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## Maine Conservation in an Age of Global Climate Change

Richard Judd  
*University of Maine*, rjudd@maine.edu

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# Maine Conservation in an Age of Global Climate Change

by Richard W. Judd

## Abstract

Maine has been a key player in one of the most dramatic changes in conservation strategy since Gifford Pinchot coined the term in the 1890s as private nonprofit land trusts have become essential to the conservation movement in the state. Land trusts spearheaded the new approach to conservation by drawing together landowners, philanthropic organizations, state and federal agencies, older conservation organizations, and most importantly, ordinary citizens. Given its prominence in the land-trust movement, Maine has provided leadership in a second revolutionary trend as trust managers embraced the emerging science of ecosystem management.

## BACKGROUND

In the decades after 1990, Maine became a key player in one of the most dramatic changes in conservation strategy since Gifford Pinchot coined the term in the 1890s. Private nonprofit land trusts appeared in significant numbers nationwide in the 1960s, and by the end of the century, they had become essential to the conservation movement. By 2010, Maine ranked second in the nation in acreage managed by land trusts, with some 2.5 million acres held outright or under conservation easement.<sup>1</sup> Given its prominence in the land-trust movement, Maine provided leadership in a second revolutionary trend as trust managers embraced the emerging science of ecosystem management. In Maine's bicentennial year, we can look back with pride upon a history of pioneering conservation ideas that range from some of the earliest forest, fish, and wildlife commissions in the nation to the first salmon hatchery built in America and the dam removals that helped make these salmon migrations viable. Land trusts and the shift to ecosystem management follow in this long and venerable tradition.

Maine's place in this new conservation strategy is understandable given the vast amount of undeveloped woodlands in the state. Life zones ranging from temperate hardwood to boreal and alpine ecosystems host a trove of

rare plant and animal species, and with its varied landforms, elevation changes, and microclimates, Maine is a critical ecological link in the eastern North American biome. It presents perhaps the last remaining chance in the East for maintaining or re-establishing viable populations of wide-ranging predators like wolves, lynx, and marten (Long et al. 2002; McMahon 2016).

Local land trusts first appeared in southern Maine in the 1960s and quickly became important conservation tools, offering protection for open spaces near expanding residential areas and providing a variety of ecosystem benefits such as recharging aquifers and filtering streams. Typically they protected small habitats overlooked by public conservation agencies—wetlands, meadows, or watercourses high in biodiversity despite their relatively small size. The flexibility built into the land-trust approach proved crucial in an age of rapidly evolving conservation strategies. In the 1960s, trusts responded to the open-space needs of a suburbanizing metropolitan fringe, and in the 1970s, they adapted to the values of the burgeoning environmental movement. In the next decade, they expanded their scope to address landscape-scale projects like farmland stabilization, greenway corridors, and greenbelt mosaics, and when scientists re-thought the principles of conservation biology in the 1990s, trusts joined with state and national agencies to build region-wide systems designed to sustain ecological integrity in the face of global climate change and other far-reaching threats.

In the 1990s, trusts formed networks that amplified their purchasing power, honed their organizational skills, and expanded their ability to attract public funding (Elfring 1989). Working closely with state and federal agencies, they provided the flexibility necessary to address local and regional circumstances while public funding encouraged more ambitious projects. Working with

government agencies also put trusts in touch with public research units, which encouraged a more scientific approach to land acquisition and management. By the turn of the century, this middle-way conservation—neither fully public nor fully private—had become the signature approach to conservation in Maine and the Northeast (Hocker 1996; Pidot 2011).

During these decades, Maine state government stepped up its own public conservation purchases, begin-

**With ample public and private funding, the land-trust idea evolved rapidly in the 1990s, coincident with a dramatic shift in timberland ownership in Maine.**

ning in the early 1970s with a contentious court case that restored to the state the public reserved lots in the unincorporated townships: land that had been set aside to support schools when the towns were settled (Urquhart 2009). In 1987, Maine voters approved a \$35 million bond issue to fund the Land for Maine's Future program, which acquired a stunning assortment of coastal headlands, mountain summits, river access points, wetlands, lakeshores, islands, forests, marshlands, farms, and working waterfronts (Clark and Howell 2007). These decades also saw an expansion of federal funding for conservation initiatives. The Land and Water Conservation Fund (LWCF), created by Congress in 1958, was cut back in the 1980s, but other federal agencies stepped up their grant programs, particularly the US Fish and Wildlife Service, the Department of Housing and Urban Development, and the US Forest Service through its Forest Legacy Program (Fairfax and Guenzler 2001). By the early 2000s, federal funding had become a mainstay of the land-preservation movement (Endicott 1993; NCCRSP 2016).

