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Oklahoma HUMANITIES

SUMMER 2015

Planet Earth

Oklahoma HUMANITIES

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The Oklahoma Humanities Council (OHC) strengthens communities by helping Oklahomans learn about the human experience, understand new perspectives, and participate knowledgeably in civic life. The humanities—disciplines such as history, literature, film studies, ethics, and philosophy—offer a deeper understanding of ourselves and others by confronting us with the questions, values, and meanings of the human experience. As the nonprofit, state partner for the National Endowment for the Humanities, OHC brings people together to explore these ideas through programming and community grants that support book groups, exhibits, film festivals, teacher institutes, and more. OHC engages people in their own communities, providing forums for education, critical thinking, and productive civil discourse.

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ON THE COVER

Earth observation taken by the Space Shuttle Discovery STS-124 (Space Transportation System) crew during its mission to the International Space Station, May 31-June 14, 2008. On return, shuttle commander Mark Kelly noted, "We installed a Japanese lab that will allow a lot more science on the station, we did three spacewalks, and we exchanged the crew of the space station. It was really an exciting mission." NASA image 745236

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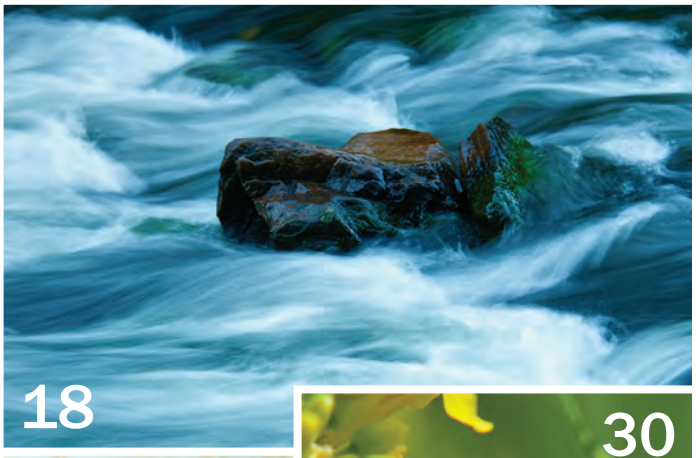

OCCUPYING OUR PLANET is a complex mix of competition and cooperation: Conserve or expand? Constrict or evolve? Inhabiting the Earth, too, is at the center of how we interpret our existence. Mapping the way forward isn't easy; there is no one, right path. But clues are all around us—in our history, our ethics, and the cultural imagination of what *might* be. From "Grand Excursion" to "Thinking Like an Ocean," we'll explore and expose Planet Earth.

FEATURES

IN EVERY ISSUE

from our PERSPECTIVE

Ann Thompson
Executive Director

Susan McCarthy
Chair, Board of Trustees

WE RECENTLY RETURNED FROM WASHINGTON, D.C., for an annual visit to our U.S. congressional delegation. We spent a day advocating for funding for the National Endowment for the Humanities, the independent federal agency through which the Oklahoma Humanities Council receives an annual general support grant. Showing our elected officials the local value of that funding was the focus of our conversations. Two recent events in our own state made our visits seem all the more critical—and prompted us to write letters to the editor in local newspapers.

The first was of national importance, the video of University of Oklahoma fraternity members singing a racist song during a fraternity function. The response both nationwide and locally was swift and loud. Our response centered on the need for us all to learn about "the other." We are all "the other" to someone and we can't understand the world in which we live if we don't address our differences.

The second was the cancelling of one of our reading programs about the Muslim American experience. It was cancelled because the sponsoring library received negative comments, some even threatening, saying that the program advocated Islam. This, of course, was not what the program was about. A corollary would be that a reading program about the French Revolution encourages participants to become French. Our letter to the editor in this case pointed out that learning about how this group of Americans lives can only enrich our understanding of society as a whole and strengthen our government's democratic process.

Rather than focus on the vocal minority who are fearful of "the other" in our society, we remember the hundreds of thousands of individuals that our programs have touched over the years. In addition to serving almost a quarter million Oklahoma citizens in 2014, our state matched each federal dollar with over $8.00 of cash or in-kind donations. We are good stewards of these funds. Beyond numbers, however, impact is important.

Even after forty-four years of service to Oklahoma, we still see the unique value of humanities programming and the relevance it plays in our lives. All of us need to put fear and ignorance aside, learn about the differences that make us interesting, and experience the diversity of our state, nation, and world. This is what makes funding for the Oklahoma Humanities Council, and our fellow state humanities councils, so urgent. We appreciate the opportunity to have shared this with our elected officials.

LETTERS

SCOUTED

Congratulations to our colleagues in Oklahoma (but none of us will be surprised) for quite a nice call-out on the nationally-followed website *The Internet Scout Report*. Based at the University of Wisconsin-Madison, the *Scout Report* is the Web's much-watched report card on A+ resources available on the World Wide Web at no charge to the public. [Read the report at: scout.wisc.edu (search Oklahoma Humanities Magazine)]

—Jamil Zainaldin, President, Georgia Humanities Council

POINT ON POETRY

I wanted to let you know how much I enjoyed Jessica Glover's article, "Pointed Boots are Just Bad News" [Winter 2015]. Jessica put a fresh spin on this topic and made me look at the subject in an entirely new way. Her article was engaging, resourceful, and very enlightening. I felt the presented viewpoint was empowering for women. I'm looking forward to researching the contemporary poets mentioned in the article. Thank you for publishing such a great piece.

—Christine Nichols, Stillwater

WISHFUL THINKING

Thanks for the magazines, and may I say that it makes me wish I lived in Oklahoma? Everything I have read, including the article about romance novels, has been excellent. I love the way you used the book covers. Great layout.

—Cindy Blewett, Kyle, TX

SPORTS TALK

I heard from one reader who called to say he enjoyed the "Equal Access to Hometown Teams" article [Winter 2015]. He shared some interesting stories about his experience playing college basketball at Oklahoma City University during the 1960s. He was very knowledgeable about issues of race and sports in Oklahoma. We had a nice chat.

—Dr. Amy Carreiro, Stillwater

FIRSTEP *to Success*

Why Your Investment Matters

"This is a way to change, right here."

The Oklahoma Humanities Council sponsors *Let's Talk About It, Oklahoma* reading and discussion groups in libraries, museums, and nonprofit organizations across the state. One of our groups takes place at the Women's FIRSTEP residential work-recovery program, where participants have struggled with drug and alcohol addictions and often have suffered physical and emotional abuse. Many are referred through the Drug Court jail alternative program; instead of incarceration, the women are given jobs, tools for recovery, and opportunities to learn responsibility. "We're all about changing and becoming new people," says one participant.

After participating in OHC's *Let's Talk About It, Oklahoma* reading and discussion program, participants at the Women's FIRSTEP program are building a library of their own. Seated among some of the newly-acquired books are Jennifer Francis, FIRSTEP Director of Clinical Programs, and April Prentice, FIRSTEP Residential Advisor.

Let's Talk About It, Oklahoma (LTAIO) brings a humanities scholar to FIRSTEP to facilitate discussions of great books. Through the exploration of literature, participants consider diverse perspectives. They can relate to characters both similar and dissimilar to themselves, contemplate new ideas, and begin to envision new directions in their lives. LTAIO provides a setting where sharing opinions is encouraged and insights are valued. For FIRSTEP participants, it gives them a voice and builds self-confidence.

"The scholars did an amazing job of putting the women at ease and making the material come alive," said Jennifer Francis, FIRSTEP Director of Clinical Programs. "They were gracious and made genuine efforts to get to know our ladies."

"Each night of the reading group, we're not just girls in rehab," said one participant, "we're with our friends, talking about a book, just being normal. For some of us, it's been a long time since we were normal. We talk about the things we find in the books that are funny, the things we find that are sad. It's like we're in a different world. There are so many things in the books, like my favorite one, *The Color Purple*, where you say to yourself, 'Maybe that works,' or 'Maybe that sounds like me or someone I know,' and you can take it and adjust and try to move forward." Another participant noted, "When I came here I was drinking myself to death, and my whole purpose was to change. I can't do that without broadening my horizons. In school, reading was never my thing, ever, but I thought, 'This is a way to change, right here.' Now I read and write with intelligence. I have words that I never had before."

"Women in recovery are some of the most determined, motivated, and bright individuals I have ever known," said Francis. "Thank you to the LTAIO program for being dedicated to reach this population—I promise you, they won't disappoint."

You can help build stronger communities by sustaining humanities programs, like this one, that make a difference. Your support of the Oklahoma Humanities Council brings rich, cultural programming to audiences around the state and to *your community*—programs that "broaden horizons" and promote lifelong learning. Please send your gift today. Use the envelope in this magazine or make a secure donation online: okhumanities.org/donate

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EDITOR'S NOTE

In a fiery blaze of promise, Apollo 13 slipped Earth's gravity and launched into space. With a mission to perform a third landing on the moon, day three was looking like "the smoothest flight of the program." Crew members Jim Lovell (commander), Fred Haise (lunar module [LM] pilot), and Jack Swigert (command module [CM] pilot) had just finished a TV broadcast, showing the folks at home what it was like to work in weightlessness. Lovell signed off, saying, "This is the crew of Apollo 13 wishing everybody there a nice evening. . . . Good night."

Nine minutes later, an electrical fault caused one of two oxygen tanks to explode, tripping a domino effect of power loss and system failures. A sharp bang and vibration accompanied warning lights and Jack Swigert uttered the often-misquoted *under*statement: "Houston, we've had a problem here."

By Lovell's account, disappointment that a lunar landing was no longer possible changed to "strictly a case of survival" as he looked out the window and reported, "We're venting something. . . . It's a gas of some sort." It was oxygen jettisoning from the second (and final) tank.

Back here on Earth, millions waited for news of Apollo's fate. Among them was native Oklahoman Capt. Chuck Smiley, commander of the Navy helicopter squadron slated to recover the crew on splashdown in the Pacific Ocean. He worried that there might not be a splashdown—or astronauts to rescue.

Long story short, the crew shut down the CM, which had just enough power for reentry, and used the LM as a lifeboat while Mission Control jerry-rigged a way to get them home. Loss of cabin heat and a shortage of potable water made for tough conditions, but splash down they did and Smiley's team picked up three hungry, dehydrated, exhausted astronauts.

The chopper flight to the rescue carrier *U.S.S. Iwo Jima* was short, but Smiley managed a meaningful exchange with Lovell. "Tell me what it was like looking at the Moon from space," he asked.

"It wasn't the Moon that impressed me," said Lovell, "it was the Earth. It looked like a big blue Christmas ornament hanging out there in space."

"Give me a word for it," Smiley urged.

Lovell answered, "Fragile."

Apollo 13 accomplished few of the experiments assigned in addition to the missed lunar landing. Nevertheless, a perilous situation rendered valuable experience with the safe return of the crew. NASA classified it "a successful failure."

In 1806, explorers Thomas Freeman and Peter Custis experienced a similar fate. Their mission to explore the Red River, a "Grand Excursion" conceived by Thomas Jefferson, stopped short of its goal, turned back by dramatic events. In Jefferson's view, says author Dan Flores, it was an underwhelming outcome in comparison to Lewis and Clark, a failure swept under the rug and masked from public scrutiny. Its observations of unexplored territory and catalogue of species and habitats went unreported.

And so sets the trajectory for our Planet Earth issue: stories of unintended failures, unsung successes, and calls to recognize our world as "fragile."

In the twenty-first century, political polarization and public distrust are the great logjams to policy reform—a failure to act. Michael Svoboda examines climate change advocacy through the lens of the civil rights movement and exposes the many reasons why climate urgency is a more complex message to communicate to a more fractured, divided audience.

Water—and lack of it—is a fragile resource made more so by competing demands. Environmental journalist Cynthia Barnett directs attention to freshwater and calls for a water ethic to preserve it. Oklahoma state climatologist Gary McManus tells us that climate studies predict longer, hotter growing seasons (which require more water) and stronger, damaging storms. Studying weather history, he says, can help us anticipate water shortage cycles and better manage other consequences of a changing climate. On a wider scale, Katherine Pandora asks us to "think like an ocean," to recognize that oceans make up the majority of our planet, and that this (still) largely-unexplored expanse is worthy of our continued imagination.

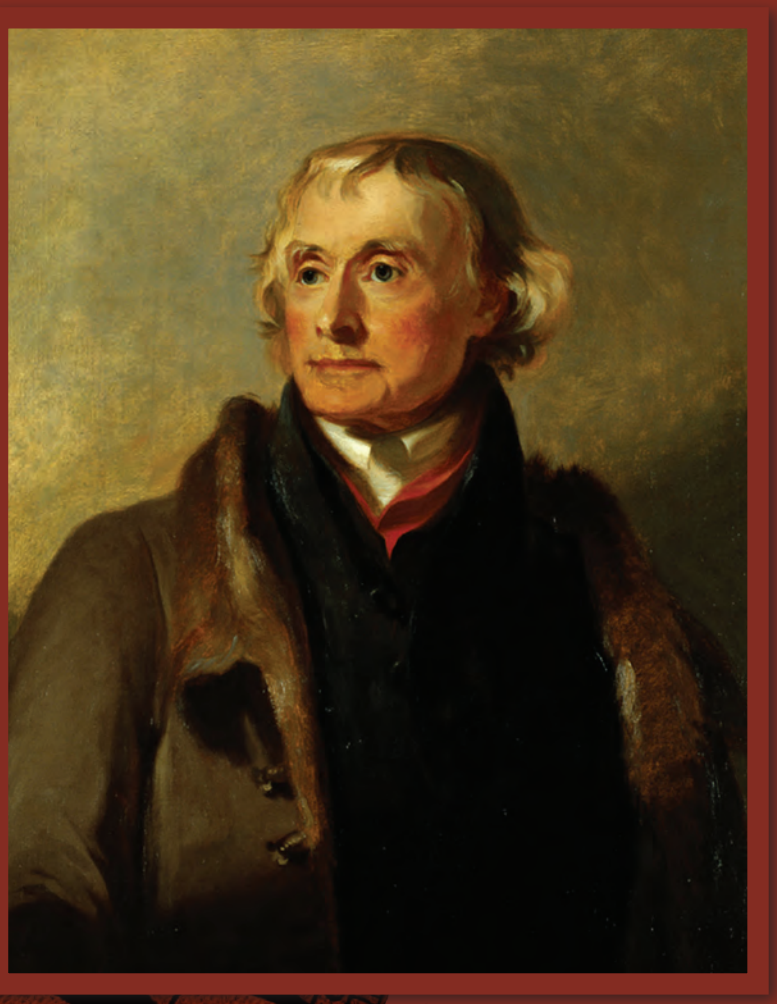
And we *will* get our hands dirty on this trek around Planet Earth as we address the byproduct of its human inhabitants: trash. The more we grow, the more garbage we produce. Jon Roberts lends insight on how we manage waste while still keeping it mostly out of sight, out of mind. We'll end with upbeat observations from author Brian Doyle (a kid's-eye expedition of all outdoors) and poet Britton Gildersleeve (a meditation on bees and blooms).

