

Bird's-Eye View

Airborne

of the Amazon

Unlike most archaeologists,
Erickson doesn't begin his research
in excavated holes; he starts in the sky,
reading the landscape for markers of
vanished civilizations.

Pre-Columbian raised fields (lighter) and canals (darker) in Bolivia savanna.

Archaeologist Challenges the Myth of a Pristine Wilderness

BY TED MANN

In the office of a typical archaeologist, you would expect to find things like stone tools, pottery fragments, and maybe even a few Woolly Mammoth bones. But Clark Erickson is no typical archaeologist. Oversize rolls of aerial photographs are stacked into tubular pyramids on a desk and worktable in his University Museum office. They fill up file cabinets and populate a storage room. At last count, he had about 700 giant aerial and satellite images—almost all of them picturing some region of the Amazon.

He rolls out a 1958 U.S. Air Force photo of a Bolivian savannah. Even with the vast acreage blown up to movie-poster size, the details are as impenetrable as braille to the sighted. “See that,” he says, pointing to a line running across the landscape. “Anything that’s straight—it’s not natural.” With a finger, he traces a symmetrical block of toothpick shapes. “These are raised fields. See, you can pick out the linear patterns.” With Erickson’s narration, more and more geometric designs pop off the glossy print—settlement mounds, fish weirs, irrigation canals, roads. The photo begins to look like a prehistoric engineering blueprint.

Unlike most archaeologists, Erickson doesn’t begin his research in excavated holes; he starts in the

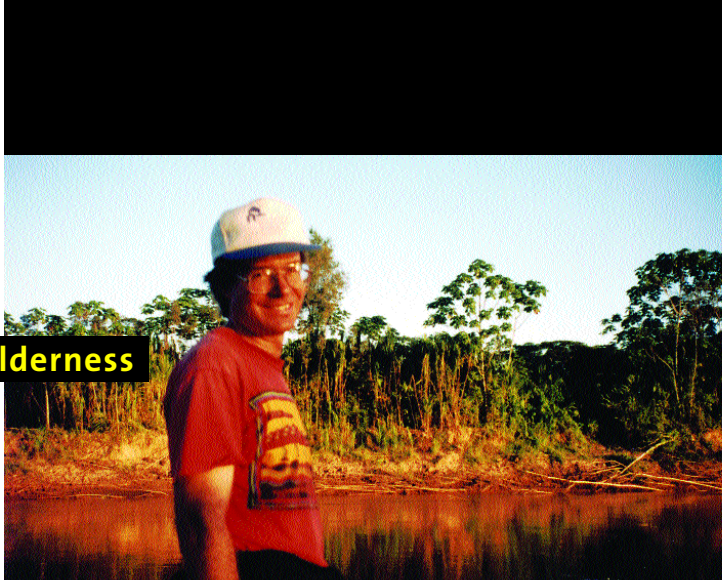
sky, reading the landscape for markers of vanished civilizations.

For the past decade, Erickson has used aerial images—borrowed from the military, scientists, and even oil companies—to guide his fieldwork. What he’s discovered about the prehistoric Amazon challenges many textbook teachings. Before Columbus, he argues, the area was heavily populated and agriculturally advanced. His work has led to a surprising supposition: Humans may have engineered nearly every aspect of the Amazon landscape.

As an undergraduate, Erickson wasted no time becoming an archaeologist. He was part of an excavation on the first day of freshman-year classes and then spent two summers at digs on Lake Titicaca in South America. The biggest discovery of his young career came at the end—in the rear-view mirror of a beat-up Volkswagen bus. The team was departing on a five-hour drive back to “civilization.” On an unpaved, uninhabited stretch of road, cresting over a ridge, Erickson stole one last glance at the diminishing lakebed. Through the cracked windows, he couldn’t believe what he saw: an unnatural crosshatch pattern. It covered several square miles, and it seemed to be human-made.

In this part of the Amazon, farming is difficult. The soil spends

half the year scorched in desert heat and the other half inundated with rain. For this reason, say scholars, the region is incapable of sustaining large civilizations. Erickson believes the raised fields he glimpsed through the back window of his microbus were a solution hit upon by an ancient people. The system of mounds and canals provided irrigation in the dry season and drained the soil during floods. Ten years before, geographer William Denevan had written about the fields, but by the 1970s, when Erickson was there, no archaeologist had studied them. No one knew the age of the structures, who built them, or if they even worked.



Archaeologist Clark Erickson



What he's discovered about the prehistoric Amazon challenges many textbook teachings.

