

THE OFFICIAL MAGAZINE OF THE OCEANOGRAPHY SOCIETY

# Oceanography

CITATION

Dybas, C.L. 2009. Ripple marks—The story behind the story. *Oceanography* 22(2):14–18,  
doi:10.5670/oceanog.2009.56.

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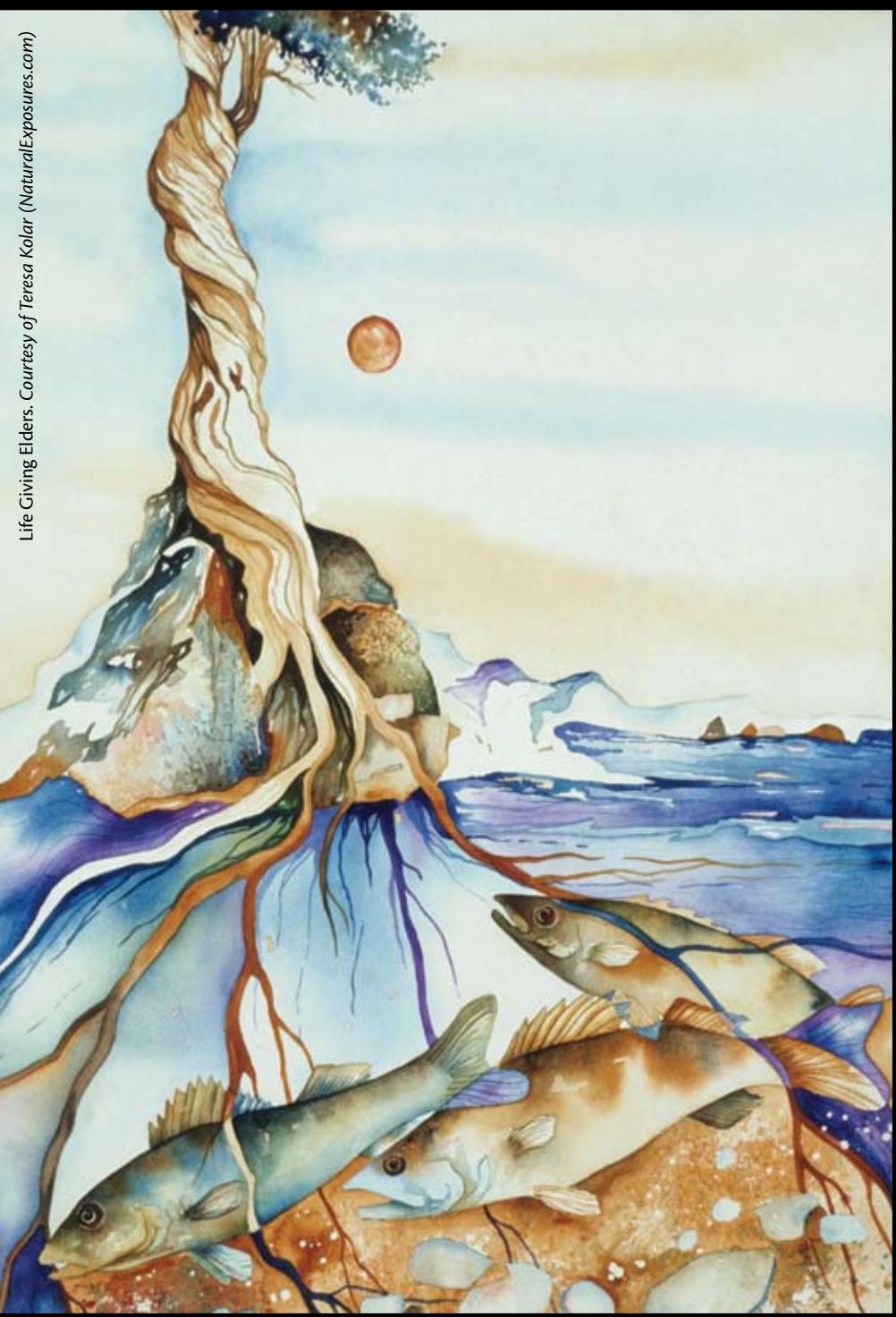
# Ripple Marks