We launch your tour of Planet Earth with this note from conservationist and philosopher Aldo Leopold: "That land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known, but latterly often forgotten." Here's to a *memorable* exploration.

—Carla Walker

Above right, Captain Chuck Smiley, commander of Helicopter Squadron-4, which set the record for at-sea recoveries for Apollo 8, 10, 11, 12, and 13. Chuck piloted the astronaut recovery helicopter for Apollo 10 and 13. Photo and recollections of Chuck's experiences are courtesy his sister, Nancy Smiley. Left, photo of Earth taken from Apollo 13, April 1970; NASA, AS13-60-8588.

Have a comment, question, or suggestion? Email the editor at carla@okhumanities.org or tweet us: @okhumanities



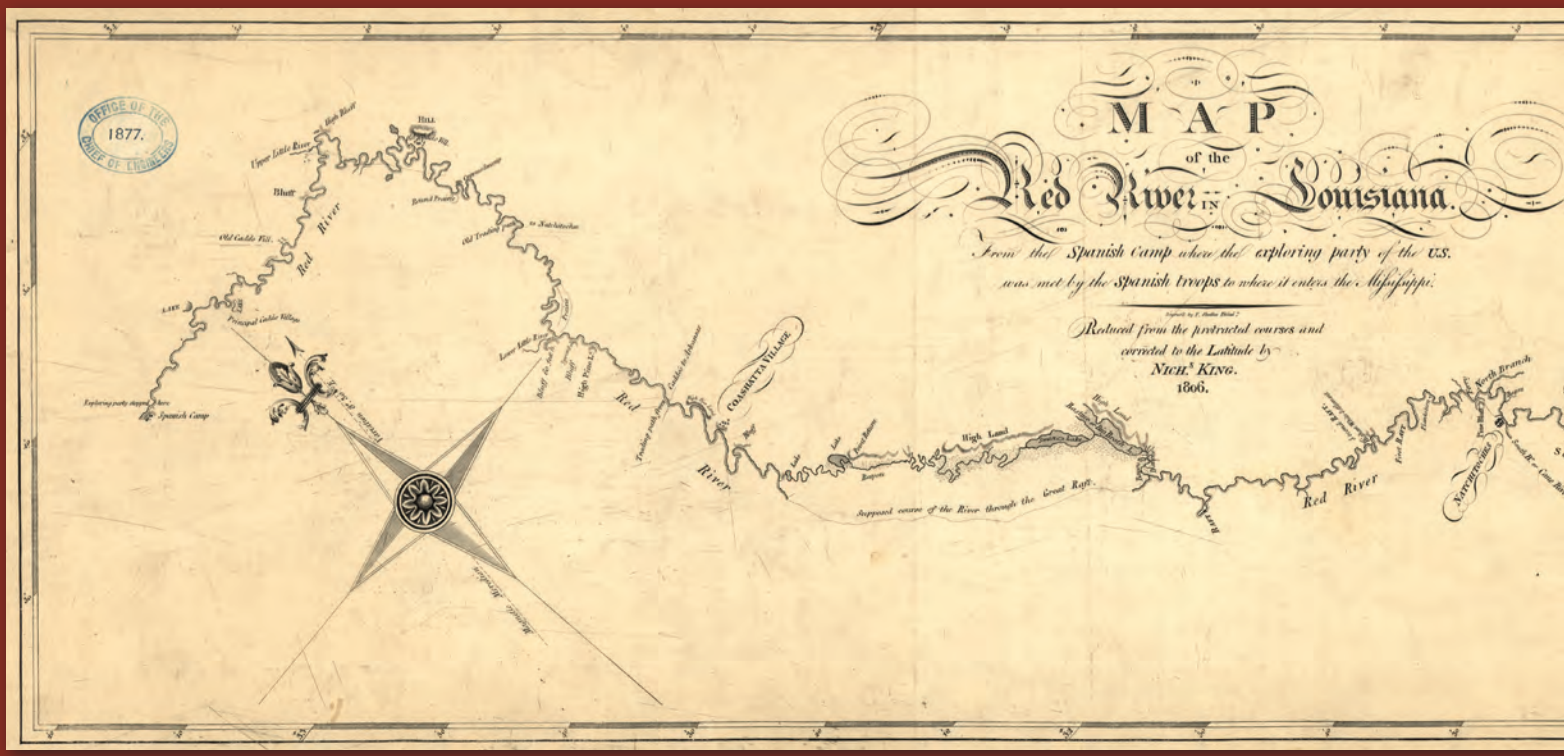
A Very Different Story:
Exploring the *Southwest* from Monticello

By Dan Flores

The unsung "Grand Excursion"—a counterpart to Lewis and Clark

Thomas Jefferson by Thomas Sully, 1856. U.S. Senate Collection. Compass: book jacket of *A Treatise on Navigation and Nautical Astronomy*. NOAA Central Library Historical Collections

No one has ever accused Thomas Jefferson of being uncomplicated or easy to cipher. Whether history has grappled with his political legacy, his contradictory stance on social justice, or his vision for the American West that his Louisiana Purchase folded into the country's destiny, Jefferson has remained the Great American Enigma. Part of this has to do with the pragmatism that colored most of his decisions, but there was also a certain risk-taking impulse in his personality. The man who was willing to speak in favor of the occasional revolution was the same individual who could push the envelope of possibility in areas like exploring the West, too. Sometimes, as with a Lewis and Clark expedition whose popularity in the American imagination is presently in full soar, these gambles paid off. Sometimes they didn't. When that happened Jefferson was fully capable of turning his back.



Map of the Red River in Louisiana from the Spanish camp where the exploring party of the U.S. was met by the Spanish troops to where it enters the Mississippi, reduced from the protracted courses and corrected to the latitude. By Nicholas King, 1806. Library of Congress

For the better part of two decades now I have been trying to untangle what Jefferson intended with his actions vis-à-vis the other—and relative to Lewis and Clark, today virtually invisible—exploration he personally launched into the West. I do not here mean either of the Zebulon Pike probes, although most people familiar with Jefferson-era exploration would assume that. Like his earlier search for the source of the Mississippi, Pike's 1806–7 overland expedition to the Southern Rockies was an exploration launched by the American military—by General James Wilkinson, in fact—and not Thomas Jefferson. Other than being pointed in the same general direction as Lewis and Clark, it shared little in common with their probe in intent or preparation.

Nor do I mean the brief William Dunbar–George Hunter expedition to the Ouachita Mountains of present Arkansas in 1804–5, although this one preceded even Lewis and Clark as the first to report back from the Louisiana Territory and in its time made the two leaders famous enough that no less than John James Audubon would later speak reverently of Dr. George Hunter as that "renowned *Man* of Jefferson." Although that expedition did originate with Jefferson, as executed the Dunbar-Hunter probe was merely a trial balloon for the "Grand Excursion"—the southwestern counterpart to Lewis and Clark—Jefferson had in mind all along.

Two centuries later, the historical fate of this latter expedition—directed in the field by a civilian engineer/surveyor named Thomas Freeman, assisted by a celebrated American "bush fighter," Captain Richard Sparks of Virginia, along with young Peter Custis of the medical and natural history programs at the University of Pennsylvania—looks extremely intriguing. And while some hard digging and a good bit of luck enabled me to produce the first edition of my book [*Jefferson & Southwestern Exploration: The Freeman & Custis Accounts of the Red River Expedition of 1806* (1984)], that adorned this "forgotten expedition" in every manner of factual dress that history hadn't known before, I still find aspects of the story puzzling, even troubling. Not, however, its invisibility in the *popular* American imagination. Unless multicultural history in the twenty-first century shapes the writing of the American past far more than at present—and the fate of Jefferson's southwestern exploration comes to be celebrated by southwestern Hispanos as one of their great early successes in *resisting* American imperialism—there should be no doubts why Lewis and Clark history is worthy of a general national celebration while not a single roadside historical marker exists to remind the American public of Freeman and Custis.

The explanation for that is simple and has to do with the truism that the winners write the version of events later generations celebrate. In the context of American continental expansion, we see Lewis and Clark's traverse of the continent as a nationalistic success, while failure (at least from the U. S. perspective) is the legacy of Jefferson's southwestern exploration. Intended originally to chart the entire lengths of both the Red and Arkansas rivers, the southwestern expedition failed even to achieve its last-minute, more limited objective of exploring the Red River only. What brought it to a halt after four months and an ascent of only half the river's length had nothing to do with daunted courage on the part of its leaders, or a disinclination to "proceed on" in the face of nature's obstacles (and there were some big ones). Jefferson's second great western exploration was intercepted, and confronted, and turned around on the Red River by a Spanish army four times its size. And the major reason it happened that way was because in the face of Spanish resolve he may have underestimated (and—perhaps—was encouraged to underestimate), Thomas Jefferson took a risk that backfired.

That a failed exploration, blocked and forced to retrograde by a foreign power, should fade in the American memory is no surprise, of course. But since the intent of Jeffersonian exploration was always at least nominally scientific discovery (and the party was to carry out the same kind of wide-ranging examination Meriwether Lewis was instructed to conduct), it has always puzzled that an exploration that did, after all, have a look at almost seven hundred miles of landscape new to Americans somehow ended up *erased* from history at every level. What is the explanation for that, and what has that meant for the process of selective historical memory? Of course, since the past is a foreign country, much history strikes us as odd, ironic, or unexpected. But given the continued fascination with Lewis and Clark—and with the state of nature in the West as it was two hundred years ago, and as it is now—it may be worthwhile to look less myopically at Jefferson's West with a closer understanding of his southwestern exploration, whose story in American history is now attached to Lewis and Clark in the manner of a tail flapping along after a kite.

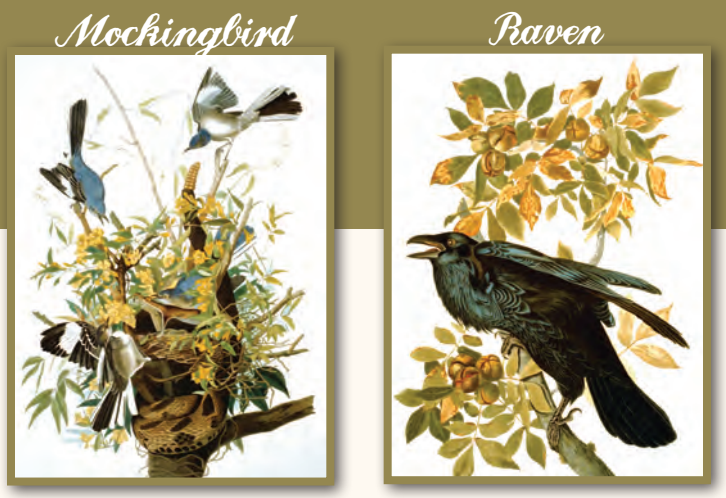
Indeed, even the genesis of U. S. southwestern exploration lay with Jefferson's goals for the Lewis and Clark expedition. While a probe to the Missouri and Columbia river systems would resolve the question of a commercial Northwest Passage, in the larger picture American exploring parties in the West could establish a presence on the continent that Jefferson hoped both competing imperial powers and indigenous peoples would acknowledge. Additionally, and famously, exploration represented an official U.S. support of Enlightenment science, aimed directly at a mysterious and wondrous part of the planet where European plant collectors and naturalists had only nibbled. There was a whole, fascinating world out there beyond the Blue Ridge Mountains of home about which Jefferson's mind wondered restlessly.

But obviously the Lewis and Clark expedition would leave these missions unfulfilled for an enormous stretch of the Louisiana Territory, and that was hardly Jefferson's intent. Indeed, he seems from the first to have regarded an American expedition across the southern reaches of Louisiana as nearly equal in importance to his Missouri-Columbia exploration. As the president told Meriwether Lewis in November 1803 (after Lewis himself had expressed interest in exploring toward New Mexico), Congress had assented to a larger plan to examine the principal rivers of the West. "In that case I should send a party up the Red River to it's [sic] head, then cross over to the head of the Arcansa, & come down that." As the president explained to Lewis, "This will be attempted distinctly from your mission."

Once Lewis and Clark were underway in the spring of 1804, then, Jefferson began planning what he and all the principals regarded as the southwestern counterpart to the Lewis and Clark expedition. On April 14, at home at Monticello, the president composed a seven-page letter of instructions for southwestern exploration. Unpublished until it appeared as an appendix in my book, Jefferson's letter was based closely on his 1803 letter of instructions to Meriwether Lewis, a classic expression of Enlightenment science. The southwestern version differed on routes, of course, and gave southwestern explorers a greater burden in winning the Indian tribes of the Spanish border over to the Americans. It also included a line that had its origins with the Lewis and Clark letter, but that would prove far more significant in the Southwest: "If at any time a superior force authorized or not authorized by a nation should be arrayed against your further passage and inflexibly determined to arrest it, you must decline its further pursuit and return." In the Southwest, that particular line would prove critical to the history that followed.

Custis's natural history work (he catalogued nearly 270 species) provides us with a marvelous time machine for understanding the ecology of the Red River as it was in 1806. And of course that gives twenty-first century America a remarkable baseline for gauging subsequent change: what was lost, and what we might restore, in this part of the world.

It was not until eighteen months later that a young Irish immigrant surveyor and engineer would have the honor, at a private White House dinner, of seeing Jefferson inscribe "To Thomas Freeman Esquire" across that letter of exploring instructions. And it was not until Jefferson had asked several



The birds pictured here are among 270 animal and plant species catalogued by Peter Custis in his official natural history observations from the Red River exploration, 1806. Color engravings by artist R. Havell, after drawings by John J. Audubon, for Audubon's *The Birds of America* (Elephant Folio, 1827-1838). Library of Congress

of America's most famous naturalists, including sixty-five-year-old William Bartram, to take "the department of Natural History in the voyage up the Red River," that the administration found its man in twenty-five-year-old Peter Custis. Jefferson personally chose Captain Richard Sparks, a good friend of Meriwether Lewis's, to lead the accompanying military contingent. (The most important changes that appear in my 2002 edition, *Southern Counterpart to Lewis and Clark: The Freeman & Custis Expedition of 1806,* spring directly from the work of these expedition leaders, especially Freeman's precise map work, which, upon initial publication of the 1984 edition, enabled archaeologists to locate not only expedition campsites but some of the Indian villages described in the accounts).

