In July 2015, Fred Phillips, who runs an eight-person firm in Flagstaff, Arizona, that specializes in wetlands restoration, took a call from a prospective client. On the line was a representative from one of the world’s wealthiest companies: Apple. The representative spoke hurriedly, Phillips says, and he struggled to follow at first. They needed help with a project to restore land that had been mined for tin in Indonesia. And it had something to do with pineapples, dragon fruit, and an extremely tiny primate.

Phillips knew nothing about tin mining landscapes, nor what was involved in rehabilitating them. But the representative from Apple, who had been referred by a mutual acquaintance, was persistent. By the end of the conversation, she offered Phillips a job with the company. He declined. “I told her I was happy with my firm, but would be glad to help as a consultant,” Phillips recalls. “She said, ‘Can you be on a plane to Jakarta in 10 days?’”

Virtually every electronics product in the world uses tin solder for its circuits, and 30 percent of that tin comes from Indonesia, mostly from deposits in the ancient riverbeds that run across Bangka and Belitung Islands, palm-studded paradises a few
degrees south of the equator. An estimated 30 percent to 40 percent of the population on Bangka is employed in the industry. Large mining companies denude vast tracts of land to dredge tin ore from the sandy granitic soil using industrial equipment. These companies are legally responsible for restoring the landscape after they are done mining. But in practice, restoration efforts are meager at best, and government enforcement is lax.

This is complicated by the 50,000 or so artisanal miners—laborers who illegally enter abandoned mine sites to sift for remaining bits of tin with rudimentary equipment, undermining any attempts at reforestation. Driven by poverty, and encouraged by the rising demand for tin from the $430 billion global cell phone market, the artisanal miners abandon personal safety to enter open pits of loose, wet earth filled with cloudy water. Child labor is rampant, as is death by landslide or drowning. According to a 2012 article in the Guardian, an estimated 100 to 150 artisanal miners die annually on the job.

Flying over Bangka Island, where Apple hoped to rectify the horrors stemming from the source of its tin, Phillips looked down on 1.5 million acres of pocked moonscape. Loss of the lush forest cover has put the Horsfield’s tarsier, a small primate, on the list of threatened species—and taken the island off Indonesia’s tourist circuit.

“It’s heartbreaking,” Phillips says. “Bangka used to have some of the best beaches in the country. Now when you fly in, all you see is exposed white sand on the land and muddy water extending miles out from the shore. The rivers, and the estuaries they feed, are all brown; the mangroves and coral reefs are smothered by sediment. It’s not much of a travel destination anymore.”

The plight of Indonesia’s artisanal miners has been known for decades. But as electronic devices increasingly saturate our homes, not to mention...
landfills, manufacturers’ supply chains have garnered greater scrutiny. In 2013, 14 of the biggest electronics companies, Apple included, formed the Tin Working Group, a partnership housed under the umbrella of the Electronic Industry Citizenship Coalition (EICC), a nonprofit that monitors ethical supply chain management for electronics-based industries.

The idea was to leverage the buying power of multinational electronics companies to force Indonesia’s mining companies and government regulators to reform the tin industry. The Tin Working Group has considered audits and incentive mechanisms to nudge the local actors in that direction, but the forces of supply and demand seem to be nudging the other way: Consumers aren’t forcing change, and the electronics companies aren’t so noble as to sacrifice profits to pay for cleaning up the industry themselves, leaving the mining companies with all the cards in their hands.

Enter the pineapple. On Phillips’s first foray to Bangka in 2015, it was clear that the only way to stop illegal tin mining and restore the mined landscapes was to create an alternative livelihood for the miners that paid them more to steward the landscape than to destroy it. Farming—based around agroforestry plantings designed as much to restore local ecosystems as to yield cash crops—seemed the only feasible solution. If the produce could be marketed through fair trade or organic channels, the premium price might help make the whole affair more economically sustainable.

Apple declined my requests for an interview, though Michele Bruelhart, a tin industry expert at the EICC, shared her view on the conundrum of sustainable smartphones. “Mining is an inherently unsustainable activity because it’s dealing with finite resources, so rather than talk about ‘sustainable tin,’ we call it ‘responsibly sourced’ tin.”
a proof of concept for turning illegal miners into ecofriendly farmers (officially, the EICC is his client). The conceptual plan, completed in late 2016, calls for smoothing out the random piles of soil and dredging pits that typify tin mining sites into broad planting terraces threaded with constructed wetlands to filter runoff. Half the site is slated for agriculture and half for reforestation with native species, which may also be managed for timber, honey, and other goods.

