

Amazonia Ablaze

Abstract: *The Amazon region has long been a place where ecological diversity reigns supreme, and where people have lived in harmony with Nature for millennia. But from the late 1960s onwards the news started spreading that all was not well. The world’s largest rainforest was to be ‘developed’ under the auspices of modern progress, and using the powers of modern technology. What are the implications of rampant deforestation for the future of our home planet? What can be done to halt the devastation? This essay starts out as personal observation by the author and goes on to try and assess the ecological and economic implications of the onslaught on Amazonia, a rainforest region the size of western Europe.*

Published:	1 September 2022	Editor:	Brendan Montague
Author(s):	Professor Herbert Girardet	Fact checking:	Helen Banks
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Affiliations:	Girardet is a visiting professor at the University of the West of England, a founder of the World Future Council and member of the Club of Rome.		
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It was 7 September 1988. Brasília was celebrating Independence Day. Hundreds of thousands of people were lined up along the Monumental Axis. On a separate stand, flanked by army officers, the president, in his ceremonial uniform, saluted his troops. Brass bands played rousing music as tanks and armoured vehicles rumbled by on the asphalt, and fighter planes and helicopters flew in formation overhead releasing blue, green and yellow smoke. There was a carnival atmosphere as people once again celebrated Brazil’s independence from its former colonial masters, the Portuguese.

But meanwhile – so I had been told – people in the Amazon were celebrating Independence Day in a rather different manner. I wanted to find out how. I was on my way to the Amazon to film a Channel 4 documentary called *Jungle Pharmacy*. We wanted to find out what we could learn from the traditional eco-culture of Amazonian tribes and how they were being affected by the ‘development’.

Early the next morning, I clambered into a Bandeirante passenger plane to fly into the interior. As soon as the small two-engine plane had climbed into the sky, the air around us was hazy. There was a veil of smoke between us and the Cerrado, the savannah region in the heart of Brazil where

emus and jaguars had roamed for time immemorial. Every so often the land was criss-crossed by a small river. Strange green circles dotted the landscape. My neighbour told me these were irrigated fields of soybeans and sugar cane: the land of the emus was being turned into farming country.

Gradually the landscape below us changed from savannah to tropical forest. Great columns of smoke were rising right across the land. Vast tracts of forest down there had been taken over by cattle ranchers, and they celebrated Independence Day by setting patches of it alight: the *queimadas*, the annual Amazonian forest fires, had started.

As we flew deeper into the interior, we could no longer see the land below us. Only the contours of hills rose up through the thick smoke blanket from time to time. My neighbour told me that people were clearing more land for cattle, sugar cane and soybeans. “Brazil needs to develop,” he said. “Forests are in the way. The sooner they are gone, the better. Isn’t that what you did in Europe, in America? Isn’t that the way to make a civilisation?”

After three hours in the air, it was time to land at a stop-over, some nameless small town carved out of the jungle by loggers, cattle ranchers and gold-diggers. As we made our descent, we could see nothing but smoke until we neared the

ground. And as we landed, right next to the dirt airstrip trees were burning like giant torches. They looked as though they had been set ablaze just to mark the runway. It was a crazy, sickening sight.

Back in the air, I could not believe the scale of what was happening below us. There were fires everywhere and the smoke even penetrated the cabin of our unpressurised plane. The eyes of some of the passengers were watering, but most people did not seem overly concerned, except when one of the babies on board seemed almost to choke. The pilot climbed as high as he could, up and away from the smoke.

Now we were off to our final destination, Redenção, another two hours' flight away. The smoke was getting even thicker and I went into the cockpit to ask the pilot whether he'd seen it as bad as this before. He stared at the inquisitive foreigner but was polite and helpful. Yes, he said, he had, but not for hour after hour like today. He remembered when this was just a sea of green, with only the occasional Indigenous village in a jungle clearing. No, he said, it wasn't fun flying in the Amazon these days. It was getting too dangerous. Too many people were burning too much forest.

The pilot excused himself. After all, he had a plane to fly. And now he was diving down through the smoke once more on our approach to Redenção. But there was a problem. There was no airstrip in sight – only burning trees and smouldering land. Anger was welling up inside me like I had never felt before. We were witnessing an ecological holocaust, but what could we do about it except take pictures and try to tell the world? The Earth's greatest biological storehouse was being incinerated as though it were no more than a pile of dry logs.

Later I was to learn that in those few weeks of September 1988 some 42 million acres of forest and grassland were on fire, approximately 5% of Brazil's Amazon region. Back in London, I phoned an American astronaut, Dick Covey, who had been circling the Earth in the Space Shuttle in early September. He told me that the whole of South America had been covered by a thick blanket of smoke. No one had ever seen anything like it.

