

THE TORTOISE

VOLUME 2 ☆ NUMBER 3

ROBERT F. KENNEDY JR.
Talks turtles, Trump, and
how to save the world

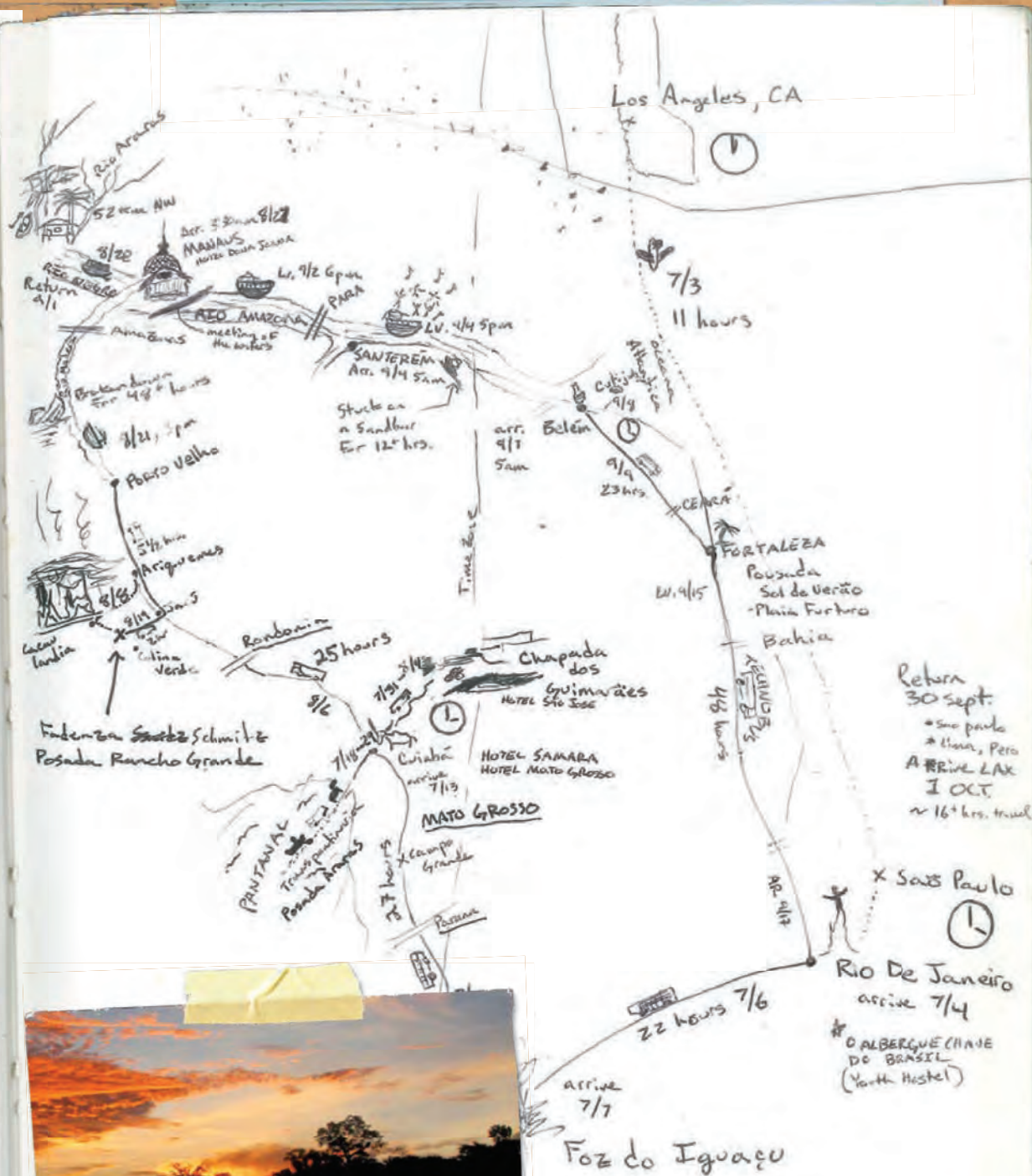
PRIZE SPECIMENS
Meet the elite turtle collectors
of Germany and Austria

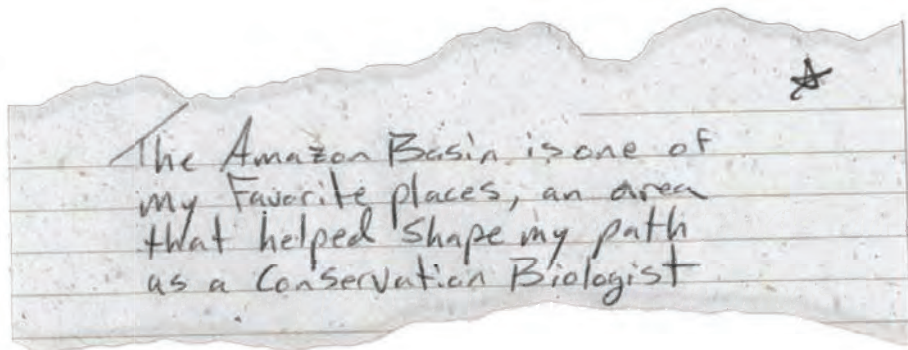
AMAZON ODYSSEY
Journey to the
Peruvian rainforest

A PUBLICATION OF THE TURTLE CONSERVANCY

Amazon Turtle Diaries

an eco-travel expedition in Peru





By Taylor Edwards

My first introduction to the Amazon was now over 20 years ago in Brazil when I spent several months in the forest and on cargo boats traveling along the Rio Madeira, the Rio Negro, and, of course, the Rio Amazonas. I originally went to see in person something I felt an innate responsibility to protect. What I found was much more than I expected. The rainforest was not just a single, uniform green wilderness but a complex mosaic of weaving tributaries and flooded ecosystems in constant flux. There are many, many wonders that we don't understand and these keep bringing me back.

