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THE VALUE OF FRAGMENTS: MAKING A HOTSPOT IN MOUNT NIMBA,
LIBERIA

Emmanuelle Roth and Gregg Mitman

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Emmanuelle Roth and Gregg Mitman



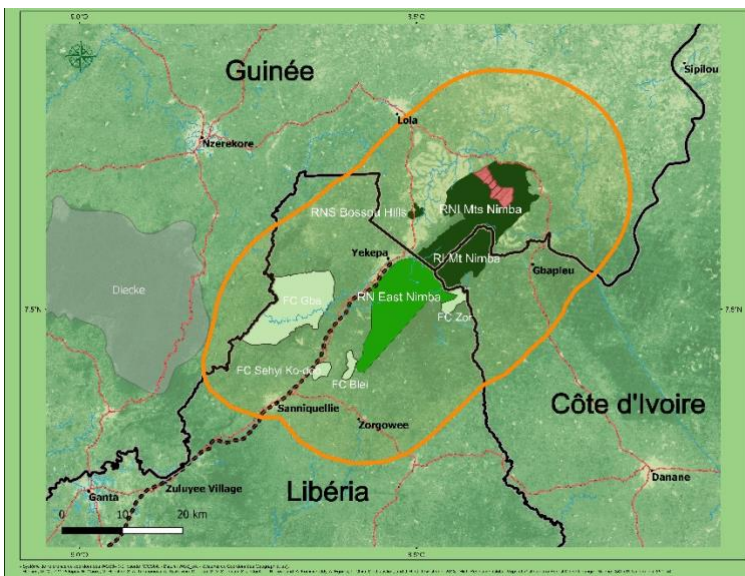
Les Grands Rochers, with Mount Signal Sempéré in the distance, Mount Nimba Strict Nature Reserve, Guinea. Photo by Gregg Mitman. [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/).

Faint high-pitched sounds echo up from the cavernous pit into which we peer. At twilight's edge, the dry season's intense midday sun has mellowed into a cool orange glow as bats take flight. Moses, a middle-aged Liberian park ranger with a solid frame and a taste for good stories, shows his anxiousness when we lean just a bit further over the concrete-lined chasm obstructed with twisted steel. One man died here already, salvaging scrap metal from the abandoned conveyor shaft. Moses holds in his hands our protection, and that of the bats who reside in these fragments of a once-prosperous iron-ore mine.



Abandoned iron-ore conveyor shaft, now home to bats, Mount Nimba, Liberia. Video by Gregg Mitman. [CC BY-NC 4.0](#).

We stand on a plateau in the southern reach of a mountain range named Mount Nimba at the triborder region where Liberia, Côte d'Ivoire, and Guinea meet. Stretching 40 kilometers and towering above the rainforest below, the Mount Nimba range is a series of sky islands that capture moisture-laden clouds to envelope its summits and slopes in mists.



Map of Mount Nimba priority landscape, extending across the borders of Liberia, Guinea, and Côte d'Ivoire. Map created by the EU project [Programme d'Appui à la Préservation des Ecosystèmes Forestiers en Afrique de l'Ouest \(PAPFor\)](#), 2021. Courtesy of VisioTerra/AGRECO. [CC BY 4.0 DEED](#). This map has been cropped.

This plateau was once subterranean, before men and machines whittled down this part of Mount Nimba. After two decades of open-pit iron-ore extraction, the roar of machines ended in 1990. Depletion of the main ore body, departure of a major investor and buyer, and disarray wrought by the outbreak of the First Liberian Civil War (1989-1997) brought a silence now broken by the squeaky creatures rustling below us!

At the plateau's edge, terraced ledges, carved to stabilize rock walls and move heavy equipment, plunge downward and surround the mining pit that now holds the collected waters of Blue Lake. A shoreline signpost warns the trickle of tourists who visit this mining-site-turned-nature reserve: Swim at Your Own Risk. Across the lake, the highest remaining remnant resembles the ruins of an ancient Inca temple.

