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## REPORT

Exploring the Amazon

By Jeffrey Laign

Scientists are searching for miracle drugs to extend our lives, as healing plants abound in the rain forest. But commerce has other plans.

Like Sean Connery in the movie "Medicine Man," David Kingston is feverishly searching the Amazon jungles of Suriname for a cancer cure. "We have not found a drug yet," says Kingston, a chemistry professor at Virginia Polytechnic Institute and State University in Blacksburg, "but we have isolated 25 new chemical entities-and all have biological activity."



The Amazon is packed with plants that might hold cures for cancer or AIDS. Others may contain chemical compounds that could slow the aging process and extend our lives significantly. But unless steps are taken to slow destruction of the Amazon rain forest, there may not be any plants left to provide us with lifesaving medicines. Harvard's Pulitzer Prize-winning biologist Edward O. Wilson estimates that every day the rain forest loses 137 plant, animal and insect species. That's 50,000 a year!

And a new study has found that loggers, miners and developers are destroying the Amazon twice as fast as scientists believed-more than an acre a second, in fact. "And that's a conservative estimate," says Massachusetts ecologist Daniel C. Nepstad. "The problem could be greater."

### **The lungs of the earth**

If the Amazon region were a country, it would be the ninth largest on earth. Covering more than 1 billion acres-two-fifths of the South American continent-the vast Amazon rain forest crowns nine nations: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela. The most bioactively diverse region on the planet, the Amazon is our greatest natural resource. Because it continuously recycles carbon dioxide into oxygen, the forest has been dubbed the "lungs" of the earth. The Amazon, in fact, produces more than 20% of the oxygen we breathe.

Nonetheless, commerce has swallowed up 57% of the world's rain forests. Only 40% of the Amazon remains-and that's disappearing at an alarming rate.

### **The year the world caught fire**

In just the last few years, 16% of the Amazon has been destroyed-far more than Brazilian authorities had estimated, say Nepstad and colleagues at Massachusetts Woods Hole Research Center. Each year, Nepstad contends, commercial enterprises wipe out 17,000 square miles of Amazon forest, three times more than the Brazilian estimate of 5,700.

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"It's creeping up on us," says Bill Mankin, director of global forest policy projects for two international environmental groups, "and people may not even be crafting a solution because they don't realize there's [such a large] problem."

Worldwide, more than 200,000 acres of rain forest fall victim to fire and chain saws every day. In 1997, in fact, more tropical forests were burned than at any other time in recorded history, according to a report issued by the World Wide Fund for Nature. "That was the year the world caught fire," says Jean-Paul Jeanrenaud, head of the organization's forest program.

Commercial logging accounts for the single largest cause of rain forest destruction. Loggers strip the forests of tropical hardwoods,

including teak, mahogany and rosewood, and sell the lumber to developed countries, including the United States. The wood then is used to produce furniture, building materials, charcoal-and even coffins, which are buried or burned.

Other industries as well are looting the Amazon. The cardboard packing and wood chipboard industries, for example, employ 15-ton machines that gobble up 200 species of trees, transforming centuries-old giants into chips half the size of a matchbox. Brazil, moreover, sits on one of the world's largest reserves of iron ore, gold, semiprecious and precious stones, natural gas and oil. Strip mining is common in the Amazon. And each year miners gouge out thousands of acres, rendering the land useless.

When you consider the poverty that challenges so many Amazon nations, it's possible, perhaps, to understand why governments are reluctant to turn away developers. Nonetheless, Amazon logging concessions are sold for as little as \$2 an acre, while the companies that purchase them net lumber worth thousands upon thousands of dollars.

Mass deforestation produces horrendous side effects-not only for the Amazon but also for the rest of the world-including air and water pollution, soil erosion, malaria epidemics, eviction and destruction of indigenous cultures, and loss of animal species. Environmentalists worry as well that enormous quantities of carbon dioxide produced by forest fires and rotting wood may hasten global warming. In fact, they speculate, damaging the rain forest, which produces huge amounts of water vapor, could throw the entire planet's climate out of balance.

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And, of course, every time we lose an acre of rain forest, we lose perhaps hundreds of miracle medicines that could prolong our lives and cure many of the ills that plague us.

### **Mother Nature's Pharmacy**

Think of the rain forest as a living drugstore. Twenty-five percent of the prescription drugs we use in this country come from plants that grow in the rain forest. Worldwide, just 90 species of rain forest plants produce 121 powerful prescription drugs, which net \$200 billion in sales each year. Rain forests are vast repositories of natural resources. In fact, more than half of the world's estimated 10 million species of plants, animals and insects live in rain forests. If there's a cure for cancer, there's a good chance we'll find it there. That's because rain forest plants are especially rich in disease-fighting alkaloids.

The National Cancer Institute has identified 3,000 plants that fight tumors-and 70% come from the rain forest. Yet scientists have tested only 1% of the potentially healing plants that live in the rain forests. Who knows how many anti-aging therapies and drugs might be derived from the remaining 99%?

Rain forests plants make good medicines because they contain thousands of chemicals they have evolved to protect them from pathogens. The few chemical compounds we've analyzed so far have proven to be highly effective in battling the organisms that cause tuberculosis and other diseases. And scientists speculate that some might be able to eradicate even the virus that causes AIDS.

Some of the most potent medicines known to science were discovered in the rain forest. These include:

Vincristine. Extracted from a species of periwinkle that grows in the rain forests of Madagascar, this drug has dramatically increased survival from childhood leukemia. Thanks to vincristine, 8 out of 10 children stricken with the devastating disease recover fully.

Quinine. For decades this medicine made from South American cinchona bark has been used to save millions around the world from perishing from malaria.

Curare. South American Indians dip their arrowheads in this plant-derived poison. But curare has far more valuable uses. It yields d-tubocurarine and other alkaloids used to treat multiple sclerosis and Parkinson's disease. And it's an essential ingredient of anesthesia.

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Those miracle medicines are just a fraction of the healing drugs that may be hidden in the forest. As many as 300 new life-saving drugs-valued at \$147 billion-await discovery, in fact, estimate Yale economist Robert Mendelsohn and Michael J. Balick, director of the Institute of Economic Botany at the New York Botanical Gardens.

But will scientists find them before the forests are destroyed?

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