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The Rainmakers

IN A JEEP WHOSE SHOCKS HAD LONG SINCE SURRENDERED to rocks and potholes, Godfrey Ogonda and I bumped and jerked over the road leading into the Gwassi Hills in western Kenya. Godfrey was laughing at me. I didn't believe that trees could make it rain. I'm not in the habit of challenging holders of PhDs on the tenets of their fields—Godfrey's is in Botany—but his claim seemed farfetched. This was basic cause and effect. "You mean that where it rains there can be trees," I said, and Godfrey explained the idea yet again: "The trees have moisture, so, you see, where there are trees, there can be rain."

I was tagging along as Godfrey's guest as he traveled to Gwassi to check on the reforestation project he oversaw. I started to say that I still didn't understand, but didn't want to invite yet another watery tautology. I exhaled a little more loudly than was polite and said, "OK." He laughed again, as if I were the one being silly.

AS RECENTLY AS THE 1980S, THE GWASSI HILLS were covered with dark green deciduous forest and glossy-leafed, soft-trunked banana trees. Then a population spike put new pressure on the landscape: people needed wood for boats, houses, and charcoal. By the 1990s, the Suba rainforest was all but gone. This is part of a larger pattern. The Suba forest was part of the once vast, fast-shrinking Congo River Basin Rainforest; the only part of this ecosystem that survives in Kenya is the tiny Kakamega National Forest Reserve, about 80 miles northeast of Gwassi. By the time we visited, the Suba forest was completely gone. There was no rain; there were no trees. Instead the hills were covered with tawny grasses and shrubs, the fields planted with maize and sorghum—crops for the drylands.

Could Godfrey's trees reverse the region's drought? We'd met a few days earlier at his office in the headquarters of an environmental organization in the city of Kisumu. The organization goes by OSIENALA, an acronym of its full Luo name, Osiepe Nam Lolwe Aluora, meaning, Friends of Lake Victoria, which sits beside Kisumu. Godfrey grew up near

the Lake and saw it change dramatically. The number and variety of fish in the Lake had plummeted; chemical pollution had caused algal blooms that turned swaths of water opaque green. During Godfrey's childhood the water hyacinths had arrived in force. The fast-growing invasive species grows in thick assemblages of waxy leaves and long stems tipped with purple flowers, the whole mess buoyed by hollow pods. By the 1990s, the hyacinths choked many of the Lake's port cities, huge mats of fibrous plant matter locking boats to their docks. The green masses were visible from outer space.

After finishing his doctorate in Germany, Godfrey returned to Kisumu and started working at OSIENALA, using satellite images to track siltation and water hyacinth in the Lake, and overseeing the Gwasssi reforestation program, which provided local farmers with saplings of a few different types of trees with commercial value and taught participants how to care for them. The main aim was to alleviate poverty and erosion in a draught-exhausted region, but I was most intrigued by the business that Godfrey had tried to explain to me in the car—the notion that replanting trees could also bring back the rain. I was a visitor in Gwasssi, and for me, the long-term success or failure of the project wasn't a matter of survival but of curiosity—a challenge to what I was certain I knew.

Godfrey had picked me up in Kisumu that morning when it was still dark out. A two-hour drive took us to the tiny town of Luanda Kotiene where we caught the day's first ferry across the Winam Gulf, a corner of Lake Victoria that juts into the Nyanza province. On the ferry, it was easy to understand the Luo name for Lake Victoria, Nam Lolwe, the endless waters. For most of the ride we couldn't see land, just the water, alternately bright and leaden, stretching into haze.

Of OSIENALA's environmental programs, the Suba Green Forest Initiative seemed least connected to the Lake itself. The Gwasssi Hills start at the shore and continue inland for about 25 miles. OSIENALA's projects don't generally stray this far from the water, but the fate of this region is more connected to that of the Lake than one might think. Deforestation in the hills resulted in high erosion. Now, when the rare rains do come, huge gullies wash soil and silt into the Lake, filling in the marshy wetlands around its edges and carrying agricultural nutrients that fuel the growth of the hyacinth. The gullies can also wash out sections of the region's unpaved roads, making travel to town and city markets slow or impossible.