With ample public and private funding, the land-trust idea evolved rapidly in the 1990s, coincident with a dramatic shift in timberland ownership in Maine. Responding to global competition and other factors, the pulp and paper industry underwent a series of mergers and liquidations that transformed the character of the working

forest. At the same time markets for second-home and resort developments surged due to easy credit access, baby boomer retirements, and improved road access into northern Maine. Historically, Maine ranked first in the nation in the percentage of housing stock in seasonal use, but in the 1990s, these investments moved from the coast and into the North Woods. These trends challenged a tradition of recreational access to the North Woods dating back to the nineteenth century and pointed to an uncertain future for this vast territory (Liliehalm et al. 2010).

Given the complexity of landownership and land-use patterns in the North Woods, existing conservation strategies based on national forest, national park, or federal wilderness status seemed inappropriate to many observers, but The Nature Conservancy (TNC), the nation's largest land trust, provided a plausible alternative (Baldwin and Judd 2010). In 1986, TNC purchased 12,000 acres of International Paper Company land in the Green and White Mountains in one of the largest private land conservation ventures in history. Maine trusts followed suit; as the paper company lands came on the market, they formed complex private-public alliances and took on preservation projects that would have been inconceivable only a decade earlier (Clark and Howell 2007).

The need for action was urgent. In 1982, British corporate raider James Goldsmith acquired 976,000 acres of Diamond Occidental timberland in Maine, New Hampshire, Vermont, and New York and began reselling to speculative interests. In view of this massive land transfer, in 1989 the US Forest Service established a Northern Forest Lands Study and governors of the four states formed a similar Northern Forest Lands Council (Baldwin and Judd 2010). With these studies ongoing, TNC, the Society for the Protection of New Hampshire Forests, and several state and federal agencies came together and purchased 186,000 acres of Diamond land in New York and New Hampshire. In Maine, the Land for Maine's Future program spent \$13.2 million for 800,000 acres in several forested tracts, including the Nahmakanta Lakes region near Baxter State Park. In 1997, Champion International shocked the environmental community once again by announcing the sale of nearly 300,000 acres in the Northern Forest, and the following year a coalition of federal and state agencies and land trusts, using LWCF funds, purchased 144,300 acres in New York, 18,000 in New Hampshire, and 132,000 in Vermont for a total of for

\$78 million (Fairfax et al. 2005). That same year, TNC took the lead in negotiating for 185,000 acres of International Paper Company land along the St. John River in northwest Maine—again the largest private conservation acquisition completed to that date. Thus while no clear consensus emerged from the Northern Forest study groups, the path of least resistance led to public-private conservation purchases that would meet the recreational needs of the surrounding communities, sustain the forest products industry, and protect the natural systems on which these two concerns rested (Ginn 2005).

In 1999, Seven Islands Land Company, acting on behalf of the Pingree Family, offered the New England Forestry Foundation a conservation easement on 762,192 acres of dispersed holdings along the upper St. John River. If TNC's St. John purchase was the largest land-trust acquisition in US history, the Pingree partnership was the nation's largest conservation easement (Goldberg 2001). In the same year, a broad partnership headed by the Friends of the Downeast Lakes purchased land and easements on 342,000 acres of former Georgia-Pacific land in eastern Maine. The organization, made up of local residents, lodge owners, foresters, fishing enthusiasts, and registered guides, later became the Downeast Lakes Land Trust (Liliehholm et al. 2010; Perez-Pena 2002). By 2015, according to the National Land Trust Alliance census, Maine's 76 trusts, along with state and federal agencies and other conservation organizations, protected some 5.8 million acres in the state. Businesswoman Roxanne Quimby capped the era of large-scale conservation transactions the following year when the 87,563 acres she donated to the federal government became the Katahdin Woods and Waters National Monument.

Despite these and other accomplishments, a great deal of ecologically rich territory remained unprotected in Maine, and the arrangements written into some easements to ensure sustainable timber management did not include full biodiversity protection. Existing ecological management areas were "too small, too isolated, and represent too few types of ecosystems to maintain native biodiversity in all its forms" (Long et al. 2002: 12). This vulnerability became apparent as scientists spelled out the implications of global climate change.

