

WORLD WILDLIFE

A FOREST APART

Partners come together to protect Madre de Dios, one of the most biodiverse forests in the world

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FALL
2024

An aerial photograph of a vast, dense tropical forest in the southwestern Amazon. The canopy is a rich, textured green, with some darker patches indicating shadows or different tree species. The perspective is from a high angle, looking down on the forest's expanse.

MADRE DE DIOS

IN THE SOUTHWESTERN AMAZON, A CONSTELLATION
OF EFFORTS HELPS SAFEGUARD ONE OF THE WORLD'S
LAST GREAT STANDS OF TROPICAL FOREST.



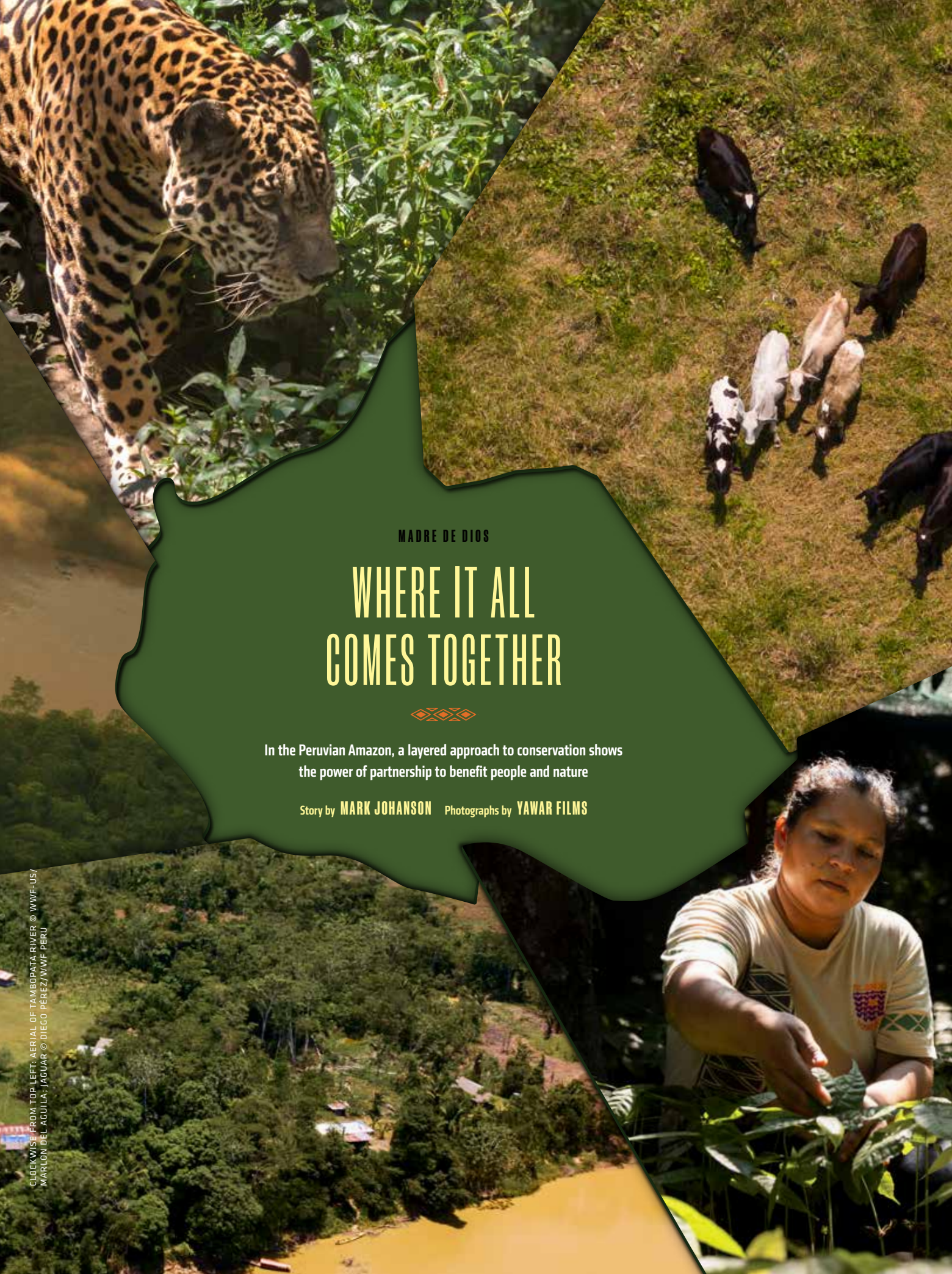
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MADRE DE DIOS

