

Earth is having a bad acid trip, study finds

October 3 2011, By Russell McLendon

Earth may be overdosing on acid - not the "turn on, tune in, drop out" kind, but the "kill fish, kill coral, kill crops" kind. And it's shaping up to be a very bad trip.

The problem isn't just [acid rain](#) or [ocean acidification](#), either: pH levels are plummeting all over the planet, according to a new study by the U.S. Geological Survey and the University of Virginia. The origin of all this acidity, the researchers report, is humanity's growing use of natural resources such as coal, metal ores and nitrogen.

Scientists have long known that certain chemicals can acidify soil and water when released en masse into the environment; [sulfur dioxide](#) and [nitrogen oxides](#) contribute to acid rain, for example, while carbon dioxide is widely blamed for causing ocean acidification.

In their new study, though, the USGS and UVA researchers report that a worldwide acid wash is now being fueled by a variety of human activities, namely "the mining and burning of coal, the mining and smelting of metal ores, and the use of [nitrogen fertilizer](#)." This is dramatically reducing pH levels not just in soil and [seawater](#), they report, but also in streams, rivers, lakes and even the air.

Each of these activities contributes to rising acidity in its own way, the study's authors explain. Much of the [CO2 emissions](#) from coal burning are absorbed by [ocean water](#), for instance, producing carbonic acid that wreaks havoc with [marine food webs](#). SO2 from both coal burning and metal smelting leads to acid rain, which in turn acidifies soil and

freshwater and can directly kill plants. Drainage from [coal mines](#) also boosts acidity in soil, freshwater and groundwater, while nitrogen added to farmland can reduce soil pH over time, limiting its ability to sustain crops.

In a recent press release, USGS scientist and project leader Karen Rice calls the study the first of its kind, and says it can help other scientists and policy makers tackle the planet's acid problem. "We believe this study is the first attempt to assess all of the major human activities that are making Earth more acidic," she says. "We hope others will use this as a starting point for making scientific and management progress to preserve the atmosphere, waters and soils that support human life."

The U.S. and other developed nations took steps years ago to address acid rain, the researchers point out, and environmental regulations have also improved mining and smelting practices. But acidic runoff remains an issue in many areas where intensive mining takes place, even in wealthy countries, and ocean acidification from CO₂ is a growing global issue. Plus, as UVA geochemist Janet Herman explains, fast-developing nations in Asia, Africa and South America are actually expanding their reliance on coal, metals, nitrogen and other acidifying resources.

"The low [pH levels](#) of streams in coal regions of the eastern United States were a major environmental concern 50 years ago," Herman says in the press release. "Changes in mining practices as well as shifting location of production brought about improvements in water quality in Appalachia. In contrast, exploitation of coal has grown in China, where the same environmental protections are not in place."

The researchers created a set of world maps showing coal use, nutrient consumption, copper production and metal smelting on a country-by-country basis, and then factored in things like population forecasts, technological development and regulatory trends. This let them predict,

for example, how rapid population growth in some African countries will likely drive up the use of nitrogen fertilizers to grow more food - thus acidifying soil and freshwater in places that haven't faced such issues before.

"Looking at these maps can help identify where the current hotspots are for producing acidity," Rice says. "The population increase map can help guide policymakers on possible future trends and areas to watch for the development of new hotspots."

The study, titled "Acidification of Earth: An Assessment Across Mechanisms and Scales," was published in the journal *Applied Geochemistry*.

© 2011, Mother Nature Network.

Distributed by MCT Information Services

Citation: Earth is having a bad acid trip, study finds (2011, October 3) retrieved 25 April 2024 from <https://phys.org/news/2011-10-earth-bad-acid.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--