Nearly two years of detailed planning and preparation, much of it devoted to a search for personnel for the expedition, and a congressional budget of $5,000 (twice the original appropriation for Lewis and Clark) finally poised the president's "Grand Excursion" for a scientific strike at the heart of the Southwest in April of 1806. With Lewis and Clark then crossing the Bitterroot Mountains bound for Saint Louis and home, one western triumph seemed ready to proceed on the heels of the other.

Despite the Grand Excursion's outstanding personnel and minutely-detailed preparations, that was not to be. In the Southwest the Americans essentially inherited the French side of a decades-old debate with Spain over whose imperialist infrastructure had controlled which parts of the region. Beginning in 1714 the French had established permanent settlements among the Caddo Indians at Natchitoches, on the Red River, and at New Orleans on the Mississippi in 1718. With century-old settlements already in New Mexico, Spain had responded with the presidio/mission of Los Adaes (present Robeline, Louisiana) in 1716, and San Antonio in Texas in 1718. Over the ensuing decades, French traders connected with the numerous and widespread Caddoan peoples had used the Red and Arkansas rivers to penetrate far into the southwestern interior. Spain had resisted those "intrusions" with its own rather less successful policy of Indian trade. Then, after the French-Indian War turned French Louisiana over to Spain in 1763, Madrid had employed its former French rivals in the trade to consolidate its hold on the Southern Plains. For their part, the native peoples—like any properly-sophisticated customers—longed for the days when competing Euroamericans vied for their attentions. As far as they were concerned, let the Americans come.

In 1806 Spain was within fifteen years of the endgame of three centuries in the Southwest. Its empire was weary and stretched filament-thin, and incapable of resisting the revolutionary sentiments that had already created the United States and would soon divest the Spanish crown of the bulk of its colonies. In North America the new historical pattern was especially apparent in the Southwest, and diverse Americans (including even the vice president) awoke with dreams of revolution and conquest in their heads. Jefferson's own public pronouncements that the Rio Grande was actually the boundary of the Louisiana Purchase left Spanish officials with few doubts about the threat that an official American exploration posed. In 1804–5 they made several attempts, all unsuccessful, to intercept Lewis and Clark. The Freeman and Custis expedition was both more threatening and far more accessible. And so, in one of its last heroic acts of self-preservation in the Southwest, Spain mustered the resolve—and the military force—to resist.

If the Lewis and Clark story has functioned in American history as a kind of "tribal history for white people" (the phrase is art historian Brian Dippie's), then in our present multicultural West, how should we interpret the Freeman and Custis story? I've grappled with this personally, because I had direct ancestors on both sides of the event. My great grandfather four times removed was Pierre Bouet Lafitte, whose French (Natchitoches) trade alliances with the Indians the Americans inherited, and whose compatriots served as guides for Freeman and Custis. Meanwhile, one of the officers who led the opposition Spanish force was another ancestor, José Flores, who undoubtedly believed his expansive Rancho Tortuga south of Nacogdoches was threatened by the American intrusion, and he was absolutely right. Whether I see the outcome of this Red River probe as regrettable failure or heroic resistance thus depends on which side of my family I identify with. The truth is, I identify with *all* the competing factions in this story, including the Indians. And I suspect that in modern America, that's how Jefferson's second great expedition to the West ought to strike us.

Two other aspects of Jefferson's southwestern expedition make it intriguing. One is that in young Peter Custis it included the first American-trained academic naturalist to explore in the West. Over the four-month duration of the exploration Custis was able to bring his skills to bear on a fascinating region, and once I found his manuscript reports in the National Archives, it became plain that Custis's natural history work (he catalogued nearly 270 species) provides us with a marvelous time machine for understanding the ecology of the Red River as it was in 1806. And of course that gives twenty-first century America a remarkable baseline for gauging subsequent change: what was lost, and what we might restore, in this part of the world.

The other point has to do with continental geography. Based on the best and most recent cartography he could assemble, Jefferson could only assume that the Red River, like every other sensible river, had its headwaters in mountains, in this case the Southern Rockies. Thomas Freeman had no doubts: he expected his exploration to take him somewhere near Santa Fe, New Mexico. Not even Spanish officials seem to have known what a handful of traders—some Spanish, some French, evidently even an American or two—had figured out, which was that the Red River headed nowhere near the Rockies. In 1804 the Jefferson administration had gotten a glimmer of the truth. Far out on the immensity of the southern prairies, it heard, there was "a height, the top of which presents an open plain," and it was in great canyons along the east side of this "height" that the Red River headed. Then the report muddled the picture by claiming that there was another fork of the Red that "flowed thru the mountains," which must have allayed any doubts the "height" passage raised.

The truth of the matter, a truth about which neither American nor Spanish officials were cognizant in 1806, was that the river Jefferson called "next to the Missouri, the most interesting water of the Mississippi," would never have led his explorers where he thought he was sending them. Instead it would have pitched them atop the great, remote tableland Hispanic traders called El Llano Estacado. The Red would have taken them, in other words, not to the soaring peaks of the "Mexican Mountains," nor into the thicket of trade possibilities and revolution in New Mexico, but onto a runeless slate, the middle of nowhere.

The late exploration historian Donald Jackson once penned an essay, "What If the Spaniards Had Captured Lewis and Clark?" Jackson, who late in his career became fascinated with Freeman and Custis, used his insights to conclude that America almost certainly lost a great exploration epic when the Spanish army turned back Jefferson's Red River party in July of 1806—regret at that even led him to write a novel, *Valley Men* (1984), which sent Freeman and Custis (re-named "Dr. Raphael Bailey") up the Arkansas River to the Rocky Mountains in 1807. And more recently it tantalized me into including in my 1999 book, *Horizontal Yellow*, a novella called "The River That Flowed from Nowhere," a fictional story that imagines Freeman and Custis continuing up the Red River into a Southwest beyond all Thomas Jefferson's fantasies.

But the fact is, what actually happened to Freeman and Custis was that historical forces cut them off in mid-stride. Their fate not only ought to increase our appreciation for Lewis and Clark's success, it also throws new shadows around the Lewis and Clark story. Perhaps the best answer to Jackson's question above lies in what *did* happen with Freeman and Custis. And in Big Picture terms, what becomes clear is that America's destiny in the West didn't truly rest on Jeffersonian exploration. Despite the failure of Freeman and Custis, American traders carrying American goods (and even flags) still intruded themselves among the Indian tribes in the Southwest, and American expansionist policies still brought Texas, New Mexico, and the entire region into the United States within decades. Had Spain similarly intercepted Lewis and Clark, the American West would have lost an epic story, but otherwise western history probably wouldn't have turned out much differently. Someone else would have discovered the grizzly bear, written rhapsodically about the Great Falls of the Missouri, and crossed the Great Divide and the Bitterroots on Indian trails.

But Thomas Jefferson couldn't know that. In the context of western exploration in 1806, the reality was that his southwestern *entrada* had been turned back short of its goals, while his northwestern probe had crossed plains and mountains beyond compare all the way to the Pacific. If he concentrated on the far-happier results of Lewis and Clark, then, an exploration that had featured the grand theme of Americans confronting the wilderness rather than Americans confronting "the other," who could blame him?

The country has been emulating Jefferson in that decision ever since. Perhaps it's time to reconsider.

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EXTRA! | READ | THINK | TALK | LINK

- *Map of the Red River*, Library of Congress. Get an up-close view of the Red River expedition with mapmaker Nicholas King's rendition, drawn to show Indian settlements and regional features the explorers encountered along the route. loc.gov/item/2003623378
- Read more of Dan Flores's research on the Freeman & Custis expedition, including a comparison of exploration instructions Jefferson drew up for the Lewis & Clark and Freeman & Custis expeditions. lewis-clark.org/channel/135
- Read correspondence between Thomas Jefferson and Thomas Freeman, dated 1805, including Jefferson's request that Freeman procure for him "an accurate compass for surveying." A return note from Freeman reports that he has not yet found a qualified expedition botanist, but will continue inquiries "for a suitable person in that line." loc.gov/ammem (click on *Presidents*; select *Jefferson, Thomas ~ Papers*; enter *Thomas Freeman* in the "Search this collection" box)

Climate Change in the Disunited States

By Michael Svoboda

Can civil rights-era activism serve as a model for climate change advocates?

Above: Earth illustration by NOAA NESDIS Environmental Visualization Laboratory. From caption: This image shows the North American snow cover on April 30, 2010, the lowest snow cover ever recorded for any April. Sea ice extent was trending towards dipping below the 2007 record low. Inset: NOAA Office of Exploration, 2005 Expedition. From caption: A polar bear cub and mother approached within 200 meters of the ship.

Change is a given. Since the first Europeans and Africans were transported to this continent, the climate has changed several times—but within fairly well-defined limits. Now we, through our greenhouse gas emissions, are pushing Earth's climate past these limits. That's the gist of the most recent Intergovernmental Panel on Climate Change (U.N.) and National Climate Assessment (U.S.) reports released last year. A warmer Earth means the atmosphere holds more energy and absorbs more water; it also means the atmosphere has more seawater to push against the coasts. We are priming an engine of destruction.

This basic global science we understand; the specific regional consequences still puzzle us. The winter of 2014–15 was the warmest on record; the Arctic sea ice maximum was the smallest ever measured. But this was also a colder than normal winter for much of the eastern United States, and the snow falling on Boston broke records. San Francisco, however, experienced its warmest winter ever. As some wordsmiths have suggested, "global weirding" may be a more accurate synonym for climate change than "global warming."

Political change is a given as well. But in the last few years, surveys measuring respect for Congress and trust in government have reported record lows. Have we pushed beyond normal variance here too? And if so, what are the implications for U.S., and international, climate policy?

A Divided People, A Divided Government

The United States has always been divided—by states, by creeds, by parties and ideologies—sometimes to the point of open conflict. And it has always been hard to bridge these divisions. The effort to form one country out of thirteen colonies took two tries (the 1781 acceptance of the Articles of Confederation, then the 1789 final ratification of the Constitution). Less than four score years later, that country dissolved into civil war. The twentieth century, however, brought the American body politic a new sense of unity. As measured by polarization in Congress and public trust in government, the most sustained period of unity in the United States was the period from the 1930s to the early 1990s. The collective struggles to free the country from the Great Depression, and the world from fascism and communism, pulled the country together. Even in the turbulent 1960s, more than fifty percent of Americans said they trusted the federal government some or most of the time. Forty to fifty percent of their congressional representatives and senators would have been classified as moderates based on their willingness to vote the issues rather than a party line.

Anyone over the age of forty likely regards this comparative period of unity as the political norm, but even limited data suggests it may have been the exception. Since the resignation of Richard Nixon in 1974, trust in government has risen above the fifty percent threshold only once—and that, barely and briefly, in the immediate aftermath of 9/11. Over the last eight years, trust in government has fluctuated between ten and twenty percent, and only about five percent of legislators now serving in Congress would be classified as moderates.

For those advocating action on climate change, this raises an interesting question: Can mid-twentieth century examples of mobilization and activism serve as models for persuading U.S. legislators and for mobilizing citizens today? This past March, for example, Americans observed the fiftieth anniversary of the Freedom Marchers' "Bloody Sunday" attempt to cross the Edmund Pettus Bridge in Selma, Alabama. Climate change activists have repeatedly been urged to emulate organizers of the Civil Rights Movement. The new cause may be as noble and the activists as brave as the old, but what other social and historical conditions figured in the success of the civil rights movement?

For those advocating action on climate change, this raises an interesting question: Can mid-twentieth century examples of mobilization and activism serve as models for persuading U.S. legislators and for mobilizing citizens today?

Crisis, Community, and Mass Communication

First, a series of traumatic national experiences had already shaken traditional social structures. The Dust Bowl and the Great Depression mixed class and regional identities in new and profound ways. The home-front mobilization and massive military organization constructed to fight World War II mixed races and broadened the vision of those affected by segregation. When black soldiers returned home from the war, and when black workers returned home from the big-city factories in which they had labored, they resented efforts to reimpose the old Jim Crow order. Change was already on the march.

Second, new national media—consisting of only three major networks at the time—allowed opinion leaders to focus the public's attention on the same event or concern simultaneously, across the nation, often countering local news and opinion. Franklin Roosevelt had used the national radio networks to powerful effect during the Great Depression and World War II. The practitioners of nonviolent civil disobedience in the 1960s understood the value and the operational requirements of the new national TV networks.

As activists and organizers Julian Bond, John Lewis, and Andrew Young explained in an August 2013 program celebrating the fiftieth anniversary of the March on Washington, the sit-ins and protests of the civil rights movement were carefully planned events, artfully staged for nightly network news broadcasts. "The civil rights movement without the media," explained now Congressman John Lewis, "would be like a bird without wings. . . . When we had a protest, when we had a demonstration, we knew we had to do it at a certain time to make the evening news." Andrew Young, former mayor of Atlanta and former ambassador to the United Nations, explained that events were scheduled for late morning so that the film could be on the early-afternoon flight to New York City, where it would be developed and edited in time for that evening's network broadcast. It was thus national television that presented the civil rights movement to the American people. As former CBS reporter and program host Marvin Kalb noted, "In the South. . . . the local news was extremely sympathetic to the white end of the argument," adding that the print news often missed the main story.

Third, the message of the civil rights movement was simple and direct: equality. And protestors' nonviolent actions were designed to deliver that message visually. "The sit-ins were so disciplined," Lewis said. "We had these well-dressed college students sitting there, orderly, reading a book, writing a paper, looking straight ahead. And then you had the [racist] element come up and beat on [them]. . . . People saw the contrast." Television exposed the violence of racism, allowing viewers to empathize with the aspiration for equality, which "only" asked that Americans watching at home grant African-Americans the same rights and privileges that whites enjoyed.

By contrast, climate activists face the challenge of delivering a far more complicated message through much more divided, multi-platform, niche media. Too, effective action on climate change will likely require significant restructuring of our economy. Prices paid for fossil fuels will rise, making some amenities like air travel prohibitively expensive for some. And fully integrating renewable energies will require changes in the nation's power grids and in the ways we are charged and billed for electricity. This is a harder "ask" than equality, and it's more difficult to convey visually. In a February 2013 protest against the Keystone Pipeline, for example, moderately well-dressed and predominantly white protesters tethered themselves to the fence surrounding the White House.