## LAND TRUSTS AND ECOSYSTEM MANAGEMENT

These middle-way acquisitions occurred as a second revolution was appearing on the Maine horizon. By the end of the century, scientists in several disciplines had realized that the environmental laws passed in the 1970s, despite their success in slowing species extinction, were not up to the task of protecting biodiversity (Anderson and Allen 2011; Layzer et al. 2008). Fortunately, conservation was by no means a static concept. In the Progressive Era, it had been limited to federal lands and the recreational and commodity-based resources they contained, and in the 1970s, the environmental movement added charismatic wildlife species, old-growth forests, and wilderness areas to this agenda. However, in both cases conservation meant drawing hard boundaries around selected habitats and protecting these areas from human influences. In the 1990s, preservationists realized the limitations of this fortress conservation approach (Berkes 2004: 622). Saving nature would require a more strategic form of intervention aimed not at individual species or specific habitats but at entire ecosystems.

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Ecosystem management was rooted in wildlife biologist Aldo Leopold's game management philosophy, particularly his dramatic mid-career shift from managing a specific game species to preserving its habitat as a functioning ecological whole. Under advisement from Leopold and others, the US Forest Service began setting aside primitive areas where the "normal processes of nature" could continue undisturbed, and in 1934, the National Resources Board recommended that these areas be enlarged to at least a quarter million acres each (National Park Service 1938: 21). The board's recommendations were based on an

influential series of ecological studies published by the National Park Service titled *Fauna of the National Parks of the United States*—an early attempt to assess the habitat needs of various park species (Grumbine 1994).

The idea of preserving large ecosystems was used earlier in African parks and preserves, but in the 1960s, biologists Frank and John Craighead applied this idea in Yellowstone National Park, showing that grizzly bear range extended far beyond the park's two-million-acre perimeter. Subsequent radiotelemetry studies affirmed that not even the largest parks were adequate to sustain wide-ranging predators or large ungulates like elk, bighorn sheep, or bison. In response, a group of scientists and planners met to discuss the biodiversity crisis in 1987 and published their proceedings as *Ecosystem Management for Parks and Wilderness*. The authors stressed four challenges in conservation biology: fleshing out the still-inconclusive science of ecosystem dynamics; factoring in the inevitable human presence; encouraging cooperation between government, nonprofit, and private stakeholders; and recognizing the need for ongoing active management and monitoring in preserves (Agee and Johnson 1988). The field crystallized around the northern spotted owl controversy in the Pacific Northwest, which pitted environmentalists concerned about an endangered species against timber companies intent on harvesting its old-growth habitat. Ecosystem management offered, if not a solution, at least a way of assessing the owl's habitat needs in broader context (Grumbine 1992; Layzer et al. 2008).

Ecosystem management rested on two related studies, the first being island biogeography, which investigates conditions that affect species distribution and diversity in a specific locale. Among other things, these studies demonstrated that ecosystems require multiple breeding populations to accommodate genetic mixing, promote resiliency, and allow for evolution (Alhern 1995). Ecosystem management also relied on a relatively new scientific assumption that ecosystems are inherently dynamic. In classic theory, ecological systems undergo a series of successional changes that lead to a climax—a balanced set of relations between component parts—and then remains static unless disturbed. Careful observation beginning in the 1920s showed that even without readily observable disturbance, habitat and species composition are constantly readjusting and realigning. Indeed, evolution itself requires this instability. “Natural, undisturbed systems,” Canadian ecologist

C. S. Holling pointed out in 1973, “are likely to be continually in a transient state” due to subtle influences like changes in nutrient flows, hydrology, competition, and predation (Holling 1973: 13–14). Wind bursts or lightning strikes open holes in a forest canopy and begin a new successional sequence; pathogens change forest composition; subsurface conditions remain in constant flux. Viewing nature as a shifting tapestry changed the way ecologists thought about preservation. Classic conservation policy aimed at keeping ecosystems in stasis; ecosystem management focused on an “inherently moving target” (Ahern 2010: 562).

These considerations were complicated by a growing concern over climate change. Anticipating rising temperatures and new pathogen regimes, ecologists predicted that “the composition of nearly every plant community and wildlife habitat in Maine is likely to be affected” (McMahon 2016: 11). Plants and animals migrating northward or to higher elevations will require large blocks of unfragmented forests connected to similar reserves in other states and provinces, along with multiple examples of each natural community and landscape type. Setting aside the fortress conservation approach, ecologists recommended creating “sustainable landscapes” (Ahern 1995: 131): matrixes of preserved and private lands unified through a common goal of protecting critical habitat (Massachusetts DF&G 2010).

