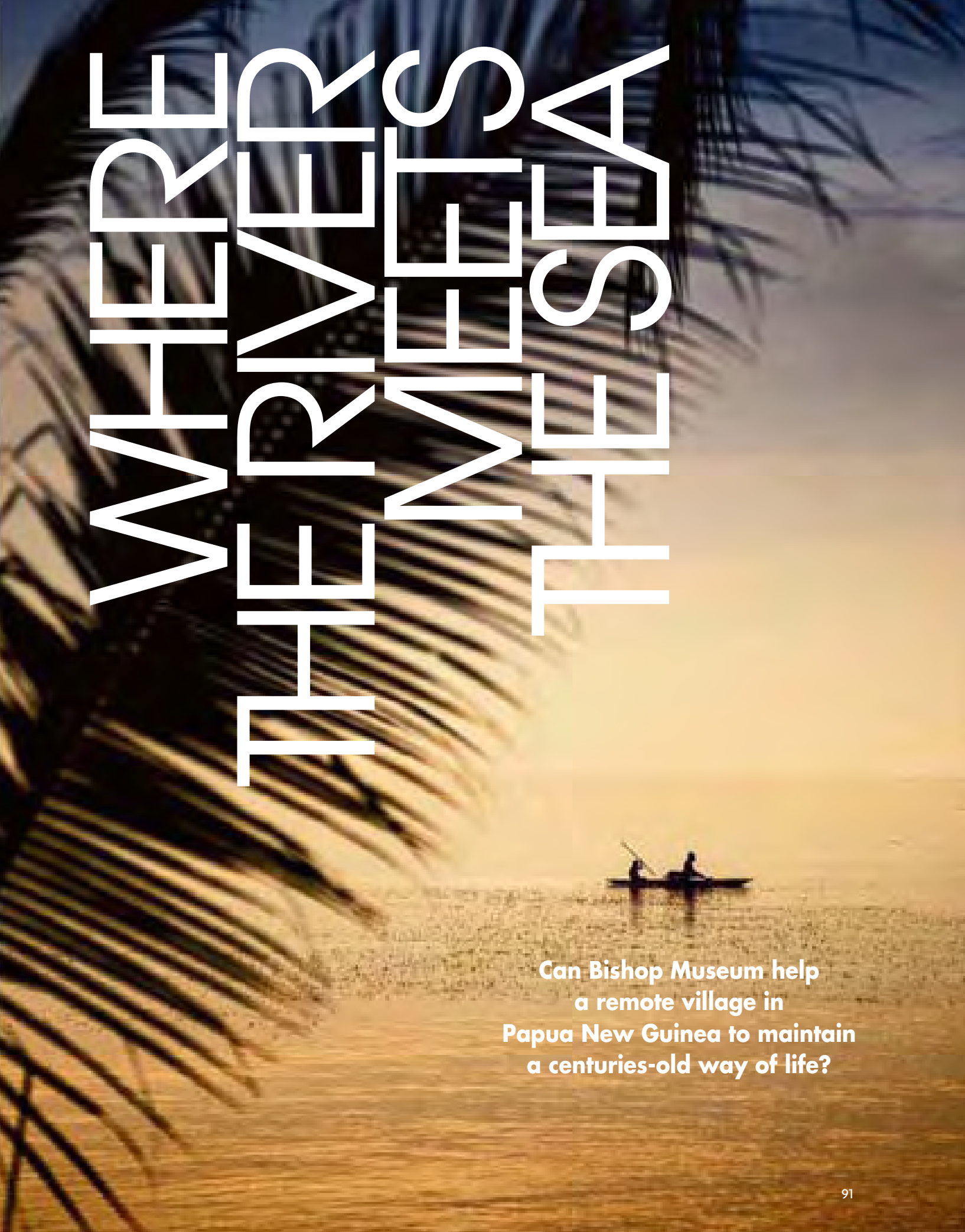




# WHEREVER THE RIVERS MEET THE SEA



Can Bishop Museum help  
a remote village in  
Papua New Guinea to maintain  
a centuries-old way of life?