Police carefully disconnected them, cuffed them, and put them into vans to be taken to the station for booking. No risk. No drama. The point of the climate activists' protest could not be discerned from the images; it had to be explained. Though some media carried the message, there is now no one, central communication platform that can reach seventy percent of the American people, as national news networks did during the civil rights era. Many, if not most, Americans did not hear about the 2013 protest. And many of those who did likely had it described to them in a way that suited their political prejudgments—like the local newspapers of the civil rights era.

Marchers carrying a banner lead the way as 15,000 people parade in Harlem. Photo by Stanley Wolfson, *World Telegram & Sun*, March 15, 1965. Library of Congress

How Government *Doesn't* Work

Conditions in Washington during the civil rights movement were also profoundly different than today. President Lyndon Johnson, whose attention the protesters strove to win, had been a master legislator, but he was also working with a nation in shock after President Kennedy had been assassinated—in a southern state. That shock and guilt created openings for Johnson, openings that would not have been available to Kennedy, openings that are not available to contemporary climate activists.

Trust in government peaked at seventy-seven percent in November 1964 when the nation rallied to formally elect the man who had taken Kennedy's place. Ironically, the passage of the Civil Rights and Voting Rights Acts brought changes that altered that spirit of cooperation. Trust in government began to erode as individuals and communities came to understand that progress on civil rights, education, the environment, or poverty necessarily impinged on local autonomy. Trust in government also declined when federal programs and actions did not turn out as planned—as, for example, in Vietnam. As a result, proposals for federal action are now viewed more suspiciously—as are those who draft, pass, and administer such programs.

The social culture in Washington has also changed, as technological advances in transportation and communication made new, more extreme political tactics possible. Cheap airfares made bi-weekly or even weekly commutes back to legislators' districts possible. When, as a result, many representatives and senators did not move their families to Washington, the social bonds that had moderated the nation's politics were weakened. The Internet and social media then made it easier for representatives' and senators' most active constituents—and donors—to micro-monitor their actions. As social relationships in Washington atrophied and as partisan and ideological bonds strengthened, Congress became increasingly polarized and fractious. When the last easy inducements to compromise were removed, such as the opportunity to insert special earmarks for one's district or state into funding bills, the gridlock could be total. Even Lyndon Johnson could not do now what he did during his presidency.

Consistency and Collaboration

We would do well to remind ourselves at this point that climate change is not the only issue that faces these political and social barriers and obstacles. Even problems we routinely solved in the past—funding for infrastructure repairs and improvements, military budgets and contracts, approving executive nominees, raising the debt ceiling—can now occasion breakdowns and even shutdowns of the government. And the public has responded accordingly: Trust in government reached its lowest level, ten percent in individual polls, when a debate over raising the debt ceiling nearly resulted in a complete shutdown of the federal government in October 2011. So what can be done?

In their book, *It's Even Worse Than It Looks*, political analysts and historians Norman Ornstein (American Enterprise Institute) and Thomas Mann (Brookings Institute) review the advantages that the U.S. system offers more sparsely-populated midwestern and western states. Some of this is built into the Constitution, as a sort of mandated political "affirmative action." The 550,000 people of Wyoming, for example, are given the same number of senators (two) as the 37,500,000 people of California. Other advantages derive, Ornstein and Mann note, from the traditions of the Senate. For example, Alaska's Senator Murkowski (who was last elected by 101,000 votes) has the right to put a hold, no questions asked, on anyone nominated for an executive post by President Obama (who was first elected by 69.5 million votes and then by 65.9 million votes). These separation-of-powers tactics, when combined with parliamentary-like animosities, Ornstein and Mann conclude, "are a formula for willful obstruction and policy irresolution." To restore some balance, Ornstein and Mann

African-American woman being carried to police patrol wagon during demonstration in Brooklyn, New York. Photo by Dick DeMarsico, *World Telegram & Sun*, Aug. 20, 1963. Library of Congress

propose severely curtailing filibusters and holds, abolishing gerrymandering, and strengthening voting rights and access at all levels of government.

More generally speaking, anything that reduces polarization, increases trust, or facilitates simultaneous national messaging could prepare the ground for action on climate change. *Consistency* and *collaboration* fit the bill. There are now two electorates: the larger, broader, more diverse electorate that votes in presidential elections, and the smaller subset of that electorate that votes in midterms. Rather than quixotic efforts to persuade conservatives to vote for action on climate change, simply getting presidential-year voters to turn out, consistently, for midterms may be more productive. A more *consistent* electorate would reduce the biennial whiplash of dueling political mandates and may thereby persuade politicians to negotiate rather than hold out for the next vindication.

Motivating these inconsistent, presidential-year voters will require *collaboration* across a variety of issues. Finding common cause with those interested in social justice and social programs may be a good next step for those who seek action on climate change. Activists might also publicize ways that action on climate change, through something like a carbon tax, could provide new solutions for other, long-standing problems, such as infrastructure; carbon tax revenues could fund new roads, education, and other domestic needs.

Which America?

The first step in solving a problem is to understand it fully. Just as it is difficult for some to accept that humans are changing the climate, many Americans may find it hard to accept that the political climate has also fundamentally changed. Liberals make a mistake when they regard the moderate national unity of the twentieth century as the political norm; that period may be the relatively harmonious exception that proves the divisive rule. Conversely, conservatives likely err in thinking a smaller, weaker federal government can still function as a world leader. And both are wrong when they assume that the Great Depression and World War II offer clear lessons that can be patriotically shared by all. Liberals and conservatives tell themselves very different stories about the twentieth century, and they draw very different lessons from these histories.

Paradoxically, those who seek real action on climate change may draw some comfort from the fact that our deeply-disunited states do *not* work. Something has to change. This twenty-first-century change will not be effected by twentieth-century tactics. New technologies, new crises, and new tactics may once again alter the balance between the forces that push us apart and those that pull us together. Which of the two Americas this new balance will most resemble—the united twentieth century exception or the divided rule—remains to be seen. On that balance hangs the climate.

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EXTRA! | READ | THINK | TALK | LINK

- "Remembering a March, a Movement, and a Dream," *The Kalb Report*, August 29, 2013. Watch video of the program mentioned in Michael Svoboda's article. Pulitzer Center senior adviser Marvin Kalb and a distinguished panel discuss the role of the press in the civil rights movement. pulitzercenter.org
- *Yale Climate Connections* website, "an independent, nonpartisan, multimedia climate news and information service that provides original reporting, commentary, and analysis on the issue of climate change." Links to articles, videos, and audio from scientists, journalists, and educators. yaleclimateconnections.org (search *Michael Svoboda* to read more from this author)
- "Extremism in Congress: 'Even Worse Than It Looks'?" *Morning Edition*, NPR, April 30, 2012. Host Steve Inskeep interviews scholars Thomas Mann and Norman Ornstein on what they view as dysfunction and extremism in today's Congress. Listen to the interview and read an excerpt from their book, *It's Even Worse Than It Looks: How the American Constitutional System Collided with the New Politics of Extremism*. npr.org
- "Climate of Doubt," *Frontline*, PBS, October 23, 2012. Reports on political forces working to shape public perception of climate change. pbs.org

Weathering Heights
The Oklahoma Forecast

By Gary McManus

When the forecast is high temps and low water resources, weather history can help guide the future.

VORTEX2 field command vehicle in vicinity of thunderstorm, June 2009. Photo by Dr. Mike Coniglio, NOAA National Severe Storms Laboratory Collection (NSSL).

OKLAHOMA'S UNIQUE SETTING within the Great Plains provides its citizens with some of the most variable—and violent—weather on earth. Most people immediately think of the 1930s Dust Bowl years as the "big" weather event in our state, but we're impacted by devastating weather nearly every year.

Tornados, like those in Moore in 1999 and 2013, can destroy whole communities. After a particularly bad hail storm, entire neighborhoods will reverberate with the sound of workers replacing roofs. Ice storms and blizzards have left significant parts of the state paralyzed and without power for days at a time. To plan well for future weather events, and to best manage limited resources, we must take a long view of weather patterns. Such are the lessons of weather history.

Oklahoma is bounded by the Rocky Mountains to the west and the abundant moisture source of the Gulf of Mexico to its south. Summers tend to be long and at times exceedingly hot, while winters are generally shorter and more temperate. Enough moisture is provided through precipitation—around 15 inches annually in the far western Panhandle to nearly 60 inches in the southeast—to sustain an agrarian- and energy-based economy, as well as support a burgeoning population base of nearly four million. The state often serves as the battleground for cold, dry air masses from the north and warm, moist air from the south, setting the stage for tumultuous weather. Major weather hazards impact both safety and the economy in Oklahoma, and come in many varieties: severe storms, including tornadoes, hail, and severe winds; floods; wintry precipitation such as snow, sleet, and ice; and last, but not least, drought.

Drought is a lingering, creeping hazard that brings its own brand of misery. Shorter-term droughts lasting several months or seasons can create problems such as wildfires and water shortages. Longer-term episodes can drain lakes, deplete groundwater, and make rivers disappear. Lake Altus-Lugert and Lake Tom Steed in far southwestern Oklahoma fell to twenty percent of capacity or less back in 2011 and have remained at those reduced levels throughout the current drought episode, threatening the city of Altus' water supply. Oklahoma City's water supply reservoirs have hovered around 50 percent of combined capacity for the last couple of years, leading to harsh water rationing regulations for its citizens.

Depending on the timing of the precipitation scarcity, billions in damages to the agricultural community can occur, creating a ripple effect up and down the economic structure. Agricultural losses alone in Oklahoma for 2011–12 were in excess of $2 billion. Other industries, such as energy and tourism, were no doubt similarly impacted.

Since the instrumental climate record for the area began in the late nineteenth century, six prolonged drought episodes, including the current 2010–15 event, are noted within the precipitation records of the Oklahoma Climatological Survey. The most notable of those droughts span the years 1909–18, 1931–41, and 1952–58. The 1930s drought is associated with the cataclysmic "Dust Bowl" in the High

Forecasting the Future

According to the most recent National Climate Assessment (2014) of the U.S. Global Change Research Program, Oklahoma and other Great Plains states will have impacts throughout the twenty-first century due to rising temperatures and changes in precipitation patterns. The report's key messages for the region include:

- More frequent and intense droughts, severe rainfall events, and heat waves
- Rising temperatures leading to increased demand for water and energy, which, in parts of the region, will constrain development, stress natural resources, and increase competition for water among communities, agriculture, energy production, and ecological needs
- Changes in crop growth cycles (extended an average of 24 days by mid-century) due to warming winters and alterations in rainfall events, requiring new agriculture and livestock management practices

NOAA/NSSL

Todd Johnson/DASNR/OSU

Oklahoma weather is ever changeable. Photographer Lelayne Tapp shot the dust storm image, below, at Tapp Ranch, north of Boise City near the Colorado line. Courtesy Cimarron County Conservation District

NOAA/NSSL

Plains, often regarded as one of the three worst environmental disasters of the modern world, in which poor farming practices and Depression-era economic conditions led to the large migration of population from the Great Plains to the West. As disastrous as those droughts were, paleoclimate evidence points to even longer, more significant Great Plains droughts throughout the last millennium.

The 1980s brought an abrupt end to the cyclical pattern of drought for Oklahoma. At that time, Oklahoma entered an extended wet cycle, abundant moisture that was unusual in both length and consistency, that lasted nearly thirty years. There were still significant, damaging droughts during that time, but those were shorter, lasting perhaps a year at most. Although this wet period, or "pluvial," was a boon for agriculture and Oklahoma's growing industrial and municipal infrastructure, it did have one unfortunate aspect—the loss of our collective memory and wisdom learned from long-term droughts of our past. Farmers with collective family memories of growing wheat in the 1930s or 1950s certainly understand the problems of water scarcity better than those who have farmed only in more recent times, such as the 1980s through the 2000s. Likewise, water managers for municipalities are feeling the shock of the current extended drought cycle that is so different than the shorter droughts of the previous three decades.

Oklahoma's drought cycle is a part of its naturally variable climate. Peer-reviewed research indicates that at least some of the variability in our precipitation cycle is explained by changes in sea surface temperature anomalies, such as El Niño, La Niña, and other oceanic disturbances. Current research is also looking at the decrease in arctic sea ice and its impacts on weather patterns across the Northern Hemisphere. Understanding the role of those naturally-varying patterns can lead to powerful planning and mitigation tools in the event of imminent dry episodes, short- or long-term.

Given that Oklahoma's population is expected to increase by nearly two million people by 2075, understanding the difficulties faced by an ever-challenged water cycle are of the utmost importance to the socio-economic well-being of the state over the next several decades. It is imperative to understand Oklahoma's climate history, to study the results of those hard lessons learned, and apply them to not only our current water demands but those of the future as well.

GARY McMANUS joined the Oklahoma Climatological Survey in May 1999 and is currently the State Climatologist for Oklahoma, tasked with providing vital, timely weather information and assessing past weather conditions for the state. He is editor in chief of Oklahoma's Monthly Climate Summaries and has done extensive research cataloguing Oklahoma's weather hazards. He earned B.S. and M.S. degrees in Meteorology from the University of Oklahoma.

EXTRA! | READ | THINK | TALK | LINK

- Oklahoma Mesonet. Get current conditions and long-term outlooks for Oklahoma weather, soil conditions, and fire danger. Scroll down the home page to *SIP-Lawn Irrigation* for info on when and how much to water your lawn. mesonet.org
- "What We Know: The Realities, Risks, and Response to Climate Change," a report from the American Association for the Advancement of Science (AAAS) synthesizes key messages from recent climate change studies. Read the report and watch videos with scientific experts discussing the findings. whatweknow.aaas.org
- The U.S. Global Change Research Program (USGCRP). View graphics and reports from the most recent National Climate Assessment and access the latest findings from the International Panel on Climate Change (IPCC). globalchange.gov

Blue Revolution:
A Water Ethic for Oklahoma and America

By Cynthia Barnett Photos by Todd Johnson

wa • ter eth • ic *n.* Making sure the way we live with water *today* doesn't jeopardize fresh, clean water for our children, businesses, and ecosystems *tomorrow*.

Editor's Note: This article is adapted from speeches Cynthia Barnett delivered at the 33rd Annual Oklahoma Governor's Water Conference, Oklahoma State University, and The University of Oklahoma.