## The Story Behind the Story

BY CHERYL LYN DYBAS

### "Witch Tree" Embodies Spirit of Lake Superior

Life Giving Elders. Courtesy of Teresa Kolar ([NaturalExposures.com](http://NaturalExposures.com))



Black ice cloaks the roads of Grand Portage, Minnesota, five miles from the Canadian border, on this dark February day. The previous night, a foot of snow and freezing rain cut a swath across the state, knocking down trees and power lines.

But a gnarled old member of the Grand Portage Band of Minnesota's Ojibwe Indians, exposed to the elements, has lived to tell another tale of hardship and resilience, determination and resourcefulness. The Band member stands rooted, forever fixed, if not in time, in place, on Hat Point along Lake Superior.

To reach it, one must pass through a grove shrouded by moss-like Old Man's Beard lichen. The ethereal light green lichen, today laced with snow crystals, falls like Rapunzel's hair over ice-rimed trees and a wooden railing leading to the lake. At path's end stands the tribe's sentinel: the Witch Tree, a centuries-old northern white cedar, or arborvitae, in which a spirit is said to dwell.

"It's like stepping into a different world," says Don Hoaglund, a Grand Portage Band member.

Called Manido-Gee-Zhi-Gance, or little spirit cedar tree, by the Ojibwe, its trunk has split in two. The halves grew together and are now entwined; they reach down into Lake Superior and up into the sky. Beneath the surface, in what may be the lake's most unusual habitat, fish dart among the tree's limbs. From a boulder above, the Spirit Tree offers safe haven to the eagle and the raven.

Manido-Gee-Zhi-Gance likely began life, it's believed, in a fissure in the granite rock lining the lake. There it survived gales,

ice floes and blizzards—for a time.

Then an unknown occurrence—perhaps lightning—damaged its crown but left its main root alive. A second root sprouted, entwining the original trunk. As the rock fissure in which the cedar grew slowly weathered away, a path to an aquatic world below cracked open. The roots followed, extending into the lake.

Manido-Gee-Zhi-Gance became half-land, half-water.

Now its spiral trunk encases a hollow where the heartwood has rotted. Visitors to the tree—who must be accompanied by a member of the Grand Portage Band—place offerings to Manido-Gee-Zhi-Gance in this opening, says Hoaglund, ensuring safe passage across Lake Superior and asking for the spirit's blessings.

Arborvitae means “tree of life,” according to Guy Sternberg and Jim Wilson, authors of the book *Native Trees for North American Landscapes*. The trees grow slowly on cliff faces and in northern swamp forests, and live to venerable old ages.

They’re often surrounded by Old Man’s Beard, says Seth Moore, wildlife biologist for the Grand Portage Band. “Like Spanish moss in the Deep South, this lichen hangs from tree branches,” he says. “It’s very sensitive to air pollution, so we’re happy that it grows so well here. Where the air is unpolluted, Old Man’s Beard may reach 20 centimeters long.”

The earliest written records of the Witch Tree are those of the French explorer Sieur

de la Verendrye in 1731, who called it a mature cedar at the time, making the tree some three hundred years old.

The tree almost met its end in the late 1980s, however, says Hoaglund, “when its rocky promontory came up for sale. The guy who owned the land used to sell souvenirs of the tree. People were taking pieces of it, destroying the Spirit Tree little by little.”

Hoaglund and fellow Band member Bill Corcoran teamed up with Rick Novitsky, director for 20 years of the Band’s natural resources department, to rescue the tree. Forming the “Friends of the Witch Tree,” they raised \$85,000 to purchase the land for the Grand Portage Band. The last payment was made in May 1990. “We had to save it,” says Novitsky. “It embodies the strong, tenacious spirit of the Grand Portage people.”