Gwasssi used to be near-constantly misty. One of Gwasssi's tall conical hills was so often invisible behind its shroud of fog that locals named it "the shy hill that hides its face." This was no longer the case. The rain, the permanent fog, the rainforest had all disappeared over time. When Godfrey and I had arrived in Gwasssi the sky was bright and empty, but for a few skimpy clouds—certainly nothing of the sort a shy hill could use to hide its face.

THE SCIENTISTS OF THE GREEN FOREST INITIATIVE are not the only ones who have ideas about how to make it rain again in Suba. Traditional rainmakers are still held in high esteem in the region. In 2004, researchers from the Drought Monitoring Center of the Greater Horn of African came to Suba to visit three elderly rainmakers, Mama Dorcas, Barack Thango Mino, and Mr. Adiel. All three reported inheriting their rainmaking abilities from a parent. Mr. Adiel said his father had received his powers directly from the Lake. One day while walking by the shore, a voice called him to the Lake, where he saw a floating calabash. The voice told him to take the calabash home, and he did. That night, a fever came over him, and he heard the calabash speak. Black liquid flowed out of the gourd, and the dark concoction somehow placed him inside the gourd itself. His fever lasted the night, and afterwards Adiel was able to both predict dry spells and summon rains; he passed the ability on to his son.

The rainmakers use natural indicators to predict the rainfall: certain plants drop their leaves; butterflies appear or fail to; ants move in particular patterns; birds change their calls. The presence of frogs indicates rain, the presence of snakes a dry season.

To bring a shower, all three rainmakers used a similar method. A person or group requesting rains makes a gift of cash or livestock, and the rainmaker holds a ceremony on one of the hilltops, making a brew of water and medicinal herbs that they apply to their own skin. The water for the mixture must be brought from the Lake by a young girl who walks from the shore to the hilltop without ever looking backward. The rainmaker confers with ancestral spirits, who will sometimes require that a calf or a goat be sacrificed and the meat shared. Everyone then spends a few nights waiting—when a fever comes to the rainmaker and he passes a wakeful, sweaty night, the rain is about to arrive.

The idea that OSIENALA could change the weather by planting trees seemed to me only slightly less magical.

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AFTER THE DAY'S TRAVEL, GODFREY AND I ARRIVED at the Golgatha, a small guest house overlooking the Lake, run by a group of Catholic monks. Sitting in the compound's otherwise empty dining hall, which had the feeling of a school cafeteria, we finished our dinner of tilapia stewed in tomatoes, using balls of ugali in place of utensils. When Brother Joseph returned to give each of us a beer, Godfrey's giant grin of delight made me realize what a special treat we were getting.

We played an extended game of what-is-your-country-like. We'd talked about being an American in Kisumu or a Kenyan in Stuttgart—we both felt like spectacles, but I'd found people in Kenya mostly went out of their way to talk to and help me; Godfrey had felt people in Germany were frightened of him. We'd covered our nations' approaches to school uniforms, road upkeep, and police forces when Godfrey asked, "What do your presidents do after their term has ended?"

I had to think for a moment before answering. I had been focused on mimicking the ease with which Godfrey kept his fingers clean while using the ugali to pick up the stewed fish. "They travel around giving lectures, I guess. Or start a foundation. They all seem to open libraries." It seemed an odd point to wonder about, but Godfrey was as engaged and interested in the Carter and Clinton Foundations as he had about anything else. I was about to return the question when I remembered that Kenya at the time had only two ex-presidents, only one of whom had outlived his presidency.

After dinner Godfrey and I sat on the back porch of the monastery reading. I'd been in Kenya for several weeks, and had been disappointed by the gorgeous pastel sunsets—postcards and movies had promised me red, preferably with a baobab tree in silhouette. That night I got my first and only red African sunset, complete with fishing boats docks bobbing at the edge of the Lake and black and white ibises rooting around in the kale gardens that sloped to the shore. Africa! I turned to Godfrey, to make some comment on the scene, but he was busy with his stylus, answering emails on his Blackberry.

THE NEXT MORNING ON THE WAY to OSIENALA's small Suba office, we passed through a tiny hilltop town—a small eatery, a grocer, and several tailors sitting at old-fashioned sewing machines on small porches in front

of their shops. The tailors, the doorways standing open with curtains flapping in the breeze, the people chatting on elevated sidewalks called to mind the Old American West. Maybe it was just the sun and dust.

