

# NATURE'S



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# SALARY

## A FLORIDA RANCHER, AMONG OTHERS, FINDS HIMSELF ENMESHED IN CONSERVATION'S NEXT BIG THING: PAYMENT FOR ECOSYSTEM SERVICES.

BY JONATHAN LERNER

**L**OW DIKES SEPARATE PASTURES on the Florida cattle ranch Jimmy Wohl's father bought in 1962, when Jimmy was 12. Jimmy runs the 5,200-acre spread now, driving his pickup along the dikes with a rifle ready on the dashboard. "I'm not a killer of everything, but if we see wild hogs I'm going to shoot them," he says, pointing to a berm the feral animals have torn up while rooting for grubs. "That's where all the exotic weeds will start growing," he explains. "This really galls me. I've worked hard to keep these slopes grassy so when it rains it doesn't cause all kinds of ruts."

Rain and dikes—and invasive species, too—are often on Wohl's mind. His ranch is about 100 miles south of Orlando in the peninsula's sparsely populated middle. It's an area nowadays referred to as the North Everglades, though in its primeval state the terrain was not a "river of grass" like the true Everglades, but pine flatwoods and palmetto scrub skeined with marshy creeks. It absorbed the seasonally heavy tropical rains and then trickled the water south into vast Lake Okeechobee and beyond

into the Everglades proper. But over the past century, to dry out acreage for ranches, citrus groves, sugarcane fields, and other industrial-scale farming, landowners and government entities patched together a labyrinth of ditches and dikes, pumps and canals that thoroughly disrupted the region's natural hydrology. In a climate this wet, "it is the agriculturalists' mantra to get rid of water," Wohl says. "We were taking what was considered wasteland and making it an economic driver, the salad bowl of the United States throughout the winter. Everybody kept throwing dollars down here, saying, 'Drain more land, cut more canals.'"

His rifle and pickup truck notwithstanding, Jimmy Wohl is no cliché cowboy. He doesn't wear a Stetson or a feed cap. His hair, just graying at the temples, is neatly trimmed. The button-down collar of his checked shirt is open. As any successful farmer must be, he's in business—he has a real estate brokerage, too—and dresses the part in a Florida-casual way. And, because it works for him economically, love of the land aside, he is an eager participant in a pilot project that could

contribute to reestablishing a more natural water regime here. Like a handful of other ranchers in the area, Wohl is being paid to hold stormwater on a portion of his land rather than immediately sluice it away. This is a practical and promising example of a relatively new and often arcane concept, payment for ecosystem services.

It's easy to list the benefits we get from undeveloped or lightly developed places, and even from natural processes that happen in cities. Among these benefits are clean water from mountain streams, fisheries sustained by estuarine spawning grounds, even shade and lower temperatures from street trees or the stress relief and pleasure we get from urban green spaces. Some of these ecosystem services, called provisioning services, yield things such as fish or timber, resources that can be harvested and sold. Others, regulatory functions like the air-cleansing transpiration performed by a forest or rainwater filtration by a patch of ground, are processes rather than tangible and extractable products. But they are resources, too, and can be as essential to human economies as any other—and as degraded and increasingly scarce. We don't dispute a landowner's right to manage her forest and harvest and sell its timber. But many ecosystem services would seem to belong to no one, or to everyone. We might then expect government to do the managing, but governments are strapped and don't easily adapt their practices. So here comes the market, and today's proliferating experimentation in how to value, commodify, and profit from ecosystem services.

The idea of ecosystem services, and of pricing them, was raised in the United Nations' 2005 Millennium Ecosystem Assessment report. A lot of theoretical elaboration and practical application of the concept has followed. The United Kingdom is well into a national assessment of ecosystem valuation begun in 2007 to help guide public policy. Sweden's government has begun to consider formally how it might factor ecosystem

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Jane Graham, the Everglades policy associate at Audubon Florida, and Jimmy Wohl at a pumping station on Wohl's Rafter T Ranch.

services into national laws and local regulations. Of course, governments, nonprofits, communities, and individuals have long invested in the preservation and repair of natural resources and in undeveloped lands by, for example, setting aside parks and preserves, arranging conservation easements, or restoring wetlands. What's different is the focus on a specific natural process occurring in a specific locale, one that has identifiable benefit to society, then quantifying and monetizing it. This specificity is made possible by our increasingly fine-grained understanding of how natural environments work.