At last our pilot found the airstrip. We dived through the smoke to a nerve-racking but perfect landing. We had arrived. As we drove through Redenção, the town was so thick with smoke that our taxi driver had to turn on the headlights, even though it was early afternoon. There was a concert of car horns in the streets as drivers made sure of avoiding each other, driving through this infernal landscape as if blindfolded.

Redenção was a frontier town straight out of a wild west movie, Brazilian style. Most of the houses were nailed together from wooden planks. Only in the centre were there stores, bars and some large villas that had a sense of concrete permanence about them. The people walking the streets did not seem to be overly perturbed by the smoke or the stifling heat.

The following day, as we drove out of the town, we could see the transformation the Amazon landscape was going through. Wherever the road led, trees were being cleared on both sides. There was smouldering forest everywhere, stumps of trees grotesquely projecting up out of the ash-covered soil. The eerie silence was interrupted only by the sound of explosions, as pockets of air expanded and tree trunks burst. Here and

there cattle with humps were wandering about looking for grass in the blackened landscape. One was limping badly, her hoof apparently singed. Up in the sky, groups of screeching parrots were flying about where only a couple of days ago there had been the crowns of trees, fruit trees, nesting trees - all now reduced to ashen traces on the smouldering soil.

And all of this devastation was being wreaked in the name of progress. 'Land for people, for people without land' was the government slogan in the 1960s that started it all. But there was not much evidence of peasants and small farms. The last great untouched forest region on Earth was being turned into a giant cattle ranch. Never mind that the thin soil was not really suitable for grass. And never mind that the land, when it was still forest, had actually been inhabited by people, other people, forest people, who had been living here for tens of thousands of years. Oh, but they were 'primitive' people, weren't they? They were not worthy of survival in a new world of sawmills, airstrips, mines and hydroelectric dams.

Out of the smoke a small settlement emerged, made up only of huts nailed together from mahogany planks. Here was the new wild west. Gold had been found and people had flocked in from far and wide. Young men with haggard faces looked with suspicion as the minibus full of gringos stopped outside a bar. A few of the men had mouths full of glittering gold teeth. One of them pulled a handful of nuggets out of his pocket. Did we want to buy some gold?

The road was full of deep holes, but our driver thought of the dirt road as a race track, and each time we crossed a narrow tree-trunk bridge we held our breath. In several places, where smouldering forest giants were lying across the dirt, we had to cut holes in the cattle fence with wire cutters, and drive across the ash-laden pasture until the dirt road was passable again.



Amazonia ablaze, seen from a helicopter © Herbert Girardet

Eventually we branched off onto a mud track, and after a few kilometres a chain barrier marked access to the Gorotire

Kayapó Reserve. A youngster with a crown of feathers in his long black hair emerged from a guard hut and examined us suspiciously. When we told him that we had come to film with the Kayapó, he dropped the chain and let us through.

Driving along the narrow, winding track, we soon realised that we had come to a very different world. For the first time on our car journey we saw the colour green, and it was shady and much cooler. Towering trees covered in vines, orchids and other epiphytes rose up on both sides of the track. No two trees seemed alike. Groups of parrots were chattering and flying about, and howler monkeys were shouting at us from the treetops. There was still smoke in the air, but for the first time for hours there were no fires in evidence.

We had entered the largest officially protected tract of tropical rainforest in the world. Our guide, the late Darrell Posey, an ethnobiologist, told us that with the neighbouring Xingu reserve it extends to 26 million acres, nearly half the size of England. Led by Chief Raoni, the Kayapó were being widely recognised as true guardians of the rainforest inhabited by jaguars, giant otters, giant armadillos, various monkeys, hyacinth macaws and harpy eagles, and of many living species that were being decimated outside the reserve.

We drove past gardens that were being cultivated by the Kayapó, growing manioc, bananas, beans and exotic fruit trees. They were 'shifting cultivators', clearing small areas of forest every year to grow their staple crops. Posey had discovered that in addition to food crops, the Kayapó, like other Amazonian tribes, cultivated a wide range of medicinal plants.

Gorotire is a settlement made up of rows of brick houses. Unlike a traditional Indigenous village camp, where straw huts are usually arranged in a circle, it had been built along a straight, central track. The Kayapó live here in a world somewhere between ancient and modern.

The villagers greeted us with great warmth, and the few children seemed particularly excited to meet us. I explained that our documentary was intended to highlight the importance of their knowledge of the forest and its medicinal plants. They were the 'librarians' and we had come to film them in their 'library'.

Many Kayapó wore feather head-dresses, but they also clothed themselves in western-style T-shirts and shorts. Some had painted their faces and bodies with geometric patterns using ash and red *urucum* seed pods, but their coloured glass beads were imported from faraway Prague.

Posey had studied with the Kayapó for many years and had written groundbreaking articles about their sustainable lifestyle. He introduced us to Beptopup, the revered shaman we had come to film with, who had been his teacher. Beptopup welcomed us with the detached curiosity of an old man who had seen many changes in his life. He had the silver-haired looks of a distinguished university professor, and he wore large hoops of glass beads in his ears. He preferred to live in a traditional straw and mud hut away from the modern village.