The sculpted vistas and fragmented landscapes of the Mount Nimba region reveal what human, nonhuman, and inanimate beings can be to each other when extractive enterprises and conservation concerns seek to derive value from nature.



A mist cloud above Blue Lake at the end of the rainy season. Photo by Gregg Mitman. [CC BY-NC 4.0](#).

Conservation biologists identified this fragment of the Upper Guinean Forests of West Africa as having significant concentrations of endemic species threatened by extinction. This determination earned the region “hotspot” status in 2000, one of 25 (now 36) areas on Earth designated as places of critical endangerment in need of protection.² British conservationist Norman Myers appropriated the term “hotspot” in 1988 to call attention to regions of the globe with high concentrations of endemic species experiencing “extinction spasms”—accelerated, human-induced species loss—due to habitat destruction and fragmentation.³ In the era of the sixth extinction, hotspot identification is a “silver bullet” strategy that touts a simple solution to a complex problem: concentrate the scarce resources dedicated to conservation on areas where preventing habitat loss should save the largest number of species.

In 2013, Ebola disease became visible for the first time in West Africa near Liberia’s Mount Nimba. Ecologists came to posit a correlation between biodiversity loss and disease emergence, which garnered Mount Nimba new attention from virus hunters. In the post-Ebola landscape of pandemic preparedness, Mount Nimba is a hotspot for both biodiversity and emerging infectious diseases.

Hotspots are inseparable from the infrastructures of extraction, knowledge regimes, and the ecologies that make them.

We came to Blue Lake to interrogate the concept of the hotspot, a place deemed by scientists to be simultaneously worthy of protection and harboring a potential threat. In this essay, we build on critical scholarship that reframes the hotspot as a site where the slow violence of capital investment and extraction dramatically alters environments and amplifies disease transmission. Hotspots, we

argue, are inseparable from the infrastructures of extraction, knowledge regimes, and ecologies that make them.⁴

Over the last 60 years, natural scientists, mining engineers, multinational firms, scrappers, tourists, and others have come to Mount Nimba to extract value—both living and inert—from the landscape. As open-pit mining gave way to the East Nimba Nature Reserve (ENNR), the welfare benefits provided to the mine's workers became more diffuse expressions of corporate social responsibility that extend care into the nonhuman world. Care, Maria Puig de Bella Casa reminds us, “is more than an affective-ethical state.” It involves labor to create, maintain, and repair ties between interdependent worlds. Care can also be selective and violent.⁵ In the care of Mount Nimba, interests of mining, conservation, pandemic preparedness, livelihoods, and ecotourism converge, collaborate, and collide.

The East Nimba Nature Reserve was established in 2003 to protect a fragment of the Upper Guinean Forests, including most of the Mount Nimba range within Liberia and the abandoned mining landscape where Blue Lake formed. But mining remains. Since 2011, the international mining and steel producing conglomerate ArcelorMittal has been piloting a biodiversity conservation program as part of its pledged commitment to environmental and social responsibility. Liberia is one of many places where the relationships between mining and conservation are intensifying and deepening.

From the vantage point of the Peruvian Andes, geographer Timothy Norris sees “hotspots of biodiversity and extractive investment as two sides of the same coin.”⁶ In Liberia, Peru, Madagascar, and Gabon, mining and conservation both work “to gain control over land and resources” in the creation of commodity frontiers.⁷ Both depend on the formalization of territory and the parceling of land, whether a mining concession or a protected park, to extract value in capitalism's quest for cheap nature and cheap labor.⁸

Spaces of endangerment accrue value in an era where market mechanisms, from offsets to ecotourism, are seen as tools of nature conservation and pandemic prevention.

