How Your Cup of Coffee Is Clearing the Jungle

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Credit...Illustrations by Hokyoung Kim

By Wyatt Williams

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In the fall of 2015, Matt Leggett, a newly hired senior adviser for the Wildlife Conservation Society, found himself sitting in a meeting in Jakarta, Indonesia, wondering if someone had missed the point. The meeting, as he remembers it, was meant to unveil some good news about tigers. In brief: Back in 2002, a survey of one of the last habitats of the critically endangered Sumatran tiger, Bukit Barisan Selatan National Park, showed a tiger population that, in biologist-speak, amounted to only 1.6 tigers per 100 square kilometers. He learned of a significant improvement: 2.8 tigers per 100 square kilometers. Here was statistical proof that their approach — a collaboration with the Indonesian government to infiltrate poaching networks and prevent a cycle of livestock deaths and revenge killings — had been effective. Tiger numbers were going up. Conservation was working the way it should.

Leggett wasn't so sure that it was. He sat at the conference table, looking at data sets and satellite maps and spatial distribution grids being projected on a screen, and couldn't help noticing the forest. It seemed to be getting smaller. The borders of Bukit Barisan Selatan National Park were established in 1982 and have barely changed since. Yet the annual satellite images, the same ones used to illustrate improvements in tiger population, seemed to also show a forest shrinking — at times rapidly — year after year. He wondered: Were the people in this meeting looking at the same maps he was? Was he crazy? He was not crazy. By the time of that meeting, roughly one-fifth of the park's protected lands had been chopped down, nearly 150,000 lost acres. Leggett couldn't help wondering what the point was of going around counting tigers every season if there wouldn't be any forest left for them in a few more years.

That the environment of Bukit Barisan Selatan is worth protecting has long been evident. UNESCO added the tropical rainforests of Sumatra to its World Heritage List in 2004, citing in particular the remarkable biodiversity contained within. This was the last place Sumatran elephants, rhinoceroses and tigers lived together, where the world's largest flower grew on the ground and gibbons sang into the distance. This forest, just north of where Krakatoa erupted 138 years ago, nurtured an ecosystem unlike any on earth. And it is disappearing.

As he left that meeting, Leggett determined that he would find a reason for the deforestation. He soon sent a team of researchers on an undercover operation into the park. They went out on dirt bikes with cameras and G.P.S. receivers. They found a web of unmapped paths winding under branches and along steep ridges, destinations unknown. These scouts explored for months, snapping pictures and dropping pins. Their approach was meant to be quiet, a way of gathering information without drawing too much attention to themselves. They might have been confused for, say, ambitious bird watchers looking for a glimpse of the great argus. They could have been counting frogs. What they identified instead was a definitive cause of the forest's disappearance: hundreds of small coffee farms, cleared an acre at a time from within the park's boundaries. From certain vantages, the rows of coffee stretched as far as you could see.

Such a problem might appear to be a simple one. People were growing coffee in a place where everyone seemed to agree they shouldn't be. The forest was already well recognized as important, worth saving, formally protected. How hard could it really be, then, to do something about this? As with the satellite maps of the forest he'd just seen, Leggett was determined to keep widening the perspective, pulling back the camera until he could see the full picture.

Image

It is not exactly wrong to say that the first great coffee company started right around here, a few hundred years ago. The Dutch East India Company, founded in 1602, grew to be so successful at moving coffee beans from the Malay Archipelago to the Western world that the product became synonymous with the best-producing island under its control: Java. To mention only that the company was wildly profitable would be to overlook the methods by which it achieved success: forced planting, wage theft, intimidation, mass murder. The requirements and expectations of Tanam Paksa, as the Dutch colonial planting system is known in Indonesia, were so severe that communities were ravaged by famine and starvation while continuing to be forced to plant cash crops that made the Netherlands rich. Tens of thousands died. Despite the end of formal colonial policy, the organizational systems created by the Dutch East India Company — public offering of shares, vertical integration of production and processing, diversified global shipping — have become the model for the multinational corporation of today. And Western capitalism, in turn, remains a caffeine-fueled enterprise. The office worker, whether sipping a tepid afternoon cup of drip in Toledo or a flawless morning macchiato in Milan, is drinking a beverage made from beans grown somewhere hot, humid and very far away. To try to disentangle this economic reality from the history entwined with it is a difficult and foolish task. To understand one, you need the other.