Oklahoma stands at the crossroads of America's water stressors, from groundwater depletion to worsening droughts. You are also *taking a stand* with progressive solutions, as in your Water For 2060 Act—the first of its kind in the nation—with its goal that Oklahoma consume no more freshwater in 2060 than you do today.

It's important to celebrate the water triumphs we have achieved. They prove that we *can* change our environmental fortunes. But it's also crucial not to let those successes blind us to continuing threats to quality, quantity, and access to water around the country. I think it is safe to say that for the first time since we created the Clean Water Act, the Environmental Protection Agency, and other protections of 1972, American children today are not inheriting waters as clean and abundant as when they were born. Water is calling us once more, as it did when threats to our freshwaters drew broad public attention to industrial pollution in the rivers of the East and to the great damming of the American West.

Americans can live as well or better than we do now with far less water. Our barrier, as I see it, is as tall as Hoover Dam and as wide as the 63,240 square miles of turf grass that cover our nation. Our barrier is America's illusion of clean and abundant water.

Ethos of Entitlement

If you've read about or traveled in the Third World, you understand that U.S. water problems are incomparable to the global water crisis and its victims, 3.5 million of whom die each year of water-related illnesses: 1.2 billion people do not have access to clean drinking water; 2.4 billion lack basic sanitation.

The inherent irony in America's water story is our water riches compared with other continents: 3.5 million miles of rivers; another estimated 60,000 trillion gallons of groundwater stored in aquifers beneath our feet. Yet, freshwater has become the single-most degraded of America's natural resources. And there is no single culprit. Our common use of water—for flood control, power production, agricultural irrigation, or water flowing in and out of our homes and businesses—is largely to blame.

Americans are confounded about the climate and its effects on water resources. California is withering in the worst drought in its history, western forests have blazed with wildfire, and recent summers have been some of the hottest since modern weather records began. The answer to these water issues is much broader than digging the next-deepest well or the next-largest reservoir. It involves transforming

the way we live with water, in much the same way we came to live differently with soil in the wake of the Dust Bowl.

In the West, and even in some parts of the relatively wet East, quantity is a big concern. Despite evidence to the contrary, from the parched lakes of Texas to the shrinking Colorado River, Americans have not shaken the notion of water as an endless resource. Industry users still believe in an inalienable right to as much water as they think they need—often overestimated—for growth and development. As urban users, we still flush toilets with potable water treated at great expense to meet drinking-water standards. We pour large amounts of this same potable water on lawns, America's largest crop, covering a combined area almost as large as the state of Oklahoma. In my book *Blue Revolution,* I call this turf grass our 51st state.

The conveyance of clean water into our cities, and the movement of wastewater out, was among the greatest scientific achievements of the twentieth century, one that saved countless lives. But now that great achievement has grown into an entitlement. Water flows from our taps like magic, an endless and cheap supply of clean water. The resulting ethos has led to degraded freshwaters, enormous energy consumption to move water around, financially unstable utilities, and other problems.

Troubled Waters

Harsh realities lie behind Americans' illusion of water abundance. The Colorado River, for example, is (impossibly) *more than one hundred percent allocated* through legal agreements among the U.S., Mexico, and seven states that share the river. There is no longer enough water for all human legal users, much less fish and wildlife, during times of drought—and this one is a doozy. Federal scientists have completed a years-long study of climate and population scenarios for the region. They project that by 2060, the river will fall short of human demands by an additional 3.2 million acre-feet—more than five times the annual amount of water consumed by the city of Los Angeles today. Water experts have the impression that the public knows what's going on with the Colorado. I don't think that's true. Twenty million people a year visit Hoover Dam, yet the tour guide never mentions the stress to the Colorado—or the obvious bathtub ring left by receding waters.

Another example of illusion is the massive High Plains Aquifer that irrigates an entire fifth of the country's agriculture in the Midwest. Most Americans still see this region as our nation's breadbasket. They don't realize that this aquifer (the primary source of groundwater for Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming) is being depleted to extinction. Conversely, if you're a businessperson working to locate, say, a microchip manufacturing plant or a Google server farm (both of which need large amounts of water), you are poring over groundwater maps and climate-change models to avoid parts of the country where scientists predict continued severe drought.

Energy is another refraction of the illusion. Every energy source except wind has significant consequences for water. Nationwide, between ten and twenty percent of energy supplies are used to pump, treat, and heat freshwater (and move it around)—more than is used to power our computers and the Internet. Yet, the water consequences of energy projects and the energy consequences of water projects are often afterthoughts to planning and approval.

A Water Ethic

It is clear that neither water management and government regulation, nor the courts, nor costly technical fixes will be enough to save our freshwaters for future generations and ecosystems. All of those answers have a place. But it seems to me that, now, the water issue must rise above politics and policy—to the level of ethics.

For *Blue Revolution*, I traveled around the world to report on what this ethic might look like. Academics and human-rights activists have sounded the call. The Global Water Policy Project's Sandra Postel defines a water ethic as making "protection of freshwater ecosystems a central goal in all that we do." Oregon writer and ethicist Kathleen Dean Moore makes the moral argument that taking whatever we need from the world to support our comfortable lives, while leaving unreliable freshwater supplies to the future, "is not worthy of us as moral beings."

The voice that resonated most with me was that of Aldo Leopold, founder of the field of wildlife ecology. Leopold was intensely interested in helping people connect to the natural world. He believed the answer was "an extension of the social conscience from people to land"—the land ethic. Sixty years ago, he described this land ethic in his book *A Sand County Almanac*, which helped inspire modern conservation and change unsustainable soil practices that helped cause the Dust Bowl. Aldo Leopold defined his land ethic as a community instinct in the making. This is where the water ethic comes in.

His son, Luna, former chief hydrologist for the U.S. Geological Survey and professor at UC Berkeley, built upon his father's ideas to call for an "ethos for water." Luna wished foremost for a "reverence for rivers," the sort of appreciation that happens when people can kayak on their local river or plunge into the local swimming hole with their kids. But that would not be enough. He tried to help people understand that technology could not fix all our water problems, and that indefinite expansion of water supply was not possible. With nature's lessons in mind, he wanted to find the "steady state"—the balance point at which our water use today would not jeopardize fresh, clean water for our children and ecosystems tomorrow. He articulated this water ethic as a set of guiding beliefs for government, large water users, and citizens.

The *shared* nature is key. We know that agriculture and energy drink up the vast majority of the U.S. water pie. So the ethic is much bigger than asking citizens to stop watering the grass. It's a new way of living with and valuing water in every sector of the economy. The question, of course, is how to make that transformation.

Global Solutions

The countries with a tangible, national water ethic, I found, were those historically defined by drought, such as Australia, or by flood, such as the Netherlands, or that otherwise lived under a water threat, as is the case in Singapore. What they have in common is political leadership that is ultra-focused on water.

The Dutch are inspirational for our politically-divided times because they've shown how different points of view and different financial interests can come together on water—the most important asset *and* the biggest threat to the country. The Netherlands has perhaps the proudest water-engineering history in the world, including some of the largest modern dikes and its multi-billion-dollar Delta Works to keep the low-lying nation safe from the encroaching North Sea.

Freshwater has become the single-most degraded of America's natural resources. Our common use of water—for flood control, power production, agricultural irrigation, or water flowing in and out of our homes and businesses—is largely to blame.

But Dutch engineers were surprised when it turned out sea-level rise was not the first climate-change threat. The first trial was river flooding. Wetter winters and more extreme summer showers, along with deforestation and urbanization, created more river runoff than ever before. Ironically, the intense barricading of the Delta Works at the sea meant there was no place for all that extra water to go—but up and over the river dikes. In the 1990s, the country was surprised by three mighty floods of the Rhine and Meuse rivers. One of them forced 250,000 evacuations and caused $1 billion in damage—*after* the country had spent $6 billion and four decades on the Delta Works to prepare for flooding from the sea. The new dangers posed by river flooding, along with pollution and other problems, have led to an extraordinary turnaround in a country whose history is defined by building stronger dikes. The Dutch are reestablishing historic watersheds—tearing down some dikes, flooding agricultural land with fair compensation to farmers, and restoring wetlands on the grand scale.

Australia is another country that now sees water as a matter of national urgency, and it's a good model for what scientists tell us are drier years to come. In 2000, the Aussies entered a drying period more severe than normal drought cycles. The first sign that something was different was that water levels in dams dropped below thirty-five percent capacity, unheard of in previous droughts.

Most of what you read about the response to Australia's Big Dry involves desalination plants and a national water market to buy, sell, and trade water rights. But another important part of the story is an urgency to keep as much water as possible in natural systems—restoring wetlands, managing forests, *returning* water to nature as a water-supply strategy. Fully one-half of Australia's "new" water is coming from conservation efficiency, thanks to a revolution of small technologies. Small as in micro-irrigation (drip irrigation) for farming and waterless everything: waterless urinals, waterless carwashes, even waterless woks in Chinese restaurants.

Australia is a particularly good comparison for America. One decade ago, the Aussies were just as wasteful as we, using about 150 gallons of water a day per person. Today, it is half that. Backyard groundwater wells used to be common for irrigation, but now most families have switched to rainwater catchment and say they would never go back to pumping their precious aquifer for lawn watering.

I found the ultimate water-collectors—and the ultimate recyclers—on the island of Singapore. The 275-mile island is the smallest and most densely populated country in Southeast Asia. When it became a republic in 1965, it was mired in poverty, massive unemployment, and filth. The past half century has been a Cinderella story, including a turn of water fortunes. Singapore has gone from relying on neighboring Malaysia for its water supply to achieving water independence by harnessing every drop on the island. Singaporeans are among a growing number of the world's population that recycle their wastewater, using highly-advanced treatment to purify it into drinking water.

Parts of the United States, including Orange County, California, have been forced to do the same. The water is delicious, I can attest. But in most of this country, if we lived differently with water we would not need to emulate Singapore in wresting every drop out of our rivers or building the largest wastewater-treatment plants on the globe. In fact, some smaller sewage-treatment plants in the United States are developing ways to generate energy from sewage to run their plants. So the great lesson of the Singaporeans is to use only what we need, then recycle what we use.

There is another side to Singapore's water story that most people have not heard. At the same time the government was building the most advanced water-purification technology in the world, it was also working on the human side of the problem—on a water ethic. As Singaporeans became more prosperous, per-capita water consumption had grown steadily. Elaborate "save water" campaigns didn't make a difference. Nor did a water-conservation tax that

charged more to Singaporeans who used more. Utility officials told me what ultimately worked best to lower consumption (now about forty gallons a person per day) was a conscious effort to bring Singaporeans closer to their water in every way—from helping them understand their water supplies, at every level from kindergarten to the elderly, to getting them in the water physically.

American Success Stories

Here in the U.S., San Antonio is a good case study as a wasteful city that made an absolute turnaround on water. Twenty-five years ago, a federal judge intervened to stop San Antonio from over-tapping the Edwards Aquifer. The city manager from that era told me the decision felt "like Armageddon." Instead, it was an impetus for real change. Industrial water users made particularly sweeping changes, largely thanks to a massive commercial rebate program funded by the city. Building supervisors slashed water use by millions of gallons a year with changes as simple as recycling their air-conditioning condensate. A Frito Lay potato chip plant saved 43 million gallons a year—and $138,000 annually on its water bill. A local granite company figured out how to recycle water used in its wet saw, and other stone cutters followed. A dentist realized old "dental vac" machines wasted an inordinate amount of water compared with newer models the utility would help pay for; other dentists are now switching. Twenty-five years later, San Antonio has managed to cut per-capita water use *in half*.

What I loved about the San Antonio story was how the water ethic spread, building supervisor by building supervisor, citizen by citizen, and even church to church. Growing numbers of U.S. churches are taking up water as a responsibility of faith. The water ethic requires this sort of cultural broadening, or democratization. It says that water managers and water lawyers, engineers and environmentalists, are no longer enough. Just like in the early 1970s, water now needs the rest of America.

Indeed, stormwater is a particularly ripe opportunity for bringing more Americans to the water ethic. We see the idea spreading, with examples like Philadelphia's "Green City, Clean Waters" plan. To halt sewage spills and comply with the Clean Water Act, the city was looking at a $10 billion price tag for a massive sewage tunnel under the Delaware River. Instead, Philadelphia will spend just $1.6 billion to restore streams, remake everything from parking lots to basketball courts with porous pavement, and plant miles of vegetation atop rooftops and along city blocks. What's so important about this and other progressive stormwater projects across the country is that they make individual families part of the solution in their own yards, which is the best way to help people connect *personally* with water.

We can take heart from past environmental successes. In 1969, half of all Americans littered. By 2009, it was fifteen percent. Drivers of that change included inspired political leadership, private industry buy-in by way of packaging and other changes, successful educational campaigns, and government fines and regulations. But research shows that what changed the culture, more than any other factor, was a community-wide judgment about cleanliness—*an ethic*. Once citizens embraced this ethic, they pressured industry. As just one example, beverage companies finally eliminated the pull-off tabs on soda cans. This is precisely the pressure we're beginning to see in agricultural water use. When society becomes more aware of issues like subsidies that flow to the crops doing the most damage to water supplies, they can influence national policy.

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Aldo Leopold

Luna Leopold

Foundations of a Water Ethic

ALDO LEOPOLD INCLUDED WATER in his call for a land ethic. This community instinct-in-the-making would build an ecological conscience among everyone who uses land—a common sense approach to right and wrong. His son, river hydrologist Luna Leopold, built upon his father's ideas to call specifically for a water ethic. He articulated the ethic as a set of guiding beliefs for government, large water users, and citizens.

The following passage comes from Aldo's now-iconic *A Sand County Almanac*, which includes his call for a land ethic and articulates the modern principles of conservation science and ethics.

> All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. . . . The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.
>
> This sounds simple: do we not already sing our love for and obligation to the land of the free and the home of the brave? Yes, but just what and whom do we love? Certainly not the soil, which we are sending helter-skelter downriver. Certainly not the waters, which we assume have no function except to turn turbines, float barges, and carry off sewage. Certainly not the plants, of which we exterminate whole communities without batting an eye. Certainly not the animals, of which we have already extirpated many of the largest and most beautiful species. A land ethic of course cannot prevent the alteration, management, and use of these 'resources,' but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.
>
> In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.