At the Green Forest office I met Peter Mireri, an older man with a loud, resonant voice, whom everyone called simply Mzee, the Swahili honorific for elders that sometimes gets used before a name, like “Mister,” and sometimes on its own, like “Sir.” Though Godfrey was the Green Forest program director, he lived in Kisumu and also worked on other projects. Mzee Mireri was OSIENALA’s main man in Suba. When I asked him if he’d grown up in the area, he laughed boisterously and boomed, “Born? Born, live, die, in this area,” striking his forefingers against his chest with each verb for emphasis. “I will be buried in this area!”

Mzee described the initiative to me in a high-volume, ultra-enunciated outline, giving numbered lists of problems and responses, from agricultural runoff to erosion and deforestation. The people native to this part of Kenya, the Suba, had cultural checks in place that prevented deforestation, much as the Luo around Winam Gulf had traditional laws and taboos that prohibited fishing for fingerlings (young fish in the shallow breeding grounds)—these laws against recklessness allowed the fish and trees to replenish. In Gwassi, tribal elders could fine people for gratuitous tree-cutting, but as population in the region grew, so did the need for wood. Other groups moved into the region; communities became more diverse, more modern. Traditional Suba taboos faded along with the canopy.

In 2001, Mzee Mireri was working for OSIENALA in Kisumu when a group of residents from Gwassi approached the organization, looking for help with the conditions that had decimated the forests of their hills. “We were reluctant,” he recalled, “because of the political environment.” Around that time, he said, “talking about the environment simply meant you were opposed to the political machinery of the country.” To talk about the environment was not a liberal or conservative position, but a subversive one. Kenya’s most famous environmentalist, Wangari Maathai, who started the Green Belt Movement, a tree-planting initiative, and later won a Nobel Peace Prize, was once beaten unconscious by the police while protesting a development in a Nairobi park.

But after a 2002 socioeconomic survey of the area, OSIENALA decided the situation warranted their attention. The twelve streams that used to run through the Gwassi Hills into the Lake had all become

seasonal or dried up completely. Erosion was making farming more difficult and less productive. Animals, lost without their hilltop forest habitats, ventured into towns in search of water. Snakes and monkeys showed up in homes. The Ungoye baboons, famous for emerging from the forests to sit on the hillside and watch the Lake at sunrise and sunset, were encroaching on valleys and towns, stealing and eating chickens and goats.

OSIENALA started several nurseries in the area where locals could get saplings to raise. They carefully selected trees, including jatropa, whose oily berries make biodiesel; thevetia, a quick-growing tree used for fuel and timber; and acacia, whose hardwood makes cost-effective charcoal. The plan was that OSIENALA, with the help of a Dutch investor, would buy the products from the farmers when the trees were mature, process them at a local factory, and sell them. The project also involved non-tree products. Locals were learning to keep honeybees, cultivate aloe, and grow the bushy shrubs that produce castor and sandalwood oils. Often environmental and economic concerns are presented as being in opposition—the Green Forest Initiative relied on the idea that Gwass’s financial and ecological problems could have the same solution: trees.

In Kisumu, I’d seen several young people wearing t-shirts to publicize the project: NO TREES NO WATER, NO WATER NO LIFE printed across their chests. It’s easy to understand how reforestation would prevent erosion, how the arboreal products would bring the resource-drained region a fresh source of income, but to Mzee Mireri’s endless amusement, I still didn’t see how trees could possibly bring rain. “Trees trap moisture in the area,” he said, answering my confused look with a series of nods. “It’s easier for the clouds to form there.”

Often, projects that aim to improve the quality of life for people in drylands end up exacerbating the very environmental problems that cause the poverty. In his 2009 book on bioclimatology in Africa, Henri Le Houérou, an expert on the ecology and management of arid lands, writes that international “development” organizations (air-quotes his) are largely responsible for causing ecological disasters by promoting livestock in arid lands. If poverty reduction schemes lead to environmental destruction, and that destruction leads to more poverty, what are any of us to do?