Leggett knew that solving the problem in Bukit Barisan Selatan wouldn't be as simple as identifying a few coffee farms. He needed to understand where the coffee was going, who was buying, what they were paying. Among the Wildlife Conservation Society's greatest strengths is its aptitude for fieldwork. Few NGOs are as capable of counting endangered mammals or cataloging rare orchids and putting those numbers to use. It may be helpful, then, to understand Leggett's coffee investigation as an analogous approach. Instead of counting tigers in trail cams, Leggett and his colleagues set out to create a data set that would explain how an ecosystem of illegal coffee had come to thrive on such theoretically well-protected land.

Using the location data gathered through the initial fieldwork, three women went out with a cover story. If anyone asked, they were college students working on a project about coffee. This wasn't exactly a lie. Some had attended the University of Lampung, and they were working on a project about coffee; the two things just didn't happen to have anything to do with each other. Leggett had guessed, correctly as it turned out, that a farmer in a remote forest might not mind the attention of young women curious about his work, even if he knew some of these questions were not the sort he should be answering. The interviews were

structured around casually gathering hard data: How much land did the farmer work, and how many kilograms of coffee did that land yield? Who bought the coffee from him? How much was it worth?

Combining their fieldwork with some previous research, Leggett came to understand that most coffee farmers in the park tended plots smaller than three hectares, many smaller than a single hectare (roughly two and a half acres). Their individual yields were often low, sometimes less than one thousand kilos annually. In aggregate, though, the amount of land being cleared for coffee, and the amount of coffee being produced, represented staggering numbers — a small but not-insignificant percentage of Indonesia's total coffee production.

These small growers did not have the resources to handle the transportation or distribution of their product. They were selling to middlemen, toke, who operated around the edges of the park, trading with a mix of legal and illegal farmers, which gave their product cover. Leggett sent his researchers back out to identify a number of middlemen, who were apparently susceptible to the same routine as the farmers. We're just a few dumb college students who want to know about the coffee business. It never seemed to fail. The middlemen gave up annual purchasing amounts and exporter names. They said who owned this warehouse and who owned that one. They said which export companies paid better and which ones were low on their list.

> **The point of this coffee was to forget that it had ever come from anywhere at all.**

In July 2016, harvest season arrived. All around the park, farmers were observed stripping the cherries from their trees, sun-drying the crop in flat, red-dirt yards and packing away the beans in clean, white, heavy sacks, ready to sell. As the coffee began to leave the park in long caravans of motorbikes, the investigators tailed vehicles, taking pictures and detailed notes. Two hundred kilos on a blue-and-black Yamaha F1zr motorbike. Fifteen bags loaded on a customized hardtop aquamarine Jeep. Two tons on a yellow Mitsubishi Colt diesel adorned with the driver's name in a matching yellow script across the windshield. A middleman's warehouse just outside the park with a broken satellite and laundry hanging in the yard. A garage entrance hiding under a Djarum Black banner. They spent a lot of time smoking *kreteks*, clove cigarettes, waiting for one truck to leave one warehouse after another.

In an internal report compiling this research, Leggett concluded that Nestlé, Olam International and the Louis Dreyfus Company, among a dozen other exporters, have most likely purchased coffee illegally grown in the national park and distributed it throughout the world. (Olam and the Louis Dreyfus Company did not dispute this version of events; Nestlé did not respond to requests for comment.) You might imagine that such a colorful and strange origin — a globally recognized rainforest filled with rare and endangered species — might make for a precious marketing angle were it not explicitly illegal to be growing coffee

there in the first place. The reality is that such beans are sold into the anonymity of a commodity market designed to make uniform products for placeless destinations. The point of this coffee was to forget that it had ever come from anywhere at all.

The coffee sold by Starbucks or almost any other brand seeking to market its quality or origins almost uniformly comes from Coffea arabica, a relatively finicky plant that has become known for superior quality and flavor. The coffee grown in and around Bukit Barisan Selatan is a variety known as Coffea canephora or, more commonly, robusta. A brief survey of coffee literature and experts will explain what you need to know about robusta's reputation for flavor:

"A more bitter taste."

"A woody, burnt-rubber quality in the cup."

"Ferment, mildew and a sort of compost half-rotted flavor."

"Like putting a child's unvarnished building block in your mouth."

"It doesn't taste very good."