It's always a pleasure when I am able to share this passion for the Amazon and its biodiversity with a broader audience beyond my academic community. Since 2003, I have been an "expert" for National Geographic Expeditions. I accompany ecotourism trips to exotic places and offer my perspective as a scientist with a background in wildlife ecology, molecular biology, and conservation. My research focus is herpetology (reptiles and amphibians), with a particular interest in turtles, so the Amazon is mecca for me. I lead one or two trips a year to destinations including Costa Rica, Panama, Ecuador and the Galápagos Islands, and even US national parks. Last September, I returned to Peru for the fourth time to lead the Upper Amazon River Cruise: a 10-day adventure that starts at the headwaters of the mighty Amazon and ends in the heart of Peru's northern rainforest, at the Pacaya-Samiria National Reserve.

What makes these ecotourism expeditions special are the participants who are travelers, not tourists. They want to learn on their vacation and are interested in and open to experiencing new things. When most people think of the Amazon, they probably expect to see Jaguar, Harpy Eagles, Tapir, Howler Monkeys, and Scarlet Macaws. Those animals are real possibilities—I've seen three of the five on all of my trips—but I still work to curb what naturalist guides refer to as "T.R.E.S.—Tropical Rainforest Expectation Syndrome." (You can blame *National Geographic* magazine for T.R.E.S. to some extent.) My modus operandi is that I capitalize on people's interest in learning to promote the conservation of turtles,

snakes, frogs, and other species that may not be on their top-10 list.

In reality, observing animals in the wild can be challenging. Even the moments one does happen to witness—a flock of macaws flying overhead—are often fleeting, or hard to see—a sloth snoozing so high in a tree that it is difficult to discern from a termite nest. Personally, I try to take a microcosmic approach, in which wonder can be found in the mutualism of an ant carrying a leaf. And that is where the turtles come in: no one ventures to the Amazon to be wowed by the turtles, but after a week with me, I hope that my groups go home appreciating these animals in a way they never did before.

Day 1

This morning the group and I flew from Lima to Iquitos, the largest city in the world that cannot be reached by road. The region, long inhabited by indigenous peoples, became a rubber production hub in the late 19th century. European influences are still apparent in the architecture and local culture, perhaps nowhere more so than in the Casa de Fierro (Iron House) designed by Gustave Eiffel. We unfortunately only got to pass through the city quickly on our way to the port in Nauta where we boarded our home for the next eight days: the *Delfin II*, an elegant 120-foot riverboat with 14 luxurious, air-conditioned guest suites boasting panoramic windows and private bathrooms. The boat has an outdoor lounge and bar and a dining room, where the ship's chef serves fine cuisine made from local, sustainable produce. The staff onboard outnumber the guests.

This is a *lot* different from my youthful, independent adventures in the Amazon when I traveled on cargo boats through Brazil. On those boats, you simply hang your hammock on the second deck among other passengers, sometimes stacked three high. During those trips, I wore a dog tag so that I would look like I had been in the military, which made me less of a candidate to mess with. My packing essentials consisted of one *rege* (hammock), one water filter, mosquito netting, sterile needles and suture (in case of a laceration),

syringes (in case of a mandatory yellow fever vaccination where the medical supplies might be questionable), and cigarettes—I don't smoke, but it's a great way to make friends in a country where you don't speak the language.

Day 2

Today was our first day exploring the rainforest. We woke early so that we could observe the wildlife at its most active. There was a light drizzle as we boarded the skiffs from the *Delfin II*, but it is called a rainforest, after all. After a short ride, we found a place to land and worked our way up to the terra firma using steps cut into the sandy bank. As we climbed, I remarked on the dynamism of this ecosystem where the river rises three to four yards during the rainy season—in another couple months, this makeshift landing area will be underwater. Wondrous surprises awaited us on the high ground: elusive Owl Monkeys, giant strangler fig trees, brightly colored poison dart frogs, the haunting calls of Trogons, and even a young Green Anaconda!

To make sense of this amazing diversity, it helps to understand the geological and environmental forces that have shaped evolution in the region. The study of the geographic distribution of organisms and the corresponding evolution of their traits is called biogeography, and while they may not have called it that, it was at the forefront of the minds of early explorers and naturalists such as Alexander von Humboldt, Alfred Russel Wallace, and Charles Darwin.

The Amazon wouldn't exist as we know it without the backdrop of the Andes. The mountains feed countless tributaries and ultimately contribute one-fifth of all river water flowing into the world's oceans. What is currently the Amazon Basin still contained marine environments a mere 10 million years ago; these changed to freshwater as the rivers began to run, which is why we see white sand here instead of soil (the remains of an inland sea) and why the Amazon River fauna includes sting rays and dolphins.

