The Magnificent Dream of Luis Chavez Rodriguez

In which one poet and five engineering students set out to change the world

Luis Chavez hopes to create a new type of village, like those in the novels of Gabriel García Márquez, Mario Vargas Llosa, and Juan Carlos Onetti.

BY ART JAHNKE

MANY YEARS AFTER the flood, Luis Chavez Rodriguez walked along the bank of Peru’s Shocol River and wondered if the watery lifeblood of his village could ever be returned to its rightful path.

When Chavez was a child, the river curled like a vine across flat bottomland planted with coffee, bananas, and sweet lemons. At the time, more than thirty years ago, he would fish for trout in the clear blue lakes beside the river and imagine the fat silver fish swimming from the pools into the river, following it...
The plan was to spend six weeks in Chirimoto and to figure out the best way to clean up the town’s contaminated water system.

THE TOTAL STATION helps map existing pipe systems.

RICHARD BURRIOLA (ENG’10) does his best to work around a flock of turkeys.

CHARLES JAHNKE (ENG’10) takes a water sample from a cistern, one of many that serve the village.
downstream to where the water disappeared beneath the mountain. In those days, more than 1,500 people lived in Chirimoto, a good-sized village on the low eastern slopes of the Andes in the Amazonas region of Peru. And life, as Chavez remembers it, was good.

Then came the season of the rains, and the waters rose, sweeping with them debris that clogged the entrance to the cave where the Shocol dove underground. The river turned on itself, and on the town, flowing backwards and swallowing the clear blue lakes and the banana trees and eventually Chirimoto itself. In the village, water climbed as high as a man's shoulder, filling the adobe homes with thick, dirty brown liquid.

Most Chirimotans moved to higher ground, selling their farms for a fraction of their worth. But some refused to go, and today about 300 people remain in the valley, where, in Chavez's opinion, life is not as good as it should be, largely because several things that are considered basic services in much of world are either nonexistent or broken.

"Chirimoto needs infrastructure," says Chavez (GRS'04,'10), a College of Arts & Sciences senior teaching fellow in Spanish and a Ph.D. candidate. "It needs better education. It needs health care. When I returned to Chirimoto after much time away, I realized there was a lot missing."

Chavez, whose family moved to Lima when he was fifteen, returns each year to his childhood home, where he is both benefactor and a kind of chief technology officer. It's an odd role for a poet and a novelist, but it's a natural one for a dreamer, and Chavez is admittedly all those.

"My specialty is literature," he says. "I approach reality with my imagination. I imagine and I dream that this town can be organized and can work well. My plan here is very ambitious. It is to create a new village, like the towns in Latin American novels, novels by Gabriel García Márquez, Mario Vargas Llosa, Juan Carlos Onetti."

Three years ago, Chavez spent $40,000, most of it borrowed from banks, to build a community center and library, called Casa del Colibrí, or Hummingbird House. He also started a program, funded by Chirimoto natives who have moved to Lima, to provide school supplies, and he persuaded town leaders to bring back the annual heritage festival, a three-day (and night) community-building party that hadn't been celebrated since the flood. But Chavez's most valuable gift to his village may be persuading a small group of engineering students from Boston University to buy into his dream.

**THE ENGINEERS ACCEPT THE CHALLENGE**
The effort began two years ago, when Chavez learned about a new student organization at the College of Engineering called Engineers Without Borders (EWB). The group was looking for an engineering project that fit their skills, preferably one that would take them to some distant corner of the globe. Chavez knew he had just the thing.

In January 2008, with Chavez's guidance, Chris Spring (ENG'08), then the EWB chapter's president, Julia Delogu (ENG'09), Paolo Belfiore (ENG'09), Ramona Georgescu (ENG'07), and graduate student Emily Johnson (SAR'07, SPF'08) visited Chirimoto to see if it would be possible to build solar-powered generators that would bring electricity to the town.

When they arrived, the students learned that Chirimoto was soon to be wired to a regional electrical grid. Searching for plan B, the engineers considered a report from local health workers that Chirimoto's aging water system was contaminated with silt, clay, and coliform bacteria, and that the likelihood that over the course of a lifetime a villager would suffer from a parasitic infection was 100 percent. The group quickly steered their project from providing electricity to providing clean water.

"The local governments were trying to raise awareness of the problems of waterborne illness," says Jeremy Schein (ENG'10), current president of the University's EWB chapter. "But they seemed to have no desire to correct anything. We thought we could help out, because this was a project with a manageable size. All of the contamination was biological, and it was serving a small population."

Last June, using money raised at an auction, the chapter bought an optical surveying instrument called a total station. Three weeks later, four undergrads, Schein, Richard Burriola (ENG'10), Elissa Mueller (ENG'12), and Charles Jahnke (ENG'10) (the
After two weeks of surveying, it was clear that the decision about which pipes to save and which to abandon would be harder than they had hoped.