As with any culinary rule, there are plenty of contrarians with arguments for robusta's qualities — more caffeine, thicker crema — but robusta's main selling point is that it is cheap. The reason for that cheapness is not only because it is bad coffee, though that's part of it, but also because robusta plants are unusually hardy. They grow in conditions (low, hot, neglect) where more desirable arabica plants would wither. They bear prolific fruit. Perhaps most important, robusta is resistant to coffee rust, a fungal disease that decimated large swaths of the arabica crop throughout Java, Sumatra and many other parts of the world in the late 19th century. In spite of the taste, robusta is an ideal commodity crop to feed the planet's ever-expanding appetite for caffeine: affordable, reliable, anonymous. It is the primary bean used in instant, soluble coffee.

This is a strange journey to imagine: the way a single sack of coffee beans would have been harvested by hand inside a national park, amid the clamor of apes echoing through the rainforest. How that single sack would have been smuggled out of the mountains on the back of a dirt bike down a perilous cliffside track and delivered to a middleman, who would be likely to sell it to at least one more middleman before it was driven into the gates of the exporter, who would then put it on a shipping container to be loaded on a boat. From there, the bag would float to the other side of the planet, where it would be unloaded, mixed in with other beans, roasted, ground and packaged into small, premeasured bags for brewing cisterns of coffee at a corporate cafeteria. There, a customer might pay two dollars for a cup of it — twice as much as the farmer was paid for an entire kilogram of beans — pour in some milk, set it on the table and maybe, depending on the time of day, forget to even drink it.

Image

Leggett spent much of 2017 meeting with the coffee companies implicated in his investigation, explaining the methodology and results. These were largely receptive meetings. Leggett's research had been thorough; there wasn't much to be disputed about it. Nearly all the companies could understand that this was a problem, that illegal coffee was being grown inside the park, that it was finding a way into the commodity market and that something needed to be done about it. They could even agree that the problem was one created by the coffee industry as a whole in Sumatra, though none would directly admit to having knowingly bought the illegal coffee. Leggett brokered a sit-down meeting with all the major players — local governments and park officials, eight companies that collectively constituted more than two-thirds of regional coffee production and even some coffee farmers themselves. They signed a statement of intent to work together, admitting among other things that "business-as-usual coffee production" was only going to make this problem worse.

What exactly needed to be done about it, on the other hand, was still up for debate. In recent years, many companies have preferred to market their products through certifications or auditing schemes. The popularity of labels indicating "organic" or "fair trade" or "rainforest safe" offer some promise in standardizing better agricultural practices, but was this really a solution to the problem in Bukit Barisan Selatan? Did the companies merely need to hire consultants to keep illegal coffee out of their purchases? Leggett doubted that bringing in more auditors would do any good. Coffee moving through the complicated geographical web of thousands of small farmers to hundreds of middlemen to dozens of exporters throughout the region meant that establishing a reliable and consistent chain of custody was likely to be impossible. Even if it weren't, the task would be too expensive for exporters specializing in cheap, bad coffee.

It would be possible, Leggett knew, to single out a large company and blame it for buying illegal coffee. Even if that worked, though, he couldn't see the point. If, for example, Nestlé were to be shamed into shutting down its operations at Bandar Lampung, the nearby port city, what good would it do? This was a problem larger than any one buyer. Their absence would create a market opportunity for a less scrupulous buyer, most likely one less susceptible to public opinion.

In previous decades, the Indonesian government tried to evict farmers from the park. In some cases, whole villages inside the boundary were burned down and the farmers forcibly relocated. A visitor to these locations today would find the houses gone but the farms still there, coffee trees grown crooked and unpruned. Without a plan to restore forest on these lands, the evictions were useless: merely punishment of farmers without addressing the actual problem created by them.

There are further abstractions in terms of approach. Financial instruments have been created in recent decades to quantify the relative value of "carbon stored in forests," a concept meant to persuade companies or governments to make investments that would theoretically mitigate or adapt the environmental problems of development and industry. Leggett has been dubious of the real-world results. "When you've been in these climate-change meetings at the U.N., they're talking about these really complicated procedures for counting carbon and the creation of a mechanism around additionality and all of these things," he told me. "Then you go to the community where these things are meant to be happening. The gulf between the two is so enormous, so wide."