But to truly understand the Amazon's astounding biodiversity you have to actually experience it: the rain tickling your neck as drops fall from the "drip tips" of the leaves above, the deafening sound of a flock of white-wing parakeets flapping overhead, the medicinal smell of a crushed piper plant leaf, the intricate pattern on the blue hind legs of a Red-Backed Poison Frog, the iridescent scales

of a Rainbow Boa, even the texture of a Pinktoe Tarantula.

It was a short hike, but we returned to the boat with our senses completely overwhelmed.

Day 3

One of the last things you are supposed to do while crossing a swaying suspension bridge is to look down. The vertigo is worth it, however, when you are deep inside the Amazon Rainforest and rarely get a bird's-eye view.

Today we explored the Parque Nacional Amazonico Reserva Natural, a private reserve on the Marañón River, where the bridge took us high into the canopy. All the individual creatures we had seen below—radiant Blue Morpho Butterflies, Saddle-Backed Tamarin Monkeys, and the elusive Pygmy Marmoset—faded away, replaced by the sheer immensity of the forest. From this unique vantage point, the intricacies of this complex ecosystem disappeared behind a dense carpet of green leaves.

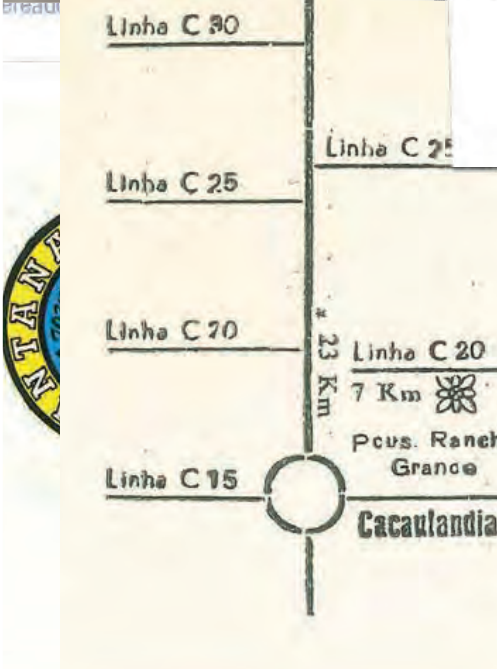
Back on the *Delfin II*, we discussed how scientists define and measure biodiversity. One method might be to simply count the number of species in a certain region, like the approximately 127 species of reptiles and amphibians here in the Pacaya-Samiria National Reserve. What is more revealing, however, is factoring in the density of those species in a given area and their *distinctiveness* (e.g., are they found other places or are they closely related to other common organisms?). As a conservation geneticist, I also include genetic diversity as a part of the equation because it is the underlying variability in a population that fuels the evolutionary process through the expression of adaptive traits. This helps to explain why there are so many different types of plants and animals that we are seeing.

Our heads full of knowledge, we set out again in the late afternoon to explore the tributaries by skiff. Pink River Dolphins broke the surface of the water around our boats, White-throated Toucans passed overhead. We add new species to our list.

Red-Backed Poison Frog (top), Yellow-Spotted Amazon River Turtles (middle), and Blue-and-Yellow Macaws (bottom) are among many of the animals found in the Peruvian Amazon.



NOTE: When going into a rain forest,
take rain jacket along!



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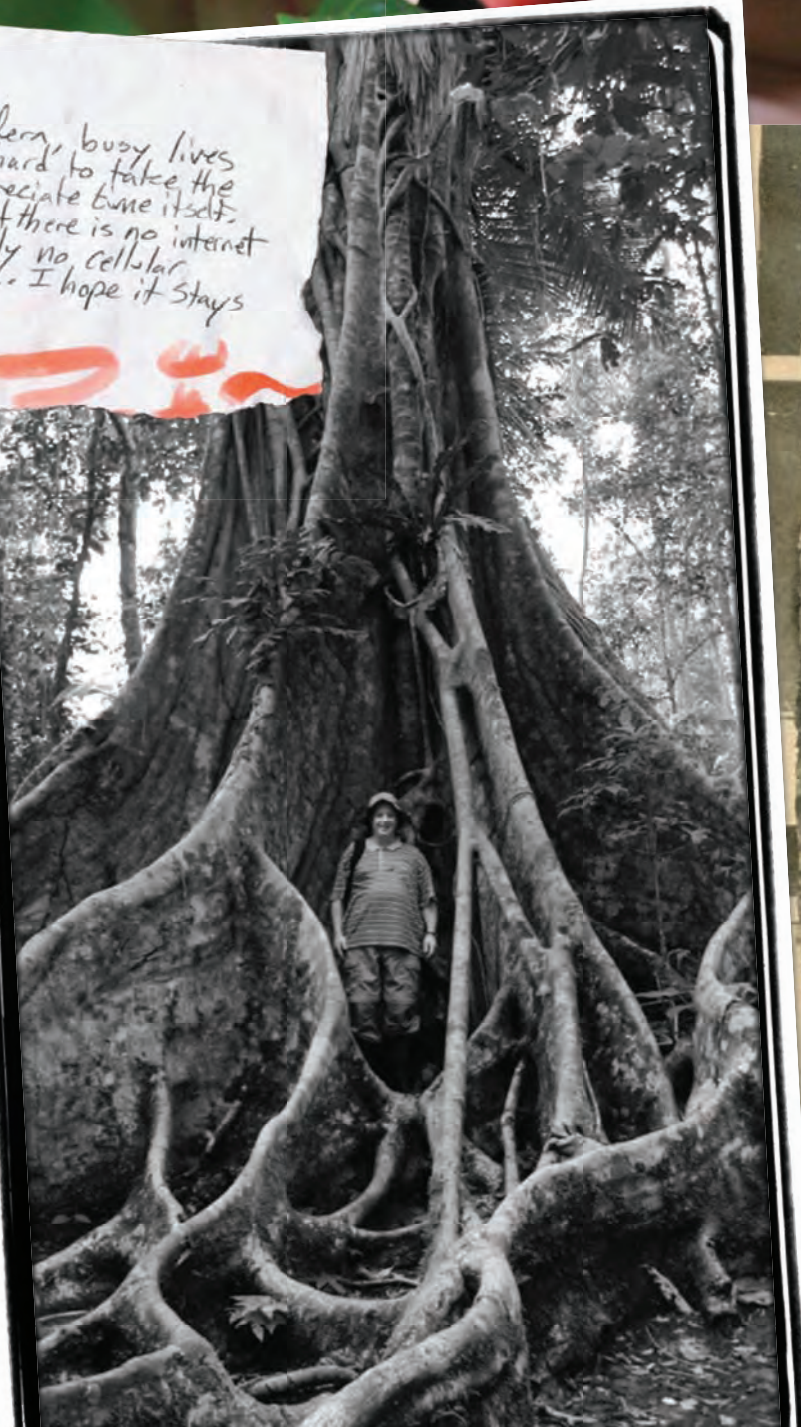