In a television interview about the tree, Bill Corcoran offered his view. “It symbolizes the timelessness of our heritage, which follows from the tree defiantly standing there, season after season, storm after storm, day after day.”

Legend says that Native Americans approaching Hat Point in canoes once placed gifts in the tree’s branches.

Centuries later, more recent tributes are barely visible through ice-fog encircling the tree. “The Witch Tree lives on,” write Sternberg and Wilson. Traveling past Hat Point, they “touched the tree, imagining the stories it could tell, and left in silence.”

In the waning light of a mid-winter afternoon, Old Man’s Beard reaches out, clinging to hat and gloves, entreating another privileged visitor to linger and listen to the Witch Tree’s message: where there is challenge, there are strength and wisdom.

Where there is life, however wizened, there remains spirit.



## No Safe Harbor for “Living Fossil” Fish Along Tanzania’s Coast

For 65 million years, they've survived in the depths, these ancient fish called coelacanths.

Once thought extinct, in 1938 they were discovered alive and well in the Indian Ocean. For millennia, they lived in obscurity in undersea canyons and caverns off East Africa and the Comoros Islands—until fishers developed shark nets that could reach the coelacanths' last strongholds.

Now the fish face a new threat: impending development of a deepwater

port in Tanzania.

In 2003, coelacanths were found off the Tanzanian islands Yambe and Karange, near an area the Tanzanian government had set aside as a possible Marine Protected Area. Since then, Tanzanian fishers have reported more than 50 coelacanth catches in the vicinity.

The proposed new port, in shallow Mwambani Bay, borders Yambe and Karange.

“If plans for the port go forward, the coelacanth population could be wiped out by massive dredging, blasting of reefs, pollution, and ship traffic,” says William Bemis, director of Cornell University’s Shoals Marine Laboratory off New Hampshire, and a biologist who has long studied coelacanths.

The area is known as the coral coast, according to Bemis. “The last thing



you want to do is dredge a harbor in these shallow waters,” he says. “Mwambani Bay is only 10 meters deep.”

An accident of bathymetry brings coelacanths close to shore; a steep drop to deep waters lies just off the coral reefs. “Just outside Mwambani Bay’s ring of coral, you’re very quickly in more than 180 meters of water,” says Bemis. “Coelacanths have been found on both sides of the channel into the proposed harbor.”

The \$400 million harbor project would also force out local fishers and seaweed farmers, and destroy the ecotourism revenues a Marine Protected Area might provide.

Port managers say the facility is needed for an on-the-drawing-board plan to export soda ash from nearby Lake Natron, a project on hold as a result of opposition from international environmental groups. Lake Natron has a very high concentration of sodium carbonate, and so is known as a soda lake. A soda ash plant there could produce up to one million tons of the substance, used in glass, paper pulp and other industrial goods, each year.

Lake Natron is also the world’s most important breeding ground of lesser flamingoes. Each year, the bright pink birds come to the lake by the hundreds of thousands to raise their young.

Representatives of the shipping industry admit that “it’s a fallacy to assume that a deep-sea harbor at Mwambani Bay would be able to attract large vessels and thus more business to the region.” They report in a technical assessment of Tanzanian



Photo courtesy of Jerome Hamlin

Overview of Tanga Coast, Pemba Channel, Mwambani Bay and proposed ship channel, proposed MPA, and recent coelacanth captures (red stars). Courtesy of William Bemis, Cornell University

Prepared using data from: B. Bennoa et al., 2006. Coelacanth (*Latimeria chalumnae*; Smith, 1939) discoveries and conservation in Tanzania. *South African Journal of Science* 102:486–490. Works also consulted: S. Kaelher, A. Ribbink and L. Scott (compilers). 2008. ACEP Final Report 2007/2008. Nearshore and Offshore Studies in the Western Indian Ocean. South African Institute for Aquatic Biodiversity (downloaded April 12, 2009 from: <http://www.sustainableseastrust.org/ACEP/ACEPReportFINAL.pdf>). Additional data from Google Earth and Protect Planet Ocean (<http://www.protectplanetoceon.org/index.html>). Base satellite image purchased from TerraServer.

port operations that "in fact, vessel capacity is governed by total cargo flows of regional ports, not by the depth of a particular port."