During the 1990s, Maine conducted several biodiversity surveys, and conservation organizations used these as the basis of a new proactive approach to ecological preservation. They divided the state into ecoregions, and in each of these regions, they identified core habitats large enough to sustain source populations that could disperse to surrounding areas (Anderson et al. 2006; Groves et al. 2002). By the end of that decade, they had at their disposal an impressive collection of protected natural areas that included former industrial timberlands and older reserves such as Baxter State Park and the Rachel Carson National Wildlife Refuge. Although these core areas were far from pristine, they usually included some old-growth components, since certain species needed damp forest floors, thick carpets of moss and lichen, large snags and downed woody material for nutrient cycling and animal shelter, and trees in multiple age classes. Early succession stands were also necessary to provide other species open ground, strong sunlight, and warm soils. Finally, core areas almost

always required carnivore species to stabilize prey populations (Long et al. 2002; Elliott 1999).

These areas, as ecosystem managers pointed out, need not be consolidated, since most plants and animals can migrate across lands in various states of disturbance. For those that needed more stable landscapes, connectivity corridors along roads, streams, ridges, or other linear features would suffice. Finally, ecosystem management required buffers: minimally impacted landscapes available to species less affected by disturbance. These buffers could support recreation, low-density housing, and low-impact farming and forestry under regulated conditions. A complete conservation system, then, would consist of core areas functionally linked by corridors and buffered by well-managed stewardship lands. If the conserved areas were networked, nature could thrive within a larger landscape fragmented by forestry activity or suburban development and subject to the effects of climate change. Core-and-corridor preservation was not the ultimate solution to biodiversity loss, but it was feasible and cost-effective in the East where protecting vast landscapes through outright acquisition or federal designation, as in the West, was all but impossible (Elliott 1999).

Ecosystem management changed Maine conservation in four ways. First, it encouraged trust managers to think in terms of systems of landownership rather than individual acquisitions. Second, it encouraged them to intervene more directly in their reservations. Maine's recovering wilderness was particularly dynamic, given its humid climate and long history of interference, and in this rapidly changing natural environment let-alone policies did not always yield intended results. Trust managers, once aghast at the idea of messing with nature, relearned the art of restoring degraded habitat, eradicating invasive species, reintroducing plants and trees, clear-cutting to encourage pioneer growth and increase habitat diversity, and planting to control stream-side erosion. Active management involved complicated choices, and this in turn meant detailed baseline studies and constant monitoring (Massachusetts DF&G 2010; Owley 2011).

Third, ecosystem management required more rigorous scientific input. In Maine's dynamic forest environment, little in the core-and-corridor approach was self-evident. The line of least resistance followed by migrating animals and plants was difficult to predict, and poorly placed buffers or corridors could accelerate the spread of diseases, unwanted domestic predators, or invasive non-native

plants and insects. To account for the dynamism they had previously overlooked, managers needed precise information about topography, hydrology, forest type, species distributions, habitat needs, and potential threats across a broad spectrum of contingencies. Only systematic scientific planning, according to a 2007 study, could provide the "kind of decision-making tool that stakeholders...respect" (Baldwin et al. 2007: 67). Scientific assessment, in short, had become an integral part of the funding process (Grumbine 1992; Linehan et al. 1995).

Fourth, ecosystem management meant factoring in societal influences such as land-use traditions, cultural values, and a range of economic considerations. In a rapidly shifting political and economic climate, management decisions required input from public and private stakeholders often at odds with one another—timberland owners, environmentalists, recreationists, hunters, snowmobile and ATV users, and municipal officials, among others. Adaptive management—the preservationist response to volatile social and ecological conditions—meant using a wide range of strategies and policy tools to respond quickly to unanticipated changes, whether an exotic pathogen or a new state or federal administration (Grumbine 1994).

## Ecosystem management changed Maine conservation....

Ecosystem management was an idea conceived in the West, where natural systems were more stable due to arid conditions and higher altitudes, and where huge blocks of public land could be managed under a single set of guidelines. Applying these same principles in Maine was challenging, given the state's complex ownership patterns, smaller conservation holdings, and dynamic ecosystems. Fortunately, the core-and-corridor concept was flexible; corridors could be large enough to accommodate top predators or small enough to allow wood frogs to move between vernal pools and upland forests. In this context, land trusts, the most flexible of all preservationist tools, would play an important role in Maine's changing conservation scene (Massachusetts DF&G 2010; NCCRSP 2016).