Av. Ponce de Arruc





In our modern, busy lives it can be hard to take the time to appreciate time itself. It helps that there is no internet and practically no cellular service here. I hope it stays that way.



Day 4

It is tough to be a herpetologist on a boat. Even on land, the rainforest's countless reptile and amphibian species remain elusive; they survive by staying out of sight. When you do spot a snake that looks like a vine or a forest frog whose dorsal pattern perfectly resembles a dry leaf, you realize just how successful these animals are.

The nocturnal animals become active and easier to find when the sun sets. After boarding the skiffs, our headlamps soon caught the orange-shining eyes of a Spectacled Caiman. On land, the lights expose more than the average person might want to see; the sparkling green emeralds that carpet the forest floor are the reflective eyes of spiders. Thousands of them! I am happy to spot just a single Ornate Snail-Eating Snake (*Dipsas catesbyi*).

One common misconception people have when they see a reptile such as a spiky Green Iguana, a beady-eyed caiman, or a docile turtle is that these animals are relics from the past. Their ancestors were present before the first dinosaur and their basic appearance may not have changed much over hundreds of millions of years, but that does not mean that the species we see today stopped evolving. In fact, every living species continues to adapt and undergo natural selection.

I like to use the analogy of a spoon and a blender. Picture an ecosystem as a kitchen, in which all the implements and appliances serve a purpose. The blender is shiny and fancy. It requires electricity (like a mammal with a high metabolism requires fuel). The blender is *really* good at making smoothies. It's probably the best item in the kitchen for this purpose. The spoon, in comparison, seems simple. But the spoon is the best item for eating soup. There are a lot of different spoons—big spoons, wooden spoons, spoons with slots—and they all have a different use despite maintaining a similar appearance. Spoons have been part of kitchens for much longer than the blender and they remain because they are really good at what they do. No one has come up with a better way to eat soup that would eliminate the spoon. Thus, reptiles and amphibians have endured because

Our trip took us across rope bridges and face-to-face with Clown Tree Frogs (top) and to the roots of a mighty Strangler Fig (bottom right).

they are well adapted to their environments and are the living proof of a successful evolutionary strategy.

Day 5

Exploring the river and rainforest is why we came here, but one of the trip's great pleasures is actually just spending time on deck and watching them go by. Time passes differently onboard a boat, and the pace helps one appreciate the immensity of the forest and the rivers. The one-hour, 52-minute flight from Lima to Iquitos does little to convey the enormity of the Andes Mountains. In our modern, busy lives it can be hard to take the time to appreciate time itself. It helps that there is no Internet and practically no cellular service here. I hope it stays that way.

Given that we have an afternoon to enjoy the ride, it is only customary that we do it with the Peruvian national drink: the pisco sour. Pisco is a brandy made by distilling grape wine into a high-proof spirit. The pisco sour is made using the formula 3:1:1—3 ounces of pisco, 1 ounce of limón juice (lime or lemon depending on preference), and 1 ounce of simple syrup (or *jarabe*). Add a raw egg white and shake vigorously. Pour the foamy drink through a cocktail strainer into three or four small, old-fashioned glasses and garnish with Angostura bitters. It is better to drink multiple small, refreshing drinks than to pour a single large one.

Every Latin American country has its own version of a pisco sour, a refreshing citrus and sugar drink made with the local liquor. Brazil has the caipirinha made with cachaça, Cuba has the mojito made with rum, and Mexico has the margarita made with tequila. But we are in Peru and a pisco sour suits the mood perfectly.

