

BY Cristina Santiestevan

# CHANGES ON THE HORIZON

Land trusts prepare for climate change by exploring adaptation methods



**A**s climate change continues to affect natural systems in the coming years, land trusts may need to adapt their approach, their properties and even their guiding philosophies.

What do we do about climate change? This is the essential question of climate change adaptation. And, for many land trusts, what to do and how to adapt are becoming central to everything from the drafting of conservation easements and

the siting of buildings to the rethinking of what should be protected in the first place.

"Ecosystems are going to change everywhere," says Andy Pitz, executive director at French and Pickering Creeks Conservation Trust in Pennsylvania, who writes and speaks regularly about climate change and its projected impacts within the land trust community. "It's a touchy subject, but we have to accept that things are going to change."

Opposite: The sun sets over Rush Ranch, Solano Land Trust's property where research on the effects of climate change is conducted.

### Think Locally, Act Hyper-Locally

The World Wildlife Federation defines climate change adaptation as *the process of adjusting to and anticipating the impacts of man-made climate change*. This definition can be applied at any scale from global to local. For the purposes of land trusts, however, it's the local scale that matters most.

"If you try to think on too big a scale, you're just going to get a headache," says Pitz, who advises land trusts to focus on the anticipated impacts and adaptive actions that best apply to their region and their individual properties. Each land trust should consider completing its own vulnerability assessment and developing its own site-specific plans for adaptation.

"If you're a land trust working in a coastal region, your greatest concern has to be sea level rise," says Pitz. "If you're in the West, you've got to think even more about fire. If you're inland on the East Coast, like we are, hurricanes and extreme flood events are inevitable. It's just a roll of the dice whether you get hit or not."

Regional variability means that there is no single answer to climate change and there is no single best climate change adaptation plan. At French and Pickering Creeks Conservation Trust, which works with watersheds and riparian communities, Pitz is concerned about the impacts of extreme flood events. "We have to think in terms of 250, 500 or 1,000-year

## Training the Ranks

The Land Trust Alliance's National Land Conservation Conference, Rally, often features sessions on climate change. And around the country, the Alliance partners with experts like Dr. Adena Rissman, assistant professor in the Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, to deliver training in the field. Rissman recently conducted a session with stewardship staff of land trusts in the Midwest. Her talk "When Permanence Requires Adaptation" examined the challenges of conservation easements in dynamic landscapes and climate.

Rissman described research conducted by a team of professors from six universities who examined more than 250 conservation easements and interviewed 70 government and land trust staff members. Rissman emphasized that flexibility and principled adaptation are not the same thing. "We found that conservation easements are becoming more specific, but also need a process for conservation-oriented change in the context of landscape and climate change. Conservation staff perceived a need to respond to changing social and ecological conditions, but were divided on whether climate change was likely to negatively impact their conservation easements. Our study suggests the need for greater attention to the choice of land to conserve, the choice of the land protection tool and drafting and stewardship of conservation easements to ensure the public benefits of land conservation in changing landscapes."

For more information see [labs.russell.wisc.edu/rissman](http://labs.russell.wisc.edu/rissman). Rissman's team will be publishing white papers for conservation easement holders and funders in the near future.

we site buildings, prioritize habitats or direct resources."

In California, Solano Land Trust is planning for climate change on one of its owned properties called Rush Ranch, which lies within Suisun Marsh, part of the San Francisco Bay Estuary. Historically, the marsh was a vast stretch of brackish tidal wetlands separated by tidal channels and ponds that were alternately flooded and drained by the

executive director. "Just by virtue of us protecting the ranch from development, it will be able to handle sea level rise because we're preserving the ability for the marsh and the transition zone between the marsh and uplands to rise with the sea. The goal of the restoration projects in the management plan is to restore the connectivity of this natural system. And we already have mitigation funding for one project lined up, which will include an endowment for long-term maintenance and management."

The San Francisco Bay Natural Estuarine Research Reserve has been gathering meteorological and other information on the site, says Byrd, "and they are partners in stewarding this amazing resource." Rush Ranch is destined to become one of a relative few "sentinel sites" in estuaries around the country where vertical benchmarks, sediment accretion rates and marsh vegetation response are precisely monitored to provide early detection of how marshes adapt to sea level change.

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events because 100-year events are happening every couple of years now," says Pitz. "While in the past organizations routinely looked at 100-year floodplains when setting conservation priorities or designing easements, we now need to think about larger flood events and see how that may affect where or how

ocean's tidal influence. Today, Rush Ranch contains one of the largest existing tracts of historic tidal brackish marsh, providing home for numerous endangered species that can live only here, including the last known population of the Suisun thistle.

"We are updating the management plan for the property now," says Nicole Byrd,

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KACHEMAK HERITAGE LAND TRUST

Alaska's Kachemak Heritage Land Trust protected this 11.76-acre property along the lower Anchor River, including side channels and discharge slopes that are important for water quality and salmon and moose habitat.

Ultimately, plans are for it to be tied to a global project by the Smithsonian Institution that will extend these “coastal observatories” to many other parts of the world.

“I think the fact that we are doing climate change planning on a historic ranch, where we also allow public access and the ranch is still a working ranch, is pretty cool,” says Byrd.

## Prepare for Instability

“There are three basic scenarios,” says Andy Pitz. “In the first, greenhouse gas levels in the atmosphere just continue to grow, in which case the climate will always be changing. Or levels could grow then stabilize at some higher plateau. But even after we reach that point, there will still be a very long lag time before ecosystems have fully adapted. Or levels could grow, then decline and eventually stabilize at some lower point. In any scenario, there will be no stability for at least a hundred years. It’s mind-blowing if you think about it.”