WHERE IT ALL COMES TOGETHER



In the Peruvian Amazon, a layered approach to conservation shows
the power of partnership to benefit people and nature

Story by **MARK JOHANSON** Photographs by **YAWAR FILMS**



ALBERTO YNUMA FERNANDEZ, apu (chief) of the Boca Pariamanu Native Community, is standing on the edge of the tawny Pariamanu River, inspecting the muck of an abandoned gold mine, when the throttle of an engine startles his surveillance crew. He turns and locks eyes with three men huddled together inside a rough-hewn wooden boat. “Miners,” he whispers.

The miners started coming this way in 2015, searching for pockets of gold in the hard-to-reach Madre de Dios region of Peru. Now their illegal mines plague the edges of rivers here, which flow onward into the vast Amazon. Left in their wake (when the riches dry up) are stark mud deserts and toxic ponds laced with the mercury used to extract the gold.

“Look,” Ynuma mutters, pointing to the murky pool beneath his mud-caked boots. “They’re contaminating our fish. And the thing is, we still have to eat them.”

A miner reaches for a radio. Ynuma, sensing a potential conflict, decides to head back to his village. It’s a familiar scene for the shrewd leader. He travels up and down the Pariamanu every three months as part of a six-person monitoring team, protecting more than 11,000 acres of Indigenous territory of prickly monkey brush and cumaru trees. On their most recent trip, a six-hour jaunt upriver, they counted 77 illegal mines, which they reported to local authorities. At stake is not only the forest they live in but also their economic livelihood.

The main commodity in Boca Pariamanu is Brazil nuts. They’re found in the coconut-sized seed pods that dangle from immense castaña trees, which can grow to more than 100 feet tall over the course of a millennium. These ancient trees require cross-pollination, don’t grow in plantations, and depend on wildlife to consume and disperse their seeds. So to see nearly 2,000 of them yielding fruit, as this community has for the past decade, “is a good indicator that you have





QUID PRO QUO

Alberto Ynuma Fernandez, leader of the Boca Pariamanu community, harvests Brazil nuts in a local forest. Protecting and thoughtfully cultivating their lands is central to the community's way of life.

a healthy forest,” explains Edith Condori, a forest specialist at WWF-Peru who has joined Fernandez on this trip. “This tells you that the work you’re doing with the Brazil nuts isn’t negatively impacting the ecosystem built around them, and yet you’re able to maintain a way of life.”

By contrast, illegal mining has put a new stress on the forest, worrying those whose lives depend on it. “All of the families here are beneficiaries of these trees,” says Nadia Medalit Pacaya Grifa, a Boca Pariamanu resident and vice president of AFIMAD, an Indigenous-run association that provides economic assistance to 11 Native communities. “Every year, without fail, they give us their fruit, so we feel privileged and fortunate to have them here in our forest.”

Pacaya takes AFIMAD president Emily Urquia Sebastian down the narrow, dusty trails that lead away from Boca Pariamanu’s main village. They hurdle ficus trees and duck beneath wayward lianas. All the while, the hum of cicadas hangs in the sticky air. Each woman has a thatched basket strapped to her back and a nut-grabbing prong called a *payana* in her hand, ready to inspect the latest harvest.