Some observers worry about unforeseen consequences of valuing and creating a market for a single service among the many that any ecosystem actually supplies. That hasn't been an issue in the past: Yosemite, for example, was set aside as a whole without having its timber, wildlife, snowcaps, and other resources and processes enumerated as line items for accounting purposes. The Stanford ecologist Douglas McCauley, an early critic of the monetizing of

conservation, pointed out the simplism and anthropocentrism inherent in the approach. "Environments don't act for the benefit of any single species. There are myriad examples of what might be labelled 'ecosystem disservices,'" he wrote in a 2006 essay in *Nature*, such as diseases that emerge from wetlands and jungles, or destructive animals like Wohl's wild hogs. He went on to cite the fickleness of the profit motive: What's valued and protected today may become unremunerative and abandoned tomorrow. He observed an implicit discounting of what human ingenuity might accomplish, writing, "Conservation plans that underestimate the technological prowess of humans are bound to have short life spans." He concluded that, as was the case with the creation of national parks like Yosemite, conservation should be motivated by ethical commitment. "Nature has an intrinsic value that makes it priceless, and this is reason enough to protect it."

Despite such critical voices—and because market-based approaches are easier to sell politically than moral appeals—payment

for ecosystem services (PES) looks like the next big thing in conservation. In the United States, PES is in its infancy, but there are pilot programs emerging that address water quality, water supply, water temperature control, stormwater management, air quality, pollutant sequestration (including carbon emissions markets), and, possibly coming soon, programs on soil erosion and even pollination. Multiple PES approaches are being applied to stormwater management because it's a problem in so many places.

Stormwater management as it's generally practiced uses infrastructure to compensate for a regulatory ecosystem service that no longer works well, in cities because so much area is built and paved over, or in a place like the North Everglades because so much has been diked and drained. Stormwater infrastructure in many places is easily overwhelmed as severe storms are becoming more frequent. The alternative to constructing more hard infrastructure is to re-create, or approximate, the processes nature used to handle stormwater in the first place. That means spreading its management out, onto public land and ultimately onto private land, too. And that means asking owners to adapt their properties to absorb or detain rain. For this service, somebody's gotta pay. But who? How? How much? And who decides?

**I**n the agricultural territory of interior South Florida now, when big rains fall, an extensive drainage network concentrates their volume and rushes it toward Lake Okeechobee—runoff nutrients included. The lake itself is surrounded by a 35-foot-high dike composed principally of sand. “It's had leaks so bad they've caused sinkholes up to the top,” says Paul Gray, an Audubon Florida science coordinator who has worked in the area for 19 years. To protect the lake's dike when the water level gets too high, water is flushed down the St. Lucie River east to the Atlantic and the Caloosahatchee River west to the Gulf of Mexico, scouring and polluting the rivers and altering the salinity of their estuaries. Gray recalls the

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perverse situation following two especially rainy years, 2004 and 2005. “The next spring we're in a drought, with severe rationing for farmers. And we dumped, in those preceding two years, enough water to meet the [farmers'] needs of six years.” Meanwhile all this engineering has interrupted the natural sheet flow of water south of the lake into the Everglades, which as a result is slowly drying up. And the Everglades is the recharge source for the aquifer supplying Miami, Fort Lauderdale, and other thirsty cities on the coast.

There has existed, since 2000, a long-term and hugely ambitious federal plan to restore and protect the hydrology of 18,000 square miles in Florida's peninsular interior including the Everglades. By many accounts it is underfunded and so far largely ineffectual. Paying ranchers for the ecosystem service of detaining and slowly releasing stormwater was not originally part of that plan, and it can't solve the whole problem. But it is a low-intensity and relatively inexpensive strategy that is already making a contribution. With a different attitude and minor tweaks—installation of a pump, or a weir with flashboard risers here or there—dikes built to keep water out of a field can also keep it in. Ditches dug for drainage can become linear detention ponds. “It is economically feasible to take these large tracts of grassland that aren't good cropland and see if we can re-create some of the predevelopment hydrology,” when prairies were often flooded during the rainy season, Wohl says. Cows don't mind water up to their ankles occasionally, and some grasses they like can stand periodic inundation. “I can't grow food or fiber crops with a lot of water. But you can keep the place wet during the summer and still have a viable agricultural entity raising cattle.”