Leggett is a contrarian by constitution and experience. Though born to English parents, he has spent a majority of his life living elsewhere: Papua New Guinea, Indonesia, throughout Central and South America. For years, he worked as a fixer in the Amazon, helping the filmmakers of nature documentaries find secure locations and negotiate with Indigenous communities for access to their lands. Of the films he helped facilitate, he said: "They were essentially: 'Look at this beautiful bird. Isn't it beautiful? Hasn't it got a fascinating life history?' I had believed that people would be inspired by the wonder and therefore that would mean that they cared." Instead, he found that "there were all sorts of horrible dynamics going on in the places just behind the camera."

> **I told him it sounded a little absurd. I asked if that wasn't like offering hunter safety courses for poachers.**

The solution Leggett eventually arrived at in Sumatra was not getting rid of coffee farmers or their livelihoods. He had discovered, while poring over the data he gathered for the internal report, that the annual yields per acre reported by coffee farmers inside the park were paltry. They harvest less than half the coffee crop of a comparable farmer in, say, Vietnam. The farmers inside the park are isolated. They don't have a local agricultural extension service to ask about plant spacing or a place to buy fertilizer. A farmer who needs to earn a little more money cannot do so by improving the quality, because robusta will most likely never command a much higher price. He has few options but to clear more land to grow more coffee. The price for a kilogram of his beans rarely exceeds two U.S. dollars. After interest on debts and transportation costs, many earn less than a couple of thousand dollars a year. Leggett believed there was some promise here, that the problem could be solved by helping farmers get better at their job. It is an issue that dovetails with the priorities of Indonesia's Ministry of Environment and Forestry, which has stated that sustainable land management should put people first.

The first time Leggett explained this approach to me, I told him it sounded a little absurd. I asked if that wasn't like offering hunter safety courses for poachers. Who would he really be helping? Leggett offered a different kind of metaphor: the negotiation of acceptable losses. In approaching this long-running conflict of farms against nature as all-or-nothing battle, conservation would keep getting nothing. He described what he was working on as a demilitarized zone between two, long-fighting forces. He asked me to picture this as a "green fence," a boundary for nature created by and upheld by the farms that surround it.

There are reasons to be skeptical of such an optimistic approach. Why would a farmer, now enabled with greater agricultural resources and better yields, not invest his new fortunes into chopping down more of the forest and clearing more land? Contingencies were developed. Access to resources like fertilizer or a distribution chain could be withheld from communities that initiate new land-clearing. The gamble was that a farmer, once hooked on the benefits of good fertilizer and a fair buyer, would not act against his own self-interest. Perhaps.

There are good reasons to be skeptical of conservation's adversarial approach to agriculture, as well. The primary one is that it simply hasn't worked. For all the billions raised by NGOs, the feel-good campaigns filled with pictures of flagship species and the wonder inspired by documentaries about beautiful birds (aren't they so beautiful?), the net result is simply that we live in an age of environmental disaster and mass extinction. If the conservation movement was meant to stop that, the simple answer is that it has failed. There are a billion more people coming to this planet soon and another billion after that. A majority of these billions will be born in the places where agriculture is the way of life, where if you want your own plot of land, you might need to go out into the forest and find it. If our approach to that situation is to continue to say, "No, that's bad, don't do that," or to draw unseen lines around certain groups of trees and insist that these are the special ones, then the results will continue to be the same.

Leggett's thought is that we must understand the full ecosystem of needs: that a forest cannot be understood or protected by knowing only what a siamang gibbon needs or wants from it. That if we can understand what humanity wants or needs from forests, why we keep going in and chopping them down, then we might get a little bit better at managing our inclinations and appetites.

Image

In the fall of 2019, I traveled to Bukit Barisan Selatan to see about this problem that Leggett had found. I first heard about it at a dinner party in Bali, that a protected rainforest in Sumatra was being chopped down for instant coffee, that he was trying to do something about it. So I found myself on the western edge of a wide lake, Danau Ranau, where the driver who brought me from the airport outside Bandar Lampung could not venture down the dirt path any further. A team of *ojeks*, motorbike drivers for hire, were waiting there. They were a rough-looking crew. Their dirt bikes had been customized in what you might call a "Mad Max" jungle style: thick welded racks bent from repurposed metal, suspension held together with wire and chain, upholstery fashioned from inner tubes, feed sacks and palm trees. They were dressed with masks, motocross jerseys and machetes. I sat down behind a driver, and he took off up a path into the forest; my translator did the same. It was a narrow, makeshift dirt route, sometimes no wider than the tire on the *ojek*'s bike, and it led up the steep edge of a mountain rise, switching back and forth among the trees. We rode until the dirt bike engines overheated from the steep climb. We paused long enough for a pack of *kreteks* to be passed around for a smoke and for the engines to cool before kick-starting them again for the last leg of the trail. I ducked my head under vines and the low branches of trees heavy with fruit.

