The lush rainforests of Amazonia, with their overwhelming profusion of green, fed by massive rivers and torrential downpours, were long thought to be a cultural desert. Despite the richness of the environment and the highly complex and successful cultures that existed just uphill in the Andes, the poor, shallow soils in the Amazon Basin were seen as an insurmountable hurdle to large-scale societies. This was the thinking for much of the 20th century. Recently, however, this view has shifted.

In a May 2005 meeting in Florianopolis, Brazil, sponsored by the Santa Fe Institute and the School of American Research, representatives of a kaleidoscope of disciplines came together to take a fresh look at long-term cycles of social and environmental change in the Amazon. The former image of virgin rainforest occupied by small nomadic groups has been replaced by one that also includes large, complex, long-lived human settlements.
Villagers wear Atugua masks in a Kuikuro Village in this 1993 photo taken in Brazil.

PHOTO: MICHAEL HECKENBERGER

that left a subtle but increasingly unmistakable mark on their environment. This more accurate picture may shed light on the region’s future development path based on its current social and economic realities.

Close to 20 physicists, economists, cultural anthropologists, archaeologists, and computer scientists met on the island to discuss recent research into how past and present indigenous populations in the Neotropics altered the diverse yet fragile surroundings. “We wanted to examine the relationship between environmental complexity and the development of social complexity,” says co-organizer George Gumerman, SFI external professor and former interim president of the School of American Research.

Another purpose was also at work in the meeting. The group hoped to find ways in which historical models may inform our understanding of present-day interactions between societies and the environment, and vice versa. But ecologists, economists, anthropologists and archaeologists all look at their subjects at very different scales and formulate their models accordingly, which makes translation difficult. “We have to get our scales comparable,” says Gumerman. “We have to combine them. That’s where the computer modelers”—which made up roughly a fifth of the Florianopolis group—“came in.”

“Part of the goal was to have people from different communities talk to each other—mostly archaeologists and ecologists,” says co-organizer Steve Lansing, professor of anthropology at the University of Arizona and SFI research professor. “We’re tribal,” he says, referring to the way specialists in a field spend much of their time with their own colleagues. “We haven’t talked to each other much.” Now they are.

This new spirit of collaboration has already resulted in a shift in thinking
about the prehistory of Amazonia. In the past decade, the stereotypical idea of tropical Latin America as ecologically pristine throughout most of its history has fallen out of favor. “When I was in graduate school,” says Gumerman, “the prevailing thought was that ‘high’ civilization started in the Andean highlands and moved down to lowlands, but because of the depauperate environment, it couldn’t maintain social complexity. Lately, though, it’s been shown that complex societies did form in the lowlands, but they collapsed.”

Evidence continues to mount showing that agrarian cultures thrived in the Amazon during much of the Holocene epoch (from about 10,000 years ago to the present), with large-scale agriculture, orchards, and fisheries, but these had largely vanished by the arrival of Europeans. “It looks like things were a lot more complicated and interesting than we suspected,” says Lansing.

For the workshop, four geographical zones—three in Brazil and one in Central America—were selected based on the amount of information available on each. “There is very little archaeological data for so much of the Amazon Basin,” says Gumerman. “We tried to find target areas that had the most archaeological, cultural, and environmental data available. Each “target zone” was assigned its own subset of researchers, who met as a group and also gathered with other groups.

Rivers defined two of the target zones in Brazil. Recent evidence suggests that the upper drainage of the Rio Xingu in the southern Amazon Basin may have held towns of 5,000 people, with complex social organization, by at least AD 1000. Unlike other Amazon regions, the ethnographic record in this area is more continuous and less interrupted by physical contact with Spanish and Portuguese settlers and the national governments they spawned.

Discussions about the Xingu focused on how sedentary populations managed to sustain both themselves and their environment. The recent discovery of terra preta or dark earth soils, adds fuel to the debate. While archaeological remains don’t tend to last long in the warm, humid environment—thus few have been found—in the past decade, patches of darker, more fertile soils have been detected throughout the region, often by remote sensing. It’s unclear whether these are the product of indigenous soil management or simply the byproduct of human settlements, but both explanations suggest that larger populations stayed in specific locations for longer periods of time than was once thought.

Past landscape signatures have also helped researchers determine that the next riverine zone, the Central Amazon Basin, may have held communities as large as those in the Xingu as early as 500 BC. The widespread use of polychrome ceramics (which don’t travel well) by AD 400 suggested that fish, manioc, and other dietary staples were
abundant enough for larger, more permanent settlements to evolve. Discussions about this zone emphasized the possibility that, based on the availability of resources and ongoing social or environmental changes, the inhabitants might have repeatedly shifted from hunting and foraging to fishing and agriculture.

In the third region, shell mounds up to 22 meters high offer clues to the past. The rich boundary environment inhabited by the Sambaqui peoples of coastal Brazil contains many of the mounds, which are also found as far north as Florida. They were once thought to be simply casual deposits of debris, but more recent archaeological evidence suggests that the piles were built deliberately of uneaten shellfish and other marine life to bury community members. The practice was preceded by feasting, and suggests that important, recurrent events prompted the community to rebury several individuals together.

The Sambaqui built burial mounds for up to 8,000 years, an exceptionally long duration for an Amazonian culture, which makes them an excellent example of stability and sustainability for the region. It’s unclear why they eventually passed on, but their passage may have been associated with the arrival of Tupi-Guarani speakers, who brought their ritualized warfare practices to the Amazon Basin by AD 1000 or even earlier.

Researchers considered the fourth zone, the Yucatan Peninsula of Central America occupied by the lowland Maya, to be similar enough to
the other three to fit into the larger discussion, but distinct enough to serve as a yardstick for comparison. While it received similar rainfall to the other zones, the natural limestone platform that stretched across what is now southern Mexico, Guatemala, and northern Belize accommodated fertile soils, allowing agricultural production on a much larger scale. Although surface water tended to drain away through the porous and pockmarked terrain, the Maya obviously figured out how to overcome this environmental hurdle, as their peak population reached as high as 2,000,000 during AD 100–900.

Why this highly complex culture suddenly collapsed around AD 900, leaving huge ruins to be swallowed by the jungle, is one of the great questions in archaeology. Warfare, the exhaustion of farmland, and drought may have contributed. In the Florianopolis meeting, talks on the Maya focused on how important the concentration of resources (through the construction of ancient roads and the storage of foodstuffs) was in fostering the development of the complex Maya society.

“The Brazil meeting was just a first step,” says Lansing, “a success in some ways and less in others. It exposed real gaps in our approach to modeling, but it did create the beginning of a dialogue to be continued not just at SFI but more broadly. Seeds have been planted.” A smaller meeting focused on modeling, held in Tucson in mid-December, was the first spin-off, but likely not the last.

“The real strength of the workshop was that researchers found areas where they could overlap,” says Gumerman. “You had computer modelers from southern Brazil meeting archaeologists from Arizona. Individual teams are plan-

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Above: From the air, this Kuikuro village of Ipatse in Brazil is organized around a broad plaza.
Left: This overview map shows the ancient settlement of Heulugihiti, with a GPS mapped road and plaza curbs or berms.