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# Lava Life

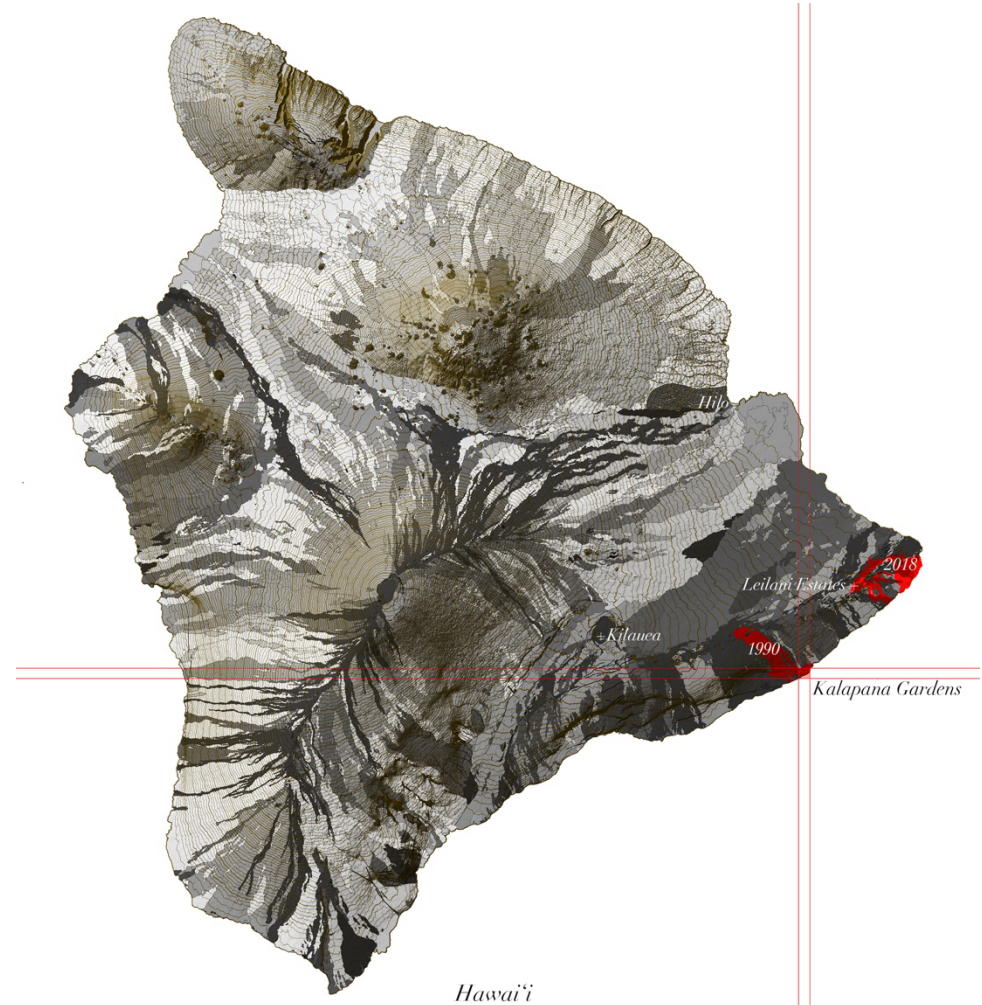
## Homesteading in Kilauea's active rift zone

Karl Kullmann

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Like a basalt iceberg, the Big Island of Hawai'i conceals most of its unfathomable bulk beneath the Pacific Ocean. As measured from seafloor to summit, one million years of accumulating lava assembled the largest mountain on Earth. Not overnight, but still the blink of the Earth's eye in geological time.

With a blink of our own eyes, we can easily overlook the tick of geological time through the present. Rock climbers understand this through the phrase *Geological Time Includes Now*, which basically serves as a reminder to look out for falling rocks. If we link the falling rocks that climbers see with the erosive and seismic processes that geologists surmise, we gain some measure on geological time. Like the compounding eruptions that built Hawai'i, we comprehend it as an incremental progression of many observable events that add up over a very long timeframe.