With these considerations in mind, in 1993 University of Maine's Janet McMahon, working with the State Planning Office, compiled a report titled *An Ecological Reserves System for Maine* (McMahon 1993). The following year the Maine Forest Biodiversity Project brought together timberland owners, nonprofit leaders, outdoor sports advocates, environmentalists, property-rights defenders, scientists, and state and federal officials to piece together a management system for Maine's federal, state, trust, and private lands. The proposal was not a formal mandate but rather a working understanding among stakeholders based on a manual titled *Biodiversity in the Forests of Maine: Guidelines for Land Management* (Elliott 1999). In a world of shifting timber harvests and changing recreational needs, the manual suggested, among other things, varying harvest plans to

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provide diverse habitat types, retaining large blocks of mature conifer forest, and establishing corridors to allow movement between these old-growth enclaves. Endorsed by key timberland owners and officials in Baxter State Park, Acadia National Park, the White Mountain National Forest, the US Fish and Wildlife Service, The Nature Conservancy, and the Appalachian Mountain Club, the document summarized the techniques necessary to sustain Maine's industrial forest and at the same time protect its diverse natural communities (MERSAC 2009).

A second example of cooperation and planning on a scale never before achieved in the conservation community involved the almost 3.3 million acres of protected land between New York's Tug Hill and the eastern Maine coast. In 2009, TNC and the New Hampshire Fish and Game

Department brought together a collection of trusts, conservation organizations, and public agencies in the Northern Forest region and launched the Staying Connected Initiative. They identified connectivity corridors running southeastward from the Tug Hill Plateau into the Taconic Range, eastward to the Maine woods, the Gaspé Peninsula, and the Maritime Provinces; and northward into the parks and preserves in Quebec and Ontario. The project engaged local residents through community meetings, presentations, conferences, workshops, natural history walks, and school science programs. Participants gathered data on habitat values, species, and animal road crossings and provided this and other technical information to around 50 federal and state agencies, municipal boards, conservation organizations, fish and game clubs, land trusts, and landowners. Local and regional planning commissions incorporated connectivity provisions into their comprehensive plans and land-use ordinances, and the effort resulted in nearly 80 connectivity projects covering over 300,000 acres in the four-state area (Reining et al. 2006; TNC 2013). New England and New York had taken a significant step in knitting together the hard-won conservation lands acquired during the timberland transactions of the 1990s.

These accomplishments showcase Maine's leadership in the turn-of-the-century conservation revolution and the importance of private nonprofit land trusts to this process. Land trusts spearheaded the new approach to conservation by drawing together landowners, philanthropic organizations, state and federal agencies, older conservation organizations, and most importantly, ordinary citizens. In an age when environmental crises seemed overwhelming, trusts gave each citizen-member an opportunity to participate in the global struggle against biodiversity loss. Maine has led the nation throughout its 200-year history in several conservation initiatives, and its land trusts provided a bridge between these older strategies and the biodiversity management techniques of the twenty-first century. As the histories of Acadia National Park, Baxter State Park, and the Katahdin Woods and Waters National Monument demonstrate, Maine relies heavily on private philanthropy to protect its natural wonders, and land trusts continue this legacy in an increasingly complicated conservation milieu (Grumbine 1994; Layzer et al. 2008). 🐾

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## NOTES

- 1 Figures on the number of trusts and their holdings vary from account to account, since these concepts are difficult to define. Most studies use the Land Trust Alliance national census of land trusts, compiled every five years. See Fleming (2015).

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**Richard Judd** has been a member of the history faculty at the University of Maine since 1984 and was Col. James C. McBride Professor of History and editor of the Maine Historical Society's journal *Maine History*. He has been Emeritus since 2018. Judd is the author/editor of several books, including *Finding Thoreau:*

*The Meaning of Nature in the Making of an American Icon*, *Historical Atlas of Maine* (coedited with Stephen Hornsby), *The Untilled Garden: Natural History and the Origins of American Conservation, 1730–1850*, and *Maine: The Pine Tree State from Prehistory to the Present* (coedited with Joel W. Eastman and Edwin S. Churchill). He is currently working on a book titled *Democratic Spaces: Land Preservation in New England from Village Improvement to Biodiversity Management, 1850–2010*.