Large-volume container shipping, which the new port would be built to attract, follows global and regional economic growth centers. "The present trends, however, are that all East African seaports are used as mere feeder ports linked to major hubs along the east-west or north-south shipping arteries," states the assessment.

The report predicts that smaller vessels could make use of an increased capacity of the port at nearby Tanga (five miles away), with bigger ships plying their trade at Mombasa and Dar-es-Salaam: "The proximity of these larger ports eliminates all technical and economic justifications for a new harbor as suggested for Mwambani Bay."

An alternative to a port at Mwambani involves upgrading the harbor in Tanga, which, according to Tanzania's Natural Resource Forum, "could compete with the ports of Dar es Salaam and Mombasa" with an investment of around \$10 million.

As of this writing, neither side has backed down. The Mwambani port—and a fish that's the rarest of the rare—are set to collide.

"For such a conservation-oriented country, it's tragic," says Bemis. "Mwambani should be a center for the study of coelacanths, not a means of exporting the latest hot commodity in the marketplace."

"Coelacanths are fast becoming the world's most political [inedible] fish."

## Total Eclipse of the Art

National parks. Protected environs we hold as examples of the last of Earth's pristine places. But are they?

Eclipse, a Web-based artwork program that alters and "corrupts" images of US national and state parks based on air quality within a 65-mile radius, has the answer: in many cases, they're not.

The brainchild of digital and new media artists Cary Peppermint of Colgate University and Leila Christine Nadir, who teaches at Colgate and Columbia universities, Eclipse reveals what the human eye can't see: air pollution compromising America's parks.

"We called the site Eclipse," Peppermint says, "because we wanted to show what's hidden and elusive behind natural, pristine images. You can't see what you can't see, if you will."

After a park is chosen from a pull-down menu, Eclipse performs two data-scraping operations: searching for images tagged with a park's name on the photo-sharing Web site <http://flickr.com>, and finding real-time particle pollution (particulate matter) data for the area via <http://airnow.gov>.

The higher the Air Quality Index (AQI), or pollution level, for a selected location, the more Eclipse corrupts a park image through a set of algorithms that changes color, saturation and contrast, and imposes intermittent mirroring, deletion or cropping of the file.

Two of the most affected national parks, according to Nadir, are the Great Smoky Mountains in Tennessee and Acadia in Maine. "We might think of the Smokies as being, well, smoky," she says, "but for most of us, Acadia's remoteness wouldn't cross our minds as being polluted."

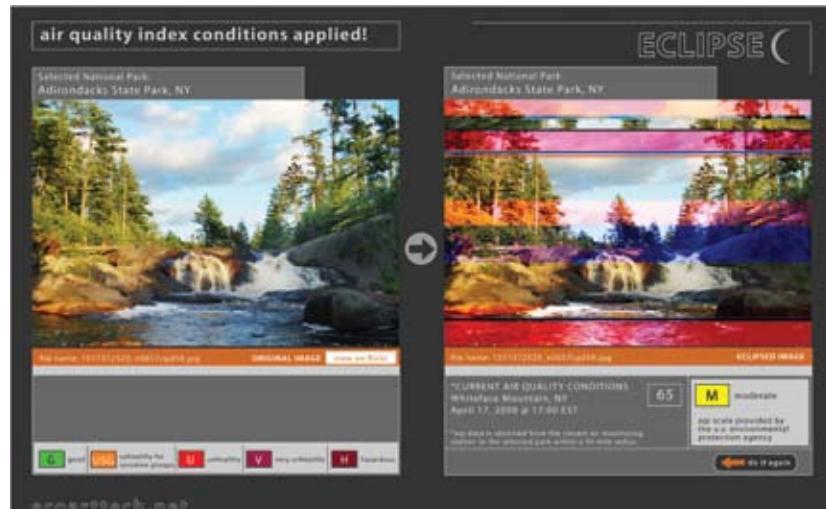
She and Peppermint hope Eclipse users will see that the environment in which they live doesn't stop at the front door. "Wherever you are, your actions are having an impact—sometimes hundreds of miles away," says Peppermint.