At high tide in Kamiali, a coastal village in Papua New Guinea, Gabu Reuben, chief of one of the village's two clans, paddles toward his house on the riverbank with his sons in a handmade canoe.

STORY BY SARAH ROSE | PHOTOS BY PF BENTLEY

A man with big ideas about little fish is putting along in a fiberglass boat riding perilously low in the waters of the Huon Gulf. The marine biologist from Bishop Museum in Honolulu, Ken Longenecker, is six feet tall and 215 pounds—almost twice as large as the average resident of Kamiali, Papua New Guinea, many of whom are waiting to receive him on the beach. Yet it's not just the big *waitman*, as the New Guineans call him, that's sinking the boat and straining the forty-hp outboard motor; it's what is on his shopping list: Eight carpenter's saws, four bow saws, sixteen hammers, four tape measures and sixteen boxes of nails, each weighing twenty kilos.

Just inland is a reception hut, a collapsing sago shack built in 1998 by a Dutch NGO promoting an eco-tourism venture in this remote area of already remote Papua New Guinea. That venture failed; "It was way too 'eco' for the tourists," Longenecker says. When Bishop Museum was looking for an alternative to its deteriorating Wau Ecology Institute, a research outpost the museum had created elsewhere in PNG back in 1961, it saw Kamiali's ghostly infrastructure as an opportunity. Just beyond the reception hut, there's a dilapidated guesthouse that supposedly sleeps twenty

—as long as it isn't raining, in which case the bunks must be arranged like Tetris pieces to avoid the holes in the roof and floor.

"I have no idea what they'll do with all 750 pounds of nails," says the man known in Kamiali as *dokta* Ken as he steps off the boat. He's uneasy about the future of his cargo, which a village elder had requested and that Longenecker donated for repairs to the guesthouse, which houses visiting scientists and provides income for the hundred or so families living a mostly subsistence lifestyle in the seaside village.



A sailing canoe plies the waters of Nassau Bay just after dawn. Generations of Kamiali's fishermen have relied on the bounty of these waters to maintain their mostly subsistence lifestyle as well as to resist the economic pressure to open their lands to extractive industries like mining and logging. Researchers from Bishop Museum in Honolulu have been working to develop management strategies that could help ensure a bountiful fishery for future generations.

"They might just divide the nails down the middle, like the time I brought three hundred pairs of glasses from the Lions Club, 150 to each clan. No one even tried them on."

A biologist in Papua New Guinea pursues a timeless urge: to explore a faraway and barely touched world, to brave perilous travel for unknown rewards. Longenecker isn't the only researcher who sees this village in the Huon Gulf as a living laboratory; Bishop Museum scientists have been coming here since 2001. Why would an institution whose primary mission is to study and preserve Hawai'i's cultural and natural resources be interested in an island thousands of miles away, one that's not even a part of Polynesia? Bishop Museum's founder, Charles Reed Bishop, believed that to understand Hawai'i, one must understand the cultural heritage and natural history of the Pacific. Kamialians are Polynesians' Pacific cousins, branched off from the family tree about 3,500 years ago, when Papuan people began making ocean crossings in outrigger canoes. The local language, Kala, stems from the same Austronesian language group as Hawaiian but is now spoken by fewer than 2,500 people. Life in Kamiali looks a lot like life in Hawai'i might have once upon a time: intimate, family focused, tied to the

land and the sea. "It's like Hawai'i around the time of Captain Cook," says Longenecker, referring to the British explorer's "discovery" of Hawai'i in 1778. As in Hawai'i then, Kamiali's drinking water flows untreated down from the spine of the mountains. The villagers still make and use stone tools, still get all of their protein from the sea. From a Western point of view, Kamiali's culture is "pre-modern."

