

You can't separate the Amazon's forest from its freshwater, scientists say

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A man navigates his boat along the Lorencillo River in the municipality of Ciudad Constitucion in Peru's Amazon, Oct. 27, 2015. Photo: AP/Rodrigo Abd

Environmentalists want to stop deforestation in the Amazon basin and the topic gets a great deal of attention. Preserving trees is important, but scientists worry that the freshwater ecosystems, another important aspect of the Amazon, are not getting enough notice.

The Amazon is the world's largest remaining rain forest and home to one of the greatest varieties of plants and animals on Earth. It covers 2.1 million square miles of land. Sixty percent is in Brazil, 13 percent is in Peru, 10 percent is in Colombia, and the rest is split into very small parts in six other countries. The whole area covers 40 percent of South America, which is one of the world's seven continents.

Water Equals Life

Scientists say freshwater ecosystems, or bodies of water where plants and animals interact with their environment, are critical to the health of the Amazon basin, the world's largest network of rivers, streams and lakes. It covers more than 2.6 million square miles and funnels water from over 1,000 rivers in eight countries into the 4,000-mile-long Amazon River.

The plants and animals that make their homes in the Amazon are facing a number of threats. In the journal *Global Change Biology*, scientists argue that finding better ways to protect the water systems is of great importance. In addition, they say people who live there need protection, along with the plants and animals.

Leandro Castello, a professor of fisheries at Virginia Tech, helped write the article. He says that when he worked on fish conservation in the Amazon, he was disappointed in how much more attention was paid to the rain forest than its water systems.

Freshwater ecosystems in the Amazon provide many important services to the plants, animals and people who live there, including moving water through the rainforest, cycling soil, and regulating microclimates. The water systems are also home to a variety of plants and animals, including thousands of fish species. In addition, people who live in the Amazon need them for food and water.

Changing Hydrology Hurts Water Systems

In spite of their importance, the freshwater ecosystems are in trouble.

One cause is a change in hydrology, or the way water moves around. Castello says that kind of change is one of the worst things for a freshwater ecosystem.

"If you change the amount of water in either a lake or river or stream, you will change a lot of processes," Castello says.

Building dams is one way to change hydrology. Dams interrupt natural water flow and collect water in reservoirs, keeping fish and other animals from moving through and preventing nutrients in water from moving downstream. Studies show that damming is not only a threat to the jobs of fishermen, but also a threat to people whose diet is mostly fish.

There are many dams in the Amazon basin already and 277 future projects under consideration. In the journal, scientists say that if all the new dams are built, only three rivers will be left untouched.

Danger From Mines And Deforestation

Mining can also have an impact on water systems. Gold mining often requires dredging rivers and streams which can alter river beds and introduce pollutants such as heavy metals into the water.

In addition to dams and mining, deforestation is one of the most serious threats to freshwater ecosystems. Castello says trees perform an important step of the water cycle known as evapotranspiration — when trees suck up water from the soil, draw it into their branches and then allow it to evaporate into the air through their leaves. Deforestation means there are fewer trees to do this, so water trickles back into the rivers, bringing soil with it.

Deforestation can also make droughts worse and reduce rainfall. In addition, plants and trees are important for the soil structure on land, and removing them can cause soil to wash into the water, and even reshape rivers and streams.

Hotter Climate, Disappearing Streams

Climate change may add another problem as temperatures in the Amazon basin continue to rise, and droughts and severe storms become more frequent and intense. Drier conditions may also drop water levels in large rivers, and some streams might disappear completely.

Castello says that the key to better conservation is for policymakers to develop a strategy that focuses on both land and freshwater ecosystems. He also says that satellites could be a useful tool for monitoring freshwater ecosystems in the Amazon. Satellites already help governments to keep an eye on illegal deforestation.

Scientists also say that although there is much protected land in the Amazon, a large number of freshwater areas are unprotected. In addition, many freshwater ecosystems are in protected areas but still affected by dams outside their boundaries. Some are protected, but include exceptions to allow activities such as mining.

Beware Of Downstream Impacts

Marcia Macedo is a scientist with the Woods Hole Research Center in Massachusetts. She also worked on the paper. Macedo says policymakers should consider how development projects affect the whole environment and the effects on water systems do not stay in one place.

"You have the impacts moving downstream in the river, across official boundaries, across state and country lines," Macedo says.

Claudio Maretti is president of the Brazilian Institute of Biodiversity Conservation and Protected Areas.

"The most important thing is to build the information across borders," Maretti says.

If countries have the same policies, they can do a better job of protecting species and ecosystems, he believes.

Maretti also thinks that totally halting development in the Amazon would not be advisable. He says policymakers and conservationists must find ways to balance economic development with good conservation practices that include all aspects of the Amazon.

Quiz

- 1 Read the following selection from the article.

(Castello) says that when he worked on fish conservation in the Amazon, he was disappointed in how much more attention was paid to the rain forest than its water systems.

Which of the following can be inferred from the selection above?

- (A) Castello does not appreciate the great work being done by deforestation activists.
- (B) There is likely a bitter rivalry between forest activists and water systems scientists.
- (C) Castello thinks that when the public does not know about water systems, water systems issues are harder to solve.
- (D) Castello believes the damage to the water systems is ultimately more significant than deforestation, because everything needs water.

- 2 Read the following paragraph from the section "Changing Hydrology Hurts Water Systems."

There are many dams in the Amazon basin already and 277 future projects under consideration. In the journal, scientists say that if all the new dams are built, only three rivers will be left untouched.

Which idea below is MOST clearly supported by this paragraph?

- (A) Dams interrupt natural water patterns, which get in the way of fish and nutrient flows.
- (B) Damming is affecting more and more of the Amazonian ecosystem and should be addressed quickly.
- (C) Waterways need to be treated as seriously as rainforests, because the waterways nourish and affect everything else.
- (D) There are several human-caused activities affecting the Amazonian basin, such as damming, mining, deforestation, and global warming.

- 3 Which statement accurately identifies the article's purpose?
- (A) to educate the public about the dangers to and importance of Amazonian water systems
 - (B) to educate the public about a courageous scientist and his unorthodox views about water systems
 - (C) to persuade readers to push for companies to stop development in the Amazon region until the problems are addressed
 - (D) to persuade readers that the issues of deforestation are minor compared to the issues of mining, damming, and global warming
- 4 Each selection is an argument from the article. Which selection is LEAST relevant to the purpose of the article?
- (A) Freshwater ecosystems in the Amazon provide many important services to the plants, animals and people who live there, including moving water through the rainforest, cycling soil, and regulating microclimates.
 - (B) In spite of their importance, the freshwater ecosystems are in trouble.
 - (C) Castello says that the key to better conservation is for policymakers to develop a strategy that focuses on both land and freshwater ecosystems.
 - (D) Maretti also thinks that totally halting development in the Amazon would not be advisable.

Answer Key

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