Houérou writes that aid agencies have spent billions of dollars on dryland development projects “with the only questionable net result that many million hectares of productive rangelands have be turned

into desert wasteland” (emphasis mine). His statement hinges on a very particular definition of productivity. In everyday speech we use it to mean simply efficiency or usefulness; for development workers and economists it’s a measure of a given output against the inputs necessary to create it. For ecologists like Houérou, it’s the conversion of energy and nutrients into organic matter. Because plants do this so much more efficiently than animals, production in ecology is often used interchangeably with plant growth.

These seemingly semantic differences (what’s the proper definition of productive?) have very practical consequences (what should we do with our land?). Scenarios like the one in Gwasssi are vulnerable to misreading—it’s easy to see the region’s troubles through the lens of an “environment versus development” dichotomy that puts environmentally conscious people in the ethically awkward position of valuing, or seeming to value, flora and fauna over human life. (It also spawns unfortunate lingo like “human-lion conflict,” a real term I encountered on the website of an otherwise venerable wildlife conservation organization.) For many, that’s what was so exciting about the Green Forest Initiative: it was designed to be productive in different ways. When they were starting up the project, Mireri recalled, “We asked—reforestation for whom? And for what purpose?” Instead of trying to convince people to plant trees for trees’ sake—or even tree’s for water’s sake—the people of Suba could plant trees for their own sakes. The water would follow.

MZEE AND I SET OUT FOR THE PROJECT’S WOULD-BE FACTORY SITE, still under construction in Kwethumbe, where the trees’ oils and woods would be processed and prepared for sale. The dusty roads were empty of cars, but we passed several groups of teenage girls hauling jugs of water, and a few people directing donkeys wrapped in ingenious rope riggings supporting massive jerry cans. The potted roads jangled the car frame and everything inside it, and it wasn’t long before we blew a tire. Mireri laughed. While the driver examined the rear tire, Mireri whipped out his cell phone and arranged for someone from the office to drive over with a spare.

An hour later we arrived at the factory site—a large breezy hilltop, the Lake glittering just behind it. Mireri handed me off to Gershon Siage, the manager of the Kwethumbe project, and headed back to the office. If I’d met Gershon anywhere other than a remote town in East Africa, I’d have taken him for a Texan. A big man with a big laugh and bigger belt

buckle, Gershon was wearing the first plaid shirt I'd seen in Kenya, and whenever he got a call his cell phone erupted in a spectacle of hot pink and electric blue lights and a chorus of Hallelujahs that sounded like he had the Mormon Tabernacle Choir in his jeans pocket.

After a short banquet of bananas and cookies and peanut butter sandwiches that Gershon called "tea," we walked through the nursery, where row upon row of saplings with their roots in black plastic bags of soil sat in the shade of larger trees. The whole place was bustling. Teenage boys appeared with cans and watered the seedlings. From a spot where the hilltop dropped to the lakefront, we could hear the sound of rocks dropping on rocks. A dozen or so young men and women were walking up and down the hillside on a wide path made of bright white rocks the size of cantaloupes. They were carrying up the same sort of rocks, which they'd gotten from a pile at the edge of the Lake, forty or fifty feet below, dropping them at the top end of the walkway, extending the path up the hill as they went.

When finished, the pathway would lead from the shore to a row of thatched huts. The walls hadn't been built yet, but they already had floors and ceilings. "Those are the wazungu houses" Gershon explained merrily. Wazungu is the plural of *mzungu*—the literal translation from Swahili is wanderer, but really it means white person or foreigner, East Africa's answer to gringo. "The Europeans will stay there when they come," he said, referring to the Dutch funders. Standing inside the frame of one of the unfinished wazungu houses, we had a commanding view of the Lake. Out on the water, we could see the white triangles of dhow sails drifting near the horizon. Fish eagles swooped over the Lake, at eyelevel to us at our elevated vantage point. "These houses have the best view," I commented. The day was hot and bright, but we were comfortable standing in the shade of the thick thatch with a cool wind blowing off the Lake. "Yes," Gershon said. "And they have the best breezes."

On the shore below grew an enormous fig tree, its trunk and branches extending almost to the top of the hill where we stood. Tiny monkeys chattered and clucked in its branches, feasting. Gershon let out a loud laugh. "They like to stay in this kind of house," he boomed, "because it seems so African!"