But for our inner clocks, this remains abstract. It is more revelatory to fathom the story of Hawai'i in terms of biological events. In the time that the Hawaiian hot spot has been manufacturing volcanic islands in profound isolation, just 15 species of bird found this lost archipelago and made it their home. And those founding specimens didn't arrive feather-by-feather or bone-by-bone, like innumerable stones falling into an eroding canyon. They landed as whole birds, with *really* big gaps in between arrivals. On average, one gravid female (or even less likely, a breeding pair) made landfall from across the vast and empty ocean about every one million years.

We might imagine that one evening in the mid Pleistocene, a disheveled finch is ushered in on a typhoon to nest. And then for an entire geological age, the horizon offers up no other avian castaways. As both the island and the colonizing bird's descendants evolve into new shapes and species, the horizon remains silent, dispensing only occasional seeds, insects and 365 million sunrises.

One morning in the late Holocene, the birds bear witness as a weathered twin-hulled voyaging canoe slips into frame on a rare westerly wind. To this new ground, the Polynesian landing party conveys a precious cargo of sweet potato and taro tubers. Half a million sunrises later—with the island now five feet taller—a pair of His Majesty's Ships drop anchor in a sacred cove. Soon, mongooses, coffee trees, and fire ants make landfall.

As the course of biological and geological events converge towards the present day, life forms and lava flows continue to create the island in real time. The flow map of the island is steeped in streaks, as viscous lava slowly pushes new routes down the mountain, thickening the ground as it goes. Human settlement patterns have traditionally yielded to these veins, revealing a lava-nomadism that underpins the ancient story of inhabitation on the Big Island: packing down and retreating when the flow changes course, and then gradually re-inhabiting the new ground once it cools and hardens.

Indeed, so integral is lava to everyday life that its geomorphology is expressed in ancient Hawaiian language. *Pāhoehoe* is a solid lava sheet with a billowy glassy surface that often twists into ropy forms. *ʻĀʻā* lava is a jumble of broken basaltic blocks that create a rough rubbly surface. A *kīpuka* is a remnant oasis of green cradled between converging lava streams. In Hawaiian, *kīpuka* also generally means *island*, so these oases are essentially little islands within a big island.

From the 1960s, humans came to the Big Island in increasing numbers in search of cheap land. Runaway speculation spurred the release of 80,000 lots in a little over a decade, which at the time equated to about one lot per island inhabitant. Taking full advantage of sight-

unseen paper-investors, the land rush clustered on and around Mount Kilauea's volcanically active East Rift Zone.

Kalapana Gardens was the first subdivision to be hewn from the southern flanks of Kilauea. Taking its lead from the nearby village of Kalapana, the subdivision was named after a priest of Pele, the volcano deity. All told, 740 lots were platted from a 160 acre *'ili* (a traditional local division of land) named Makanihalulu. By the early 1980s, mainland transplants and some local Hawaiians had crafted about 120 homes in this idyllic seaside setting.

And then in 1983, the largest and longest eruption of the rift zone in half a millennium began. While lava initially streaked downhill to the ocean, a shift in direction trapped flows behind a horst (fault ridge) running parallel to the coast. With the outflow blocked, lava pooled laterally, burying houses, gardens, and streets under 50ft of solid rock, eliminating the back sand beach, and pushing the coastline out by 1000 feet.

By late 1990, after just three decades on the ground, Kalapana Gardens was wiped off the map. *Virtually* wiped, that is. Although every familiar landmark that once grounded collective memory was gone, one key vestige of the settlement endured: the original subdivision parcels remained un-molten and legally intact. Even though the survey pegs lay buried somewhere beneath 50ft of basalt, land ownership automatically projected vertically to the newly thickened surface.

Here, the stubborn intransience of modern land title is revealed in sharp contrast to traditional Hawaiian approaches to inhabiting a fluid landscape. Geometrically rigid parcels did not feature in the topographically derived system of traditional land division, where large wedge-shaped territories called *Ahupua'a* ran from the coast to the highlands. *Ahupua'a* provided access to a diversity of resources and provided room to relocate in the advent of lava flows. And when the coast shifted, the territory did too (unlike today, where the State, rather than the local landowner, annexes any new ground created in the ocean).