Photos and excerpt courtesy Aldo Leopold Foundation, aldoleopold.org

Talking Trash
A Brief History of Garbage

By Jon Roberts

The town dump and other dirty secrets of waste

New York's streets, Nov. 13, 1911; by Bain News Service. Library of Congress

For most of us, trash day happens once a week. We park the can at the curb in the morning and when we get home from work it's gone. Neat. Where to put everyone's garbage is something that most citizens rarely consider, but it's a question that has been contemplated since humans established their first primitive societies.

Archaeological studies demonstrate that Native Americans in what is now Colorado may have produced an average of 5.3 pounds of trash per person per day in approximately 6,500 B.C. In more "modern" times, approximately 500 B.C., the Athenians developed one of the first municipal disposal sites in the Western world, requiring citizens to dump their garbage at least one mile from the city limits. Around A.D. 200, the Romans established an early form of garbage collection where teams of two men walked the streets, tossing garbage into a wagon. In the United States, trash management has been an evolution of changing mindsets over four hundred years, since the Pilgrims first landed on our shores.

Pigs, Vermin, and Vultures—Oh, My!

In early American history, there was essentially no thought about what to do with garbage and, as a result, it was everywhere. Disease was prevalent, but little was known about the causes. It wasn't yet evident that a significant portion of disease could be attributed to unsanitary conditions. Garbage was handled similarly to English practices—burning or dumping it into streets, alleys, and waterways. Pigs, stray dogs, and other animals roamed freely, eating garbage, which helped keep it in check. For cities near the coast, the ocean was a handy disposal site. Regulations addressing pollution in Boston Harbor did not take shape until the mid- to late-1600s.

While government showed little interest in developing waste management systems, by the mid-1700s individual American households, to a limited extent, began digging pits for their household wastes. Benjamin Franklin instituted the first municipal street cleaning service in Philadelphia in 1757. During the early 1800s, the concept of garbage as a "public nuisance" slowly gained traction, not for any correlation between unsanitary conditions and disease, but for the reeking smell and unsightliness of rotting waste and the resulting vermin. As late as the Civil War, dumping trash into the streets and alleyways remained a common practice, as was allowing animals to roam the streets to eat garbage. Animals were so important to waste management that some cities passed laws to protect them. In 1834, Charleston, West Virginia, enacted an ordinance to prohibit vulture hunting because the birds were needed to eat the trash.

The theory that unsanitary conditions could contribute to disease was gaining ground in England in the mid-1800s and gradually made its way to America. To address increasing public health concerns, local governments began setting standards for the protection of human health. The nation's first public health code was enacted in New York City in 1866.

Waterworks

Though large portions of the country remained rural, by the late 1800s American cities were becoming urbanized. The nation's expanding industrial base led to increasing amounts of waste—and problems with where to put it. Local politics, costs, and general public apathy frequently thwarted attempts to establish local sanitation controls. It took tragedy to force change.

A cholera epidemic in the Mississippi Valley in 1873 killed approximately three thousand people. In 1878, the South suffered the worst yellow fever epidemic in the nation's history. In the wake of these epidemics, local and federal governments became more involved in efforts to protect water supplies and ensure sewage was properly managed. Still, there was little effort to provide organized trash collection and disposal. Garbage was managed by dictating where it *couldn't* be disposed. Oklahoma Territory was no exception; territorial statutes of the late 1800s gave a laundry list of prohibited waste disposal practices.

As the nineteenth century ended, the need for a garbage collection system was a growing public concern. Beyond disease and management problems, citizens and politicians realized that a

New York City sanitation department employee sweeping street, ca. 1910. Library of Congress

Trash collection employees at work. National Photo Company, 1923. Library of Congress

clean city would attract business and create jobs which would, in turn, improve local economies. Public sanitary services were already well established with water and sewage managed by local governments; waste collection and management seemed a natural extension of those services.

The Town Dump

During the first half of the twentieth century, urbanization (and its resulting trash) increased, but the focus of local governments remained with providing clean water and managing sewage. There was still little attention given to garbage. Most municipalities had established a "town dump" and required garbage to be disposed there. Collection services sometimes consisted of a one-man, horse-drawn wagon—not much different from the Roman process of 1,700 years earlier. While the town dump represented an early definition of what *could* be done with garbage, it was hardly adequate. Dumps were easy to construct and relatively cheap to operate; they were also extremely unsanitary, attracted vermin, smelled terrible, and were fire hazards. Dumps were generally located near rivers and streams, where liquids and refuse could easily enter and threaten water supplies, but as long as the garbage went somewhere—out of sight, out of mind—most people were satisfied. It was not until 1929 that the federal government issued the first location restriction for disposal sites by recommending, but not requiring, dumps to be located away from river banks.

After World War I, the nation's economic recovery was astounding. Through the Roaring Twenties, technical innovations, mass production, easy credit, and increased wages translated into a consumer society, an expanded middle class, and an increase in solid waste to be managed. Municipalities began citywide waste collection and disposal services, which quickly became costly enterprises with expanding city limits. Rather than attempt some sort of integrated waste management system to address the waste problem, most localities focused on reducing costs, instituting mechanized collection services (using large vehicles, barges, and railroads to transport waste from centralized transfer stations to a disposal site) or contracting for collection and disposal services. The town dump remained the primary disposal option.

In Great Britain, the concept of a "sanitary landfill" was developing by the 1920s. The British called the practice "controlled tipping," from which the term "tipping fee" (the fee charged by landfill operators) was probably coined. While the town dump model had been in use for years, the idea of a pseudo-engineered fill was quite unique. By alternating layers of waste and either soil or another non-putrefying material, the belief was that vermin, odors, and fires could be reduced, making land disposal more "sanitary" and acceptable. The first sanitary landfill built on British design in the U.S. was in Fresno, California, in 1934. Momentum slowly shifted toward use of sanitary landfills.

Meanwhile, the Great Depression brought an unprecedented loss of jobs and farms. Shanty towns of the displaced rose up across the nation. Often called "Hoovervilles" after President Herbert Hoover, whom many blamed for the Depression, these shanty towns were frequently located near town dumps. "Trashing" was a way to find a few scraps of food or something of value to sell. Oklahoma was not immune from this sad situation. A fairly large shanty town in Oklahoma City (documented in 1939 by Farm Security Administration photographer Russell Lee as "May's Avenue Camp"), with a population of several hundred was built in the North Canadian River floodplain in the area of the South May Avenue bridge. The Oklahoma City dump and an adjacent hog farm were located there. It was a grim aspect of life during the Great Depression. Town dumps were often dumping grounds for both people and trash.

The Rise of Regulation

From the beginning of the Great Depression to the end of World War II, state laws began to prohibit adverse disposal practices. In 1934, the United States Supreme Court upheld a lower court ruling requiring New York City to cease disposal of its municipal waste at sea. In the 1930s, California passed laws prohibiting disposal of garbage within twenty miles of shore. While these actions may have helped remove refuse from America's waterways, we had not yet embraced the question, "How can we manage garbage *and* protect public health and the environment?"

After World War II, the Baby Boom was on and prosperity soared. New consumer goods made life easier: central air heated and cooled

homes; electric refrigeration facilitated pre-packaged, easy-to-prepare food; television introduced us to Lucy and Ricky; Detroit filled our desire for big, comfortable cars to travel the new Interstate highway system; new pesticides and herbicides ensured bountiful crops and perfectly-manicured lawns. Urban sprawl increased as the new middle class moved to the suburbs. With this new consumer society came a drastic increase in the amount of trash. While responsibility for collection and disposal rested with local governments, cities found it increasingly difficult to manage waste. National oversight was needed, yet town dumps, with the resulting fires, odors, and vermin, continued to be used in many locations.

It was not until 1953 that national guidelines for waste disposal sites (based, in part, on sanitary fill methods developed during World War II) were published. Even with criteria in place, most of the nation was slow to adopt them. In 1956, only about thirty-seven percent of landfills in the country were making an effort to follow the guidelines.

Though the federal government had established a long history of oversight of water resources, it was not until 1965 that the federal government finally put the solid waste problem on par with protection of water resources. In that year Congress passed the Solid Waste Disposal Act (SWDA), the first effort to implement a comprehensive management framework for the nation's solid waste. The SWDA was designed to assist state and local governments with developing and managing waste disposal and to promote the development of guidelines for waste collection, transportation, recovery, and disposal. Amazingly, when the SWDA was passed there were *less than ten* full-time employees in state solid waste programs nationwide. Furthermore, no state had any real solid waste legislation; solid wastes were indirectly covered under health and nuisance statutes. In 1970, Congress passed the Resource Recovery Act, shifting the emphasis of federal involvement from disposal to recycling, resource recovery, and conversion of waste to energy, and stipulating that a national system for hazardous waste management be implemented. The Environmental Protection Agency (EPA) was also created in 1970. Solid waste management was now as great a national concern as water quality had been for many years.

Washington, We Have a Problem

Even with new federal authority over waste issues, one event would thrust the history of waste management to the nation's attention as never before, demonstrating that "out of sight, out of mind" was a disastrous approach. To a great extent, it changed the national conversation.

William Love had a grand vision to build a model industrial city, powered by cheap hydroelectric power. In 1892, he found the perfect location—a site the federal government had previously identified as a possible location for a canal between Lakes Erie and Ontario. Love's plan was to build a canal connecting the upper and lower Niagara River to provide hydroelectric power for his model city. The partially-completed canal was abandoned due to a collapse in the economy and the discovery of alternating current, which could transmit electricity cheaply over long distances. The site was sold in 1920 and for over thirty years the canal was a dumping ground for garbage and chemical wastes from the City of Niagara Falls, New York, and surrounding municipalities. In 1953, the owner of the site, Hooker Chemical Company, covered the site with soil and sold it to the Niagara school system for one dollar. A neighborhood and school were built on and around the canal. In 1978, after a record rainfall, toxic chemicals from the old canal began to leach into the yards and basements of the community. The Love Canal problem was thrust into the national spotlight as President Carter declared it a disaster area, releasing emergency funds to evacuate the citizens. Out of this debacle—fifty-eight years in the making—the federal government took on a greater role in waste management issues.

During the Great Depression, loss of jobs and farms forced many to relocate. Shanty towns, known as "Hoovervilles," cropped up across the country, often located in or near the city dump. This family home at the Oklahoma City dump (South May Avenue) was photographed by Russell Lee, July 1939, documenting what he identified as "May's Avenue Camp." Library of Congress

In 1980, in direct response to Love Canal, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), more-commonly known as Superfund. Its purpose was to implement a national response for problems resulting from past hazardous waste management, to impose liability on those entities creating problems, and to remediate (remedy, clean up, reclaim) contaminated soils and groundwater caused by those practices. CERCLA also imposed various taxes on chemical and petroleum industries, which were deposited into a trust fund (hence, the name Superfund) to be used for cleanups initiated under its provisions.

Under CERCLA authority, the Tar Creek Superfund Site in northeast Oklahoma became one of the first sites in the nation to undergo a Superfund cleanup. Due to the size of the affected area and the multitude of health and environmental problems associated with the site, the cleanup is still underway. Oklahoma has fourteen Superfund sites, most of which are former petrochemical refineries, lead and zinc smelters, mines, and industrial waste landfills. Seven sites have been completed and one is in the beginning phases of investigation. The remaining six are undergoing remediation or are in a long-term groundwater remedy phase.

A Responsible Future

Since Love Canal, we have come to realize that trash talk is a bigger question than simply what can or can't be done with it. There is a larger responsibility to protect public health and the environment.

Father and child with sign reading "I want to live" at a Love Canal protest, 1978. Residents had become mistrustful of the U.S. Health Department, thinking information was being withheld, and with scientific experts who didn't know how to advise cleanup of their community, which would later be declared a national disaster area. Courtesy University Archives, State University of New York at Buffalo

Today's improved technology and waste management practices are specifically designed to protect public health and the environment, both at the source and at the final disposal location. Much more can be done, but with public awareness, increased recycling, improved manufacturing techniques, and other actions we will continue to reap the benefits of a cleaner, more attractive environment.

JON ROBERTS served for more than eight years as a Weather Officer with the U.S. Air Force, after which he joined the Oklahoma Department of Environmental Quality in 1991. He is Environmental Programs Manager at the DEQ and has directly supervised the agency's regulatory programs for solid waste, hazardous waste, radiation, and used tires. Roberts' article "GARBAGE: The Black Sheep of the Family—A Brief History of Waste Regulation in the United States and Oklahoma" is a well-researched review of the history, legislation, and social influences that have shaped modern waste management. Read it online at: http://www.deq.state.ok.us/lpdnew/wastehistory/wastehistory.htm

EXTRA! | READ | THINK | TALK | LINK

- "Following Garbage's Long Journey around the Earth," *Fresh Air*, NPR, April 26, 2012. Radio host Terry Gross interviews Edward Humes, Pulitzer Prize-winning journalist and author of *Garbology: Our Dirty Love Affair with Trash*. Discussion includes where trash goes after we throw it out, how waste management is largely hidden from Americans' daily lives, and how it is making its way into oceans, the food chain, and to other countries as an export product. npr.org
- Love Canal Collections, University Archives, State University of New York at Buffalo. Newspaper articles chronicle the environmental disaster known as Love Canal. Includes images, maps, and posters, and a link to the University of Buffalo's Love Canal website. library.buffalo.edu/specialcollections/lovecanal
- Link TV. Watch videos on how other countries are managing trash and recycling (often doing a better job than the U.S.) and how trash collection is seen as noble, rewarding work. linktv.org (search: *garbage*)

The federal government encouraged conservation of waste paper during WWII, noting that it would "save millions of dollars annually for Uncle Sam." These young conservationists are measuring their stack, with the goal to donate it when it is "broomstick high." Photo by Ann Rosener, Feb. 1942, U.S. Office of War Information. Library of Congress

Trash—By the Numbers

12 Americans throw away enough office and writing paper annually to build a wall 12 feet high, stretching from Los Angeles to New York City. For every ton of paper recycled, we save 7,000 gallons of water, 17 trees, and 3 cubic yards of landfill space.

500,000 Americans buy 62 million newspapers a day. It takes over 500,000 trees (an entire forest) to make all the Sunday editions in the U.S. each week.

426 Americans throw out enough Styrofoam cups each year to circle the earth 426 times.

75% Recycling scrap metal consumes 75% less energy than raw materials. Each ton that is recycled saves 2,500 pounds of iron ore, 1,000 pounds of coal, and 40 pounds of limestone.