The evening was for celebrations in which the whole village took part. We were fed a delicious meal consisting of river fish, bananas and manioc, steamed in banana leaves. But we were not really in a party mood after seeing all those fires: they had reached to within 15 miles of Gorotire.

The following morning, Beptopup took us on a trek deep into the world he had always known – the multi-layered

forest ecosystem. Posey pointed out that the Kayapó had a name for every plant in the forest, and a use for most. Like other Indigenous peoples, they had lived in the Amazon for countless generations – plenty of time to experiment with the use of plants for food and medicine.

Now, at the very moment that many Amazonian tribes had been decimated by imported diseases or forest destruction, it had dawned on researchers that they were dealing not with 'primitives', but with world experts in rainforest fauna and flora who had much to teach us. Few of their medicines had yet been studied by modern science.

Beptopup's profound ecological expertise was much in evidence as he led us through the green shade of the forest. He kept pointing to vines and trees, giving us a crash course in the medicinal uses of their roots, their bark or their berries. After an hour's trek we reached his forest garden on a rocky outcrop where he cultivated contraceptive remedies. He proudly showed us a cluster of orchids known to botanists as *Epistephium lucidum*. He insisted: "Women who take this orchid medicine will have no more babies, no more babies at all. It dries up their wombs, it dries them up completely." His remedies had been much in demand because some Kayapó women did not want babies any longer: the white man was devastating the nearby forest, and gold-diggers had carved deep holes in the ground and dumped sludge full of mercury in the Fresco River. The fish were being poisoned and some children had become ill from swimming in the polluted water.

Beptopup was a shaman but also an environmental warrior. One day we went to film with him on the edge of the Kayapó reserve, where a stretch of forest had been burned to the ground by cattle ranchers. He shook his head in anger and sadness and said: "Why must the white man destroy everything? The forest is good. It looks after us. Why does the white man destroy the trees? Where are the turtles going to live, and the birds? What are my children going to eat? Where will they get their medicines from? Why does the white man hate the forest so much? I have said all I want to say. I want to leave."



Kayapó warrior © Herbert Girardet

THE BIG PICTURE

Fast-forward from the 1980s to 2022. Covering an area of more than half a billion hectares, the Amazon biome is the world's largest tropical forest area and contains 10% of the planet's known biodiversity, and its rivers discharge 15% of the world's fresh water into the Atlantic Ocean. It stretches across nine South American countries (Brazil, Columbia, Peru, Venezuela, Ecuador, Bolivia and the three Guyanas), covering two-fifths of South America.

The variety of its animals and plants is legendary, and so is the cultural diversity of its 2.7 million Indigenous people, who belong to more than 350 ethnic groups and live on some 35% of the Amazon region. Most live in riverside villages adjacent to forest gardens. They hunt with bows and arrows, and blowpipes with darts tipped with curare, and some now use shotguns as well. When fishing, they often use plant-based poisons to stun the fish.

But the tribes make up just 8% of the population: the Amazon region is now home to a total of some 34 million people.

When Europeans first arrived in Brazil in the 16th century, forest clearance was on the agenda from the very start. The coastal Atlantic Forest regions were the first areas to be converted into cattle ranches, soybean farms, coffee or sugarcane plantations, or urban centres. The assault on the Amazon interior only started in earnest in the late 20th century.

The wholesale 'development' of Brazil's Amazon forest was initiated in 1966 by the newly established military dictatorship under president Marshal Humberto de Alencar Castelo Branco, who unveiled his 'Operation Amazonia' strategy in front of 300 army officers and businessmen on board the pleasure cruiser *Rosa da Fonseca* on a trip from Manaus up the Amazon. His plan echoed proposals for 'modernising' the Amazon made by former president Getúlio Vargas in 1940.

"Nothing will stop us in this movement which is [...] the highest task of civilising man: to conquer and dominate the valleys of the great equatorial torrents, transforming their blind force and their extraordinary fertility into disciplined energy. The Amazon [...] shall cease to be a simple chapter in the history of the world and, made equivalent to other great rivers, shall become a chapter in the history of civilisation."

The fiscal instruments for developing the Amazon were to be tax breaks, land concessions and trade incentives. Cattle ranchers, logging companies and mining corporations soon took advantage of the sweeteners on offer from the Brazilian government. To facilitate the process, a massive road-construction programme was initiated. Once the bulldozers had cut deep gashes into the jungle, the trees on both sides could be cut down or burned. Often thousands of acres were converted into pasture in one fell swoop.