PAOLO BELFIORE (ENG’09) samples water with the help of a local guide.

ON PAPER, THE existing water system looks excellent. Not so in the field.

IN THE VILLAGE sawmill, a combustion engine powers belt-driven lathes and other tools.
author’s son), made their way to Chirimoto. They were joined two weeks later by Belfiore, who had been part of the original mission. Their plan, hammered out over the winter months, called for a six-week stay in Chirimoto, where they would try to determine the most efficient way to clean up the town’s water system.

A secondary project was designing a wood-burning kitchen stove that, unlike most of those in the village, would vent hazardous smoke outside the homes. Francis Hopcroft, a civil engineering professor from Wentworth Institute of Technology, came along as trip advisor. And Caitlin Bolston, a library science student from Hunter College, signed on for three weeks with plans to build a library and a horse-drawn bookmobile.

By ground transportation from Lima — a bus to Chachapoyas, a taxi to the town of Mendoza, and then any vehicle for hire — the trip to Chirimoto takes about thirty hours. But Chavez had planned well, persuading authorities to put the engineers on a twice-monthly (approximately), military-operated cargo plane, which takes off from a back lot of Lima’s airport and lands on a strip of concrete on a ridge outside Chachapoyas. Taxis carried the group to Chirimoto, where an unanticipated welcome awaited.

“We were swarmed in a flurry of Spanish greetings and handshakes,” says Jahnke, who is vice president of EWB. “Before we even knew what was happening, our bags were taken upstairs and we were led on a tour of the town. Everyone wanted to meet us and shake our hands. It was really overwhelming. As one of the few people who didn’t speak Spanish, I remember feeling a moment of great comfort when I saw a sign above a doorway that said Welcome.”

Casa del Colibrí, the community center that would be the students’ home base for the next month and a half, is a two-story cinderblock building on a corner of the town plaza, directly opposite the simple white church. Like many buildings in Chirimoto, its windows have no glass, so cool breezes, as well as the occasional bat, are free to drift through, over the dinner table.

The group pitched tents on the second story’s heavy wooden plank floor and peered across the street to the sawmill where the planks had been hewn. Later, they would learn that the combustion engine-powered mill was also used to crush sugar cane, whose sweet juices were used to brew aguardiente, a clear rum-like liquor that locals flavor with anise.

On July 7, armed with the best available maps of the local water system, the engineers set out for the mountains, hauling an unwieldy sixty pounds of surveying equipment up a ridge.

In her diary of the trip, Mueller describes a typical day’s effort:

(Our guide) Angel met Paolo and me this morning to take us up to the water source at Mari Pata, while Jeremy, Charlie, and Richard continued surveying. We had not made it all the way up to the source the other day with the whole group, and we want to be sure that all of the sources are clean. We are worried that the sample will have more contaminants than the source because much of the mountain is cow pasture. Although Mari Pata is closer to Chirimoto than the source at Lambras, the hike took longer — almost 4 hours — because the path was so dense. The source is actually several small streams that join, fall over a waterfall, and then flow down the mountain to the capture tanks. On the hike down, we passed the reservoir for the Foncodes system. We met the others at Alberto’s house for lunch, and then returned to the Hummingbird House.

THE OTHER SYSTEM: POLITICS

There were, it turned out, four systems of pipes that carried water from springs high in the mountains to the homes of Chirimoto, and each of those systems had its own set of problems. The two older systems, built forty years ago, were riddled with leaks and in such poor repair that, initially at least, a salvage job looked
impossibly difficult. Of the two newer systems, built in the late 1990s, one lacked any filtration and had so little water pressure that it was almost useless. The other was incomplete. Two weeks into the surveying, the only thing clear was that figuring out the best way to make one clean and reliable system from four ailing systems would be more complicated than the students had expected.

“Part of the problem is the engineering culture in Peru,” says Schein. “It creates a lot of half-finished projects. One of the water systems in Chirimoto, for example, had plans drawn up in 1997 for a slow sand filter. But when the system was built, they never included the filter. It seems to have just vanished.”

By day, the students hacked their way through thickets of brush, ascending and descending ridges in the relatively thin air of mile-high elevations. In the evening, the group huddled around flashlight-illuminated topographical maps, debating the merits of salvaging one system of pipes over another.

Then came the politics. Not everyone, the engineers learned, was convinced that five college students from North America could fix their water system, and the mayor happened to be among the doubters.

A meeting was scheduled. Benches were set out on the dirt floor of Casa del Colibrí, and the townspeople filed in, eager to hear exactly what the Americans had in mind. Chavez and Schein explained their options. One: they could fix one system of pipes quickly, perhaps as early as the next winter, and they could start the long process of repairing two other systems. Two: they could try to work with the government, supervising the repairs and construction of new filters on the two newer systems.