Finally, our caravan emerged from the forest and crested over the edge of the cliff. From this peak, I could see the view that I had been promised: There were coffee farms stretching out as far as I could see.

One of the Wildlife Conservation Society's Indonesian key field workers, who goes by Mas Yok, had brought me here. He had spent months riding on the back of motorbikes and showing up in small villages. He told them about the society's plans, that they wanted to find a way to help them as farmers and maybe help save the forest, too. Some people sent him away, wouldn't even listen to the first word. But here in this remote mountain ridge, in a village called Ujung Rembun, he had found a curious and welcoming group of farmers.

I wanted to know how any of this could have ever happened in the first place: Why grow coffee here? So Mas Yok led me to one of the oldest men in Ujung Rembun and asked him to explain it all to me from the beginning. As with anyone involved in the illegal coffee trade in Sumatra, he is identified here only by an initial.

M. invited me into his home. We sat down on the floor with a pack of *kreteks*, an ashtray and two cups of coffee. He told me a long story. He said the first people who had come to this place, long before it would even be named Ujung Rembun, had come in the 1950s. It was a group of no more than a dozen people. They tried to clear a little land and plant some crops to feed themselves, but elephants still lived in this place. Every time their crops came in, an elephant would come stomping through the field, eating whatever he wanted. So those first people had mostly given up.

M. arrived in 1966. He cleared two acres that year. He said cutting down the rainforest by hand was hard work, chopping and digging all day long in the heat. He laughed and twisted his hands in the air, as if he could still remember wringing the sweat from his shirt so many years ago. By this time, the elephants had become scarce in this place, and so his crops were successful. He planted cabbage and eggplants, some rice and peppers. He picked fruit from trees. It was a bountiful place, he said, so he thought he'd plant something that could make him a little bit of money.

In this way, M. took responsibility for everything that happened afterward. He was the one who brought coffee to this place. He said he brought the plants up the same steep cliff I'd climbed to get here, only he didn't ride on a dirt bike. Every single coffee plant he brought here came on his own back. He said he carried 6,000 plants all by himself. He smiled when he said this, not unlike a grandfather who delights in telling children tall tales.

M.'s coffee plants grew well and earned him, as he hoped, a little bit of money. More people came, and more people planted coffee until it was not just one hamlet here but a string of hamlets throughout the forest, all populated by coffee farmers looking for a little land.

M. said that this was a good place, that people were kind to one another, that the ethnic differences that can sometimes cause conflict in Indonesia were set aside here, that they were proud to have a diversity of people living in peace. The only part of the story that M. was upset to tell was a day in the 1980s when the national park was formed. The men who drew the border of Bukit Barisan Selatan, M. said, had drawn the park's boundary between his house and his farm. He repeated this detail several times, setting down his pack of *kreteks* in one place and his ashtray in another and drawing with his finger a line between the two. He felt it was wrong to split up his land that way and that any trouble that came to this place had been because of the way the line was drawn.

Later that night, I was woken up to hear another story. I was sleeping on the floor in one of the *ojek*'s houses when, apparently, my conversation with M. had been discussed. R., one of the *ojeks*, needed to tell me that M. got the story wrong. He said it wasn't M. who first brought coffee here but R.'s father. It was a story as convincing as M.'s, with a few new details: There had been a wealthy ivory trader in Liwa that R.'s father worked for. R.'s father was out scouting in the woods when he found this beautiful plateau. The ivory trader, R. said, was the reason the elephants had disappeared from this place, which made coffee planting possible.

During my time in Ujung Rembun, I began to learn that the conflicting details of stories I was hearing, the willful omissions and contradictory histories, could tell me as much about this place as the verifiable facts. Often, when I asked where a man's farm was, he would tell me "over there" and point somewhere vague and distant, knowing there was there no benefit to me knowing exactly where his farm was. Some of the people who lived here had farms that were legal and outside the park. The confusion created by this fact gave cover to the people who were farming illegally.