Owning land became a 'useful' safeguard against Brazil's galloping inflation. The ranchers, loggers and mine developers wanted the Amazon for themselves, and the Indigenous tribes were in the way. But so were poor migrants from the drought-ridden north-east, and from the newly mechanised farms in southern Brazil. They hoped to have their own small farms, each with a little house surrounded by mango, avocado, coconut and *cupuaçu* trees, a few pigs, chickens and a cow. They wanted a field or two

for growing subsistence crops like rice, corn, beans and manioc, and another for cash crops such as cacao, pepper and papaya.

But many small settlers were up against the power of big landowners. Some were forced to become cowboys on the big *fazendas*. Others were employed as *pistoleiros*, invading smallholdings in the dead of night and evicting the occupants by threatening murder or actually killing them. Many failed settlers ended up digging for gold at thousands of makeshift mines.

FOREST CONVERSION

Pará is the easternmost state of the Brazilian Amazon. Apart from Rondônia, further south, it is the most ravaged part of the forest. It is here that cattle ranching first started in the 1970s and that the largest iron ore, tin, bauxite, manganese, copper and gold mines are located. These large mining operations require hydroelectric schemes, the largest being the Tucuruí Dam, which powers the giant Carajás iron ore mine and other 'development' projects. Much of the investment capital for these projects originated from the World Bank and from commercial banks in Europe and the USA.

The ongoing destruction of the Amazon forest throughout the 1970s and 1980s could not be kept secret. Documentaries and magazine reports about the forest holocaust soon caused pressure groups in Europe and the US to emerge.

The town of Paragominas in the state of Pará, strategically located on the Brasília–Belém highway, vividly symbolises what has been going on across the Brazilian Amazon. In the 1980s it came to be called the world's 'sawmill capital', with some 500 sawmills in and around the town that chew up thousands of trees brought in every day along the network of dirt roads that stretch out like a spider's web deeper and deeper into the surrounding forest. A permanent smoke cloud hangs over the town from sawdust incinerators and charcoal kilns.

Much of the timber sawn up here is high-quality mahogany intended for the European, Japanese and Chinese markets. With unprecedented urbanisation in China, ever more of its demand for hardwoods for prestigious office interiors is being met from the forests of Pará.

More than 40 species of tree are processed in the local sawmills. As they are cut down in the forest, they tear down many other trees with them, because they are connected by a tangle of lianas. With the big trees no longer providing shade, the degraded forest dries out much more than virgin forest and is easy prey for fires.

Apart from providing cheap, quality timber, places like Paragominas also produce vast amounts of charcoal. The kilns are worked by resettlers from other parts of Brazil. Men and women make around 10 dollars a week, and their children earn little more than food money.

In the late 1980s, the town had a population of some 10,000 people, living mainly off sawmills and cattle ranching. By 2020 this had grown to 100,000, and its economy is now powered by the nearby Paragominas bauxite mine, one of the largest in the world. Thus the economy of the region has been 'upgraded', switching from Indigenous, sustainable, forest-based lifestyles to logging, cattle ranching and now mining, in a progression of increasingly environmentally destructive activities.



view of Paragominas © Herbert Girardet

The Bom Futuro ('good future') mine near the town of Ariquemes in the state of Rondônia is another example of this 'economic development' model. In the mid-1980s, prospectors discovered rich tin ore deposits under the forest floor. Wildcat miners soon arrived on mules, kitted out with picks, shovels, sacks, chainsaws and dynamite. A road was bulldozed through the forest, and mining started in earnest. Ironically, it was the 'success' of Bom Futuro that made long-established tin mines in Cornwall, UK, uncompetitive, forcing them to close.

Bom Futuro mine was an astonishing vista. Out of a flowering forest emerged a cratered moon landscape dotted with smouldering tree stumps. Black polythene makeshift tents covered in red dust were clustered together by the muddy road. Thousands of people were tunnelling into the ore-rich soil with pickaxes and shovels. But they were increasingly competing with the high-powered Komatsu diggers and Mercedes lorries that were carting the tin ore to nearby processing plants, where diesel generators roared day and night.

Bom Futuro was, and is, also a health horror story. There are puddles everywhere in the denuded forest soil, perfect habitat for mosquitoes. Just about everybody working there has malaria. The director of the hospital in Ariquemes explained the context: "The forest, as an organism, defends itself against devastation with enormous swarms of mosquitoes. We have nearly 300,000 cases of malaria annually. The destruction of the forest is directly responsible for this health emergency."

DEMAND PRESSURE

It is often said that the soils of the Amazon are not well suited to ranching or farming. They are usually less fertile than the soils of temperate regions, as a thick layer of leaf mould never accumulates in the rainforest. Its soils are usually deficient in humus and minerals, making it difficult to sustain the productivity of pastures sown on the forest soil. Pastures are usually set on fire in the dry season to enrich the soil with potash and to control encroaching weeds, but the fires also burn any remaining tree seeds or saplings still present in the soil. The *queimadas* thus minimise the potential for the forest to regenerate.