Capitalism fragments nature to make value. Before mining and logging operations on Mount Nimba began, surveys distinguished high-grade iron ore and useful timber from waste rock and worthless trees. But fragmentation of the mountain for profit also created spaces of endangerment. Habitat destruction threatens the lives of rare endemic species, like the viviparous Nimba toad. On fragmented edges of the forest, new relations among people, viruses, and their animal hosts are thought to give rise to zoonotic diseases like Ebola. These spaces of endangerment accrue value in an era where market mechanisms, from offsets to ecotourism, are seen by organizations like the World Bank as tools of nature conservation and pandemic prevention.

In many tales of the Anthropocene, the hotspot plays a role.⁹ Here, we attend to a genealogy of the hotspot whose multiple beginnings offer points of entry into the relations between rocks, animals, viruses, and capital that constitute the Mount Nimba story. How Nimba became a hotspot and how, in turn, this designation has altered relations among the living and nonliving occupants of the region is a question that guides a journey informed by ethnographic and archival research through this fragment of the Upper Guinean Forests of West Africa.¹⁰

Rocks

The name Nimba comes from *Niamba Tun*, a Mano-language expression that means “[hills on which] a young maiden slipped and fell.” As we traverse the grass-covered summit along a chiseled, thin ridge, the place name seems apt. A unique combination of climate and geology formed the precipitous escarpments of Mount Nimba.¹¹ Tropical weathering exposed the Precambrian spine of

iron-rich quartzite at heights above one thousand meters, making early mining easy. “Green iron,” the best grade, Moses says, remains abundant around Blue Lake.



Our team descends the steep peaks of Nimba. Photo by Shadrach Kerwillain. [CC BY-NC 4.0](#).

In the early 1950s, Scottish geologist Sandy Clarke made surveys on the Liberian segment of Mount Nimba. He found high-grade iron ore exposed on the mountain ridge with lower-grade itabirite accessible downslope, an estimated 227 million tons of iron ore valued at more than two billion US dollars in 1957.¹² Clarke’s explorations relied upon the knowledge and labor of people in the neighboring village of Gbarpa. Among Mano and Kpelle people, the ability to transform iron ore into tools and weapons had long been revered and smithing was a closely guarded art. Nimba’s iron ore had been essential to the contested territory in the chiefdom wars that raged in the late nineteenth century along the Upper Guinea Coast.¹³

In 1955, the Liberian-US-Swedish Mining Company, LAMCO, formed; it was a joint venture between the Liberian government, Bethlehem Steel Corporation, and a Swedish syndicate. The Stockholms Enskilda Bank and the mining conglomerate Gränges were entrusted not only with the mining operation but, in their words, “civic and social responsibility” that would result in a “project of major importance for the economic and social development” of Liberia.¹⁴

Major open-pit mining began in 1963. Within a year, men and machines extracted between 7.5 and 10 million tons of ore by removing one hundred meters of rock. In the concession, more than rocks were fair game for extraction and capitalization. From the manufactured plateau, Moses points to a few African greenhearts (*Piptadeniastrum africanum*; Dahoma) and ekki trees (*Lophira alata*),

ideal woods for constructing railways and a harbor needed to move iron ore from mountain to sea. Waste rock became fill for wetlands at the mountain's base where miners' camps sprouted alongside the booming town of Yekepa. Moses also shows us tall sugar plums (*Uapaca kirkiana*) and niangon trees (*Heritiera utilis* and *H. densiflora*), which Liberians use for carpentry, furniture, and dugout canoes. As the region became economically attractive, the forest was increasingly fragmented to serve the needs of the company and its workers. Moses laments, "They cut down the trees. This is why the air became so hot down in the valley."



LAMCO's mining operation in Nimba in the 1970s. Published in Maxime Lamotte and Roger Roy, eds., *Le peuplement animal du Mont Nimba (Guinée, Côte d'Ivoire, Libéria)* (Paris: Muséum National d'Histoire Naturelle, 2003), 23. © Françoise Xavier. All rights reserved.