Day 6

Diversity is important biologically and culturally. While I am a biologist trying to preserve ecosystems and protect endangered species, it is clear that this effort requires the support of local communities. The loss of indigenous knowledge and local cultures is detrimental to the environment because humanity's balance with nature is lost when people no longer have a connection to their environment or a sense of place. Ninety-nine percent of conservation is a social issue and needs to first address issues of poverty, corruption, education, disease, and overpopulation. We have been lucky

on this expedition to have the opportunity to visit several local Cocomas communities and see not only how people along the Amazon live, but also how these groups are working to become more sustainable. We learned about a nonprofit organization in this region called Minga Peru, which works to empower women and families. We met and talked to multiple women who, through this program, are working to reduce domestic violence, promote gender equality, and encourage pride in their cultural heritage. Many of these women are now operating cooperative fish farms to harvest food to feed their families and communities, and to sell for profit. Ask any serious environmentalist what the most important environmental organization is and they will say Planned Parenthood. Educating and empowering women is critical to saving our planet.

We brought school supplies and the local children sang songs for us. It was wonderful to visit villages where the children are bilingual, speaking both Spanish and the native language of their elders. I buy their beautiful baskets and wood carvings and feel good about supporting these communities. Ecotourism, when done correctly, can have a positive impact on local people and create value in preserving natural resources.

Day 7

I know I promised that there would be turtles and we haven't seen any yet. Be patient—we're getting there.

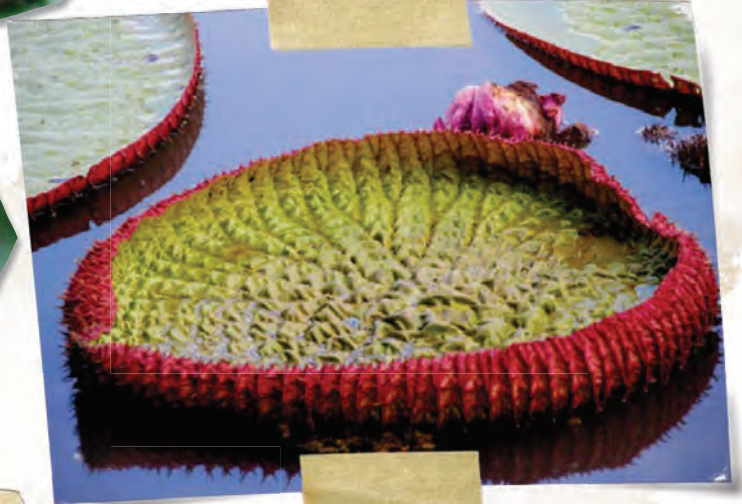
After all this discussion about biodiversity, it may be surprising to learn that the Amazon is not the center of turtle diversity. Instead, it is North America, followed closely by eastern Asia. This goes back to understanding the creatures' biogeography. Turtles are an old lineage that diverged from early reptiles at least 230 million years ago and, thanks to their shells, they have left a tremendous fossil record that helps us understand their evolution. There are two main taxonomic groups of turtles: side-necked (Pleurodires), which fold their necks to the side of the shell as they withdraw their heads, and hidden-necked (Cryptodires), which retract their heads by pulling their necks up and back. The common ancestor of these two groups lived on the supercontinent of Pangaea 220 million years ago. At the time, the problem of how to pull one's head into one's shell for protection had not yet been solved. That happened 200 million years ago, after the supercontinent separated into the northern

Laurasia and the southern Gondwanaland, and the Cryptodiran and Pleurodiran turtles independently evolved their respective neck-retraction strategies. Pleurodires are the less common of the two groups and are restricted to the continents of the southern hemisphere. Tortoises—Cryptodiran Turtles that adapted to a life on land—evolved approximately 60 million years ago in Mongolia and, later, successfully colonized North America, Europe, and Africa (including the part that became South America).

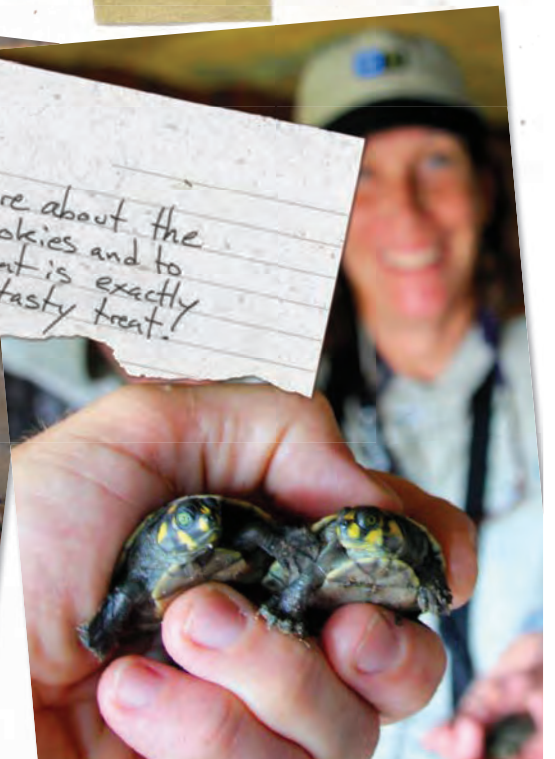
Despite a relative lack of turtle diversity in the Amazon Basin (only 16 species call the rainforest their home), some extremely interesting kinds evolved here. The Mata Mata Turtle (*Chelus fimbriatus*) has a triangular head with a neck that stretches out nearly as long as its carapace. It is cryptically camouflaged like leaf litter and it resides in shallow water where it waits for unsuspecting fish. The Yellow-Footed Tortoise (*Geochelone denticulata*), in contrast, lives on land and is primarily herbivorous, although it will also eat insects and carrion. This species can reach massive size, weighing up to 130 pounds, and it shares an ancestor with the famed Galápagos tortoises that floated to islands for which they're named.