Until the early 1990s much of the deforestation in the Amazon was due to cattle ranching. Since then, soybean production has become ever more widespread. A major

stimulus for this was the sudden appearance of BSE (known as 'mad cow disease') in Europe, caused by the use of processed animal carcasses in the fodder for cattle and pigs. After this was outlawed, more and more Brazilian soybeans came to be used as an alternative animal feed.

Demand pressure has been growing ever since, most notably from China, where the burgeoning urban middle class are demanding ever more meat in their diet, leading to a nearly tenfold increase in per capita meat consumption since 1987. Soya from the Amazon region has become the main source of feed for China's 449 million pigs. Chinese state-owned companies invest directly in Brazil's soya industry to assure certainty of supplies. This growing demand, as well as an increasing appetite for beef, is incentivising Brazilian entrepreneurs to keep razing pristine forest. The area of land planted with soybeans in Amazonian states has expanded by 14.1% per year since 1990 and now covers over 8 million hectares.

But how are the producers to get all this to market? Enter Jair Bolsonaro, who took over as president of Brazil in 2019. One of his first executive decisions was to upgrade the trans-Amazonian highway BR-163 from Cuiabá and Sinop in Mato Grosso to the port cities of Itaituba and Santarém in Pará, turning a mud track into a paved highway.

Most of Brazil's soybean crop is trucked along this road to Santarém, and from there to the Atlantic and beyond. But to further improve the trans-Amazon transport connection, the Ferrogrão railroad, intended to run parallel to the BR-163, is now at the planning stage, with substantial funding promised by China. If this railroad is built, in part through Kayapó territory, farmers and ranchers in the Amazon will be incentivised to further expand their soya and beef production, accelerate deforestation, and further impair the integrity of the rainforest ecosystem.

Bolsonaro does not intend stopping there: encouraged by Brazil's commercial lobby, he has stated that ecological reserves, currently extending to half of the country's Amazonian territory, "hinder development". As a presidential candidate he had promised "not to demarcate a single square centimetre more for Indigenous lands". In theory, mining in these reserves is currently forbidden, but new legislation is aiming to change that, and the consequences for Indigenous tribes could be dire.

Already under Bolsonaro's presidency, deforestation has reached a 12-year high. About 20% of the Brazilian Amazon is now 'developed' for cattle ranching, soybean production and mining. At what point will an ecological tipping point be reached?

THE VALUE OF THE LIVING DEMAND

Looking at the global picture, the insurance firm Swiss Re has evaluated the risks associated with human impact on the biosphere. It estimates that more than half of global GDP – US\$42 trillion – depends on high-functioning biodiversity, and even the World Economic Forum, known for its cautious attitudes, lists biodiversity loss as one of the three biggest risks over the next decade, and states that global biodiversity regulation is inevitable.

It has become apparent that deforestation in the Brazilian Amazon is contributing to regional and global climate

breakdown. In the last decade, frequent severe droughts attributed to forest loss have occurred in the transition zone between the eastern Amazon and the Cerrado.

The late James Lovelock, originator of the Gaia theory, started a scientific discussion in the 1990s about the vital importance of forest ecosystems for the sustainable interaction between biosphere and atmosphere. He made a preliminary estimate of the financial value of the contribution of the Amazon rainforest in keeping the Earth cool and moist: “One way to value the forest as an air-conditioner would be to assess the annual energy cost of achieving the same amount of cooling mechanically. If the clouds made by the forests reduced the heat flux of sunlight received within their canopies by only 1%, then their cooling effect would require a refrigerator with a cooling power of 14kW per acre. The energy needed, assuming complete efficiency and no capital outlay, would cost annually £2,000 per acre. On this basis, an estimate of the worth of the refrigeration system that is the whole of Amazonia is about £100 trillion.”

Since the 1990s, a vigorous alliance between ecological scientists, activists and Indigenous communities has been forged to try and halt the destruction. Brazilian professor Eneas Salati first drew attention to the vital importance of the Amazon ecosystem to the world – as its lungs and moisture reservoir.

Salati stated that the destruction of eastern Amazonia could have severe climatic consequences. He showed that the clouds coming in from the Atlantic first rain down onto the forests of Pará. Most moisture is released again by evapotranspiration powered by the tropical sun. It rises from the steaming forests and blows westwards, where the clouds shed their load six or seven times. Reaching the eastern slopes of the Andes, the clouds are driven upwards by the cold mountain air and then drift southwards to shed their rain over Bolivia, Chile and Argentina, and northwards as far as Mexico and even the North American plains.

Many scientists fear the consequences of further deforestation of Pará. Professor Antonio Nobre and other researchers have shown that as deforestation accelerates, rains are falling more erratically and the dry season is getting longer. More and more clouds are drifting by without shedding rain. And as the multi-layered forest canopy is removed, daytime soil temperatures increase over ever wider areas. At the same time, local soil moisture declines, and sudden flash floods cause severe erosion of denuded land, flushing topsoil into the rivers and into the ocean beyond.