Kamiali has much to recommend it to scientists and travelers. It's situated in one of the world's last virgin tropical forests, an area with one of the highest diversity of species on the planet, with many of those species yet undiscovered. Yet all across PNG, the forests are being depleted; according to Bishop Museum, if logging continues at its current pace, only 17 percent of commercially accessible forests will be left by 2021. Aware of their bounty, the villagers declared a conservation zone about a third the size of O'ahu—the Kamiali Wildlife Management Area—and banned extractive industries such as timber and mining in 1996. The village has held fast to this ecological ideal for twenty years, with the expectation that NGOs and research institutions would value this choice and contribute generously to sustain this vision by paying real money to access its treasure. The desire to safeguard the environment persists in the village, but tenuously:



Special delivery: Bishop Museum marine biologist Kenneth Longenecker (seen above at left) arrives in Kamiali with a donation: construction materials for the villagers to repair their decaying guesthouse, where visiting scientists like Longenecker live while doing research. When village residents established the Kamiali Wildlife Management Area in 1996, they did so with the hope of attracting scientists from around the world to study its wealth of biodiversity, thus creating a source of income for the village while also preserving its heritage.



Heavy industry keeps knocking on the door, and the community faces a choice that echoes the ones Hawai'i faced 150 years ago—cash in or keep Kamiali pristine. As villagers deliberate, the relationship with Bishop Museum is growing strained.

Longenecker is spending a week in Kamiali not just to deliver building materials but to summarize the results of years of marine research he conducted with and among the villagers. Kamiali is two hours by boat from the nearest cell tower, in a country with no hospital that meets Western standards of hygiene let alone has a decompression chamber. Yet Longenecker has spent the past eight years diving in the so-called “twilight zone”—about one hundred meters deep—to study the reef fish there. When he is not weighing and sizing samples, dissecting gonads, counting eggs and crunching data, he works with the villagers to translate his research into Tok Pisin and Kala for elementary school textbooks. The first book ever printed in Kala, a language that was written down only in the last three years, is a school curriculum for monitoring fish populations. Longenecker is hoping to discover what size a given species must be to reproduce, a question that affects everyone in the village. They are gardeners and fishermen, and the ocean is the sole source of protein for a town that exists in, as the sci-

entist and writer Jared Diamond called it, the “world until yesterday.”

**Gabu Reuben is a big man** in a tiny place, head of one of Kamiali's two clans. He is movie-star handsome despite living in a village where nearly every man is his cousin or uncle and so bears some resemblance. The mouth of the Alawili River is his family's traditional fishing ground, and the sand on its pillowy beach is streaked gray with traces of chromium, a mineral used in the production of stainless steel. Reuben speaks softly, with the composure of a man bred for governance. He sounds older than his 37 years as he recounts the story of how his ancestors settled the Alawili, how he must look after it for the children of his children and how he will not entertain any offer, no matter how generous, to sell to Katana Iron. Reuben is determined to stand his ground—literally. Not everyone in the village is on board with his vision; many advocate selling, but as the land's ancestral caretaker, Reuben has the final word, he says. “If the community says yes, I say no,” he tells me. “I say we are in paradise.”

Katana Iron is a mining firm based in Australia. There is little public information about the company that has been eyeing Kamiali since at least



When a boy is born in Kamiali, a canoe tree is planted; it's harvested once the boy is old enough to build his own canoe. For a village of fishermen led by Reuben (above) the tradition assures a supply for future generations. It's not so different from Reuben's thinking about Kamiali itself: As the ancestral caretaker of the land, Reuben has the power to keep mining out, even if others desire the windfall it would bring. “If the community says yes, I say no,” Reuben says. “I say we are in paradise.”

2011, when Reuben found foreign mining agents on his beach. The strangers were collecting soil samples, taking measurements, snapping pictures and generally treating his patrimony with entitlement, he says. “I can't feel good when I find these people on my land,” he says. “I start to have quarrel.” Reuben was passionately upset, says Jamie Hoover, an American graduate student who witnessed the confrontation. Reuben swung his machete like a pendulum in the sand, marking X's where he stood, and ordered the foreigners back to their boats. An armed PNG policeman threatened Reuben with arrest.

