



saving the

MOAI



by Chris Hardman

Scientists are working to reconstruct and restore the massive monoliths of Easter Island in effort to preserve these world monuments

The giant stone heads on the island of Rapa Nui (Easter Island), Chile, have captured the imagination of countless explorers, dreamers, and scientists. Hundreds of monoliths of solid volcanic rock provide indestructible evidence of man's mastery over his environment. They hint at great feats of engineering and the ingenuity of men. Up close, the statues show their vulnerability. Their sharp features have eroded, growths invade their surface, and many lie in piles of rubble.

A combination of natural and human forces threatens the statues, which are called *moai* in the native Rapa Nui language. To combat these forces and save the moai, teams of native and international scientists are working on reconstruction and restoration projects.

At 400 to 1,000 years-old the moai are young compared to other archaeological monuments in the Americas, but the very properties of the stone that make them ideal for carving also make them susceptible to rapid deterioration. Nearly all of the statues were carved in the Rano Raraku quarry located on the northeast corner of the island. Many of the statues never made it out of the quarry and

attraction to the heads. Archaeologists estimate that between 1100–1500 AD islanders meticulously carved approximately 900 statues and their accompanying stone platforms from the island’s soft volcanic rock. Most likely the carvers belonged to family groups who were competing with each other to produce larger and larger moai. The biggest statue, named *El gigante*, weighs between 145



Above, left to right: *The Easter Island Statue Project early-phase excavation of statue RR-001-156; A field crew screens deposits for artifacts after excavation in the Rano Raraku quarry; University student Rafael Paoa Rapu uses portable XRF equipment to collect data on the chemical characteristics of the stone that was used to make basalt tools. Over 500 ancient tools were collected during the excavation of two statues in the Rano Raraku quarry. Opposite: Overview of two phases of the Easter Island Statue Project excavation of statues RR-001-156 (left) and RR-001-157 (right)*

remain there today in varying stages of completion. The red scoria stone used for headpieces found on some of the moai came from solidified froth of volcano lava. These soft, volcanic rocks are particularly vulnerable to erosion from Easter Island’s relentless wind and rain. “When the stone is wet, the clays present in it absorb moisture and expand; as the stone dries, they contract. The internal stress of these repeated expansions and contractions results in microfissures within the stone which serve as channels for water migration and its corrosive effects,” wrote A. Elena Charola in a 1994 publication of the World Monuments Fund. Another natural process that weakens the stone is the growth of algae and lichens. Not only do they trap water—which plays a part in the wet-dry cycle of the stone—but they also eat away at the stone surface. Starting with the carvers themselves—who not only knocked over their beloved statues but also beheaded some of them—people have had a sort of fatal

and 165 tons and would be nearly 72 feet high if it were standing. But for reasons unknown, *El gigante* was never raised and remains in the Rano Raraku quarry. The islanders’ obsession with larger and more impressive moai wreaked havoc on the environment. More and more trees had to be cut down to provide scaffolding for the statues and to build wooden sleds to move the statues overland. By the time Dutch explorer Jacob Roggeveen landed on the island on Easter Day in 1722, he found a desolate landscape void of trees or bushes over ten feet high with no birds, bats, or lizards. The people were hungry and fighting amongst themselves. Sometime after contact with the outside world, the islanders knocked over and destroyed most of the moai, probably as a result of clan warfare. Contact with the outside world brought new diseases, a new form of religion, and kidnappings for the slave trade. By 1877 the native population of 15,000 had declined to a mere 111.

While nature has been hard on the moai, man has been even harder. The human toll on the statues has been immeasurable

The relationship between man and moai is complex, and similar to the admirers of the past, modern-day man’s fascination with the statues has produced both positive and negative results. As the island’s only industry, tourism provides a way to make a living for the most remote civilization on Earth. Unfortunately the occasional unscrupulous visitor has encouraged islanders to sell broken parts of the statues for souvenirs. Further damage comes from foreigners and locals alike who defile the moai with graffiti or accidentally step on fallen rocks or buried petroglyphs. In spite of admonishments from local tour guides, some visitors touch the statues or climb on their platforms. In the early 90s, the World Monuments Fund, reported a 20 percent increase in graffiti in a two-year period.

Locals warn that the island is not prepared to support the number of tourists that arrive each year. According to Easter Island officials, tourism doubled from 22,000 visitors in 2003 to more than 50,000 in 2007. Not only does increased tourist traffic stress the monuments, the masses of visitors strain the island’s resources. Locals struggle to deal with piles of trash and to meet the increased demand for food and water. Although Easter Island has been an official historic monument and national park since 1935, it took until 1966 for the government of Chile to actually send a small staff to the island. The Rapa Nui National Park takes up nearly half of the island and includes nearly all of the moai sites. In 1995, UNESCO named Easter Island to its world heritage list of the world’s greatest monuments.