The most abundant turtle species in the Amazon belong to the genus *Podocnemis*, such as the Giant South American River Turtle (*P. expansa*). These are the largest freshwater turtles in South America and they were once widespread throughout the larger tributaries of the Amazon. These herbivorous turtles spend the high water season in the flooded forests and oxbow lakes until the water levels drop and females migrate up the tributaries to nest. Like some sea turtles, they nest in giant aggregations called *arribadas*. Historically, thousands of river turtles would nest in these groups en masse but unfortunately now their populations have been diminished due to overexploitation by people. Recent research from biologists Camila Ferrera and Richard Vogt of Tartarugas da Amazônia in Brazil has shown that this species uses underwater vocalizations that may explain how the turtles synchronize their migration and

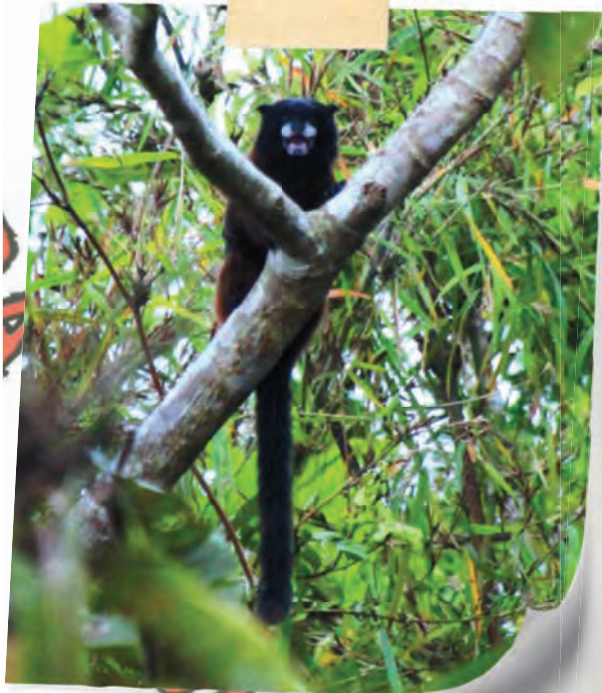
Like many other turtle species in the Amazon Basin, the Yellow-Spotted Amazon River Turtle (bottom) is threatened by human consumption. Luckily head-start programs in Peru are helping to restore wild populations.



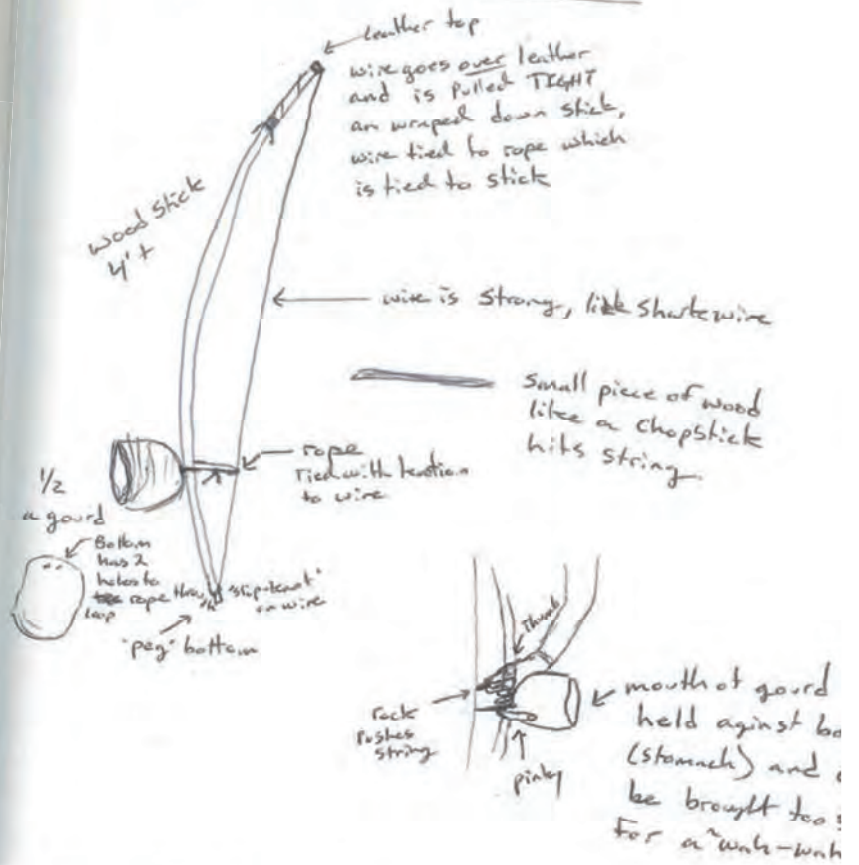
The baby turtles are about the size of Oreo Cookies and to many predators that is exactly what they are: a tasty treat!