“You want to see chromium with your own eyes?” Reuben had asked. “It is on the beach, it is under the sea and below the trees.” With that he dived into the Alawili delta, a gin-clear swimming hole fed by cloud forest waterfalls. Standing on the far shore, he spoke to the land. “Can I have metal? Chromium?” When he talked to the beach, he was in no way speaking metaphorically; his request was not a meditation or interior monolog. The land is a character in his life, and when he defends the Alawili against trespassers, Reuben is protecting family. On the riverbank he spied a block of metal glinting in the sun, a chunk of chromite ore the size of a shoebox, he says. “My land knows me. Nature knows me.”

Thrilled and shocked, the mining agents invited Reuben to Queensland, he says, but he would not go. He knows what life in cities is about; he'd tried to live in Lae, the urban hellhole nearest Kamiali, two and half hours away by boat. “When I went to town it was too difficult to get water. No money for food, sleep in a hotel or what. Here, I have shelter, enough to eat and drink, big freedom, no government run 'em you.” Reuben showed the rock to Jamie and then, in front of Katana Iron's engineers and the policeman, he made his position clear: “I throw it back to the river.”

Asked about the incident, a Katana Iron spokesperson replied in a letter that it is “definitely not accurate, as Rubin [*sic*] and his family are 100 percent behind the operation, as are the majority of the other Clan Land owners.”

**Near the fishing ground** known as “The Big Kamiali Supermarket,” Reuben takes Longenecker on a walkabout of his beach. The sky grows heavy and black, then rain begins sheeting down, so they huddle under a beach shack—three sticks propping up a plaited palm mat where fish is smoked and dried. Waiting out the storm, Reuben tells childhood stories about playing with dwarves on the beach—Kamiali's



Subsistence, mostly: A fisherman casts a handline at the local tuna fishing grounds about four miles offshore from Kamiali, a three-hour paddle each way. Fishermen bring some of the catch home for food but also sell some at the market in the urban area of Lae, two hours away by boat. Apart from the money that scientific research brings in, selling fish is one of the few ways Kamialians can earn enough to pay for medicine and school.

version of Hawai'i's legendary menehune, essentially—the little “nature guys” with beards down to their knees who climbed trees with him, who broke rocks open to eat the insides. There were ghost women too, ghost men, ghost crocodiles with human legs and a sleeping man with the skin of stingray who once walked out of the sea in front of his grandfather. “My forbidden land has many tricks,” Reuben says. But after his father gave permission for villagers to picnic at the river, Reuben says, the spirit people left.

Among Kamiali's great treasures is not just diverse jungle beauty but a largely intact indigenous culture, however fragile. Traditional living, though, in no way means either pure or backward, and life in Kamiali is not some picturesque nature idyll. Children are educated through twelfth grade. Some leave for cities and marry out, or outsiders marry in. Boats leave regularly for Lae while neighboring villages with industry have imported the scourges of modernity—drugs and guns—to Kamiali's borders.

While Kamiali's way of life might be endangered, some customs stubbornly endure the onslaught of progress. Five years ago Reuben's nephew killed a rooster and started a war. His nephew was not raised in the village; Reuben's brother-in-law was from the Sepik River, a “hinterland person” neither of the beach

nor of the mountains, Reuben says, and his son did not respect Kamiali ways. Upon the loss of the rooster, Reuben banished his sister's entire family.

The brother-in-law and nephew returned one night with a gang of *raskols*. “We thought they were having fun, making all this noise,” says Longenecker, who was staying in the guesthouse about two miles away when the shouting started. “We were thinking, ‘sounds like a good time down there, you going to the party?’” War broke out on the beach with machetes, slingshots and spears. The community didn't know whether the thugs had guns, so the women and children took to the woods. “Don't worry about the house, let them cook it,” Reuben had said, should they try to burn the village down. The manager of the guesthouse announced Bishop Museum personnel would have to bug out, but Longenecker's team could not leave on account of pirates. One Sepik man died in the fight, three were hospitalized and someone in Kamiali lopped off the brother-in-law's hand.