One of the first scientists to realize the archaeological and cultural significance of the site was University of Wyoming Professor William Mulloy, who tirelessly campaigned UNESCO for support to study the island’s monuments. During his first official mission to the island in 1966, Mulloy and Gonzalo Figueroa led a team of experts who developed a plan for studying, conserving, and restoring Rapa Nui’s cultural treasures. What followed was a series of projects with international support that restored moai and their platforms and eventually the Orongo village. In 1986, Chile’s National Center for Conservation and Restoration worked with UNESCO to investigate possible treatment plans to prevent or slow the deterioration of the statues. They chose a moai at Hanga Kio’e that had been re-erected but was highly deteriorated. After spending several months drying out under a protective tent, the moai was cleaned of all growths and dirt. The restoration experts applied a consolidation treatment to harden the stone and prevent erosion and a hydrophobization treatment to prevent water from seeping into the stone. Although these treatments have worked so far, they do not provide permanent protection of the moai and





Above: Dr. Jo Anne Van Tilburg and Cristián Arévalo Pakarati during their co-directed excavation of statue RR-001-156. Opposite left: Rapa Nui students Joaquín Soler Hotu (left) and Tikitehatu Astete Paoa screen archaeological deposits for artifacts. Opposite right: Specialized environmental monitoring equipment collects information on weather conditions, including temperature and moisture. Deterioration of the statue's stone surface is also carefully tracked and then uploaded to UCLA for analysis

Little by little [they] realized what their ancestors did was incredible. Their sense of pride was enormous

need to be reapplied periodically. From 1992 to 1996, a team led by University of Chile archaeology professors Claudio Cristino and Patricia Vargas completed an ambitious reconstruction project of ahu Tongariki, the largest and most impressive ceremonial center on Easter Island. Both Cristino and Vargas had extensive knowledge of the island's monuments. From 1977 to 1996, they were part of the Easter Island

Archaeological Survey, a University of Chile research program that recorded more than 20,000 archaeological sites and features. At its peak, the ahu Tongariki measured nearly 720 feet long, with a central platform measuring 325 feet and a wing on either side. A total of fifteen statues weighing 40 to 90 tons once stood on that platform.

The ahu Tongariki was leveled in 1960 by an earthquake that destroyed most of the central and southern regions of Chile. That deadly quake, some 2,200 miles away, triggered a powerful tsunami that swept over the twelve-foot-high monument wall, destroying the ahu platforms and dragging the statues inland. The broken moai were covered by tons of rocks from the destroyed platforms.

Fans of Easter Island feared that this great archaeological treasure was lost

forever. Then, in 1991, a Japanese company donated a crane to move the statues and provided partial funding for reconstruction costs. Cristino and Vargas led the reconstruction project which lasted four years and took a team of 50 people, most of them islanders themselves. Each rock fragment had to be studied, drawn, and then entered into the computer. Due to the soft nature of volcanic tuft, the rocks were in poor condition.

The team covered the moai with huge plastic tents and once they were dry, the statues could be moved without falling apart. "The first statue that went up was about 45 tons [and] went up in a few days," Cristino explains. Painstakingly, the team reconstructed the statues and placed them on their ahu platform. The result is a monument as tall as a five-story building with fifteen moai and their topknots called pukaos.

"We started from zero, little by little, trying to put this back together," Cristino explains. "We used historic photographs and maps. Our main goal was the reconstruction of a largely destroyed monument." For his mostly local staff, the project was a revelation. "Little by little [they] realized what their ancestors did was incredible. Their sense of pride was enormous."

UCLA archaeologist Jo Anne Van Tilburg considers herself to be "a friend of the family" to the moai. Since 1982 she has surveyed the moai, compiling what she calls "biographies" of 1,045 sculptural objects that include full or partial moai. Van Tilburg runs the Easter Island Statue Project (EISP) with Co-director Cristián Arévalo Pakarati, a native Rapa Nui artist and surveyor. "The statues today do not look the same as when I saw them in 1982," she says. "I could see the change over time." Van Tilburg appealed to the Archaeological Institute of America to



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fund a preservation project to develop treatments for the fragile stone. With the grant, EISP installed a weather monitoring station near two moai in the Rano Raraku quarry. For the first time, scientists will be able to record fluctuations in wind, moisture, and temperature near a statue and observe how the stone reacts to changes in weather. Van Tilburg says that with this information, the team will be able to develop a treatment plan that could be used not only on the sample moai, but also on the 400 other statues that reside in the quarry.

As part of the same project, Research Associate Christian Fischer of UCLA and Conservation Chief Monica Bahamondez of Chile's National Center for Conservation and Restoration used a portable sprayer to apply two different types of water-repellent solutions to the test statues.

Although the mixture will take several months to evaporate and dry, the team could see that it was already working when they poured water on the monuments and watched the water droplets run off the stone.

To better educate and manage visitors to Easter Island, the National Forest Corporation (CONAF)—the government agency that manages all of Chile's national parks and reserves—opened a sustainable visitor center in May 2011. The center is located at the entrance to the Orongo Ceremonial Village, which is one of the most visited archaeological sites on the island. "Easter Island is a landmark in the tourism world, and that is why we need to work hard to preserve its resources as well as offer all kinds of information and education to its visitors, both national and international," says

CONAF Executive Director Eduardo Vial Ruiz-Tagle.

The moai of Easter Island tell different stories depending on the listener. For the islanders, they tell the story of their ancestors. For scientists they tell the story of a society gone awry, and for the rest of the world they tell the story of human ingenuity. "Without something to remind us of the achievements or problems of the past, we don't pay attention," says Jo Anne Van Tilburg. To make sure that we continue to pay attention, scientists and conservationists are working to protect the statues for the generations of listeners in the years to come. 🌿

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