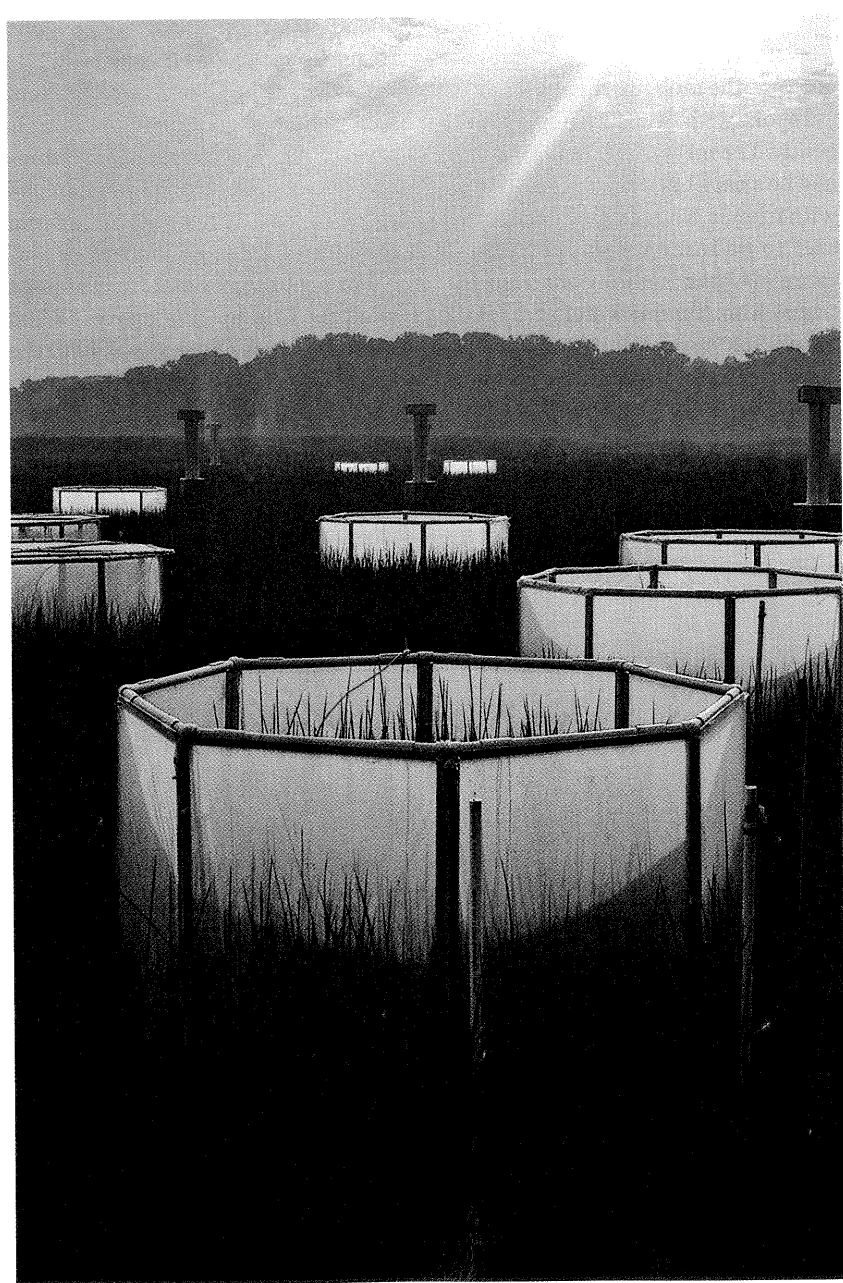




Smithsonian

Marsh treatment...power players...incoming asteroids...and more!



Coast Guard

A field study predicts how wetlands will respond to a changing climate

In a tidal marsh on the shore of the Chesapeake Bay, dozens of transparent enclosures jut above the reeds and grasses, looking like high-tech pods seeded by an alien spacecraft. Barely audible over the buzz of insects, motors power whirring fans, bathing the plants inside the chambers with carbon dioxide gas.

To scientists at the Smithsonian Environmental Research Center (SERC) in Edgewater, Maryland, it's the marsh of the future, a series of unusual experiments to simulate the effects of climate change and water pollution on a vital ecosystem. "What we're doing out here is studying plant processes to predict the conditions of wetlands like this one—and tidal wetlands everywhere—in about 100 years," Patrick Megonigal, a scientist at the center, says as he strides a boardwalk stretching into the 166-acre marsh.