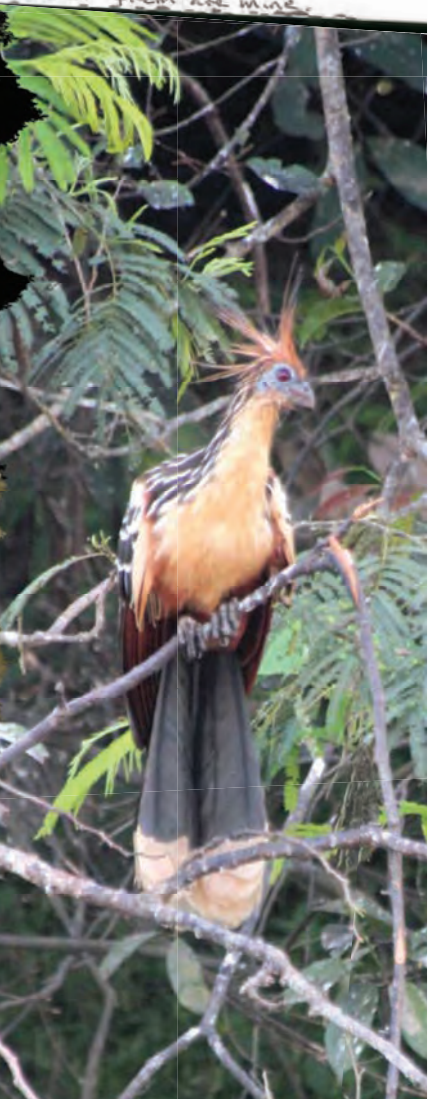
walking line
 + Fleeds like music, but I still
 how the tune.



How To MAKE A Berimbau



There are problems in these times, but none of them are mine.



nesting. Similarly, the baby turtles may communicate with one another while still inside their eggs to synchronize hatching. The females remain near these hatching sites during the entire incubation and when the hatchlings emerge from the nests in unison, the adult females and their young migrate back to the flooded forests together. These are not the only turtles that acoustically communicate and it certainly blows away the notion that they are “simple” creatures. Instead, they are more on par with birds as socially complex animals that exhibit maternal care.

Day 8

As a conservation biologist, my job is to apply the principles and tools of science to preserve biodiversity and to understand the negative impact humans are having on the environment.

Unfortunately, like most turtle species in the world, many turtles in the Amazon are threatened with extinction. And also like the majority of endangered turtle species, Amazonian turtles are primarily threatened due to human exploitation. Historically, the Giant South American River Turtle was an extremely abundant species but there is a long history of overexploitation of eggs and turtles for consumption and oil extraction. Although they were a common resource for indigenous peoples for centuries, the arrival of Europeans and the industrial growth in the region during the rubber boom practically wiped these turtles out. It has been estimated that during the 19th century, one to five million eggs were destroyed every year to make oil. Fortunately, turtles are no longer exploited for oil extraction, but consumption still remains a problem and is worsening with human population growth. Despite being legally protected, turtles and their eggs remain in high demand. In many Latin American countries, turtle eggs are thought to be an aphrodisiac and this kind of cultural folklore can be very difficult to overcome in the name of species conservation.

In Mexico, a recent campaign to stop the consumption of turtle eggs featured the *Playboy* cover girl Dorismar. In the television PSA, the scantily clad celebrity model said, “*Mi hombre no necesita huevos de tortuga*” (“My man doesn’t need

turtle eggs”). In Brazil, the Brazilian Institute of the Environment and Renewable Natural Resources took an innovative approach. The organization allowed captive farming of turtles and gave hatchlings to commercial farmers with the caveat that a certain proportion had to be maintained for future stock and, most importantly, the legal sale of the turtle meat had to undercut the black market price. I had the opportunity to visit some of these farms in the early 2000s when this project was new and many of these farmers had simply incorporated turtles into their already existing fish farming efforts. Now that some time has passed, the effort has received mixed reviews; for small-scale farmers, the time and expense required to raise turtles (farmers have to raise the turtles for at least six years for them to be marketable) has not proved profitable, but for larger farms with mixed production, where the infrastructure is already present and the turtles can be fed with byproducts of the other farming practices, the initiative has been successful.

The most common conservation approach to save river turtles in the Amazon has been head-starting, which involves collecting eggs from nests and moving them to a more protected environment until the hatchlings can be released back to the wild. Here in Peru, specifically in the Pacaya-Samiria National Reserve, the effort is focused on the Yellow-Spotted Amazon River Turtle (*Podocnemis unifilis*). And this is where we are headed tomorrow.

Day 9

We got an early start today so that we could explore deep inside the Pacaya-Samiria Nature Reserve. The rising sun cast brilliant pink and orange reflections on the river as we looked from the deck to the immense, green forest just beyond where we had docked for the night. This was the pinnacle of our exploration into the Amazon and the most remote and pristine place we have been on our journey; the heart of the flooded forest. After loading the skiffs, our first stop was to sign in to the log book at the ranger station and, thus, our presence here is documented for the ages.

