

LAST WORD

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## Proving their mettle by pedal

### Local groups donate expertise, parts to Guatemalan bicimaquina project

By Simon Rios, Globe Correspondent | July 17, 2005

Deep in the southern highlands of Guatemala, revolution is in the air. Hundreds of thousands of revolutions every day, actually.

Farmers in the hamlets of rural Chimaltenango are using a common machine in an uncommon way. Chimerical bicycles called "bicimaquinas" are grinding grain, drawing well water, shelling macadamia nuts, compacting concrete, tilling soil, and generating electricity.

A crew of MIT students who learned about the bicimaquinas in December traveled to Chimaltenango to help turn its wheels. This spring, they won an award for their own creation of a bicimaquina.

And many of the bicimaquinas in Chimaltenango have been made from bicycles donated by Bikes Not Bombs in Roxbury. Those that can be refurbished are fixed up, then sold to ride. Those beyond repair are stripped and the parts are used to make bicimaquinas.

The ultimate in low-emissions machinery, a bicimaquina is powered by a rider who pedals it like a normal bicycle.

The bicimaquinas "are technologically self-sufficient, as they don't need fossil fuel or electric energy to function," wrote Mario Siquinajay, 35, executive director of Maya Pedal, the organization that manufactures the machines, in a recent e-mail from Chimaltenango.

On a visit to Boston in December, Siquinajay presented Maya Pedal's work to a group at Bikes Not Bombs and again to students and faculty at MIT.

"Everyone was stunned at the amount of difference this small organization was able to make in the local villages," said Radu Raduta, 22, a Romanian engineer who graduated from MIT last month.

Raduta and others were so impressed that they struck up a relationship with Maya Pedal, based in San Andres de Itzapa, a town about half the size of Jamaica Plain. They took a spring break trip there and plan a more extensive visit in late fall.

Their aim is to help the Guatemalans improve the design and production capacity of current machines, and advise Maya Pedal on fiscal matters, Raduta said.

He and engineering students Jessica Vechakul, who also graduated last month, and junior Kimberly Harrison, spent a week in Chimaltenango to see the bicimaquinas in action.

They visited an animal farm that used a bicimolino to mill feed, a women's cooperative that used a biciliquadora to blend aloe shampoos, and a farming cooperative with a bicibomba, a water pump, which was a hit with neighboring farmers.

"As they installed it, people were gathering around and [Maya Pedal] immediately got requests for three more" Raduta said. The farmers "really wanted them because they knew they would get results if they used them in the field."

In the Guatemalan outback, where electricity is scarce or absent among the predominantly Mayan population, small producers often rely on generators to power their machinery. According to 2001 government figures, 58 percent of Chimaltenangans live under the poverty line. Paying for fuel and maintenance, along with a scarcity of parts, presents

a steep challenge to powering machinery.

Bicimaquinas are not only economical but bring "an increase in productivity that allows a community to start competing with the price of imported foods," Raduta said. This can "diversify the range of their products and provide an increase in revenue that will allow further investments."

With the bicimaquina, which Siquinajay calls a mix of advanced technology and "campesino" tradition, Maya Pedal is helping "propel the development of the country by enhancing productivity, generating the basic family economy, and contributing to the environment and the health of the people," he wrote.

At the Maya Pedal workshop, the MIT trio suggested different tools and more efficient welding techniques as they watched chief technician Carlos Marroquin, 35, construct a bicimolino, which, with interchangeable parts, can serve as a cornhusker, coffee grinder, metal sharpener, maize mill, and nut-sheller.

Although he lacks formal training and all the proper tools, Vechakul said, Marroquin "makes an extraordinary bicimaquina," drawing on intuition and a tireless work ethic.

But the students are concerned that lack of formal technical and financial know-how will limit the expansion of the organization and the increase in production that Maya Pedal would like to see.

Maya Pedal is "pricing the machines too low, they're cutting themselves to the bone," Raduta said, referring to preferential rates given to cooperatives that comprise the bulk of their clientele.

Groups in Ecuador and Bolivia have expressed interest in harnessing pedal power, Raduta said, but Maya Pedal needs manufacturing manuals before it can export its expertise.

"Before we went there," Vechakul said, "there was no [technical] documentation, and Carlos had all this in his head. He didn't see a point to writing stuff down."

While the purpose of the April trip was to identify Maya Pedal's weak spots, this fall, Raduta said, they plan to plunge in and help. The students will draw up manuals for the machines and introduce a prototype of the bicilavadora, a washing machine they developed over the spring semester when they make a two-month trip over November and December.

In May, the team won a \$5,000 award in the IDEAS Competition at MIT for the bicilavadora, which, like a commercial washing machine, has a wash cycle, two rinses, and one spin-dry cycle. For the women in Chimaltenango who handwash the family clothes, the machine could save hours a week.

Gwyndaf Jones, 49, founder of titanium bike-maker Merlin Metalworks, also caught wind of the project and returned in mid-June from a three-week trip to Chimaltenango. He and grad student Victoria Tai analyzed Maya Pedal's financing and accounting. Raduta, Vechakul, and grad student Alex Yip plan to make the November-December trip.

The nonprofit Bikes Not Bombs has sent two mammoth crates containing 450 cycles each, to Chimaltenango -- one last year, the other in 2002.

"We're finding ways to ship to Maya Pedal because they're working so hard at doing it right," said Carl Kurz, founder of the organization. Maya Pedal has "a very holistic way of looking at development."

With the environmental efficacy of the bicimaquinas, wrote Siquinajay, "we have reached our grand objective: the conservation of our atmosphere." ■