Eclipse users soon will be able to upload images of anywhere they'd like, and test the program accordingly.

"We're blurring the line between art and science," says Peppermint, "so people will be able to experience nature in new ways."

On Eclipse, a picture is indeed worth a thousand words.

Eclipse may be reached through EcoArtTech, Peppermint's and Nadir's Web site, at: <http://turbulence.org>.



Courtesy of Cary Peppermint, EcoArtTech

## The Unexpected Rainmakers: Forests—Atmospheric Moisture Pumps—May Be Driving Rainfall

Indigenous peoples in forested regions have long believed that trees “attract” rain, although some climate scientists might disagree. A new hypothesis suggests that the locals may be correct.

In a paper in the April 2009 issue of the journal *BioScience*, scientists Douglas Sheil of the Institute of Tropical Forest Conservation, Mbarara University of Science and Technology in Kabale, Uganda, and Daniel Murdiyarso of the Center for International Forestry Research in Jakarta, Indonesia, suggest that forests play a much greater role in determining rainfall than previously recognized.

The idea explains how forested regions generate large-scale flows in atmospheric water vapor. If correct, high rainfall amounts occur in continental interiors such as the Amazon and Congo River basins only because of near-continuous forest cover from interior to coast.

Atmospheric moisture originates from oceanic and terrestrial evaporation. Rain derived from terrestrial sources and contributing to local rainfall is termed “recycled,” state Sheil and Murdiyarso. “Conventional explanations of wet continental interiors emphasize such recycling—but do the numbers add up?” they ask.

Existing theory offers no explanation for how flat lowlands in continental interiors maintain wet climates. Researchers have puzzled over a mechanism to account for observed precipitation patterns.

What they may have missed is what’s being termed an atmospheric moisture pump. With this pump at work, “the numbers add up,” says Sheil. “Condensation thus offers a mechanism to explain why continental precipitation doesn’t invariably

The Bwindi Impenetrable Forest,  
Uganda, 2008. Courtesy of Douglas Sheil,  
Institute of Tropical Forest Conservation



decline with distance from the ocean.”

The forest-driven atmospheric moisture pump was first hypothesized by Victor Gorshkov and Anastassia Makarieva of the St. Petersburg Nuclear Physics Institute in Russia.

The underlying mechanism, according to Gorshkov and Makarieva, emphasizes the role of evaporation and condensation in generating atmospheric pressure differences, and accounts for several phenomena neglected by existing models.

It suggests that even localized forest loss can sometimes “flip a wet continent to arid conditions,” says Sheil.

Deforestation has been implicated as contributing to declining rainfall in various regions, including West Africa, Central Amazonia, and India, and to weakening monsoons. Forest clearings can cause a distinct, convection-driven “vegetation breeze,” say the scientists, in which moist

air is drawn out of the forest.

Under this hypothesis, the United States, mostly covered with forests until recently, may become a desert without rapid reforestation. Makarieva and Gorshkov believe that even small-scale clearing might switch entire climates from wet to dry, with rainfall declining by more than 95 percent.

Life depends on the hydrologic cycle, especially the processes that carry moisture from ocean to land. But the role of vegetation remains controversial. “With the world’s hydrologic systems changing rapidly, food security in many regions is heavily threatened by changing rainfall patterns,” says Sheil. “The need for understanding how vegetation cover influences climate has never been more urgent.”

Forests, it turns out, may be the heart that pumps life-giving water around a very large body: Earth itself.