Invisible Artifacts: Uncovering Secrets of Ancient Maya Agriculture with Modern Soil Science

John Morgan

After emerging sometime before 1000 BC, the ancient Mesoamerican culture of the Maya rose to become the most advanced Pre-Columbian society in the Americas. By 250 to 900 AD, the Maya were thriving in jungle cities—some larger than 40,000 people—where they erected grand temples, ball courts, and stepped pyramids, and made remarkable advances in language, art, mathematics, and astronomy. Their influence was felt throughout what are now the southern Mexican states of Chiapas, Tabasco, and the country’s Yucatán Peninsula, as well as in the present-day nations of Guatemala, Belize, northern El Salvador, and western Honduras.

And then, for reasons that are still debated despite decades of research, the civilization abandoned its core settlements of the Central Maya Lowlands—in what some call a collapse.

It’s a fascinating tale to archeologists, but one that’s not normally associated with the field of soil science. And yet the story documented in the soils of the Maya’s cities and settlements could hold the key to how they farmed, fed themselves, and treated the land, as well as why their society ultimately declined.

Archeologists have always been concerned with agriculture, notes Charles Golden, an archeological anthropologist at Brandeis University, “and that’s always been one of the great questions about the Maya: How did they manage to maintain these large cities in the rainforest?”

While the questions are enduring, how archeologists are now trying to answer them is not. In collaboration with soil scientists, they’re turning increasingly to the soil and the invisible artifacts it contains, such as chemical traces of food and crops. What they’re finding is that this substance—something archeologists literally used to brush aside—can be just as illuminating as more tangible artifacts.

“Archeologists are looking for stuff—for buildings and pottery and stuff that people left behind,” Golden continues. “So most archeologists in the past weren’t going to say, ‘well, let’s excavate here in this soil and see what the soil looks like.’ So that’s a critical change, when the concern becomes not just the stuff people leave behind, but also the soils they create, and the landscapes they create.”

The Maya and Markets

Golden is a long-time collaborator of Brigham Young University soil biogeochemist Richard Terry, who 15 years ago offered to add some more robust soil testing in the field to the spot testing that archeologists had done previously at some Maya sites. Terry had no real expectations for where the research would lead or if he’d even stick with it. But the soil chemistry, microbial life, and architecture of the ancient settlements soon captivated him.

Of particular interest to researchers, was building a temple in Tikal, labeled “Temple 1” by archeologists, was built by the ancient Maya somewhere between 682 and 734 AD. Terry and his colleagues identified significant amounts of phosphorus lining the edges of floors of Maya houses and large plazas. Using a backscatter field laboratory, Terry and his colleagues identified the remains of food, especially of phosphorus—something archeologists literally used to brush aside.

“In homes, for example, they distinguish sleeping areas from kitchen and dining areas by high levels. They’d find food remains in clear, clean, with food remains pushed to the sides.