There is a tradition in PNG of *belgut*—“good belly”—of soothing disputes with cash, pigs, cigarettes and other commodities. The village sent five thousand kina, about \$1500, to the family of the man who died. Now there is peace between the Sepik and Kamiali, though no *belgut* has been offered to the



Graduation day: Men dressed as birds lead a “sing-sing” parade of students to a village-wide ceremony celebrating the children's graduation from the eighth grade. Education in Papua New Guinea, while subsidized, isn't free—a reality that disproportionately affects people like those in Kamiali who live a subsistence lifestyle. School fees are among the economic barriers facing residents who wish to leave the village and pursue careers outside of fishing.

brother-in-law, says Reuben. “Maybe next year we will pay, make peace, shake hands.”

“Except with your brother-in-law,” Longenecker grins, “you can't shake his hand.”

**Yaeng Tana**, head of the Kamiali Wildlife Management Committee, is a wiry village elder with eight children who has appointed himself as a guide for the photographer and reporter on this story. In exchange he wants three things from Longenecker. First, a headlamp. Second, funding for travel to lobby the government on behalf of a new Kamiali youth committee. Third, community access fees from the two journalists to whom Tana has just attached himself, whether or not we want an escort (we don't).

Whether by temperament or by training, Longenecker is a believer in quiet leadership; he is mindful of his status as an outsider with money, as principal investigator modeling artisanal fishing in the Pacific and as an O'ahu family man who must raise his entire salary from grants. He gently replies to Tana that he will neither buy the headlamp nor pay for his travel. He explains that the visiting journalists are already included in the annual fee that Bishop Museum gives to the village, one thousand kina per year (about \$300). “There's this philosophy of *traim tasol*—just keep

trying, just keep on asking,” Longenecker says with a shrug.

Negotiations between researchers and villagers can be tense. Kamiali has needs, and in many villagers' eyes, Bishop Museum's contribution isn't sufficient. This makes the temptation of mining harder to resist. The village is hardly united against development, says Emanuel Sioni, the broad-shouldered 20-year-old son of the mining committee chair. “I want to be a doctor, and I know mining will support my education.” More than half the village is angling for the bounty of a Katana Iron contract: a tin roof on every bungalow, a generator in every home.

Kamiali is growing but its resources are not; the population has doubled in the last generation. While village life is mostly self-sufficient and sustainable—everyone has enough to eat, everybody has a home—luxuries such as medicine and school fees require cash, which subsistence economies have a hard time generating. “There is a thing called eco-tourism; we're research tourists,” says Allen Allison, senior zoologist at Bishop Museum and father of the Kamiali-Bishop partnership. In addition to the annual fee the museum pays, scientists hire villagers to provide meals, accommodation, transportation, construction services and to help collect and process laboratory samples. (Longe-



Kamilians speak both the national language of PNG, Tok Pisin, and Kala, the local language. Like hundreds of indigenous languages around the world, Kala is endangered, but Bishop Museum anthropologists have taken steps to preserve it by developing a Kala script and publishing a Kala dictionary in 2013. Above, villagers watch a video about the Kamiali Language Project on equipment donated by Katana Iron, the Australian mining company hoping to access the village's mineral resources.

necker's top fisherman, Utula Kondio, is a named coauthor on every one of his academic journal papers.) Yet the incentives of science are paltry compared to the allure of industry, a slow drip versus a jackpot.

But, Allison says, science does have benefits beyond cash infusions, however small. Allison says that villagers who collect specimens for him and help discover new species gain insight from his expertise in frogs and reptiles; they are geniuses of the bush and curious about the world beyond PNG. The country is a crucible of evolution; about seven hundred species of frogs and lizards in Papua New Guinea have been named by scientists, but even that huge number accounts for only about 60 percent of the estimated total, says Allison, whose own research in the country involves documenting this wealth of biodiversity. Biologists like Longenecker dive deep to study fish reproduction, which helps establish management plans that sustain the fishery on which Kamiali's way of life depends. "While biodiversity is good for museum collections," says Jeff Kinch, principal at the Papua New Guinea National Fisheries College, "discovering the size of fish at sexual maturity helps everyone." It is predicted that soon 50 percent of the planet's population will live in the tropics, dependent on the sea for protein.