The two women—part of AFIMAD’s all-female leadership team—come from different generations and Indigenous backgrounds: The younger, sterner Pacaya is Amahuaca; the elder, cheerier Urquia is Yine. “What we have in common,” Urquia explains, sifting through the forest floor for seed pods, “is the Brazil nut.”

Pacaya later leads Urquia past plantations of cacao and huicungo palm, newer forest-friendly crops that help fill the income gap outside of the Brazil nut season, which runs from January to April. AFIMAD, which also makes Brazil nut oils, hopes to replicate its management chain with new forest products while growing its export market in the US and Mexico.

WWF offers technical support to help AFIMAD build regenerative economies—those that restore and preserve rather than exploit and destroy habitat—in the Indigenous territories of its members, assuring these communities can improve their livelihoods while protecting their ancestral lands.

Madre de Dios alone is home to nearly 190,000 people, including 37 Indigenous communities, several of which live in voluntary isolation; many are still fighting for recognition of their right to manage their own lands. Across the Amazon, more than 2 million Indigenous people, representing more than 400 groups, hold vitally important stretches of land. In fact, the more than 3,000 Indigenous territories represent nearly a third of the Amazon Basin.

Their contributions to the health of this massive forest, which is directly linked to the health of our planet, have been historically overlooked. (Across the tropics, Indigenous territories have a fifth less deforestation than non-Indigenous ones, according to WWF’s 2023 *Forest Pathways* report.) Supporting Indigenous communities will be vital in the fight to keep the Amazon a carbon sink, not a carbon emitter.

Madre de Dios is of unique concern because it’s one of the most biodiverse places on Earth, located near the base of the Andes in the southwestern Amazon. Yet the area’s specific threats speak to larger issues at play across the entire Amazon, which spans eight countries and 40% of the South



A PRECIOUS PRODUCT

ABOVE: Jane del Castillo and Nadia Pacaya tend cacao seedlings in Madre de Dios, Peru.

OPPOSITE: Kathia Panceano cuts open a Brazil nut.





American continent—and contains about one in 10 known species on Earth.



Working with Indigenous leadership to protect their lands is just one pillar of WWF's stacked approach to safeguarding the Amazon, a region it's worked in since the 1970s. Just north of Boca Paríamanu, lining the Interoceanic Highway, is Peruvian cattle country. This is Texas in the Amazon, where lonely castaña trees (which cannot, by law, be cut down) die slow deaths amid vast pastures, a stark reminder of the teeming tropical forest that's already been lost.

The lands along this highway—completed in 2011 to connect the Peruvian Pacific with the Brazilian Atlantic—were some of the first to be converted into ranches. Yet their soils have become severely degraded by years of unsustainable use. Remarkably, cows can no longer live on the pastures once created for them.

Traditionally, this would precipitate a vicious cycle of denuding and burning more of the Amazon to create fresh meadows. Yet several families in the community of Iñapari, a frontier town on the border of Brazil and Bolivia, are betting on a new model of regenerative ranching they say can revive degraded plots and optimize existing land.



DRIVING DEFORESTATION

Impacts of Peru's Interoceanic Highway

The Interoceanic Highway winds for more than 1,600 miles across South America, connecting Pacific Ocean ports in Peru to the Atlantic in Brazil—and cutting directly through the heart of the Amazon, including the incredibly biodiverse forests of Madre de Dios.

From 2011—when the area's section of road was completed—to 2023, Madre de Dios lost nearly 600,000 acres of forest, according to analysis from MAAP (Monitoring of the Andean Amazon Project). Constructed to facilitate trade and travel, the highway drove an influx of people to once-isolated areas of tropical forest and accelerated the illegal conversion of forestland to agriculture, gold mining pits, and unsanctioned towns.

This explosion of illicit development spurs habitat loss, restricts wildlife movement, and threatens Indigenous peoples and local communities. It also depletes the Amazon's natural carbon storage ability as well as the forest's ability to filter pollutants from the atmosphere. In the Brazilian Amazon alone, nearly 95% of deforestation takes place within 3.4 miles of a road or about half a mile from a river. The Interoceanic Highway is just one of thousands of such examples around the world.