120 Americans throw away enough used motor oil annually to fill 120 supertankers—and it can all be recycled. It takes 42 gallons of high-quality crude oil to produce 2.5 quarts of motor oil; it only takes 1 gallon of waste oil to produce the same amount.

100 Glass never wears out. Each recycled glass bottle saves enough energy to light a 100-watt bulb for four hours.

40% Americans use enough plastic wrap every year to shrink-wrap the state of Texas. Plastic bags and wrap account for up to 40% of U.S. plastic garbage.

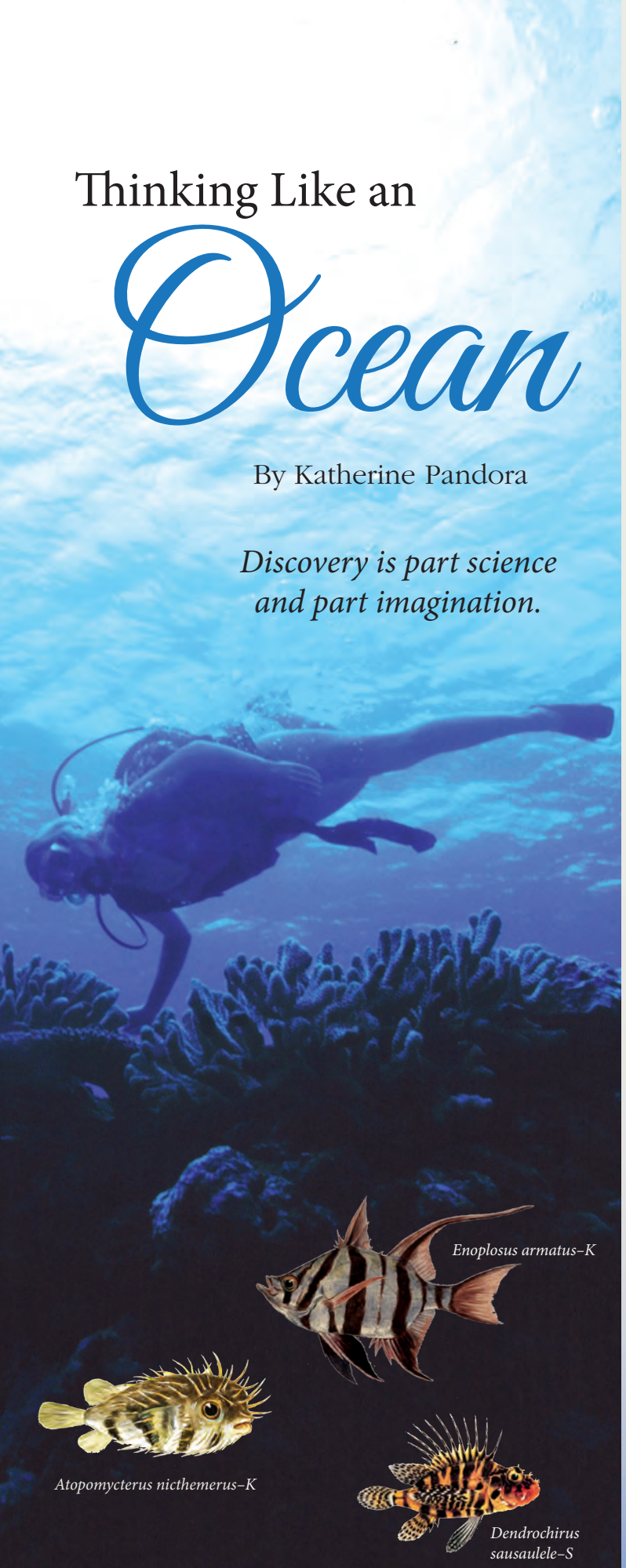
20 You can make 20 new aluminum cans from recycled materials with the same amount of energy it takes to make 1 can from raw materials.

Source: Oklahoma Department of Environmental Quality

Thinking Like an Ocean

By Katherine Pandora

Discovery is part science and part imagination.



Enoplosus armatus–K

Atopomycterus nicthemerus–K

Dendrochirus sausaulele–S

Like the dolphin who guides you, you bring us beside you
To light up the darkness and show us the way
For though we are strangers in your silent world
To live on the land we must learn from the sea.
"Calypso" by John Denver

Eons ago, we named our planet "Earth" in deference to the terrestrial footholds that made the ground we walk on the defining characteristic of human habitation. But imagine: if we had telescopes through which we could have seen this azure expanse, the opaque liquidity that spans nearly three-quarters of our north, south, east, and west, surely one of the most fitting names would have been "Oceanus." Incredibly, Apollo 17 was the first manned space flight to show us photographs of what is known as "the Whole Earth." Before, we had only glimpses, partial views of ourselves from space. Seeing those images, seeing the Earth as a whole, how could we not marvel that our dominant feature is *ocean*? If seeing the Earth suspended in the unrelenting darkness evoked a disquieting aura of otherworldliness, over time the vertigo has faded—as has the wonder of inhabiting a water-dominated world.

It is extraordinary how little we know of the ocean and thus how much we exist as strangers in our own home. This deficit derives in part from how physically distant much of the population is from the ocean. Oklahoma's nearly four million land-locked inhabitants are multiplied many times over around the world. For us and them, contact with the ocean is sporadic: as a playground on vacation or glimpsed beneath the wings of an airplane or referenced on the Weather Channel during hurricane season. Almost everyone, children included, know that Amazonian rainforests play a vital role in the life of the planet by converting carbon dioxide into oxygen through photosynthesis. Vastly fewer know that the ocean's microscopic phytoplankton account for *fifty percent* of the oxygen in our atmosphere, sustaining half of every breath we inhale. Casual consideration might reason Beijing or London or Rio de Janeiro or New York City as the world's largest built area; but, in fact, the largest structure built by living organisms is Australia's Great Barrier Reef. At 133,000 square miles, it is roughly half the size of Texas and visible to the naked eye from the International Space Station.

Our long-standing intimacy with terra firma can be easily conjured in the mind's eye, while the seas are *mare incognitum* (unknown sea), leaving us adrift, with only a surface understanding of the planet as a whole.

Aside from inquiries about the economic viability of the fishing industry or oil and gas exploration or military reconnaissance, science has contributed little to discussions of the ocean world. Until

Callyodon perspicillatus–H

recent efforts using satellite data proved promising, the scientific community could provide detailed landscape maps of the Moon and Mars—celestial bodies with which we have minute physical contact—while more than ninety percent of the seabed had yet to be mapped. Funding, personnel, and sustained research have been hard to come by. The consequences of land-locked frameworks mean that answers to increasingly urgent phenomena such as plummeting fish stocks and increasing acidification remain murky. Gaining insight into the ordinary workings of ocean ecosystems remains as complicated as it is necessary.

As we begin to debate the whys and hows of investing more resources in learning about the ocean, it may help to not only think *about* the ocean but also to think *like* an ocean. One beneficial shift in perspective is recognition that ocean habitats and terrestrial habitats are interconnected. In emphasizing locality and region, we have obscured the reality that there is *one* ocean, that influences are mutual and intermingled across its breadth and depth.

Into the Fathoms

Moves to think in terms of a "global ocean" have gained recent acceptance in research and planning and seem to signal an important shift. We may be finding our way back in time to the seventeenth and eighteenth centuries, when describing the world as a "terraqueous globe" was in vogue. Excited commentators presented a planet that was simultaneously "Oceanus" and "Earth." Integrating the two meant exploring the nature of miles-long chasms and towering glaciers; puzzling out the existence of fossil seashells on mountaintops; documenting the far-reaching reverberations of Lisbon's 1755 earthquake and tsunami; contemplating the drama of volcanic eruptions in both the cataclysmic disappearance of the island of Krakatau and rediscovery of the ancient buried seaport of Pompeii.

Looking below the surface to catalogue the living world of the aquasphere was even more challenging, limited (until well into the twentieth century) to the flotsam and jetsam that washed up on shore, to speculation rather than knowledge. Renaissance rumors of strange beasts, such as the Kraken in Norway and sea serpents off the harbor of Gloucester, Massachusetts, persisted for centuries. Christopher Columbus recorded mermaid sightings matter-of-factly in the 1493 journal of his voyage to the New World. Curiosities of the underwater world were sometimes manufactured and excitedly put on display, as P.T. Barnum did with a mermaid attraction at Barnum's American Museum in New York City in the mid-nineteenth century. (The same kind of hoaxing continues today, as with Animal Planet's docufiction film, *Mermaids: The Body Found*.) Chasing hard facts among deep ocean currents was an elusive quest, approached by default through fictional means. Readers could sound the depths with Herman Melville's enigmatic white whale or imagine themselves submerged in Captain Nemo's *Nautilus*. Through Jules Verne's *Twenty Thousand Leagues Under the Sea*, readers could encounter the lost city of Atlantis, repel attacks by giant squid—an imaginative journey so compelling that Walt Disney Productions later produced it as a major motion picture, followed by a ride attraction at its theme park.

The fragmented knowledge glimpsed through these explorations of fact and fancy were frustrating stutter steps, but they stimulated the desire to break free of the surface and explore the depths as if we belonged there. Unable to manage Nemo's feat of roaming the ocean's depths, the invention of the parlor aquarium in the nineteenth century allowed families to observe miniature oceans at home—creatures from land and sea brought together at eye level. Public aquariums brought grandeur and scale, sea creatures displayed in water-filled glass rooms in darkened buildings that heightened the feeling of being suspended in marine habitats. For the next hundred years, these artificial versions of vast ocean reaches were the closest thing to real that existed, allowing enthusiasts and the merely curious to project themselves into undersea worlds, to look from the outside in. Thinking like an ocean would require experiencing these habitats firsthand, from the inside out—a prospect that seemed as unlikely as going to the moon.

Above, top: "Meeresalgen," *Das Meer* (1874) by M.J. Schleiden; Treasures of the NOAA Library Collection. Middle: Artist's conception of the NOAA Ship *Oceanographer*; NOAA Sailing for Science Collection. Bottom: Humpback whale breaching, Maui, Hawaii; photo by Stan Butler; NOAA Sanctuaries Collection. Opposite: A diver enjoying the wonders of the coral reef at Fagatele Bay; photo by Kip Evans; NOAA Sanctuaries Collection.

Untethered

A set of deceptively simple technological advances made the voyage to the ocean's inner space possible. The first was the optimization of the aqualung, which granted divers the ability to roam, untethered, within the deeps (in its early models, up to an hour at a time). The second was the adaptation of photographic equipment for underwater use. Brought together in the 1950s by explorer, showman, and amateur naturalist Jacques-Yves Cousteau, their potential was announced in his book and award-winning film *The Silent World*. The public appeal of his immersion in the sea was captured in the book's subtitle, "A story of undersea discovery and adventure, by the first men to swim at record depths with the freedom of fish." His long-running documentary television series, *The Undersea World of Jacques Cousteau*, brought this previously impenetrable world inside the living rooms of millions of viewers.

What made the Cousteau effect so notable was more than his ability to make the invisible visible or the novel information his expeditions generated; it was viewers' experiences of being "present" in the deep ocean, drawing near, vicariously making contact with whales, dolphins, rays, octopuses, and other sea life as his crew of divers and cinematographers crossed boundaries that had been off-limits to humans. Cousteau's presentation was an intimate one. Even though viewers' immersion was secondhand, the documentaries approximated direct experience, coaxing new kinds of thinking like an ocean as the undersea world, with all its complexity and unpredictability, came alive.

As increasingly sophisticated undersea filmmaking brought viewers deeper into the fathoms, one particular line of fascination gained a tenacious following. It singled out whales, orcas, and dolphins (of the order Cetacea) as a companion species, playing on sentiments that the terra-aqueous divide could be bridged through a perceived affinity between marine mammals and humans. With the release of the album *Songs of the Humpback Whale* in 1970, cetaceans sang through the liquid deeps for *us* as well as for each other. We sent them beyond the solar system into interstellar space in a recording aboard the space probes *Voyager I* and *Voyager II*. The television show *Flipper* portrayed the successful intertwining of human and ocean cultures with a dolphin starring as the family "pet."

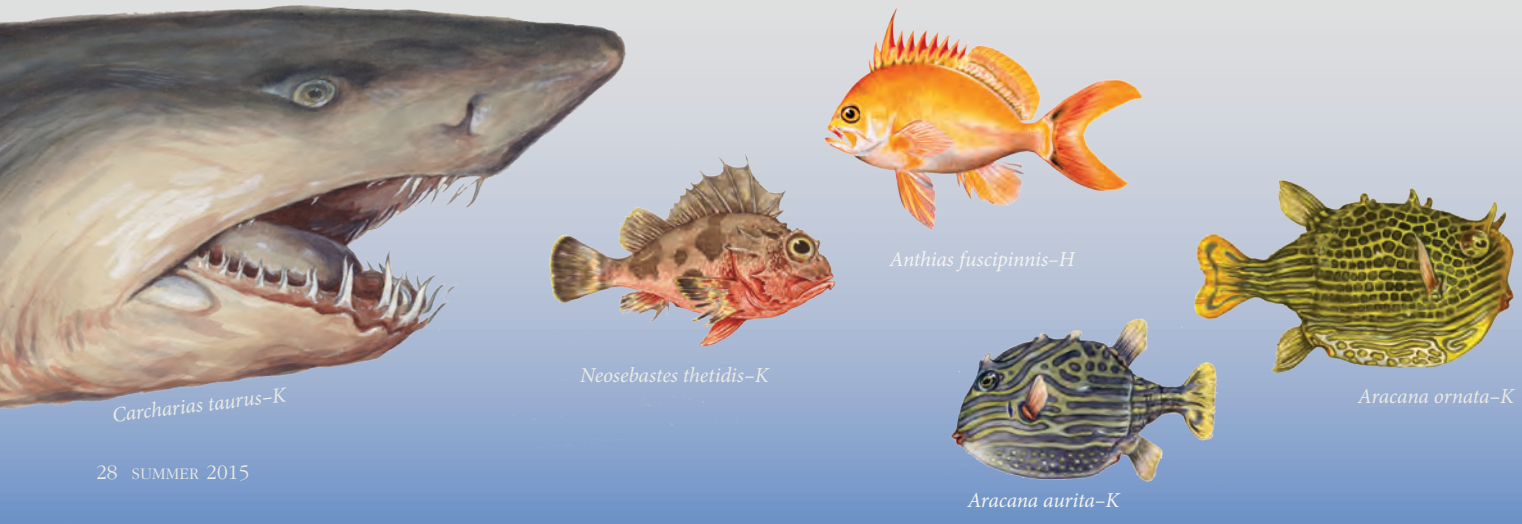
Multi-million-dollar public aquariums and oceanarium theme parks now feature the playful interactions of humans and dolphins (beloved for their seemingly gregarious natures) as they swim synchronized routines for cheering audiences. We have long lauded dolphins as having an intelligence second only to humans, and the expectation that we can learn to speak to each other has remained tantalizingly just out of reach. In the meantime we content ourselves with petting, hugging, and swimming with them at entertainment parks and organized commercial encounters in the open ocean. The most iconic of these human-marine mammal connections is SeaWorld's "Shamu" orca performances. Trainers ride the backs of six-ton killer whales which thrust themselves vertically in a spectacular balancing act of human-perched-on-snout until they leap into the air and dive back into the water.