Researchers are equally concerned with Kamiali's people as they are with its fish and frogs. Visiting anthropologists hope to situate Kamiali in the epic history of the great Oceanic migrations, telling Kamiali's ancient story to itself. In 2014 Bishop Museum anthropologist Mara Mulrooney was surprised to find shards of prehistoric Lapita stones on her first visit; the obsidian flakes came from islands hundreds of miles away, testifying to the seafaring prowess of Kamiali's ancestors. Linguists are working to preserve the Kala language as a bulwark against cultural loss. Kala is in decline among neighboring villages as mining and logging move in, replacing the indigenous language with Tok Pisin, a creole of English, German, Malay and Portuguese that is PNG's official language. Villagers worked with linguists from the University of British Columbia, Okanagan, to create an orthography for their language, and once the language committee agreed on the alphabet—Kala Biñatuwã—the vast project of writing down their words began. The first Kala dictionary was published in 2013.

But all of that is, as the saying goes, academic. Tana is not satisfied. He concludes with a new demand: "One organization must support us here. Anyone who comes must bring more—new guesthouse, new church." Scientists seldom build churches, so Longe-



Teach a village to fish: Longenecker and his chief fisherman, Utula Kondio, examine the day's catch. They will measure its length and weight and determine its sex to establish the size at which various fish species reproduce. That information is critical to the success of an eight-year-long research project aimed at creating a long-term management strategy to sustain Kamiali's fishery as its population grows. Kondio has been a named coauthor on every paper Longenecker has published based on his research in Kamiali.

necker counters by listing the benefits science has brought to Kamiali: First, after eight years of research, the news is good. Fish are getting bigger. "It will be easier to get some food, but also they have more eggs, more fish now and more for future generations," he says. "The management plan seems to be working." Second, he explains that his research is now being applied throughout the Pacific; the first summit on the Kamiali methodology was held at PNG's national marine laboratory last year. "Jungle histology" is a new kind of field research that allows scientists to do microscopic analysis on the ground rather than thousands of miles away in a lab. The procedure is one of Kamiali's many contributions to the world.

Third and possibly most persuasively, Longenecker notes the 750 pounds of nails and the sorry state of the guesthouse. Because the decrepit building is made from nonlocal materials, the community hadn't been repairing it; instead they were waiting for money, shingles and plywood. The previous year Tana had suggested the village could just build new bungalows out of native resources, in the local style, and Longenecker agreed. "Bush materials might not seem special to you," he told them, "but they're very special to outsiders who want to stay in a traditional Kamiali house." Longenecker's donation of building materials

could rekindle the flames of research romance and keep science coming back for the next twenty years. "It's the kind of attitude that funders like," says Longenecker. "Do a little and see big things."

**There is a ceremonial parting** the night before expeditions leave Kamiali. Elaborate string bags are presented as gifts, reminders and promissory notes, garlanded around necks like lei at graduation. It is a giddy evening, full of jokes, betel nut and smokes. Reuben doesn't indulge but comes to wish the party well. Does he know whether Kamiali's spirit people will return if the community stays on the path of conservation? "Yes," he says. "I believe they will come back."

The boat is much lighter on the way out, planing over the waters of Nassau Bay toward the Huon Gulf. Villagers wave from canoes as we pass the protected confines of the reef. Longenecker has a proposal with the National Science Foundation that, if funded, might see him back in the village at the end of the year, so maybe he will return. And maybe time will be kind to Kamiali. **HH**

To sponsor the museum's research, click "Support" on the museum's homepage at [bishopmuseum.org](http://bishopmuseum.org). Select "Donate Now" from the pull-down menu. Choose "Kamiali Research Initiative" from the Gift Designation pull-down menu to be sure your donation goes to work in the village.



Hills of steel: This pristine beach and rainforest at the mouth of the Alawili River is Reuben's ancestral land and part of Kamiali's treasure. Not only does it contain a wealth of yet-to-be discovered biodiversity that scientists from around the world come here to study, but buried in its soil is chromite ore, a mineral necessary for the production of stainless steel. Time will tell which, in the end, the residents of Kamiali deem the more valuable.