That's why WWF is working both in the Amazon and globally with government partners, engineering associations, financial institutions, local communities, and more to build sustainability into the early stages of infrastructure development. Projects must meet human needs while protecting habitats and the critical ecosystem services they provide.

Map: MAAP with data from the Peruvian Environment Ministry (Geobosques)

“We always learned that the fewer trees you have in the pasture the better,” explains Verónica Cardozo as she walks in through rolling fields that back up to dense forest. “Recently, though, we’ve come to understand that animals, like us, need shade. They need clean water and good food.”

Extensive ranching is one of the biggest causes of deforestation in the Amazon, which has lost 17% of its historical range. (A swath of forest roughly the size of Rhode Island has vanished from Madre de Dios alone since 2000.) Scientists believe that should deforestation hit between 20% and 25%, the forest could reach a point beyond which it will no longer be able to sustain itself.

All of this makes optimizing ranchland an urgent, practical, nature-based solution—something supported by the Green Recovery Challenge Fund under UK PACT in Peru—that puts the economic needs of residents at its core.

In 2019, with training from WWF, Cardozo began to rethink the way she ranches, implementing new silvopasture practices. Instead of taking a machete to saplings when they appeared in her fields, for instance, she simply let them grow. Then, emboldened, she started planting trees—3,000 in total—noticing that their presence made the cows happier. “They’re so docile now that it’s much easier to control them, and we need less labor,” she says. (The trees also absorb some of the cows’ methane emissions, which accelerate climate change.)

Cardozo also built a small laboratory—a collection of giant blue industrial drums—where she makes her own organic fertilizers from cow manure that cost three times less than commercial products and have become a sustainable agricultural income opportunity. She also crafts nature-based antibiotics from jungle microorganisms that are friendlier for the soil as well as safer for the consumers who buy her chemical-free products.

The biggest change, she says, pointing to newly erected corrals, was dividing her severely degraded 140+-acre estate into small quadrants to rotate the cattle around, giving each parcel at least 25 days to recover before using it again. Richer soil has meant richer grass, allowing more livestock to live in smaller areas. For example, Cardozo could previously only host an average of one cow on every 2.5 acres. Now her ranch can support more than three cows on the same amount of land.

Across town, Verónica’s elder sister, María, undertook a similar transformation of her nearly 500-acre family estate; she can now manage up to four times as many cows in the same amount of space. “It’s clear that what we have is enough and that we don’t need to touch the forest anymore,” she says, sitting with her two adult children (fellow regenerative ranching pioneers) for coffee on her front porch, surrounded by abundant potted plants.

The Cardozo sisters are the third generation to ranch in Iñapari. Yet they may be among the first here to bridge the gap between ranchers and environmentalists. After all, they see themselves as both. “The heat these days is suffocating, and it doesn’t rain as much as it used to,” María explains as a blue butterfly the size of a small bird lands on her coffee cup. “We see the changes, and so we know we have to move beyond this model of knocking down the forest.”



SHARED SPACES

ABOVE: As part of a biodiversity monitoring project, Vania Tejada, a former wildlife officer at WWF-Peru, checks camera traps near MADERACRE’s forest concession in Madre de Dios. **OPPOSITE:** María Cardozo (left) and her son Luciano Flores walk a forested path on their farm in Iñapari, Peru.

All told, some 400 families in Madre de Dios have been trained in regenerative ranching, many by the Cardozos at a field school Verónica built on her property. Of course, long-standing traditions—and classic cowboy pride—are hard to change. Yet María says it’s happening anyway. “When someone else is doing well,” she explains with a smile, “others instinctively copy the model.”



Deep in the forest, about a three-hour drive west of the Cardozos’ ranchlands on dirt roads that melt into sludge after passing storms, is the “office” of Vania Tejada, a former wildlife officer with WWF-Peru. She’s here inspecting the case of a missing forest.