When we visit the village of Zolowee, elders speak nostalgically of LAMCO. At a meeting convened to evoke memories of the company, many more residents come with their phones to record the old men. Sitting on a shaded veranda, we can see Mount Tokadeh, another Mount Nimba peak, being eaten away by the machines of ArcelorMittal, who took over the LAMCO concession. The old men remember LAMCO with affection and express disappointment with this new mine operation. One worker recalls fondly that LAMCO provided salaried employees with "comfortable housing with 24-hour electricity" and hospital "facilities equipped with trained doctors from Sweden, Germany, the USA, and other parts of the world."

LAMCO also built a water-purification plant and a piping system that made the Yah River and its mountainous effluents safe to drink. Sewage was treated, made into manure, and distributed to farmers. In Yekepa, a town built by LAMCO, the deteriorating housing, swimming pool, school, and cinema are reminders of when free worker housing, healthcare, education, and entertainment marked a fulfillment of corporate responsibility, when LAMCO directed part of its profits into population care. Now, "imperial debris" saturates Yekepa's landscape, evoking a sense of abandonment and resentment, of a future lost.¹⁵

In the mid-1960s, strikes for higher wages culminated in a July 1966 confrontation between Liberian mine workers, Swedish management, and the Liberian military and police.

Not mentioned are the hard-fought struggles that won benefits. In the mid-1960s, strikes for higher wages in Yekepa and the port of Buchanan, organized by the National Mine Workers' Association, culminated in a July 1966 confrontation between Liberian mine workers, Swedish management, and the Liberian military and police. During the strike, a Swedish television crew documented police brutality, squalid living conditions, and alleged malnutrition suffered by Liberian LAMCO workers. The resulting documentary, *Black Week in Nimba*, sparked a national conversation when it aired on Swedish television in October 1966. The episode critically challenged Swedish executives' proclamations that moral ideals governed operations abroad. The public embarrassment brought the series of social-welfare reforms that retired LAMCO workers now remember, and long for.¹⁶



The remains of LAMCO's swimming pool. Photo by Gregg Mitman. [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/).

The priority placed on worker health, education, and housing was typical of high modernist ideology and its promises of care. Such benefits were relatively cheap and easy to deliver when few environmental regulations inhibited natural resource extraction in countries like Liberia, desperate for foreign capital for development. In 1969, Swedish conservationist Kai Curry-Lindahl, under the auspices of the International Union for the Conservation of Nature, urged the creation of a nature reserve in southern Mount Nimba.¹⁷ He lamented the LAMCO-fragmented landscape, where "roads cut frightful scars" in "dense high forest."¹⁸ But, in the mind of capital, fragmentation was a necessary prerequisite to assess what held value and what did not. Care, in this instance, was tied to a calculus that weighed the fluctuating value of iron ore, the demands of labor, and profits to be made.

Forests

Among the world's ten largest tropical rainforest ecosystems, the Upper and Lower Guinean Forests of equatorial West Africa swathe a huge coastal area from Sierra Leone to the Nigeria-Cameroon border in a verdant cloak. Standing with Moses at a cornerstone marker of the ENNR, a stone's throw from Guinea and Côte d'Ivoire, we gaze over a precipice at a fragment of the Upper Guinean Forests. A canopy of broccoli-like evergreen forest spreads along the steep slopes and off into the distance, its green smoothness interrupted occasionally by a section of a haul road, burnt trees, or farmland patches. After LAMCO's arrival, farming extended into the hills and valleys at the mountain base, partially attributable to the worker influx. After LAMCO left and civil wars raged, a younger Moses accompanied his parents to these slopes during lulls in the fighting to cultivate cash crops, like banana, coffee, and rubber. He knows every ditch in the reserve where so-called "secondary forest" has taken over former farms.

Mount Nimba's isolation, both climatic and geographic, contributes to the abundance of endemic plant and animal species, a metric conservation biologists value as promoting biodiversity.

