



## A Letter from the Editor:

Dear Students,

Welcome back! I hope everyone enjoyed their break. We have passed the winter solstice, the Sun will be out for longer, and it is sweater season! January is going to fly by with a holiday on the 16<sup>th</sup>, midterms, and regents week. The 3<sup>rd</sup> marking period will also be ending on the 27<sup>th</sup>.

This week we will be completing lab 4 along with section 4 for Chapter 2. Earth Science study Hall will be held on Wednesday at 3:00.

Sincerely,  
Mr. Tarbert

## Amazon: Earth's Mightiest River

By Traci Pedersen, Live Science Contributor

The Amazon River is a massive, intricate water system weaving through one of the most vital and complex ecosystems in the world — the Amazon rainforest in South America. It is by far the mightiest river on Earth in terms of volume and width — reaching a span of nearly 30 miles (48 kilometers) in some parts during the rainy season. The river and its basin are home to many unique species of animals, trees and plants.

The Amazon River's 4,000-mile (6,437 km) journey begins high in the Andes. These mountains act as a wall blocking the warm, moist air moving in from the east, resulting in heavy persistent rainfall that consistently feeds the Amazon's headwaters. The river then makes its way east through thousands of miles of rainforests and lowlands until it empties into the Atlantic Ocean on the northeastern coast of Brazil.

The Amazon River is the second longest river in the world, slightly shorter than the Nile River (4,258 miles or 6,853 km), although some experts contend that the two rivers are so close in length (since measuring methods vary and there is still some dispute over their true sources) that it is difficult to say which river is actually longer. With more than 1,100 tributaries — 17 of which are over 930 miles (1,497 km) long — the Amazon River has the largest drainage system in the world. It is estimated that approximately one-fifth of all the water that runs on the Earth's surface is carried by the Amazon River, according to the Encyclopedia Britannica. In fact, it has greater volume and total discharge than the next six largest rivers combined.

During the dry season (June to November) the width of the Amazon River averages between 2 to 6 miles (3.2 to 9.6 km) depending on the area, and in the wet season (December through April) the width can reach up to 30 miles. At the height of wet season, the current can travel more than 4 mph (6.4 km/h).

The river received its name from the Spanish soldier Francisco de Orellana, who is credited as the first European to explore the length of the river in 1541, according to Encyclopedia Britannica. He named it the Amazon after encountering and engaging in battles with female warriors who reminded him of the Amazons in Greek mythology.

### Amazon basin

The Amazon basin is the large area of land that drains into the Amazon River and its tributaries. It occupies about 38 percent of the total area of South America, covering a total of 2.67 million square miles (6.9 million square km), according to the U.S. Geological Survey. The lowlands around the river and its tributaries flood yearly, deeply enriching the surrounding soil. More than two-thirds of the basin is covered with rainforest, or *selva*. The basin is located in parts of six countries: Brazil, Peru, Colombia, Ecuador, Bolivia and Venezuela. Most of the basin and about two-thirds of the river itself is located in Brazil.

This interior part of the Amazon rainforest is one of the most diverse corners of the Amazon basin. A hectare of forest typically contains 250 species of large trees. Credit: Nigel Pitman The Field Museum

There are several large cities located in the Amazon basin: Belem, Brazil, located at the mouth of the Amazon River and home to 1.3 million people; Santarem, Brazil, located at the junction of the Amazon River and the Tapajos River; Manaus, Brazil, a city of 2 million people located in the middle of the jungle; and the large metropolis city of Iquitos, Peru, a port city and gateway to the tribal villages of Northern Amazon.

Indigenous people make up approximately 9 percent (2.7 million) of the population in the Amazon basin. This includes 350 different ethnic groups with more than 60 of these remaining essentially isolated, according to the Coordinator of Indigenous Organization of the Amazon Basin (COICA).

### River life

The Amazon River is home to more than 5,600 known species of fish, including 100 species of electric fish and up to 60 species of piranhas. The arapaima or *pirarucu*, one of the largest freshwater fish in the world (up to 15 feet or 4.6 meters long), also makes its home here. The Amazon River dolphin is the largest species of river dolphin in the world; its color changes



## Student of the week!



McKennah Lott

McKennah has earned student of the week for consistently providing high quality work. "Work hard in silence, let your success be your noise" Frank Ocean. Congrats McKennah!



with age from gray to pink to white. The giant otter and the Amazonian manatee also live in these tropical waters.