A 2008 report prepared by the South Florida Water Management District (SFWMD) estimated that storage of between 900,000 and 1.3 million acre-feet of water annually—“a massive volume, equivalent to two or three feet of depth in Lake Okeechobee,” says Gray—would be required to make dumping excess water into the estuaries unnecessary, and to have adequate supplies for irrigation during droughts. The stormwater that Wohl and other

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By the end of South Florida's rainy season, the water-tolerant *Hemarthria altissima* will be ready to be grazed.

ranchers now detain is counted in SFWMD's Dispersed Water Management Program. This comparatively modest effort develops surface storage capacity using simple and largely existing infrastructure. Launched in 2011, it now has arrangements to store about 44,000 acre-feet per year, with capacity for another 55,000 being added. In all that's barely a tenth of the need, but it's far cheaper than planned new infrastructure like dams and underground storage. For much of the surface storage, SFWMD contributes to the cost of dikes or pumps only where needed. About a quarter of the capacity is under PES arrangements, where private owners receive ongoing payment; most of that is on cattle ranches.

Before being adopted by SFWMD, this idea of paying for water detention on ranches in the area was conceived and field tested in a six-year collaboration among nonprofits, principally Resources for the Future and the World Wildlife Fund, state and federal resource agencies and environmental scientists, and a group of landowners including Wohl. Criteria were defined for appropriate locations—considering, for example, their histories of land use and chemical application—as were performance goals and practices. A market framework was devised. Ranchers can choose the level of service to offer, and they can name their price. The purchasing agency can choose whose services to buy and what to offer, based on its evaluation of how well each property would perform. The parties enter into limited-term contracts (currently 10 years) with payment based on results the ranchers are obligated to document. (A further goal of this foray into PES is to reduce runoff nutrients, especially phosphorus. This has proved difficult to quantify and monetize but is still being researched.)

Many of this area's ranches, Wohl's included, are now owned by extended families. Not every member cares for agriculture, and opportunities to sell out are plentiful. Cattle ranching is a low-margin business. Wohl the rancher describes without irony his first reaction to the idea of being paid to store water as "Ooh,



cash cow!" Figuring the opportunity cost of planting the same pastures in sod instead, he bid \$300 per acre-foot per year but was counteroffered only a fraction of that. "I said, 'Okay, this is intriguing to me; I'm interested anyway.'" His earnings from PES (in an arrangement that is a residual of the pilot project, not with SFWMD) seem modest, but still matter. He takes in about \$60,000 annually for his water-storage capacity, mostly at \$30 per acre-foot per year, whether that

capacity is used or not, which depends on the rains. (SFWMD, negotiating individually with landowners, pays rates up to \$200 per acre-foot per year.) He also gets about \$2,300 monthly for operation and maintenance. Wohl can't use the flooded pastures for forage during the rainy season, but he plants them with *Hemarthria altissima*, a grass that can grow in water, and by the time his cows have calved in December, these fields are drying out and ready for the herd. He saves money on diesel he no longer needs to pump water off the property and has observed that on the whole his acreage stays green longer into the dry season because the impounded water recharges the water table. It also creates seasonal wetlands dazzlingly rich in wildlife. Visiting Wohl's ranch and another PES property on a single day last February, Paul Gray counted 62 bird species including herons, egrets, ibis, storks, spoonbills, limpkins, cranes, 18 songbird species, 10 duck-like species, and 11 varieties of birds of prey, and he also sighted otters, a bobcat, and—of course, it's Florida—alligators. Wohl has used some of his PES earnings to eradicate invasive water hyacinth. "A hunter couldn't ever find an alligator because the ditches were so full of hyacinth," he says. Now an outfitter pays him for the right to bring alligator-hunting parties onto the ranch. "Could we do more with ecotourism? Sure. This has produced a whole different wildlife regime."

With PES, the Wohl family ranch and the environment of interior South Florida get a boost toward rehabilitation and sustainability. Meanwhile, in Philadelphia, in very different circumstances—a northern city with several hundred thousand much smaller properties—another stormwater

#### OPPOSITE

Philadelphia's stormwater service bases its rates on a ratio of a property's total area to its impervious area.

management initiative is demonstrating how landowners and even investors might profit from letting rain soak in where it falls.