The clearest omission in all of these stories is something M. specifically didn't talk to me about. He said he came to this remote and difficult place in 1966. He said other people started coming here then, too, but he didn't say anything about what had been happening that year. Beginning in 1965, a program of mass killing spread throughout Indonesia. Communist organizers and sympathizers, as well as many others caught up in the conflict, were systematically hunted down and killed by the thousands. A story from Time magazine in 1965 described the scene:

> The killings have been on such a scale that the disposal of the corpses has created a serious sanitation problem in East Java and Northern Sumatra, where the humid air bears the reek of decaying flesh. Travelers from those areas tell of small rivers and streams that have been literally clogged with bodies.

Modern estimates say approximately one million people were killed in those years. It is not so hard to imagine that 1966 was a year when many people in Sumatra would have wanted to disappear into a forest in the mountains and start a new life.

That is only one explanation of how this might have begun. There are others: that the decline of the price of rubber sent many farmers looking for a new crop to grow or that the global demand for coffee has outgrown our ability to sustainably supply it. However it happened, anywhere between 20,000 and 130,000 people — estimates range wildly — are farming illegally within Bukit Barisan Selatan.

On the

Image

week that I visited that year, the Wildlife Conservation Society hosted a workshop in Ujung Rembun. It was meant to help forge a true partnership between these coffee farmers and the society. Fifteen men arrived in a wood house illuminated only by the daylight coming in from an open door. In the back corner, there were a dozen large white sacks of coffee stacked along the wall. The men each signed an attendance sheet, some with a single name, some with a simple mark. The room had bright, plastic posters with numbers tacked on the walls; on other days, this room was used to teach children how to count. As with the beginning of any class, some of the students here milled about, chit-chatting and smoking, and others looked

down at their phones. There were parts of this village, certain hilltops or ridges, where phone service would arrive in fleeting moments, as if it were fog blowing in on a breeze. We sat down on thin mats and gave our attention to an instructor in a clean polo shirt.

I had asked Mas Yok if there was a requirement for these farmers attending the workshop. Had they been asked to stop cutting down the forest? He shook his head. It was too early to ask for what he called the compliance step. They were here to build trust and listen to one another. He explained that there was an agreement the society was hoping to broker on behalf of the Indonesian Ministry of Environment and Forestry: commitments from individual farmers who would, over a period of 15 years, begin to replant parts of the farms within the park and return it to the forest. But that part couldn't be rushed. Mas Yok believed they would get there eventually.

Today's workshop would be devoted to that essential element of any well-meaning farm: compost. The instructor worked through the basic elements familiar to any Ag 101 course — nitrogen, sulfur, potassium — and how each was necessary and beneficial for the soil of their coffee plants. The instructor explained how robusta farmers in Vietnam were producing much more coffee than they were, because they understood these things better. Eventually, the instructor got around to some practical advice about making their own compost: that banana leaves could be gathered as a source of potassium, that chicken waste could be raked up for nitrogen. The group went outside into a dirt yard where a small demonstration had been prepared. A pile of leaves and stalks that could be chopped up and mixed with the scrapings from a chicken coop and some old, spent coffee grounds.

The farmers stood around watching. Some degree of skepticism could be observed on their faces. The smallness of this exercise was apparent to anyone standing there. How exactly a pile of banana leaves and chicken excrement was going improve anyone's life, or bring back the clear-cut sections of this forest, seemed uncertain. One of the farmers, elected by the group to speak with me, gestured to my translator to step aside from the lecture so that we could talk.

He said: "We have so many problems but don't know the solution. Hopefully through this meeting, we have a win-win solution." I thought at first that he was just saying what he thought I wanted to hear. But the longer I hung around, I realized he was saying what he wanted to hear, too.

Since I had arrived, every farmer I met assumed that I had come about "the problem with the coffee." As our conversations went on, though, I realized that there was no consensus about what "the problem" was. Sure, everyone understood that farming inside the park was illegal, but there were things that maybe mattered more. Some believed the problem was the price for coffee they were being paid, that it kept going down year after year. Others believed the problem was the yields, that the old coffee plants weren't producing as many beans as years before. Some blamed it on the weather, saying it had changed, that there wasn't as much rain

these days. Others were in debt to a *toke*, a middleman who advanced them the money from a year's harvest before they delivered. Once they took the first loan, they had never been able to get out of it.