By the time Erickson earned a Ph.D., he was itching to return. But as he hiked the dirt roads in search of the earthen structures he'd glimpsed before, the ancient fields seemed to have disappeared. From that point on, he says, "I vowed never to set foot on the landscape without having studied aerial photographs first." Now he rents a \$300-an-hour Cessna, and a team of three students helps him photograph the sites from every angle.

With aerial images, Erickson rediscovered the missing raised fields, and he immediately began analyzing them. Subsequent digs proved that the mounded fields date back to about 100 B.C. and may have been cultivated until A.D. 1100. The dimensions of the rectangular plots were astounding: Each row rose three feet high, measured up to 30 feet wide, and stretched 1,300 feet long. Between the rows were canals, also 30 feet wide and three feet deep.

As much as he learned about the fields, he kept coming back to one nagging question: Were they productive? To answer this, he tried a little "experimental archaeology"—recreating ancient tools and methods

in order to better understand how the raised fields worked. With help from colleagues and local farmers, he built a field from scratch and worked it year-round. "We found that productivity was three to four times traditional practices like slash-and-burn," he reports.

The more time Erickson spent in South America, the more he kept running into, and collaborating with, a group of sympathetic researchers, including Denevan and anthropologist William Balée. Together, the three men challenged conventional thinking about the Amazon. To begin with, they dismissed "the pristine myth" that the Americas before Columbus were an untouched Eden. Denevan countered that, in fact, much of the Amazon is anthropogenic—human made—and the sheer number of engineered earthworks and their size, he concluded, would have required a massive workforce.

Looking at an aerial photo of the Baures region of Bolivia, Erickson's index finger dances between dark polka dots covering bare earth. These, he notes, are forest islands and mounds that can rise

60 feet above the savanna. Causeways radiate from them like spokes on a wheel. Erickson and Balée have shown that the mounds were once settlements, housing between 500 and 1,000 inhabitants. Beneath the canopies of the island forests, the two men discovered pottery, bones, and orchards of fruit trees. The dozens of raised causeways, however, still leave Erickson scratching his head. Most are straight as a ruler, stretching from mound to mound. "It looks like everyone in the society had their own road and used it once!"

For all the evidence that Erickson and his colleagues have offered, there is still resistance to the idea of a once populous Amazon. Old-school anthropologists, like the Smithsonian's Betty Meggers, hold that the region's aluminum-rich soil couldn't have supported the agricultural base a large civilization needs to thrive. Environmentalists push the "pristine myth" and, Erickson fears, often see his work as "some excuse that we're giving developers to go and rape the Amazon." Even natural scientists abhor the new anthropocentric view of the Amazon. "When I give talks at the Field Museum in Chicago, there is always a bunch of them literally yelling at me," Meggers went so far as to claim, in the journal *Latin American Antiquity*, that "the myth of El Dorado is being revived by archaeologists."

In an ironic twist, the lost gold of El Dorado may turn out to be that oft-maligned soil. In the 1990s, geologists began examining Amazonian earth, and though much



Artistic rendering of settlement mounds, causeways, canals, and fields that make up the pre-Hispanic cultural landscape of the Bolivian Amazon.



Experimental raised fields based on the shape and size of prehistoric field platforms, El Porvenir, Bolivia.

His work has led to a surprising supposition: Humans may have engineered nearly every aspect of the Amazon landscape.

was inhospitable, large swaths turned out to be fertile. Called Amazonian Dark Earth, or *terra preta* by locals, this near-black soil has amazing properties. Dark Earth retains its nutrients during tropical rains, while other soil is leached, and like potting soil, it is far more productive for growing crops. The trait that makes it so exceptional, and enigmatic, is its ability to regenerate. Locals quarry and farm the rich soil, and their supply always grows back. Dark Earth re-creates

itself atop a base layer and grows—just like a living organism.

Scientists are still analyzing the biology, but Erickson believes the Amazon Indians enriched their earth with a microorganism, one that resisted depletion and helped fertilize. If better understood, this process of inoculating poor soil with a bacterial booster could aid parts of the undeveloped world starved for agriculture. Recently, geographers estimated that the creators of this ancient technology managed to

terraform at least 10 percent of Amazonia—an area the size of France. Along with the raised fields, fish weirs, causeways, and other anthropogenic features, Dark Earth may in fact be one of countless footprints left by a lost civilization. Indeed, if Erickson is right, the Amazon could be humankind's largest engineering relic. ■

Ted Mann, C'00, wrote for the winter issue.