Philadelphia sits on terrain once webbed with creeks. As the city developed, sewer pipes were buried where many of them ran; some lines are still named for the vanished waterways they replaced. In a darkly amusing urban echo of the engineered hydrology of the North Everglades, "Everything in the city is designed on a slope—roofs, streets, backyards—to take rainwater away from people," Philadelphia's water commissioner, Howard Neukrug, remarked in a recent Environmental Protection Agency webinar. The water runs into storm drains and, as in many cities, combines there with sewage; about 60 percent of Philadelphia's area is served by these combined sewers. When heavy rainfall defeats the water utility's treatment capacity, this contaminated stream spills raw from 164 overflow points into the Delaware and Schuylkill Rivers. Under a program called Green City, Clean Waters, Philadelphia is working to reduce that overflow by 85 percent over 25 years. Neukrug said, "We could not do this program if we did not have this existing network of pipes. But the question today is do we build capacity, or reduce demand on existing capacity?" The program aims for the latter. The city can redesign public spaces to introduce pervious paving, bioswales, planted curb bump outs, and similar tools for handling stormwater. But to reach its goal, it will need private property owners to make similar efforts. The inducement? "Turn water into a commodity."

Philadelphia recently changed the way it charges customers for stormwater service, from a rate based on the size of a property's water connection to one based on the ratio of its total area to its impervious, or gray, area; GIS satellite imagery was used to analyze this relationship on the city's parcels. The charge for gray area is higher, so the greater the portion that's impervious,

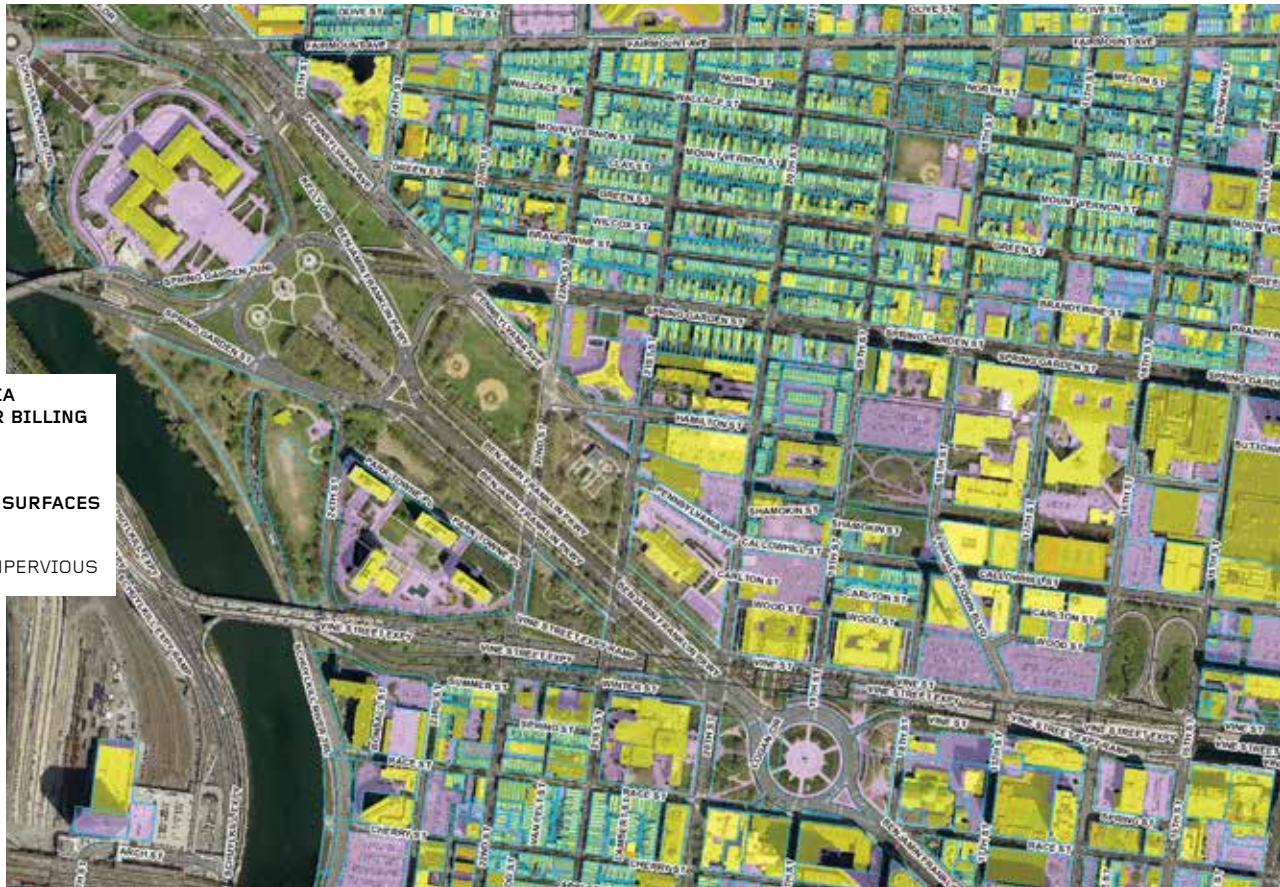
the higher the bill. If nonresidential property owners reduce impervious area or otherwise increase on-site stormwater management, their bills are reduced commensurately. This is not literally a payment for ecosystem service, but rather a rebate. Still, it's monetization of this natural function, and it's money in pockets. (Other cities are investigating similar mechanisms. Washington, D.C., for example, has established an exchange system, similar to those for carbon emissions, whereby property owners can earn credits for stormwater retention that they can use either to pay their own water bills or to sell to others.)