As we head back to Blue Lake, Moses sees a crab shell in a stream. It is a trace left by the semiaquatic otter shrew, one of the many rare species, including the live-bearing Nimba toad, poisonous giant butterfly, and tool-using chimpanzee, that make this area a prized fragment of the Upper Guinean Forests. Abrupt relief changes along the range make for a dense variety of microhabitats. Biologists identify Mount Nimba as an "inselberg," an island in the sky.¹⁹ Mount Nimba's isolation, both climatic and geographic, contributes to the abundance of endemic plant and animal species, a metric conservation biologists value as promoting biodiversity. In the 1990s, when the whacks of cutlasses and cracks of guns replaced the roar of earthmovers, Mount Nimba was named a biodiversity hotspot and, thereby, acquired new value around which conservation and mining converged.



A high-altitude thicket near a research camp in Guinean Nimba in 1942. Published in Maxime Lamotte and Roger Roy, eds., *Le peuplement animal du Mont Nimba (Guinée, Côte d'Ivoire, Libéria)* (Paris: Muséum National d'Histoire Naturelle, 2003), 14. © Maxime Lamotte. All rights reserved.

The inclusion of the Upper Guinean Forests in Myers' expanding list of the world's biodiversity hotspots was intended to attract the attention of governments and NGOs to protect, police, and care for fragments of this once-vast ecosystem through acts of enclosure. In 2003, as peace came to Liberia, the interim government established the ENNR as a protected area. Where once Liberian police forces guarded LAMCO property and surveilled workers, the hand of the state now protects and monitors a heavily mined peak and the rare species that still populate this fragmented landscape.

Immediately, conflicts with communities nearby the reserve arose. Saye Thompson, a farmer, artisanal miner, and former hunter who took college courses in natural resource management, told us that the ENNR was created "without community consent." In 2010, so-called community forests were established in the Liberia's Nimba county, and Thompson was selected to chair the reserve's comanagement committee. Land rights were formalized. Conservation was to be done according to the community paradigm favored by global actors since the 1980s. Comanagement-committee members ensure that park patrols do not treat the occasional hunter or farmer who encroaches beyond the reserve's buffer zone too harshly. Coexistence—of mining, conservation, and local livelihoods—depends crucially on the mitigation of conflicts in a fragmented mosaic of discordant uses.

In the twenty-first century, transnational mining firms have become a leading source of conservation funding in much of Africa.

Development of the ENNR occurred under the auspices and with the financial support of ArcelorMittal. In the twenty-first century, transnational mining firms have become a leading source of conservation funding in much of Africa. ArcelorMittal markets itself as a custodian of Mount Nimba, with the reserve serving as the company's biodiversity offset in Liberia.²⁰ The ENNR is a resource commodity that benefits ArcelorMittal in appeasing shareholders and critics attuned to

questions of corporate social responsibility and care. Since completion of an environmental impact assessment in 2010, the company has been intermittently funding wildlife surveys and park guards as compensation for environmental harms unleashed by a new wave of mountaintop removal on nearby Mount Tokadeh.²¹



A pregnant female Nimba toad (*Nimbaphrynooides occidentalis*). Courtesy of Johannes Penner, Frogs & Friends. [CC BY-NC 4.0](#).

Strange alliances arise where life and nonlife meet in the extractive zones of mining and conservation.²² On the Guinean side of Mount Nimba, a toad that gives birth to live young, the only known species in existence to do so, proved decisive in 1981, turning another nature reserve into a UNESCO World Heritage Site. The viviparous amphibian inhabits a mere four square kilometers of grasslands above 1,200 meters. The capitalization of iron ore and the Nimba toad collided when the Société des Mines de Fer de Guinée (SMFG, Guinean Iron Mines Company) learned that one of the Nimba toad's three largest populations lived on Mount Signal Sempéré, within their mining concession.²³ In a gesture of corporate responsibility and care, the company removed the mountain from its mine plan as a "set-aside," and made doing so a key component of their corporate communications. The Nimba toad and the mountain to which it is endemic became locked in a relation of codependence. Entanglements of life and nonlife, of toad and mountain, in the growing nexus of conservation and mining, wield power.