Just three months ago, she was in this very spot wrapping camera traps around stately quinilla trees, part of a wildlife monitoring project with MADERACRE, one of Peru’s largest timber concessions with Forest Stewardship Council® (FSC®) certification for responsible forest management. The company extracts an average of one to three trees per 2.5 acres every 20 years, and its 849 square miles of concessions account for a significant portion of the productive permanent forests of Madre de Dios. Yet it’s constantly under threat. Those same quinilla trees, for example, have been burned to the ground and replaced with fields of corn.

No sooner has Tejada arrived in the missing forest than two men race over on a motorcycle. Their long hair and bushy beards are indicative of a local religious group known for aggressively grabbing land, burning trees and planting crops, and then claiming the territory as their own. Their sudden appearance is an



“Madre de Dios exemplifies what we mean when we call for integrated approaches to large, complex conservation challenges. You have multiple and diverse threats facing this place. Address just one or two of these, or address them in isolation, and any progress risks being overwhelmed by everything else collapsing around it. With a holistic approach, however, and a devotion to inclusiveness and partnership, a healthy future for Madre de Dios is possible.”

NIK SEKHRAN, Chief Conservation Officer, WWF-US

REGENERATION AND REST

As part of her work promoting regenerative ranching near her home in Iñapari, Peru, Verónica Cardozo has shifted how she manages the cattle on her farm.



HARNESSING THE POWER OF NATURE

To meet global targets aimed at confronting climate change, slowing the loss of biodiversity, and reducing the degradation of natural habitats, the world must triple its investment in nature-based solutions by 2030—and increase that investment fourfold by 2050.

As their name suggests, nature-based solutions rely on the power of natural areas, systems, and processes to help us achieve a stable and biodiverse future. One such solution: keeping forests standing. Healthy forests capture and store CO₂, which mitigates the effects of climate change. Healthy forests also benefit people across the world, including by sustaining the livelihoods and cultures of Indigenous peoples and local communities.

WWF's Nature-Based Solutions Origination Platform builds on WWF's global reach and diverse partnerships to harness growing interest in the approach, particularly from businesses striving to adopt commitments to minimize their footprints, reduce climate change, and protect nature. The platform engages governments, multilateral agencies, and philanthropists as well. All told, WWF's goal is to generate measurable, long-lasting, positive impacts for communities, nature, and our climate through conservation, management, and restoration activities in forest landscapes, including Madre de Dios.

Corporate partner HP Inc. currently supports efforts in the region to improve the management of working forests and habitat restoration to ensure jaguar connectivity across the landscape.



Learn more about the Nature-Based Solutions Origination Platform at wwf.is/solutions.

unspoken warning, and it's not unexpected: Just two months earlier, men from the group attacked MADERACRE's surveillance patrol.

So Tejada, who's petite but fearless, packed up and retreated deeper into the forest. She's here, after all, to check on not only the existing forest but also its wildlife—including South America's apex predator—and her camera traps and acoustic sensors are cost-effective tools for monitoring the local population. A third of all jaguars in Peru live in Madre de Dios, and MADERACRE's lands have one of the area's highest densities of the big cats.

That's a good sign: The health of jaguars is a key barometer for the health of the overall ecosystem.

"We need to assess the connectivity of jaguar populations because if we work with apex predators, we can also influence the fate of other species," Tejada explains, batting away hordes of flies. Her shirt swarms with sweat bees as she unstraps a camera to change its battery. "We have these isolated patches where these animals try to live, but it's very difficult because they need to take risks to cross from one patch to the other."

The new field of corn, she adds, is yet another hole in an increasingly fragmented forest.


Tejada placed 70 camera traps in a rough grid along the logging roads that jaguars use as hunting corridors. She checks the camera in her hand for the latest sightings, scrolling back just three days before a jaguar appears, crossing this very road at dawn. Its saffron coat gleams under the low spotlight of the morning sun, accentuating spots that act like unique fingerprints for identifying individual cats.