One by one, the elders offered their thoughts, each standing to speak, asking permission, and thanking the assembly for listening. They were encouraged by a government promise to fund much of the project if EWB would help with the planning. But there was also doubt: the government’s track record for follow-through was famously unreliable. Eventually, the town and the engineers agreed on a course of action: EWB would prepare a plan and present it to regional government agencies.

By the time the villagers spilled out of Casa del Colibrí and onto the plaza, darkness had fallen. The evening soccer game among teenaged boys, played on a stretch of grass beside the plaza, had just broken up, and cooling breezes drifted down from the mountains, soft and sweet with the scent of rosemary. Things were moving forward.

On days when the engineers were not tracing water pipes, they turned their attention to their secondary project: designing a stove that would vent wood smoke, which has been shown to contribute to low birth weights as well as to pulmonary disease.

“One of the biggest health concerns in Chirimoto...
EWB Beginnings

The first project of the Boston University chapter of Engineers Without Borders is curiously similar to the project that launched the first U.S. chapter of the organization ten years ago. In 2000, Bernard Amadei, a University of Colorado civil engineering professor, was invited by a local landscaper to visit his hometown in Belize. When Amadei saw that the town had no clean water, he recruited eight CU engineering students to help. The project, which cost about $14,000, used the power of a small waterfall to supply the entire town with clean water.

In 2002, Amadei incorporated Engineers Without Borders USA, although the name Ingénieurs sans frontières had been used by a French group since the 1980s and by several other groups in other countries, including Canada.

Today there are more than 300 chapters of EWB-USA on 180 campuses, and they have worked on more than 350 projects in over 45 developing countries. EWB International, whose many groups operate under varying affiliate relationships, has member groups in twenty-eight countries and start-up groups in seventeen others. AJ

is respiratory illness,” says Schein. “We think the smoke inhalation in the poorly ventilated homes is a big reason for that. So we’d like to find a way to improve the stoves, so that they vent smoke and burn more efficiently.”

The ongoing project, which involved a quick study of commonly used oven designs, led the EWB group to several homes, where they learned that even the most basic engineering assumptions must be reimagined in different cultural contexts. The open, box-like space beneath most of the stoves in rural Peru, for example, is not intended for storing wood. Rather, it is a convenient place to store kitchen scraps until it’s their turn to be tossed in the pot.

NO NEED TO BE AMERICANIZED

Burriola, a mechanical engineering major whose Texas-based family has roots in Mexico, says the guinea pig revelation was one of many that opened his eyes to new and different ways of living.

“We learned a lot, not only about the design of stoves, but about cultural differences,” says Burriola. “We all learned that the American way isn’t the only way, that every culture is different, and that some don’t want or need to be Americanized.”

The engineers learned how to make adobe bricks, chopping the ground, mixing the water, and filling the molds that dry in the sun. And they showed Chirimotans the safe way to install electrical circuits, explaining that just because the lights go on doesn’t mean things are wired correctly.

Several days a week, the group was invited to lunch by appreciative families. When a child was hurt, Chirimotans brought him or her to the engineers for a consultation. And when it seemed like a BU student was infested with a parasite (he wasn’t), a knowledgeable and helpful town elder appeared at the door of Casa del Colibri to offer advice. When Jahnke turned twenty-one, a hemisphere from home, neighbors were waiting at Casa del Colibri, birthday cake in hand. Finally, in what may be the most meaningful gesture, the Americans were invited to join the evening soccer game. And they did.

Catherine Klapperich, an ENG assistant professor of mechanical engineering and the advisor to the BU EWB chapter, says she was struck by the changes she saw in the students when they returned from Peru. “The students have learned how to design and implement engineering designs in incredibly difficult settings,” she says. “I have been amazed at how they evolved into real leaders.”

Schein says he hopes to return, with new recruits, in the summer of 2010 to work with engineers and construction workers from the regional government. And this summer’s efforts will be expanded to include three students from the School of Public Health. Giac Nguyen (SPH’10) says the SPH students will collect data that will help evaluate the success of the water system improvements. They also hope to devise an intervention program to reduce the extent of parasitosis and other local health problems.

Chavez, unsurprisingly, is dreaming of bigger things, and at the heart of his dreams is the water that gave the town life, then took it away.

“Here in this valley,” he says, “everything is united by the Shocol River. The river has given us life; it is the center of life. But it has also given us problems. We are looking at ways to find opportunities from the river, like the installation of hydroelectric power, which could bring income to the town to build roads and schools. It is something that could be very important.

“The big-picture plan,” he says, “is to create a town where people can have a better quality of life. That is the part that is still a dream.”

WEB EXTRA

Read Elissa Mueller’s blog about BU Engineers Without Borders in Peru at bu.edu/bostonia.