For decades now, our romance with marine mammals has provided a reassuring aura of being "in touch" with the ocean wilderness, a vision that we are capable of a partnership that elevates both them and us as evolved terraqueous beings. Increasing attention to the deaths of SeaWorld trainers and investigations into the debilitating pressures on cetaceans in captivity suggest that much of this vision has been wishful thinking—perhaps delusion. Thinking like an ocean demands more than assumptions of interspecies kinship as a shortcut to understanding.

Planet Pacific

Yes, pictures of our blue planet, and underwater footage of unseen worlds, and visions of cross-species communication with intelligent sea mammals are inspiring and poignant; but perhaps it is time to reclaim a more mundane form of thinking like an ocean—by concentrating on the shoreline, the intertidal zone and near ocean, that fluid space where human presence intermingles with ocean and land simultaneously. This narrow border region presents no delusions of remote untouchability, exposed as it is to constant physical, biological, and social transformations.

Thinking like an ocean, for me, began in this intertidal space. It's tangled with my experiences in the working-class port town where I grew up, San Pedro, California, and my fascination with the ocean and its constantly changing nature. My relatives and our friends and neighbors were mostly immigrants, from places like Croatia and Italy. The ocean was an integral part of their livelihoods: working at the StarKist Cannery (like my grandmother) or loading and unloading cargo ships at Los Angeles Harbor (like my father and his father) or as so many who were fishermen. The "natural world" not so far from my front yard was a web of containerization and mechanization as the port changed the world of work as our town had known it, and as ecological shifts transformed the previously dominant local fishing industry into a ghost fleet.



Carcharias taurus–K

Neosebastes thetidis–K

Anthias fuscipinnis–H

Aracana ornata–K

Aracana aurita–K

Four-year-old Katherine is seated on a beach towel with her mother, Diane, at left, and great aunt "Boots" (Florine), seated behind. Katherine's grandmother, Esther Mai (Florine's sister), is at far left. "We were at Belmont Shore in Long Beach," says Katherine. "It was where I learned to feel at home in the ocean and developed whatever minimal sand-sculpting skills I possess. We spent so much time at beaches—tidepool visits, sailing to Catalina, biking or driving to sit by the ocean—I guess I came by my obsession honestly."

As kids, the ocean was also our playground. Fooling around in tide pools was my introduction to nature and science, seeing what was new at the then-tiny local marine museum at Cabrillo Beach (overseen not by scientists but by head lifeguard John Olguin, who had a knack for explaining the migration of gray whales and revealing the mysteries of the grunion that came ashore on moonlit spring nights). I learned about the tenacity of living creatures in miniature waterworlds lodged in the nooks and crannies of rocks as the tides shifted. I saw nature's indifference to human shore life in the vast scale of the Pacific wilderness spread out before me, a planet unto itself—and, yet, an immensity rendered vulnerable by human actions, such as the 1969 Santa Barbara Oil Spill. The ocean's edge was an intensely personal site for exploring nature, a contact zone where everyday encounters between the human and the nonhuman were consequential.

The post-World War II era was a time of self-assurance. It presumed that the secret of life, the power of the atom, the destruction of viral disease, and the conquest of space were as nothing compared to what lay ahead in the pursuit of scientific knowledge. While demonstrations of scientific prowess continued, it made for an unsettling contrast with the nature I knew best: science could claim very little knowledge about the nearly three-quarters of "the blue planet" that was oceanic. How far modern science had come, I noticed, depended on what was *left out* of the story of mastery as well as what was included.

Science's cognitive abyss about the sea showed up regularly on my family's television screen as Jacques Cousteau and the *Calypso* bobbed up and down among the waves in search of the most basic facts of marine life (which inspired John Denver's song "Calypso" that charted at #2 on the Billboard Hot 100). Cousteau was but one of many popular culture sources that made contributions to thinking like an ocean for me, whether it was contemplating the impossibility of coelacanths, the Loch Ness Monster, or giant squid; visiting Bubbles the Whale down the road at Marineland of the Pacific; seeing my first live seahorses in a neighbor's aquarium; inspecting museum murals depicting how life may have begun in the primordial ocean; or admiring blue planet photos on *Whole Earth Catalog* covers. As placid as the tidal pools I waded through might seem, both they and I existed within a world of ineradicable yet contingent cultural effects dependent on time and place.

There is no one way to think like an ocean, but there are more and less insightful ways to do so. We have come very late to this responsibility as scientists and explorers and storytellers and inhabitants of a terraqueous planet. With missteps and breakthroughs and ambiguities we've made parts of a beginning. We need to work hard to get it right, so that we understand our planet, and understand ourselves.

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Fish illustrations courtesy National Oceanic & Atmospheric Administration (NOAA), from *Art of the NOAA Photo Library* and *Treasures of the NOAA Library* collections (photolib.noaa.gov). Fish coded -H: "The Shore Fishes of the Hawaiian Islands, with a General Account of the Fish Fauna" by David Starr Jordan and Barton Warren Evermann, Bulletin of the United States Fish Commission, Vol. XXIII, 1903. Fish coded -K: Artwork by Dr. Yuri V. Kurochkin, TINRO, Russia, 1966; courtesy Mrs. Yuri V. Kurochkin. Fish coded -S: "The Fishes of Samoa" by David Starr Jordan and Alvin Seale, Bulletin of the United States Fish Commission, Vol. XXV, 1905. Crab: "The Brachyura and Macrura of the Hawaiian Islands" by Mary J. Rathbun, Bulletin of the United States Fish Commission, Vol. XXIII, 1903.

EXTRA! | READ | THINK | TALK | LINK

- "Former Orca Trainer for SeaWorld Condemns Its Practices," *Fresh Air*, NPR, March 23, 2015. Host Dave Davies interviews author John Hargrove about his book, *Beneath the Surface: Killer Whales, SeaWorld, and the Truth Beyond Blackfish*, on the disturbing practices and realities of keeping orcas in captivity. Includes an excerpt from the book. npr.org
- National Oceanic and Atmospheric Administration (NOAA). Explore the vast network of scientists and agencies that monitor our oceans, coastlines, and weather. noaa.gov (Editor's note: The NOAA photo library is a valuable, pictorial history of American initiative in ocean exploration and weather research. It is a *national treasure*. Search: *About NOAA*, then click on *History*.)
- *Twenty Thousand Leagues Under the Seas*. Read Jules Verne's novel, translated from the original French by F.P. Walter, and see watercolor illustrations created by artist Milo Winter for the 1922 juvenile edition. jv.gilead.org.il/fpwalter

BARNETT *continued from page 21*

Evolving a Thinking Community

As I was finishing *Blue Revolution*, I hesitated to define a water ethic. Each community will build its own based on unique water resources and cultures. It will look different in each region, in the same way farmers' markets look different depending on local climate and crops.

I did sketch out five common goals with the caveat that they are fluid, as Aldo Leopold said, to "evolve in the minds of the thinking community."

- Americans value water, from appreciating local streams to being willing to pay an appropriate price for water.
- We work together to pollute less and use less—rather than fight each other to grab more and more.
- We try to keep water local to avoid the financial, ecological, and energy costs of long-distance transfers.
- We avoid the two big mistakes of our water history: over-tapping natural supplies and over-relying on the costliest fixes that bring unintended consequences to future generations.
- We leave as much as prudently possible in nature—aquifers, wetlands, and rivers—so that our children and grandchildren, with benefit of time and evolving knowledge, can make *their own* decisions about water.

A water ethic will change the way our communities look: More meandering streams, less concrete. More natural wetlands, fewer retention ponds. More shade trees, less open lawn. But ultimately, a water ethic means *transformational* change: Growing the right crops in the right parts of the country. Not subsidizing those that are irreparably harming aquifers. Reusing water and harvesting rain for irrigation, cooling towers, and toilets—before we sink the next well or tap the next river.

People often ask me if it's going to take an epic event such as the Netherlands' 1953 flood or Australia's mega-drought to turn Americans toward a water ethic. The answer is yes, and I think we're there. We may not have the choking storms of the Dust Bowl, but we have historic drought. We have superstorms like Hurricane Sandy, warmest-on-record summers, "snowmageddon" winters. These are water issues everyone wants to talk about—even people who refuse to talk about global warming.

This is why I've come to believe water will be the issue around which the shouting match over climate change finally becomes a conversation. Literally a chemical bond, water is also one of the deepest bonds among people. Ultimately, the water ethic will strengthen our bonds as it brings to the fore our shared circumstance, our dependence on water, and our humanity.

CYNTHIA BARNETT is an award-winning journalist who has reported on freshwater from the Suwannee River to Singapore. She is the author of three water books, including *Blue Revolution*, her call for a water ethic, and the just-published *Rain: A Natural and Cultural History*. She has a bachelor's degree in journalism and a master's in American history with a specialization in environmental history, both from the University of Florida. In 2004, she was awarded a Knight-Wallace Fellowship at the University of Michigan, where she spent a year studying freshwater supply.

TODD JOHNSON is a member of Oklahoma State University's Division of Agricultural Sciences and Natural Resources where, for the past 25 years, his photography has been showcased in a wide variety of university, industry, and news media platforms, reaching local, state, national, and international audiences. His professional career began on the staffs of several Oklahoma-based newspapers. You can see thousands of his Oklahoma images in the OSU/DASNR Kitchen Sink Photo Database: kitchensink.okstate.edu

Blessed be the bees

Who work together
late October, luminous in fall light
Caryopteris and rose,
ageratum and *lantana*
arcs of flight
Each pair of wings
frayed with time and distance,
the homeward journey
over and over
Each time returning
to dance their own welcome.

—Britton Gildersleeve
A Murmuration of Bees
Kattywompus Press, 2014

EXTRA! | READ | THINK | TALK | LINK

- "Rain, Rain, (Don't) Go Away," *On Point* with Tom Ashbrook, NPR, April 22, 2015. Recorded on Earth Day, this interview features author Cynthia Barnett discussing her new book, *Rain: A Natural and Cultural History*. Site includes an excerpt from Barnett's book. onpoint.wbur.org
- "California Drought Tests History of Endless Growth," Adam Nagourney, Jack Healy, and Nelson D. Schwartz, *The New York Times*, April 4, 2015. Governor Jerry Brown's plan to cut California's water consumption poses fundamental changes to business and lifestyles. nytimes.com
- StateImpact, a reporting project of NPR stations. Read the latest posts by reporters Joe Wertz and Logan Layden on Oklahoma drought conditions and how the state is coping. stateimpact.npr.org
- Oklahoma Water Resources Board. Monitor drought conditions, groundwater and reservoir levels, and fire danger outlooks. Find water conservation tips and data on statewide water usage. owrb.ok.gov

Photos: Todd Johnson, DASNR/OSU

Of the Skin of the Earth

By Brian Doyle

We forget the sheer mindboggling sensuality of meeting the earth and its blankets of green and thorn and moist and flint, early in life; so come with me now for a moment this morning, and cast your memory back to your first yard, the overgrown lot next door, the copse of woods across the street, the tangled alley, the dusty paddock, the dry wale, the thicketed banks of the unsung creek; no matter how urban our first childhood impressions, were we not startled and delighted and instant cousins with birds and insects, with mud and dust and soil, with the humble mat of grass, the defiant ailanthus tree, with slugs and snails and ants and wasps, with rocky outcrop and permanent puddle, with the dense cling and yearn of the skin of the earth?

We crawled on it and then in it, and sometimes—frightened, awed, uncomfortable, prickled by the fear of forever—under it; we tasted it, and wore it as paint, and later bore it home on our clothes with pride, as evidence of effort; we dug and probed and poked and harrowed it, and carved tiny towns and farms and rivers in it, back when we were the tiny emperors of tinier estates in sandboxes and beaches and the wild corners of yards where no trowel ever went; we jammed our fingers in it, and hauled up handfuls of it, and threw bits and shreds of it at each other and at animals and insects and brothers and walls and twice, unforgettably, unfortunately, windows.

Loam and peat, muck and mire, clay and chalk, bog and sand, shale and stone, I sing the song of the skin of the earth; we staggered along barefoot on it when we first learned to walk, our toes and soles greeting it, being scarred and torn by it, savoring mud and moss, flinching from shards and stabs, learning a vocabulary of sensation that we still can speak all these years later; don't you sigh with pleasure when you walk barefoot on the beach, shuffle through lush grass, patter in water ankle deep on the shore?

And the skin of the earth that is under water, the smooth rippled sand you can see in the sea, the gentle suck of the bottom of the pond, the pebbled splay of the bed of the creek; and the skin of the earth that is under that which lives in and on and over it; aren't you as startled and fascinated as me when you see huge scars in the earth from track-hoes and toppled trees? Do you slow down too, and gape into the mysterious deep of the skin of the sphere on which we whirl?

We take it for granted, this epic skin, this vast packaging, this unimaginable layer on lava, now that we are older; we look at it mostly for money, to see what we can take from it, how we can shape and channel and furrow and shave and sculpt it, how we can glean and harvest and mine what grows in and on and under it; but this morning, for a moment, drift back to when you were two and four and eight and twelve, and ran and rolled and climbed and curled and slept on the skin of the earth, in all its astonishing forms and heaps; and ever it was patient with you, and held you gently, as it has all your life with hardly a murmur, and will hold you still after you die, taking you under, or accepting your scatter of ash, to soak in and become new soil on which new children will run and roll and skip and sleep.

BRIAN DOYLE is the editor of *Portland Magazine* at the University of Portland, Oregon, and an award-winning author of many books of essays and fiction. His most recent work includes the essay collection *Children & Other Wild Animals* (Oregon State University Press, 2014) and *Martin Marten: A Novel* (Thomas Dunne Books, 2015). Read selections of his writing at: thesunmagazine.org

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