Research by Professor Leydimere Oliveira, of the Universidade Federal do Pampa, has shown that there has been no economic advantage for Brazil from logging and converting rainforest to pasture. The more that is removed, the less precipitation reaches the area, and the lower the yield per acre becomes. Oliveira and his co-authors predict that, under a business-as-usual scenario, by 2050 a decrease in precipitation and increasing temperatures caused by deforestation in the Amazon will reduce pasture productivity and soybean yield by around 30%.

Amazon researcher Professor Philip Fearnside made similar points in an interview we filmed: “An economy primarily based on the value of environmental services is

essential for long-term viability of the forest. Services such as maintenance of biodiversity, water cycling and carbon stocks can be shown to have a much greater value to human society than the timber, beef and mining products obtained by forest destruction. Measures to avoid deforestation include the creation of protected areas, and reformulation of infrastructure decisions and development policies. Yet institutional mechanisms are still lacking to acknowledge the value of the standing forest.”

There is no shortage of proposals for an alternative, green economy for the Amazon region. The eminent US ecologist Professor Thomas Lovejoy said that the rainforest’s rich biodiversity has been greatly undervalued compared to economic activities such as farming and mining. A sustainable, green economy that monetises the food, medicines, aquaculture and climate regulation from intact forest ecosystems should be initiated without delay.

Lovejoy wrote: “The current Brazilian government tends mostly to see the forest and its biodiversity as of little value compared to economic activities like cattle, soy or mining. In contrast, the Amazon’s highest value is in forest biodiversity, and in maintaining the hydrological cycle for the Amazon and the South American climate system [...] Dieback will lead to a hydrological cycle in tatters, stranded hydroelectric facilities, largely failed fisheries, marginal urban economies and impacts on continental climate [...] The Amazon will be transformed from an Eden into a highly degraded nightmare.”



Soybean farming, Mato Grosso © Paulo Fridman/Corbis

SOME POSITIVE NEWS

It is not all bad news. Approximately 200 million hectares of the Amazon forest are currently set aside for conservation, the largest area being the Kayapó reserve. It is a well-established fact that forest protection is much greater in these reserves than in forest areas under commercial ownership. Indigenous tribes are widely regarded as the effective guardians of their rainforest world. This view was echoed by Brazilian president Fernando Affonso Collor de Mello in a speech made in the run-up to the 1992 UN Earth Summit in Rio de Janeiro.

“Indigenous people have contributed in decisive ways to the formation of Brazil and Brazilians [...] Their myths and worldviews form the basis of our popular culture. Their knowledge of animals and plants enriches the research of many scientists [...] Indians know how to communicate with Nature and the source of wisdom and vitality. Modern

man [...] has become prisoner of a sterile consumerism that does not foster happiness and wellbeing, linked to intolerable degradation of the environment. Indigenous people can inspire us to create possible paths which reconcile development and respect for Nature.”

No Brazilian president has made similar statements in the last 30 years.

In addition to Indigenous reserves, there are many ‘extractive reserves’: areas of forest that are used for harvesting Brazil nuts and for rubber tapping as well as subsistence agriculture and small-scale livestock raising. Across the Brazilian Amazon there are more than 70 such reserves, each extending to anything from between 100 and over 800,000 hectares.

Elsewhere in the Amazon, the government of Colombia has legally recognised 20 million hectares of rainforest as “collective Indigenous territory” or *resguardos*, containing around 250 Indigenous communities of 22 different cultural groups. This policy, introduced in 1986, was an important move towards recognition of the rights of Indigenous people and their vital role in rainforest conservation. Known as COAMA, the initiative was led by anthropologist Dr Martín von Hildebrand, responding to demands by Indigenous communities as well as many ‘non-Indigenous’ Colombians. The vast territory contains at least 50,000 species of flowering plant, some 1,750 bird species and 4,000 different kinds of butterfly, many of which are extremely localised and still known only by Indigenous names.

Neighbouring Ecuador has taken the pioneering step to class any intentional damage to the environment as a criminal offence. The country’s constitution is the first in the world to make Nature a subject of strong rights and guarantees. Its constitution states: “Nature or Mother Earth, where life occurs and reproduces, has the right of holistic respect of her existence and the maintenance and regeneration of her vital cycles.”

The story of Costa Rica, in Central America, is also significant in this context. Until the 1940s most of the country was covered in tropical rainforest, but in subsequent decades rampant logging converted large areas of forest into cash profits. By 1998, however, the deforestation rate had dropped to zero. Critical to this dramatic change was a recognition of the potential of eco-tourism, offering visitors a vivid experience of rainforest fauna and flora. Today Costa Rica’s forest cover is back to over 50%: double the 1983 figure. The government aims to further increase it to 70%, achieving carbon neutrality for the country in the process.