MUCH AS PEOPLE TRIED TO TEACH ME—I never did understand how trees bring rain while I was in Gwass. I remained skeptical and absorbed the

facts only when I'd returned to the United States and read about it in ecological journals. I'd like to think it happened this way because I learn best through reading, or that absorbing information more readily when it bears a UN or university seal is the result of healthy intellectual skepticism, not of prejudice. Those things are partly true.

But it's also true that in Gwassi we couldn't drink the tap water; toilets were luxuries; police officers stopped every van on the highway to collect bribes; and everyone chatted a little too casually about malaria. Things I recognized as modernity—civilization, even—were missing, and even though I knew the people I was interviewing were experts, I noticed the things missing from their world and thought I knew better.

In any case, Godfrey and Mzee's seemingly outlandish claim that trees bring rain turns out, through some obscure but observable mechanisms, to be true.

IN PARTS OF THE NEGEV, THE DESERT that covers the southern half of Israel, human effort has made the desert rain. In 1948 the newly established state of Israel limited grazing in grassy areas and planted irrigated fields of crops. These changes increased the soil's moisture content, and increased "moist convection," the force that causes water to cycle vertically over a particular area.

In the 1970s, Joseph Otterman, now an environmental scientist at Tel Aviv University, hypothesized that natural vegetation in drylands can increase what's called "convective rainfall"—rain that results from the vertical temperature and moisture gradients. Gradients like those over tropical forests, like the forests that used to cover the Gwassi Hills. In 1990, Otterman and his team analyzed rainfall and land-use data from the Negev for several years before 1948 and 25 years after, and found that with the changes in land-use—the increase in plant cover—there had been an increase in rain.

In tropical places, taking away trees does take away rain. It happens this way: Disappearing vegetation leaves the topsoil vulnerable to erosion. The earth either becomes impermeable or it blows away. Either way, the soil that's left is ill equipped to store water or nutrients, and the original plant life cannot grow back. The UN's Millennium Ecosystem Assessment explains it this way: "Low evaporation, reduced water flux into the atmosphere, and reduced convective heating all combine to produce less rainfall." A wise t-shirt puts it differently: NO TREES NO WATER.

In its most extreme form, this process is called desertification, and is irreversible. The situation in Gwasssi is not yet so dire, and the hope is that the reforestation program will have a restorative effect on the climate. Desertification is an example of phenomena called microclimate control—the effect that topography, bodies of water, vegetation, even buildings, can have on the climate of a small area. And it works in both directions; just as cutting down trees leads to drought, replanting them brings rain.

ON THE WAY BACK TO KISUMU, Godfrey and I drove around the shore instead of taking the ferry. It would be a longer trip, but Godfrey was worried that we had lingered too long chatting at the office and might miss the boat, which would mean staying the night in Mbita. Plus, he said, we would drive along the edge of Ruma National Park, and he wanted to see if we could spot some giraffes.

I don't know what Geoffrey was thinking on the drive, but I was thinking about the radical responsibility of the Suba forestry endeavor, of the optimism-bordering-on-hubris it takes to see the weather changing and decide you're going to do something to change it back.

A small part of me—the childish part that never wants to think about the changing climate, that wants to fiddle blithely while the world shifts for the better or the worse—was wishing that Geoffrey and Gershon and Mzee were wrong about their project, because if climate destruction was inevitable, everyone was (I was) absolved. The components of geography and climate—temperature, wind patterns, humidity, rainfall—seem to be beyond the scope of our influence. The realization that these systems, so giant they're almost-invisible, are as sensitive to our activities carries with it a crushing responsibility. But responsibility is not the worst thing, and larger part of myself was hopeful, of course, and curious about whether they could succeed.

Coming down out of the hills, we could see dark, heavy clouds in the distance. After about an hour the road turned suddenly to thick, gluey mud. The jeep slogged through for several yards before succumbing and sinking, its wheels spinning uselessly in the dark gray sludge. We got out and walked around the car, looking at the depth of the sinkhole the wheels were stuck in. A double-decker bus hurtled by, young men laughing at the two of us standing in the mud. We arranged some rocks around the tires and got back in the car. Godfrey switched into four-wheel drive and we were back on our way.

As we chugged up a particularly steep hill, we passed through a patch of the kind of dense forest that had gone missing from Gwassi. We held our forearms out the open windows, enjoying the cool, clean feeling in the air. We never caught up with the storm clouds ahead of us but we could tell it had just rained.