The field study, stemming from an experiment first begun in 1987, is the only one of its kind world-wide that examines how



by Joseph Stromberg | PHOTOGRAPH BY Adam Langley



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multiple factors such as air and water pollutants will affect tidal wetlands—embattled ecosystems that will become even more important as a buffer against the storms and sea-level rise that are predicted to accompany global warming.

Made from PVC piping and clear plastic sheeting, each open-topped enclosure is a microcosm of a marsh under attack. Once a month, SERC scientists squirt nitrogen-rich water into the soil within the enclosures, replicating the fertilizer runoff that increasingly seeps into bodies of water like the Chesapeake. The plants are exposed to a carbon dioxide concentration roughly twice as high as that in today's atmosphere; scientists have predicted that the higher level will be the norm by 2100, largely because of the burning of fossil fuels. The gas comes from the same tanks used in soft drink machines. "Our vendor tells us that we use more CO₂ than Camden Yards," Megonigal says of the Baltimore Orioles' ballpark. "I actually calculated how many sodas that is, and it's impressive: roughly 14 million 16-ounce bottles."

Plants, of course, require carbon dioxide and nitrogen. But SERC studies have found, among other things, that some plant species grow more quickly when exposed to higher CO₂ and nitrogen, while others show little response, a dynamic that could alter the overall makeup of the marsh. Still,

predicting the consequences is tough. These excess nutrients boost plant growth and soil formation, which might counteract sea-level rise. But nitrogen also boosts microbe activity, accelerating the breakdown of biomass in the soil and reducing the wetland's ability to serve as a carbon sink to offset carbon dioxide emissions.

Lately the researchers are examining a third environmental hazard: an invasive species. The tall, feathery grass *Phragmites australis* was introduced from Europe in the late 1800s through its use as a packing material aboard ships. In contrast to the native strain of *Phragmites*, the European version has become one of the most feared invasives in the eastern United States, aggressively displacing native species. In the SERC marshes, invasive *Phragmites* now covers 45 acres, roughly 22 times more than in 1972.

In greenhouse experiments, Megonigal and colleagues found that air and water pollution are a boon to the European *Phragmites*. With elevated carbon dioxide, it grew thicker leaves, allowing faster overall growth without any more water; with elevated nitrogen, it devoted less energy to growing roots and more to growing shoots. It was "more robust in nearly every plant trait we measured, such as size and growth rate," Megonigal says.

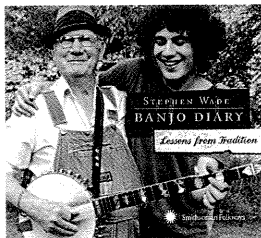
In the chambers on the marsh, the *Phragmites* experiments look like a window into an unwelcome future: a perfect storm of climate change, water pollution and an exotic species poised to hit wetlands up and down the East Coast. A *Phragmites* invasion, Megonigal says, "has a cascading effect, with implications for food webs and the biodiversity of wildlife overall."



This Just In

Profiles in Power

The nation's capital is known as a bastion of fierce partisans, but the video artist Lincoln Schatz has dug beneath the stereotype and found unexpected common ground. For his installation *The Network*, which opened last month at the National Portrait Gallery, he recorded interviews with 89 Washington heavyweights across the political spectrum, from Karl Rove to Janet Napolitano to Eric Cantor to Marcia McNutt (above), asking about their aspirations, challenges and accomplishments. Then Schatz, employing the "generative portrait" technique for which he is best known, used software that constantly recombines segments of the interviews on a single screen into a rolling montage. "My fear was that I would come away from this project being politically agnostic," says Schatz, who is based in Chicago. Instead, "the complete inverse happened. Meeting so many people who were deeply interesting, who really, deeply thought about and were engaged in their policy and politics, gave me complete faith in our democracy." —LEAH BINKOVITZ



Playlist

Finger-picking Good

It's hard to think of anyone who knows more about the banjo than Stephen Wade, the roots music expert who has played, studied and evangelized the instrument for five decades. He developed the one-man song-and-dance theatrical show *Banjo Dancing* (and performed it at the White House in 1979). On his debut CD for Smithsonian Folkways, *Banjo Diary: Lessons from Tradition*, released in September, Wade passes on what he has learned from a lifetime of seeking out American music at its roots, from his native Chicago to deep in the Appalachians. —LEAH BINKOVITZ

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