THE VIEW FROM ABOVE

In 1988, when I was filming in the Amazon, the only way one could actually see what was happening there was to travel on land and by boat, and to walk into the forest. There one could see an almost intimidating complexity and abundance of life, harbouring innumerable species interacting within the ecosystem.

The forest consists of multiple layers, from the forest floor up to the shrub layer, the understorey, the canopy, and to the overstorey above. The ground layer consists of fallen trees, fungi and low-growing vegetation. The shrubs

in the next layer grow in semi-shade, with only glimpses of sunlight. The understorey is next, consisting of small trees and juvenile individuals. The canopy further up is a dense layer of larger trees and their branches, mostly laden with epiphytes. The overstorey, barely visible from below, refers to the crowns of the tallest trees, whose leaf cover is directly exposed to sunlight.

Importantly, all these living layers add up to a surface area many times larger than the soil surface on which the forest stands. Deforestation means the reduction of a landscape’s actual surface area and, most critically, its bioactive leaf surfaces. As rainforest is removed, photosynthesis and thus the production of oxygen are invariably reduced. It is of great concern that the Brazilian Amazon has already ceased to be a carbon sink. South-eastern Amazonia in particular, where deforestation is most pronounced, has become a net carbon source. As deforestation proceeds apace, the whole of the Amazon is becoming a greater carbon source rather than its previous state as a carbon sink, with dire consequences for the world’s climate.

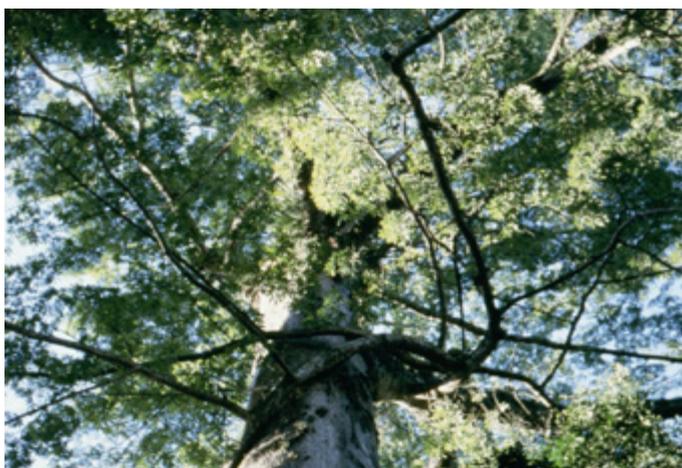
Not all of us will ever get an opportunity for walking in the rainforest, but now we can see it for ourselves on Google Earth, utilising satellite technology, without leaving our homes. As we zoom in on some of the places mentioned in this text, the pressure of commercial development becomes glaringly evident: for instance, we can see that the landscape of south-eastern Amazonia around Redenção, Paragominas and Ariquemes has been denuded on a massive scale, with logging, soybean production, mining, and road and dam construction much in evidence.

Fortunately, further east, particularly in the state of Amazonas, large areas of relatively intact forest can still be seen – Indigenous reserves, extractive reserves and Nature reserves.

Recently, flying in a small plane over these forests, I was awed by the sheer abundance and exuberance of this primeval world of trees and water, as seen from above. The rivers wound their way through the green land below us, intertwined with each other and with the adjoining forest like giant snakes, not confined to permanent beds. As they flooded their banks and changed their courses, they left behind bits of themselves in the flat landscape: oxbow lakes, separated from their umbilical river. Every so often we could see Indigenous villages set in small forest clearings.

Here and there the occasional hill rose out of the plain, and a floating mountain landscape of glacier-like clouds was suspended in a stark blue sky. In some places the crowns of trees, with a myriad leaves and flowers, were bathed in glittering light. Our pilot was proud to show us his familiar world, over which he was flying most days. Occasionally he dived down to just above the treetops, where we could see birds perching or flying up from their nests – eagles, toucans, herons and parrots, some clubbed together in large flocks.

The shapes of the trees were of an astonishing variety, the tallest ones laden with orchids and creepers all seeking the power of the sun. Many trees were covered in mauve or yellow blossoms, and as we flew on, the faraway curved horizon was changing minute by minute, forests, rivers and sky interwoven like a majestic tapestry.



Rainforest canopy © Herbert Girardet

FORESTS FOREVER?

Amazonia is an epic landscape, perhaps the greatest assembly of life on Earth, ever changing yet ever constant, never touched by an ice age or other such traumatic event. Until now.

Some people think that, equipped with chainsaws, diggers and dynamite, we can subdue these ancient forests. But there is little doubt now that our new, human-made world will be in peril if these great forests are erased. Large-scale deforestation will dramatically affect the water supplies in neighbouring farmlands and cities. And if the rainforests become carbon emitters rather than carbon sinks, there will be global consequences.