TO ENROLL PRIVATE PROPERTY OWNERS IN PHILADELPHIA'S STORMWATER MANAGEMENT EFFORT, THERE IS AN INDUCEMENT: TURN WATER INTO A COMMODITY.

Close to half of the impervious area in the part of Philadelphia that relies on combined sewers is located on residential parcels, nearly 350,000 of them. For these homeowners, the city offers stormwater audits and subsidizes simple ameliorations such as tree planting and depaving. For nonresidential properties—which, being fewer and larger, give greater return with less hassle—the city has a grant program to underwrite costlier retrofits such as installing green roofs. Why are grants necessary? "Charges for stormwater aren't enough to entice people to make that change. And if you're not charging enough, giving them credit is also not going to push them over that edge," says Ricardo Bayon, a cofounder of EKO Asset Management Partners, one of several investment

firms seeking to develop and profit from emerging markets in ecosystem services. He helped author the 2013 report *Creating Clean Water Cash Flows: Developing Private Markets for Green Stormwater Infrastructure in Philadelphia*. One scenario it explores could replace the city's grants for green retrofits with private investments. Property owners would be lent the money to make stormwater management improvements. Owners would repay the loans with the savings on their water bills and, once the debts were retired, continue to enjoy the rebates, while investors would profit by earning interest on the loans. This can't happen until a complex of policies is in place to create an environment of security, such as publishing long-term stormwater fee schedules and guaranteeing that green installations will be monitored and maintained through the life of the loans. Still, this scenario not only envisions private capital stepping





**PHILADELPHIA  
STORMWATER BILLING**

□ PARCEL

**IMPERVIOUS SURFACES**

■ ROOF

■ OTHER IMPERVIOUS

in where public funding has been used, but it also expands the concept of payment for ecosystem services to encompass broader possibilities of making money off them, however indirectly. In the same category are activities such as inventing, manufacturing, installing, and maintaining the technologies and infrastructures that enable stormwater management, or any ecosystem service.

“We’re quite good at seeing the provisioning services. You see the end product, something we know how to price and value and for which there are well-established markets. The regulatory services tend to be more complicated because we’ve taken those for granted,” Bayon says. But for designers as well as investors, regulatory services are where new opportunities, and challenges, will be found. Debra Guenther, FASLA, a partner at Mithun who led a panel on monetizing ecosystem services at last year’s ASLA conference in Boston, believes that innovation will come from projects that are large and collaborative enough “to pull in someone who’s really knowledgeable about

the financial models, who is focused at the regional scale on those connections between policy and ecosystem services. Landscape architects are uniquely suited to make those connections, [and] having a better understanding of the financial implications could allow us to build more accuracy and provide more leadership around policy issues.”

There are other places where stormwater management is being approached using variations of PES, and other ecosystem services to which PES is being applied as well. All of these share something fundamental. “It was the economic incentive that caused this problem,” Jimmy Wohl says. He is speaking of the hydrology issues where he lives, but the same could be said of any natural process that human society has put at risk. “Now use the economic incentive to mitigate it.” ●

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