Tejada also has positioned camera traps and acoustic sensors at each end of the canopy bridges she has installed across logging roads to increase forest connectivity for the Amazon's tree-dwelling wildlife. It's all part of WWF's partnership with MADERACRE under Forests Forward, WWF's signature program for corporate action in support of nature, people, and a healthy climate. Tools like camera traps assess the efficacy of the company's model for responsible forest management.

Surrounded as it is by public parklands and Indigenous territories, MADERACRE is an invaluable shield against deforestation closer to population centers near the Interoceanic Highway (see sidebar on page 25).



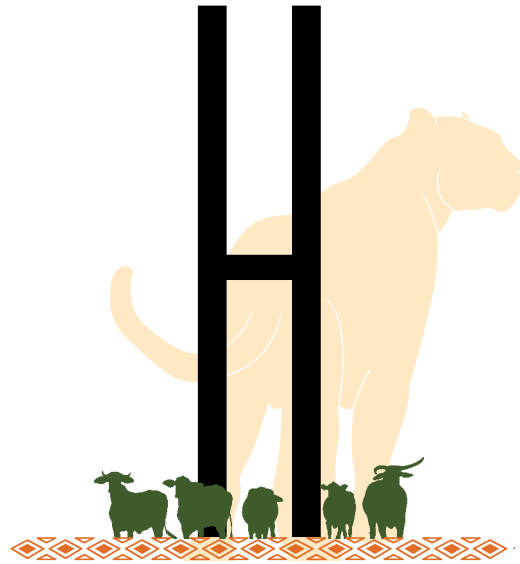
A decade on, this frontier-opening road has exposed the southwestern Amazon to a swarm of new threats. And yet, if you look hard enough, there's still reason for hope. A friendlier kind of forestry has given jaguars a surprising refuge. Brazil nut harvesting has provided Indigenous communities with the economic heft to defend their territories. And regenerative ranching has staved off needless deforestation.

It's hard to argue against progress. Yet as the highway encourages population growth across Madre de Dios, its industries will need to rethink some of their old ways. Change is never easy. "It's not magic, it's not romantic, and you need to dedicate a lot of time to it," explains rancher Verónica Cardozo. "But the most difficult part is believing that it's possible." 



TRUST EXERCISE

Reframing the Benefits of
Jaguar-Friendly Ranching



HOW DO YOU convince a room full of cowboys to love an animal that eats their cows? That's the challenge faced by Fabiola La Rosa Camino, a wildlife officer with WWF-Peru, as she navigates a gathering of sun-weathered ranchers at a field school deep in the Amazon.

Today's event in the small town of Iñapari, Peru, is ostensibly about regenerative ranching, a popular WWF program that helps communities better utilize their existing pastures while avoiding further deforestation. La Rosa hopes to use the trust WWF built in that program to steer the conversation toward the thornier issue of jaguars. Specifically, she wants to see if ranchers can imagine an improved version of coexistence with the big cats, especially with WWF's efforts in the region to restore jaguar habitats and their ability to move across the landscape.

Cow pastures have long since replaced rain forest alongside much of the nearby Interoceanic Highway (see "Driving Deforestation" on page 25). Yet the surrounding public lands remain prime habitat for the Amazon's apex predator, making this fragmented zone ripe for conflict. Quantifying cat-caused mortalities is tricky in the absence of hard data. Anecdotal, however, many ranchers view jaguars as a serious economic threat, and since it's generally illegal to kill a jaguar, incidences of retaliatory killing are rarely reported.

MEETING IN THE MIDDLE

In the heart of Madre de Dios, a group of ranchers gather to learn about regenerative ranching.

To get a better sense of the conflict, La Rosa reached out to 10 different ranching communities. The idea was to measure their tolerance levels for el tigre pintado, as the animal is locally known. She says what surprised her most when she started this work in 2022 was that each community had a unique perspective. Some really loved the jaguars and were keen to protect them; others closer to parklands had spent years sustaining losses while being lectured by environmentalists, making them resentful of conservation.