It’s hard to imagine bountiful farms springing up on such highly degraded land, but wet tropical places are well-suited to dense, multistory plantings, where various perennial crops are grown in concert, mimicking ecological functions and rapidly building soil. With the help of a U.S.-based agriculture consultant and local horticulture experts, Phillips devised a plan for intercropping trees with smaller species: coconut palms with pineapple, timber bamboo with citronella and vetiver grass, and so on. The plan calls for eight tons of compost to be tilled into every acre to jump-start biological activity in the soil, though the initial plantings have been chosen for crops known to thrive in infertile conditions. Some of the crops will also produce biomass as a by-product, which will be incorporated into the soil, allowing plants with higher fertility needs to be established later.

Soil and water toxicity is a major concern on any mining reclamation project, let alone on a site where food is to be grown. Toxic chemicals are not used to extract tin as with other metals (cyanide is often used in gold mining, for example), nor is tin itself considered acutely toxic. However, the naturally acidic soils and groundwater in the region, made more acidic by the removal of topsoil at the mining sites, are a recipe for mobilizing heavy metals, which may then become concentrated in plant and animal tissues. Although there is evidence of toxic levels of heavy metal contamination at abandoned Bangka mines, negative impacts to human health have not been documented. Still, out of an abundance of caution, Phillips says the plan is to start with nonfood crops, such as vetiver, citronella, and palm varieties that produce coco coir, while monitoring soil and groundwater conditions during the first years of the reclamation effort. Phillips expects the pH to rise as biological activity resumes, with hopes of paving the way for diverse food crops.
Phillips's preliminary research uncovered two examples of successful pineapple plantings on tin sand tailings in Malaysia where the crop did not appear to accumulate unsafe levels of heavy metals, giving hope that this cash crop, already grown successfully on Bangka, will be the first edible produced. To further evaluate the potential for edible crops, Refined Bangka Tin, the mining company that provided the 125-acre site for the pilot project from one of its mining concessions in the Pemali District along with seed money for the project, hired an Indonesian consultant to test a series of crops in a plot of soil hauled from the site to its testing facility. The verdict: Root crops, such as cassava, risked unsafe levels of heavy metal contamination, but dragon fruit, pineapple, papaya, and other tree crops are a safe bet.

Phillips has spent two years navigating the Indonesian bureaucracy, getting to know local practices, and engaging with both the mining companies and the artisanal mining community to earn their trust and understand their needs. He hired Telapak, an Indonesian nongovernmental organization headed by the environmental activist Silverius Oscar Unggul, to facilitate the negotiations. The organization has worked with illegal loggers on Belitung Island to form economically viable and environmentally friendly farming cooperatives and ecotourism ventures; the hope is to do the same with Bangka's illegal miners.
The challenge, Unggul says, is for well-meaning foreign interests to get past buzzy sustainability speak, which means nothing to someone whose only way to feed his family involves sitting in a mud pit 12 hours a day sifting for tin. The miners need to see an alternative that will replace their current income without missing a beat—spending months to build up a new farming business is not an option.

“People in Indonesia have been talking about reclamation projects and alternatives to tin mining for years, so sometimes the artisanal miners feel it’s just talk, talk, talk and no action,” Unggul says. “We told Fred that to be successful, in our experience, you have to show people what we call ‘quick wins.’ Then they will follow you.”

For this reason, quick-maturing crops will be emphasized. And Telapak is already working with people locally to set up composting facilities and nurseries based on the assumption that there will soon be demand for those products, and that the scent of commerce will inspire artisanal miners to take the leap.

Reza Andriansyah, the director of Refined Bangka Tin, told me he hopes to break ground later this year on the first 25 acres of the pilot project using the company’s own funds, and is hoping to secure grants through the EICC for the rest of the 125-acre pilot project. He’s branded the initiative Timah Tani, which translates as Tin Farmer. “The message we want to send is that the tin industry is serious about reclamation,” he says.

For Phillips, getting this far is already a success. He thinks the reason Apple wanted to hire him is that they’d heard about his ability to get people with diverse perspectives talking to each other—for two decades, he’s worked in the Southwest on projects with groups that included local tribes, small-town Chambers of Commerce, and U.S. Customs and Border Protection, among others.

“[The Apple representative] kept telling me how frustrated they were after hiring high-paid consultants who weren’t getting any traction to get the project moving. This was really the first time that the electronics industry, the mining companies, and the villages where all the illegal miners come from all came to the table to listen to each other, which is what I think will make this time different, and will make the project replicable,” Phillips says. “This is the crucial moment if we are to bring this idea to scale.”

BRIAN BARTH IS A TORONTO-BASED JOURNALIST WITH A BACKGROUND IN URBAN PLANNING AND LANDSCAPE DESIGN. REACH HIM AT BRIANJBARTH.COM OR ON TWITTER @BRIANJBARTH.