal's basic designs: as a result of tinkering by users, a five-gallon water bottle serves as an improved hopper, a converted mountain bike shells macadamia nuts with its knobby tires, and a bike-blender makes organic shampoos.

Maya Pedal now sells sixteen models of bike-machines at full price (about \$50 to \$250) to individuals, and at cost (\$40 to \$200) to groups and cooperatives. Along with sales of refurbished conventional bicycles, the bike-machines net just enough revenue to cover the salaries of Juarez and three assistants. While foreign organizations and donations kept the project alive initially, today Maya Pedal is

ing bike-machines. Bikes Not Bombs has also teamed with engineering students at MIT to draw up blueprints of Maya Pedal's unpatented designs and, with Maya Pedal's blessing, to post them on the web. Organizations worldwide could then download the designs, allowing villagers to make machines with simple welding skills and parts mostly from discarded bikes.

Such resourcefulness has worked for farmers like Everilda Tubac, whose bike mill has made her small poultry farm profitable again. And that advances one of Maya Pedal's chief goals: to help farmers retain traditional ties to the land despite the pressures of economic globalization.

“The industrialized life is less healthy and brings no spiritual satisfaction to us,” says Juarez. “I think the bicycle-machines is the best for us. [Indigenous farmers] are used to breathing clean air, hiking through our fields, eating fresh food. Rather than destroy our way of life, we should find a way to make it sustainable.” ☞

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