Sensitive Rainforest Ecosystems

The slightest cooling in the vast rainforests of the Amazon can wreak havoc with the inhabitants, imperiling the movement of species and disrupting their communities, the results of a 22-year investigation reveal. The study, published in the June issue of Conservation Biology, found that habitat fragmentation effects "the structure, composition and function of rainforests," researchers said. It "is far-reaching and widely felt... increases local extinction rates for many plant and animal species; drastically alters species richness and abundance; and disrupts ecological processes, as well as creating opportunities for non-native species invasion altering forest carbon storage and increasing vulnerability to fire." Researchers were surprised to learn how many wildlife species are extremely sensitive to very small clearings -- even a 25-yard-wide roadway alters it community composition of birds and other wildlife and creates a complete barrier to movements of some species. Researchers say the results also demonstrate "clearly that about 40 percent of Amazonian nature reserves will have to be very large in order to maintain their diversity and dynamics, and to withstand external threats from such human disturbances as burning, logging and hunting."

Fermenting Hydrogen Fuel?

Automobiles powered by hydrogen fuel cells could eventually be piling up to wastewater treatment plants for fill-ups, say Penn State University researchers, who have boosted hydrogen production 43 percent by using continuous hydrogen release fermentation process. By using certain industrial wastewater as feedstock, the technique offers an abundant, "green," local source for hydrogen and potentially makes it a cheaper fuel than gasoline. "Continuous fermentation is not hard to do and the high volumes of gas produced make it a potential source of supply for a wide variety of fuel cell applications besides cars and buses," researchers said. These include home power generation and the micro-fuel cells being developed for consumer products such as laptops, cell phones, smoke alarms and calculators. The fermentation was conducted with bacteria from ordinary garden soil collected from local farmland. The soil was heat-treated to kill hydrogen-consuming bacteria. Although the heat treatment also kills non-hydrogen producing soil bacteria, it leaves hydrogen-producing bacteria in a dormant spore form that revives as soon as it is put in suitable conditions.

Spying On Volcanoes

Researchers at Los Alamos National Laboratory have been spying on volcanoes from a distance to learn whether they give out subtle clues prior to erupting. But the spying is not always simple and straightforward. Using both infrared and ultraviolet spectrometers - instruments that allow researchers to see the spectral "fingerprints" of gaseous chemicals being discharged by volcanoes - love and Los Alamos volcanologist Fra Goff studied volcanoes at all points of the compass to learn whether the composition or volumes of volcanic gases change when an eruption is imminent. So far, they have found one spectroscopic clue that may precede an eruption. At Mexico's Popocatepetl -- an active, 17,800-foot volcano located about 50 miles southeast of Mexico City, home to 20 million people -- the amount of silicon tetrachloride gas tends to increase prior to an eruption. The gas also increases dramatically just after the eruption, then quickly subsides. The researchers know the gas turns out to be the chemical signal volcanoes give out before an eruption. They also discovered Popocatepetl, every now and then, blasts out a huge cloud of carbon dioxide, typically a hundred times larger than normal. This means volcanologists may be "significantly" underestimating how much CO2 is being discharged by volcanoes, the researchers said.

Spying Gamma Ray Bursts

A new space telescope built by scientists at the University College of London will be launched by NASA in 2003 to observe the universe's more recent big bangs -- gamma ray bursts. The most explosive events in the universe, little is known about why and when the huge bursts occur. The most distant of them have been spotted in a galaxy 12 billion light years away and scientists believe that the explosion coincided with the early beginnings of the universe. Latest research suggests gamma ray bursts may be produced by explosions of supermassive stars. The explosions, called hypernovae, leave black holes in their wake. Another possibility is the collision of very dense bodies called neutron stars collide. "One thing we do know," researchers said, "is that a gamma ray burst went off in our galaxy, it would cause mass extinction on the Earth in a matter of seconds." The new telescope will look into the most distant reaches of the universe and find about three gamma ray bursts a week.