Is Amazonia fated to be the premier sacrifice zone for the resource demands of a globalising world, experiencing the ever-increasing ecological footprint of urbanisation? A region decimated by financial onslaught and corporate business practices enabled by corrupt governments?

To counter this, we need new ways of valuing the ‘services’ of Nature. Lovejoy argues that this is not short-sighted: “Conservation efforts have not been inconsequential – and they haven’t failed totally – but [...] they haven’t spent enough time helping people understand the value.”

In the run-up to COP26 in Glasgow in November 2021, it was reported that Bolsonaro was trying to negotiate a deal with US officials to funnel billions of dollars into his administration to eliminate illegal deforestation within the decade. Nothing seems to have come of this, and in any case few negotiators would trust him to deliver. But valuing the environmental ‘services’ of rainforests cannot be ignored as a critically important tool for conservation.

The challenges are clear. Global indicators tell us that carbon emissions are spiralling to record highs, and that deforestation is playing a major part in this. In fact, forests are under unrelenting pressure not just in the Amazon, but right across the tropics. The rainforests of Indonesia, Malaysia, Burma, Madagascar, Ivory Coast, Ghana, Nigeria, Cameroon, the Congo basin and Papua New Guinea are all shrinking rapidly, largely due to resource demands from across the world. It is clear that deforestation, mainly through the privatisation of rainforest resources, is accumulating huge externalities or social costs for people across the world, and for future generations. And it is becoming ever clearer

that rainforest environmental ‘services’ such as oxygen and moisture supply are ultimately far more important than any amount of timber, beef, soybeans or metals dug up from underneath the forest floor.

Meanwhile, the number of people who are killed trying to counter deforestation is growing month after month, particularly among Indigenous groups who are trying to defend their territories. In June 2022, two names made media headlines: British journalist Dom Phillips and Brazilian Indigenist Bruno Pereira. They were shot while investigating illegal logging and fishing in a remote region of the Amazon. But the names of many others who perish will never be known.



Dom Phillips in front of a rainforest giant © The Guardian

Much of what is happening in the Amazon makes it a prime candidate for the legal classification of ecocide, defined as “unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and widespread or long-term damage to the environment being caused by those acts”. Ecocide, when internationally adopted, will be classed as an arrestable offence, making those responsible for acts or decisions that lead to severe environmental harm liable to criminal prosecution. Developed by the British lawyers Polly Higgins and Philippe Sands, the concept of ecocide has not yet been accepted by the United Nations. But it is certainly receiving a lot of attention, as human impacts on the biosphere are becoming ever more pronounced.

The crucial importance of rainforests to help safeguard the liveability of the global environment is better understood than ever before. It is becoming ever clearer that the Amazon forest in particular is fast losing its capacity to regenerate and is rapidly approaching a tipping point, after which the rainforest as we know it would be lost, with the most far-reaching implications for the global climate and for biodiversity. New ways need to be urgently found to transcend national self-interests and corporate irresponsibility, which are the main obstacles to meaningful change.

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THE ECOLOGIST SPECIAL SERIES: MEGAMORPHOSIS

The Ecologist online strategy for 2022/5 includes the publication of three new special series examining economics and the fossil fuel industry from a number of useful perspectives. The first major series is *Megamorphosis*, from Professor Herbert Girardet. The series examines how the economy and the technosphere have come to dominate and degrade the atmosphere, biosphere and geosphere in what is now called the Anthropocene Epoch.

ECOLOGIST WRITERS' FUND

The Ecologist Writers' Fund was launched to support contributors who are from, or who write about, communities and identities that remain marginalised within the environment movement and the journalism industry. This includes, but is not limited to, BAME, LGBTQI+ and disabled people. The fund is supported by readers of *The Ecologist* online and subscribers to our newsletter. *The Ecologist* Special Series is funded by trusts and foundations and not through the EWF. However, we hope those who have read and benefited from the series will consider donating to the writers' fund online.

THE ECOLOGIST

The Ecologist is a news and analysis platform with a focus on environmental, social and economic justice. Our strategic aim for the coming years is to focus on the fossil fuel industry and its impact on people, society and the natural environment. *The Ecologist* is published online. Editor: Brendan Montague. Assistant Editor: Yasmin Dahnoun. We also publish as an integral part of the *Resurgence & Ecologist* print magazine. Editor: Marianne Brown. The Ecologist is a member of the newspaper regulator IMPRESS.

THE RESURGENCE TRUST

The Resurgence Trust is an educational charity (Charity Number: 1120414) that aims to improve our connection to each other and to nature. The charity examines how we can reconnect with the living planet from the perspectives of society, economics, community and individual wellbeing. The trust publishes the *Resurgence & Ecologist* magazine, *The Ecologist* online and Resurgence.org, as well as organising events at its centre in Hartland, Devon and in London. The trust is funded through its members and with some donations from a number of trusts and foundations which support environmental and social change. The work of the trust is overseen by its board of trustees.