Viruses

Precious ore and rare animal species are not the only attractors to Mount Nimba. Viruses, which confound the distinction between the animate and inanimate, also draw attention. They, too, accrue value out of the fragmented landscape of Nimba.

In 2017, ArcelorMittal orchestrated its first translocation of bats living in an old mining adit. The project is a purported act of care, rendered as a biodiversity offset for the company's plans to extend open-cast mining to a new peak in the range. But ArcelorMittal's environmental manager had heard bats could be "carriers" of Ebola. In the wake of the 2013-2016 West African Ebola outbreak, the largest recorded epidemic of the fatal disease, precautions seemed warranted.

The team detected an RNA fragment of Ebola Zaire virus. It was the first time Ebola Zaire virus was found in a bat in West Africa.

It happened that a Liberia-based team of PREDICT, a consortium funded by the United States Agency for International Development (USAID), was in the region sampling wildlife for viruses. A charismatic American virus hunter and director of the PREDICT team, Jim Desmond, offered the team's services to help minimize the risks of moving potentially disease-carrying bats. ArcelorMittal provided the necessary infrastructure to carry out the work. Virus hunters donned protective suits and helped capture more than two thousand bats at dusk. Moses helped. With colleagues, he placed bats by the handful into cages, stacked the cages in pickup trucks, and transported the flying mammals to their new home—a concrete tunnel near Blue Lake built by ArcelorMittal. Before releasing the bats, the PREDICT team collected blood and swabbed orifices of hundreds of bats, searching for the elusive origins of Ebola. In a blood sample taken from a greater long-fingered bat, the team detected an RNA fragment of Ebola Zaire virus.²⁴ It was the first time Ebola Zaire virus was found in a bat in West Africa.



(Left) A free-tailed bat is being sampled for blood by PREDICT employees in Guinea. (Right) A PREDICT makeshift laboratory near a Guinean forest. Photos by Emmanuelle Roth. [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/).

Habitat fragmentation figures prominently in ecological tales about the causal drivers that sparked West Africa's 2013-2016 Ebola outbreak. In 2015, the Environmental Foundation for Africa (EFA), a Sierra Leone-based NGO, published a study of the relationship between changing land use, forest fragmentation, bat ecology, and Ebola-virus disease. Their investigation included a village in Guinea, several hundred kilometers west of Mount Nimba, where the outbreak is thought to have originated. Using satellite-based data and mathematical modeling, the NGO found a common pattern in six of seven Ebola outbreaks in Africa. Deforestation that resulted in more isolated patches of forest, as in a landscape mosaic of forest, farms, and plantations, led to a greater likelihood of Ebola outbreak. The group recommended protecting large forest blocks from fragmentation to minimize human-wildlife contact and thereby the risk of zoonotic spillover.²⁵

Mining companies, NGOs, conservation biologists, and virus hunters each find value in a virus inhabiting a fragment of the Upper Guinean Forests.

The Ebola-risk maps produced by EFA owe their origins to another hotspot concept that has come to dominate growing concerns around pandemics in the Anthropocene. In 2008, a group that included Peter Daszak from the Wildlife Trust, later renamed EcoHealth Alliance, published a letter in *Nature* that was instrumental in shaping US federal policy on pandemic preparedness. The authors analyzed data from more than three hundred emerging infectious disease events that occurred between 1940 and 2004. Approximately 60 percent of these events were associated with zoonoses, the majority of which originated in wildlife. Their conclusion: low-latitude, biodiversity-rich tropical rainforest regions in Central and South America, Africa, and Southeast Asia were the highest-risk “hotspots” for zoonoses and posed “an increasing and very significant threat to global health.”²⁶ The next year, USAID launched PREDICT. Over 10 years, the program spent more than two hundred million US dollars furthering research, strengthening surveillance, and increasing laboratory capacity, all aimed at discovering and detecting zoonotic pathogens at the human-wildlife interface.