## River reef

An international team of scientists made an unusual discovery during a recent expedition to the Amazon River — they discovered a coral reef system thriving in the river's plume, the area where the river empties into the ocean.

When river water enters the ocean, it has a significant impact on salinity levels, pH, sedimentation, temperature, light penetration and nutrient availability, typically making the environment very unfavorable for reef growth. This is particularly so in the massive Amazon plume, which can reach as far north as the Caribbean Sea.

Patricia Yager is an associate professor of marine sciences at the University of Georgia's Franklin College of Arts and Sciences and is one of the scientists on the expedition. "The coolest thing about these reefs is that there are corals living at least part of their year in the dark, below the turbid Amazon plume," she told Live Science. "We didn't expect that and we are still trying to understand how their metabolism works."

She explained that these reefs are situated quite low, well below any incoming sunlight — a few hundred feet below the Amazon's turbid plume which itself is about 65 feet (20 m) thick.

Yager and the scientists are still investigating how the reef animals survive in this unique system. "They also live in a fast current (North Brazil Current) that likely keeps them from getting too covered with mud, but it may also deliver food particles at a high rate, so the reef animals can suspension feed. Whether their food comes from the river plume is still to be investigated."

Unfortunately, as with the Amazon rainforest, these unique reefs are susceptible to human activity. "In terms of human threats, the most immediate are oil drilling, phosphate mining and fishing pressure," said Yager. "But these reefs are well within the tropical surface layer, so they are also likely to be experiencing ocean warming and acidification from human-driven combustion of fossil CO<sub>2</sub> (oil and gas). We also know that climate change is impacting the tropical water cycle and therefore the Amazon River, but we are still investigating those connections."

## Amazon rainforest

The Amazon River is intricately connected to the delicate ecosystem of the Amazon rainforest — the largest rainforest on Earth, covering approximately two-thirds of the Amazon River basin. The Amazon rainforest is home to more than one-third of all known species in the world. It features remarkable complexity with as many as 100 arboreal species found on a single acre with few of these occurring more than once, according to the Encyclopedia Britannica. The Amazon rainforest is often referred to as the lungs of the Earth, as it acts as an enormous air machine, absorbing carbon dioxide and releasing vast amounts of life-supporting oxygen.

The rainforest features a unique layering system: the emergent layer, the canopy, the understory and the forest floor. The canopy is home to about 70-90 percent of life in the rainforest. The crowns of these trees form a tight continuous canopy about 60 to 90 feet (18.3 to 27.4 m) above ground, and can reach as high as 120 feet (36.6 m). The branches are covered with other plants (epiphytes) and tied together with vines. The canopy helps regulate temperature and humidity and is intricately connected to the region's climate, according to the World Wide Fund for Nature (WWF).

Individual gigantic trees, called emergents, peak out from the canopy, creating the emergent layer. These trees can reach heights up to 200 feet (60 m) above ground. Some animals that live in the emergent layer include the scarlet macaw, capuchin monkey and the harpy eagle, according to the Smithsonian Tropical Research Institute.

The understory layer is very dark, receiving only 2-15 percent of the area's sunlight, according to the Missouri Botanical Garden. Because of the scarce sunlight, the understory is far less dense than the canopy and generally consists of young trees and other plants that require very little sunlight to thrive. The layer with the least amount of sunlight — receiving only 2 percent — is the forest floor. It consists of a thin layer of quickly-decomposing fallen leaves and branches, fruits and seeds.

The Amazon rainforest has been the focus of fervent conservation efforts within the last three decades as human activities have increasingly threatened the delicate balance of the area's complex ecology. The cattle industry in Brazil plays a major role and is responsible for approximately 80 percent of Amazon deforestation, according to a 2009 report by The Guardian.

## Transportation

In this land of impassable jungles and limited roadways, the Amazon River is still a primary mode of transportation for many individuals, particularly the indigenous people. River boats and ships commonly shuttle citizens, tourists and goods from one area of the Amazon to another.

But as the growing population continues to depend on the largely unsupervised river for transportation, it has exposed more people to an age-old terror — piracy. Although pirates have long been a scourge of remote waterways throughout history, the current population boom coupled with the rise of drug gangs and organized crime in the Amazon basin have led to more hijacking opportunities, according to a report in the New York Times. Many slower-moving riverboats are essentially sitting ducks for the faster boats often manned by heavily armed thieves. Ships are often seized after nightfall, and local governments and police forces are struggling to keep things under control.