*Kalapana Gardens*

But real-estate is far less flexible, and so, barely a decade after the lava stopped flowing, Kalapana Gardens was put right back on the map. But because the original plan was drawn onto now buried ground, the resurrected subdivision pays no heed to the lay of the new terrain. The result is a radically crumpled projection of parcels and rights of way onto a wildly amorphous lavascape. Here, where a straight street once ran, a rough track now squirms within the confines of a road easement, soon dissolving at the foot of an impassible lava shelf. And there, where backyard games once reverberated within a fenced suburban lot, the deeply lobed terrain now renders mere traversal a workout.

Into this barest of frameworks, homesteading recently began with simple shacks that touch the ground lightly. With one eye on Pele, an eclectic mix of shipping containers, old buses, tiny homes, flat-pack pole huts, and prefabricated greenhouses serve as human landing pods. As the *pāhoehoe* continues to crack and settle, each pod is like a life raft: self-sufficient because there are no utilities; self-made because it would be so easy to overcapitalize in an uninsurable risk zone; and self-discovered, because it takes a particular type of lava-pioneer to willingly inhabit this basalt desert.

It is one thing to subsist in a lifeboat on a black sea of stone. But how do you make a *home* on solid rock? How do you put down roots in a place with no soil? By terraforming. By stepping down from the landing pod and incrementally adapting the *terroir*. By contemplating the lay of the new land and looking for niches. Here, bolstering a small *kīpuka* with a stone fence to windward, so that hardy vegetables such as sweet potatoes might germinate. There, scraping channels in the rock to funnel precious rainwater to an ingenious gravity-fed cistern. And everywhere, forging paths between neighboring shacks that follow topographic desire lines, not rigid road easements from another time.

In the process of reciprocal human-landscape adaptation, we inadvertently become attached to our setting. When we step down from our floating houses and commune with the ground, we begin to cultivate meaning within our *milieu*. We adorn it, we rake it, we fashion found materials into elaborate symbols that convey our emergent sense of place within it. When we start to nurture gardens on the *pāhoehoe*—and transform from astronauts to stewards—that is when we know we are truly grounded.

The residents of Kalapana Gardens Mark II may set out with the best intentions to stay light, but the pull of ground's gravity is compelling. So persuasive, in fact, that it outweighs the gnawing recognition that with lava actively disgorging into the ocean just two miles down the coast, Pele *will* one day revisit her priest, Kalapana. Perhaps next



millennium, perhaps next week; the inner workings of the Earth's mantle remain so enigmatic to science that they might as well be divine providence. This gives pause for thought.

In May 2018, the nearby community of Leilani Estates met a similar fate to Kalapana, and many residents lost their homes to the wrath of Pele. It is reasonable to question whether the subdivision of an active volcanic rift zone represents a failure of land use planning at the hands of short-term greed. Indeed, if sensible land suitability analysis were

applied to this corner of Hawai'i, no one would live there at all, despite the fact that Hawaiians did so for more than a thousand years.

But if sensible land planning were applied universally, many of the most seductive settlements on Earth would not exist. Venice, Santorini, New Orleans and Hong Kong are all severely compromised locales. Even San Francisco's radical pact between grids, hills and fault lines defies sense. And while humans settle imperfect places for a range of reasons, ultimately, they do so because they have resolved that the rewards outweigh the risks. They are gambling on the tick of Geological Time *not* Including Now, or the foreseeable future.

And all perils considered, Hawai'i's slow moving brand of non-exploding lava eruptions is actually one of the more considerate acts of God. Unlike tornadoes, floods, tsunamis and wildfires, pending eruptions generally come with sufficient warning, so that while loss of property is inevitable (the US military once tried bombing a lava flow to redirect it, without success), loss of life is rare.

The lava is so accommodating in fact, that under the ocean eruptions are silently laying the foundations for a new Hawai'i. In time, the Pacific Plate will shunt the Big Island off the underlying magma hot spot. As volcanic activity ceases, the ocean will industriously begin reclaiming the mountain, as is already well underway with the northern-most islands and atolls in the Hawaiian Chain. It won't happen overnight, but in a few million years, the Big Island will slip beneath the waves. By then, a brand-new mountain will have emerged down the chain for lava pioneers of all shapes and sizes to find and settle.

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