“We saw that people don’t just want to hear about the wildlife alone,” she explains. “We needed to link that with productivity and how wildlife is important for them in terms of the benefits they receive.” Jaguars, for example, are top predators that control wild herbivore populations, which might damage fields and crops.

What La Rosa also learned and shares with the crowd today is that el tigre pintado was getting blamed for all kinds of livestock deaths, even if there wasn’t a whole lot of proof that the cat was, in fact, the culprit. So, she identified 12 ranchers for a pilot project on human-jaguar conflict management. All had small- or medium-sized lands where the economic toll of each cow fatality is greatest.

After establishing a baseline of their annual losses (which is important for demonstrating change), La Rosa worked with the ranchers to codesign and implement low-cost, anti-predation measures. Some installed perimeter fencing. Others added powerful LED floodlights to deter animals at night or opted for cowbells or similar aural deterrents. People added water sources and planted trees mid-pasture to stop cows from seeking shade along the forested periphery where predators are more likely to hide.

La Rosa made suggestions for investment-free changes, too, including better surveillance techniques to keep track of cow numbers in real time. Many ranchers already had electric fences but didn’t use them at a high enough voltage to deter jaguars, which was an easy fix. And when cows passed away of natural causes, their rotting carcasses often attracted hungry cats, leading to more losses (something that proper disposal could prevent).

Lastly, each participant placed camera traps in vulnerable areas close to the forest edge, where most attacks occur. “People tend to say, ‘There are a lot of jaguars here,’ but it might just be one who’s old or injured and can’t hunt anymore,” La Rosa says. “So, it’s important to understand if it’s the same jaguar, or if it’s different individuals.”

The long-term goal is for ranchers to increase their tolerance for wildlife. “We live in a shared landscape,” La Rosa explains, “and jaguars were here first, so it would be naïve to think that attacks won’t happen anymore.” Instead, the hope is to minimize damages by preventing jaguars from entering ranchlands in the first place.

“I don’t know if we’ll ever achieve total harmony,” La Rosa acknowledges, glancing at a toy jaguar she’s brought along to lighten the mood. “But I can conceive of a world where we could at least live in equilibrium.” 🐾