In the reserve, we traveled up the Pacaya River and saw many of the species that have become familiar over the last week; Blue-and-Yellow Macaws, Cocoi Heron, Spectacled Caiman, Squirrel Monkeys, and the enormous Jabaru Stork. We also began seeing animals that were new to

While some animals like the Hoatzin (bottom right) and the Saddle-Backed Tamarin (top) are active by day, it’s best to search for Spectacled Caimans (left) and Cat-Eyed Snakes (middle) at night.

us, beginning with a large group of bizarre-looking Hoatzin. Distantly related to cuckoos, these birds look more like prehistoric dinosaurs. As we watched them from the skiffs, they were aware of our presence but did not immediately fly away like most birds. They made a variety of odd sounds and cautiously moved to adjacent branches, almost as if they were just going through the motions but didn't really care that we were there. Apparently, people do not eat them because of their bad-tasting flesh, so we may not have appeared as much of a threat.

Among the colorful macaws and the playful monkeys we finally had the opportunity to see one of the Amazon's more timid creatures, the Yellow-Spotted Amazon River Turtle. At first, we saw just one or two basking on logs, but once we had the proper search image in mind, they seemed to be everywhere. Like the Giant South American River Turtle, these turtles and their eggs have been prized as a culinary treat by humans since people first arrived in Amazon Basin. Fortunately, Peru recognized that wild populations were on the decline before it was too late and began a head-start program to reduce poaching and help augment the survival of nests and hatchlings. This season alone, fall 2016, approximately 185,000 eggs were carefully collected in the reserve and are now waiting to hatch in sandbox "incubators" at the various park stations in the reserve. The local people living in the reserve now help protect the turtles and ensure that the eggs hatch. As temporary workers at the turtle hatcheries, they are compensated by being allowed to collect resources from the reserve that otherwise would be off-limits, including fish and even the infertile turtle eggs. As such, they are stewards of the reserve and help to protect all of its valuable natural resources.

We stopped at several small stations dedicated to head-starting Yellow-Spotted Amazon River Turtles. The workers, who live onsite, collect the turtle eggs and bring them to the stations to incubate for 55 to 70 days. As it does for many turtles, the incubation temperature determines the sex of the hatchlings. Here, the stations skew the sex ratio of the population toward females, which is crucial for achieving population recovery. Once the eggs hatch, the workers wait until the baby turtles' shells harden (about two weeks) to release the baby turtles back to the wild, giving them a head start in life. The baby turtles are about the size of Oreos and to many predators that

is exactly what they are: a tasty treat. These little turtles have a tough road ahead of them but they are well equipped with strong webbed feet to swim through the flooded forests in search of shelter and food. It will take many years for them to reach maturity on a diet of water hyacinth and fruits. Of the thousands that are released every year, only a lucky few will ever make it to adulthood.

As the day got hotter, we cooled off by swimming in a black water lagoon in the middle of the reserve. Around us, reflections of the dense vegetation danced on the surface and Pink River Dolphins periodically breached to take a breath. The water was refreshing and, as we lingered, we attracted some local inhabitants: Hatchet Fish. These little catfish nibble on you like cleaner-fish searching for a meal. While a bit unnerving at first, it reminds us that we are all just a part of this bigger ecosystem and not outside of it. Knowing that we start our journey home tomorrow, this was an important reminder that we will hopefully take back with us: our actions, whether supporting a local woman by purchasing a hand-woven basket or choosing sustainable seafood options off restaurant menus back home, affect this place and the organisms that live here.

As we enjoyed the cool water, we spotted a few adult turtles basking on logs along the banks. After learning of their plight, we felt lucky to see these incredible survivors. Half of all known turtle species are considered threatened with extinction. Since they are long-lived and slow to mature, turtles do not typically recover quickly from population crashes. But there is hope for the Yellow-Spotted Amazon River Turtle, which can still inhabit expansive areas of intact wild forest found in the reserve. It is critical to all conservation efforts that species have habitat to live in. Turtles are just one of the many animals that the Pacaya-Samiria reserve helps to protect and we have been fortunate to experience this in all the beautiful creatures, great and small, that we have met on our journey. We are thankful that these natural wonders are protected in the reserve and that we have the opportunity to enjoy and appreciate them. 🐢

Clockwise from top right: Blue-and-Yellow Macaws, Yellow-Spotted Amazon River Turtles, Yellow-Footed Tortoises (which can grow to be a massive 130 pounds), a Common Squirrel Monkey, and a Pygmy Marmoset.



Among the colorful macaws and the playful monkeys we finally had the opportunity to see one of the Amazon's more timid creatures, the Yellow-Spotted Amazon River Turtle.





TURTLE CONSERVANCY

“There’s something conservationists learn very early on, and it only becomes more palpable when you’re on the ground day after day: It’s not enough to save even the largest tracts of land if the species who belong there are absent. Rewilding missing species has to be at the core of our work. The Turtle Conservancy is at the top of this game.”

— KRISTINE TOMPKINS

“We are on parallel paths with the planet. The wants and needs of marine wildlife are our own: we want connection, companionship, a healthy clean environment.”

— ADRIAN GRENIER

“Here in the United States we turn our rivers and streams into sewers and dumping-grounds, we pollute the air, we destroy forests, and exterminate fishes, birds and mammals—not to speak of vulgarizing charming landscapes with hideous advertisements. But at last it looks as if our people were awakening.”

— THEODORE ROOSEVELT



TURTLECONSERVANCY.ORG