In the year that followed, other problems emerged. A pandemic passed over the world. Leggett returned to Britain, where he has taken a global role with the Wildlife Conservation Society aimed at identifying other "forest frontiers" around the world caught in the conflict between agriculture and nature. Mas Yok and other field workers were told to stay home. In Ujung Rembun, the coffee plants simply continued to grow as they did before. The rainy season came and went. The coffee cherries turned from dark green to ripe red. The farmers there picked them and dried them in their dirt yards and packed them away into white sacks as they did any other year. Some debts were paid; others were opened.

Mas Yok was eventually cleared to return and has continued to offer help to the farmers, to stick to the commitments he made to lend assistance and help them improve their crops. By his account, the yields are improving, and so is the quality. In exchange, some farmers have signed on to those agreements promising to the Indonesian government that they will return their farmland, eventually replanted as forest, over the next 15 years. Many others have yet to agree to anything. On certain mornings, in certain corners of the park, siamang gibbons can be heard singing out into the distance from the tops of trees. On other mornings, in other corners, chain saws can be heard, too.

When the naturalist Alfred Russel Wallace arrived in Sumatra in 1861, it wasn't long before he saw a rhinoceros. The solitary, horned mammals were then so abundant that Wallace observed their tracks and dung "continually" during his time there. Over the course of that trip, Wallace watched a lemur glide 70 yards through the air and captured a butterfly whose ability to disguise itself as a branch's dead leaf was "so complete and marvelous as to astonish everyone who observes it." He gathered a whole family of hornbills, estimated the likely distribution of orangutans, purchased a captive, rope-tied siamang gibbon to accompany him on his travels and tried but failed to bring that long-armed, musical ape home to England with him alive. He did not see any tigers, but he knew that they were there. "It is the very country that would promise most for a naturalist," he would later write in "The Malay Archipelago."

Among his observations of Sumatra in 1861, one more has proved prophetic. He noticed that the elephants seemed to be disappearing. Plenty of their bones could be found, but living ones were scarce. The decline of elephants, Wallace believed, had something to do with the "spread of cultivation." The local population had only just begun opening up the island's dense rainforests for farms, chopping logs and plowing fields where the animals once lived. In the following years, Dutch colonists would redouble their efforts to plant and mine throughout the island. But before that even happened, Wallace could see the future clearly. As far as the tenets of conservation go, this is one of the oldest stories in the book: The rise of agriculture will cause the fall of nature.

Forests have long attracted people with urgent hopes and needs. Our oldest stories, the ones about how we began, often feature a tree, the fruit that it offers and the knowledge — often terrible — that comes with taking it. We have written this conflict into our oldest books. One way to read the worst chapters of human history is to see how so many of them involve food and farms. Enslavement of generations of people. Endless, violent conquest. Wholesale eradication of species. What did we do these things for? To plant shrubs to make our clothes from. To find spices to make our food taste a little better. For a small bite of meat. The horrible knowledge of the fruit, of course, is that we are forever responsible for growing it. To tend a farm requires hope — hope that even if we know how the arc of history has bent, we still have to wake up in the morning and believe that the plants will grow better this season, that the yields will improve, that the conflict between us and nature, whatever you want to call what it is outside us, might one day be resolved.

Near the end of one day that fall, a long one I spent riding motorbikes with Mas Yok through the forest, one farmer waved us down as we passed his house. T. invited me in. His wife made coffee for all of us, black grounds stirred directly into a cup of hot water, doused with enough sugar to hide the bitter flavor. He told me that they came here from Java, that they had nothing before. They took a boat and then a bus, and then they walked the final miles to this place in the forest where they made their life. That was 25 years ago. They collected water from the stream. They kept chickens in their yard. They planted the vegetables that they ate. He said it was hard work, planting and harvesting coffee. In all that time, the best harvest he could remember bringing in was 2.5 metric tons. A harvest that size would hardly have brought $2,000 of profit. He said he couldn't even remember the last year he made so much. They had only wanted a better life.

T. remembered a day, not long after they arrived, when he heard his wife screaming for help out on the hill. He went running out between their rows of coffee, looking for her, screaming back to her. When he found her, she was standing still between the plants; her eyes locked on a tiger crouched only a few feet away. They didn't know what the cat would do, if he was here to kill them. There were only two choices that day: to run for their lives from the tiger and hope that he didn't chase, or stand their ground and scare him away. They stood their ground and kept yelling. Eventually, the tiger left. T. said they hadn't seen one since.

Illustrations by Hokyoung Kim

Wyatt Williams is the author of "Springer Mountain: Meditations on Killing and Eating," to be published in September by the University of North Carolina Press.