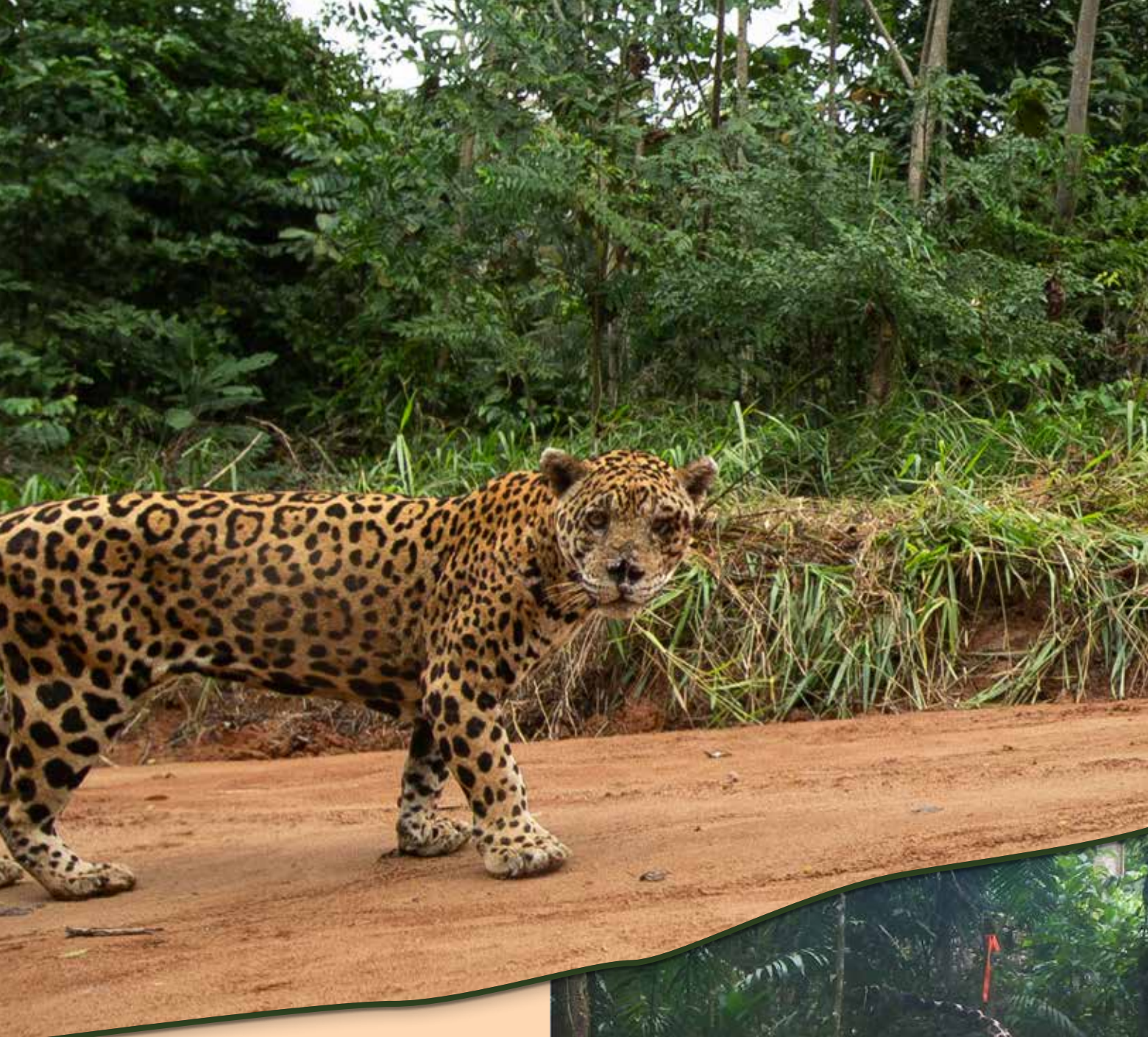


From August to October 2023, camera traps on the 12 properties recorded four jaguars and five pumas in the vicinity of the farms, suggesting close coexistence between the two predators. It also underscores the importance of recognizing that jaguars are not the only large carnivores moving through these spaces, emphasizing the need for accurate data and effective conflict-management strategies.



NOBLE NEIGHBORS

Collected as part of a broad effort to identify, monitor, and understand jaguars and their movements across wild and people-dominated landscapes in Peru, these images show the diversity of habitat the animals inhabit and the unique characteristics of individual cats.



“The jaguar is a great symbol for conservation in the Americas because of its unmatched beauty and power. Preservation of this regal species is a worthy goal in its own right. But more importantly, by preserving the habitat of this apex predator, we also preserve all the flora and fauna that interconnect to form the ecosystems of which the jaguar is an important part. Ultimately, I give to causes that make the world a better place—and protecting jaguars and their habitat is a way to do just that.”

RICHARD ROSEN, WWF National Council



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PERU'S NATURAL LEGACY

WWF's collaborative, integrated approach to safeguarding the Amazon channels a variety of forces—economic, scientific, cultural, political, and more—to ensure the world's largest tropical forest remains healthy today and in the future.

One signature effort, led by the government of Peru, is Peru's Natural Legacy or Patrimonio del Perú.

That initiative, the third in WWF's growing Project Finance for Permanence portfolio, was launched in 2019 to strengthen Peru's entire national protected areas system, starting with the Amazon. The \$70 million in donor funding will be used to expand and effectively manage nearly 42 million acres of the Peruvian Amazon by focusing on improving the oversight of parks, increasing the participation of Indigenous peoples and other local leadership in protected area management, and generating financial mechanisms that ensure their long-term financial sustainability.

WWF is grateful to all our partners in this effort.

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