Moses Darpey hikes across a mass of fallen rocks above Blue Lake. Photo by Gregg Mitman. [CC BY-NC 4.0](#).

The finding of a fragment of Ebola Zaire virus by the Liberia PREDICT team has acquired evidentiary value in the making of Mount Nimba into a disease hotspot. Such a designation has, in turn, been mobilized to incriminate different types of land use in environmental critiques of deforestation. Who is to blame for forest fragmentation, and, by inference, disease outbreaks, is deeply contested among conservation NGOs, mining companies, and local people.²⁷ This became evident when we interviewed the environmental manager of a mining company in the area. “If this theory [of fragmentation] holds,” he told us, “then of course mining can open a corridor for contact! But so can slash-and-burn agriculture.” Mining companies, NGOs, conservation biologists, and virus hunters each find value in a virus inhabiting a fragment of the Upper Guinean Forests. But they are different valuations that advance contested and collaborative visions of land use, and may differently affect the futures of human, nonhuman, and inanimate beings of Mount Nimba.

Meanwhile, some scientists criticize the commotion around the detection of Ebola virus in a Nimba bat. At a conference on African Small Mammals in Namibia, wherein a fault line ran between virologists and conservationists, a bat specialist reminded us that “fragments are no ecology.” A bit

of RNA reveals nothing of the complex interrelations and historical processes that brought bats to inhabit an old mining adit, scientists to suspect a mammal as host to a virus, or a virus to infect and kill thousands of people across Liberia, Guinea, and Sierra Leone.

Conclusion

Multiple genealogies and scales of the hotspot converge in Mount Nimba.

Hotspots, we argue, depend upon fragments. Fragments, by definition, are broken parts, detached, incomplete. Uneven fragment edges attract novel gatherings. Fragments can evoke what was, beckoning nostalgia and begging repair. They can signal new futures, inviting salvage and reuse. Fragments create value.

Nimba has been fragmented into pieces of worth—iron ore and timber, rare toads and viruses, ephemeral jobs and cash-crop farms—in the ever-changing production and extraction of value from nature. As residues, fragments invite management.²⁸ In hotspots, fragments require care and containment. As private businesses and the state reconsidered social and civic responsibilities, modes of care morphed from paternalistic provision of worker welfare to neoliberal care of the more-than-human. We hold that the governance of fragments, replete with notions of repair and restoration, is both the epitome of and a litmus test for late extractive industries. In these fragmented landscapes, codependencies, trade-offs, and quests for profit bind together lateritic rocks, trees, toads, bats, viruses, and humans. Past relations sever, new bonds forge, and uneasy compromises form in the disarray and order unleashed and imposed in cycles of capitalist extraction.

Moses is confident that the forest will again become whole. As we hike up the Sika Valley below Blue Lake, where each rainy season reveals its lot of fragmented rocks, rusty steel rods, and concrete pieces, he directs our attention to forest sections separated by the riverbed. “Look,” Moses says, smiling, “they are coming together.”

Acknowledgments

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Emmanuelle Roth is an anthropologist and a postdoctoral research fellow in the ERC-funded project “Fragments of the Forest” (2021-2026), based at the Rachel Carson Center. Her work engages with the conditions for knowing epidemics, their source, and their relations to landscapes, at the intersection of medical anthropology, science and technology studies, and the environmental humanities.



Gregg Mitman is the Vilas Research and William Coleman Professor of History, Medical History, and Environmental Studies at the University of Wisconsin-Madison and ERC professor at the Rachel Carson Center, where he leads the ERC-funded project “Fragments of the Forest.” His most recent book, *Empire of Rubber: Firestone’s Scramble for Land and Power in Liberia*, was published by The New Press in 2021.



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