This promise of change and instability is already influencing long-range planning

processes for land trusts across the country. “We’ve incorporated climate change considerations into our conservation planning and project selection criteria,” says Erik Kingfisher, stewardship director with the Jefferson Land Trust, based in Port Townsend, Washington. Indeed, in its 2010 conservation plan, the Jefferson Land Trust identifies climate change as one of four primary factors that will determine the ultimate success of its 100-year vision. Elsewhere, land trusts are beginning to write language into easements that states future ecosystem or property changes caused by impacts of climate change will not diminish the conservation value of

the land or the validity of the easement. This approach may ultimately help protect the permanence of the easement, explains Pitz. “There were incidents with Hurricane Irene in Vermont where streams radically changed course. If you had an easement that was tied to the existing location of the stream, all of a sudden you’ve got a very big problem.”

The impacts of extreme storms are not limited to regions within the reach of

hurricanes and tropical storms. In Illinois, the Lake Forest Open Lands Association (LFOLA) is grappling with the current and potentially worsening impacts of storm water runoff in threatened ravine ecosystems. “Most climatologists agree that the intensity and frequency of dramatic storm events have increased in the Great Lakes region. As a result, we’ll see more severe storm water events,” says LFOLA President John Sentell, who explains that the volume and rate of storm water runoff from impervious surfaces, residential backyards and ultimately storm sewers is carving steeper and deeper channels into the bottom of nearby ravines, a critical threat to the overall health of the ecosystem. “The effects of climate change pose a real risk to these very rare ravine habitats in our community.”

Sentell explains that one solution for protecting the ravines may involve slowing the rate at which runoff courses through them on the way to their eastern neighbor, Lake Michigan. Green infrastructure modifications translate into improved ecosystem resiliency, which is often the first and best course of action when preparing priority habitats for the impacts of climate change. “We have to think in terms of triage,” agrees Andy Pitz, who is realistic about the challenges of balancing limited resources with wide-reaching restoration projects. “You want to put more energy into your best places, so that they become more resilient. Those habitats may then become the refugia where species can retreat and find shelter, food and all the things they need in the future.”

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By protecting essential refugia, land trusts increase the resiliency of the species that live there. In order to identify the best potential refugia sites, land trusts must consider the needs of priority species, as well as the manner in which current ecosystems may change in the future. In Alaska, for example, the Kachemak Heritage Land Trust (KHLT) is working to protect the coldest pockets of water in the Kenai



Ruth Gardener-Woods, an Openlands TreeKeeper, and family mulching a young Kentucky Coffee Tree

OPENLANDS

Peninsula's anadromous Anchor River. "We want to think and plan proactively about the changes ahead," says KHLT Executive Director Marie McCarty. "By partnering with local organizations, we are able to do more than we could ourselves. For example, Cook Inletkeeper, a local community-based nonprofit, provided the thermal imagery that allowed us to identify and protect the coldest sections of the Anchor River."

The project is meant to help local salmon populations adapt to the impact of rising temperatures. "These refugia provide salmon with the cold-water stepping stones they need to make their way up and down otherwise warming streams," says Sue Mauger, science director with Cook Inletkeeper. "Researchers in Oregon and Washington have already observed salmon using cooler sections of rivers during the summer months. As Alaska warms in the years ahead, we expect to see the same behavior in our local streams."

These thermal refugia are a key component of a KHLT conservation plan that

seeks to implement realistic climate change adaptation strategies for salmon protection. To achieve that goal, KHLT and Cook Inletkeeper have also partnered with Kenai Watershed Forum to apply this same technique to the North Fork of the Anchor River and the nearby Ninilchik River. The "cold-water stepping stones" that these projects protect will create a corridor for salmon, linking their ocean habitat with the rivers where they breed. Similar conservation corridors are being implemented by other land trusts. In Florida, for example, the Conservation Foundation of the Gulf Coast is moving forward with plans to acquire new parcels of land that will allow species to migrate further inland as sea levels rise.

A Chicago-based land trust, Openlands, is thinking about helping trees adapt to

climate change. Through its TreeKeepers program, the land trust planted 800 trees throughout the Chicago region in 2012 and anticipates planting another 1,500 in 2013. Those 1,500 trees will be carefully sited based on a "hotspot" map that highlights the best places to plant trees based on current conditions and projected future changes due to urban heat islands, flooding, precipitation patterns and other factors that may change with the advancement of climate change.

In addition to *where* it plants its trees, Openlands also considers climate change when determining *what* trees it should be planting. "We are already shifting the species composition in our planting palette," says Daniella Pereira, regional forester with Openlands. "If we are able to lower our emissions 80% by 2020, we will begin considering tree species that are endemic to southern Illinois. However, if we only lower emissions 20% by 2020, we will need to consider species that are currently endemic to Alabama and possibly Houston."

Chicago sits approximately 1,000 miles north of Houston. Yet, within the course of this century, Houston's climate may migrate as far northward as the Windy City. This is the scale of change land trusts face in the coming decades. They can and should plan, predict and adapt. "We have to bring climate change into our existing processes, daily thinking and annual planning," says Pitz, who offers straightforward advice for land trusts that are just beginning to consider the issue: "Learn more about what the impacts are going to be where you are. Talk to the experts in your region. Take it a piece at a time." 🌱

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## Check It Out

Land Trust Alliance Climate Change Toolkit: [www.lta.org/climate-change-toolkit](http://www.lta.org/climate-change-toolkit)