

THE TEACHER AND THE FOREST: THE
PENNSYLVANIA FORESTRY ASSOCIATION,
GEORGE PERKINS MARSH, AND THE
ORIGINS OF CONSERVATION EDUCATION

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Pennsylvania was named for its vast forests, which included well-stocked hardwood and softwood stands. This abundant resource supported a large sawmill industry, provided hemlock bark for the tanning industry, and produced many rotations of small timber for charcoal for an extensive iron-smelting industry. By the 1880s, the condition of Pennsylvania's forests was indeed grim. In the 1895 report of the legislatively created Forestry Commission, Dr. Joseph T. Rothrock described a multicounty area in northeast Pennsylvania where 970 square miles had become "waste areas" or "stripped lands." Rothrock reported furthermore that similar conditions prevailed further west in north-central Pennsylvania.¹ In a subsequent report for the newly created Division of Forestry, Rothrock reported that by 1896 nearly 180,000 acres of forest had been destroyed by fire for an estimated loss of \$557,000, an immense sum in those days.² Deforestation was also blamed for contributing to the

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number and severity of damaging floods. Rothrock reported that eight hard-hit counties paid more than \$665,000 to repair bridges damaged from flooding in the preceding four years.³

At that time, Pennsylvania had few effective methods to encourage forest conservation. Enforcement of the forest fire laws was left to the counties and municipalities, whose officials were reluctant to arrest known arsonists who might be their neighbors and friends. Locally set property taxes favored the rapid conversion of undeveloped forested lands into farmlands, even though with its abrupt topography much of the state was not suitable for farming.⁴ In short, the prevailing public sentiment in the late nineteenth century still considered forest resources to be inexhaustible and, therefore, not needing to be managed. In his biography of Bernhard Fernow, the third chief of the U.S. Division of Forestry, Andrew Rodgers described the prevailing national attitude with regard to the forests even as warning signs were starting to be raised.

The sight of forest plenty blinded real insight into the necessities. Even though the forest wealth of Maine, New York, Pennsylvania, Michigan, Wisconsin, Minnesota, and other states and territories was being lumbered at a rate that clearly could not last, the apostle of abundance could always direct the attention of the well-meaning alarmist to the inexhaustible supplies to be found in the west.⁵

In spite of this prevailing attitude, Char Miller showed that starting in the 1870s and increasingly as time went on, the alarm of the peril of forest destruction was being raised and the framework for a future forest restoration policy was being created by a number of scientists and policy leaders.⁶ In Pennsylvania, a small number of people were beginning to believe in the need to conserve natural resources. Eventually PFA officials founded the Pennsylvania Forestry Association (PFA), a citizens group that worked to change the degraded forest conditions that they noticed in Pennsylvania and that they had read about in the rest of the United States and the world. They launched efforts to inform the citizenry through their publications and speakers, to influence the state legislature to enact stricter forest policies, and to change the perspective of future generations toward the forest through teacher training and the education of children.

This article will explore two examples of how the PFA sought to promote forestry through education. They prepared brief forestry primers to be used

in teacher training workshops around the state. They also launched a forest conservation essay contest with cash prizes for schoolteachers to stimulate their interest in the topic and encourage them to teach about forests in the schools. The essays illustrated then-current beliefs about the role of forests held by educated, nonspecialist people who were becoming more aware of the problem of forest destruction but did not yet have an idea of what form forest conservation should take. They showed what teachers may have been sharing with their students on the topic of forest conservation and, in particular, demonstrated the huge influence of George P. Marsh's exhaustively researched *Man and Nature*, which was originally published in 1864.⁷ Marsh was the first American to convincingly argue that humanity was directly responsible for the problem of environmental degradation and needed to take action to remedy the situation. The increased awareness of the deforestation problem brought about by these efforts led Pennsylvania to establish a strong policy of public forest acquisition and forest conservation in general.

The Rise of Professional Forestry in Pennsylvania

In his history of the forest conservation movement in Pennsylvania, Henry Clepper described a comprehensive series of colonial and state laws designed to prevent the destruction of forests. He concluded that none of the legislation "appears to have accomplished the desired result, which was to protect and rehabilitate the woodland of the state."⁸ According to Elizabeth Thomas, who chronicled the early history of the Pennsylvania State Forest Academy at Mont Alto, the statewide effort to protect Pennsylvania's forests began in earnest with the appointment of Dr. Joseph Rothrock in 1877 to deliver the Michaux forestry lectures for the American Philosophical Society.⁹ Rothrock, a medical doctor and botanist, was then a professor at the University of Pennsylvania. In his travels around Pennsylvania, in scientific expeditions to Alaska, British Columbia, and the western United States, and in his correspondence with conservationists around the country, Rothrock had become increasingly concerned over the destruction of the forests. In the seventeen years he gave the Michaux lectures and in countless talks around the state, Rothrock strove unceasingly to awaken the people of Pennsylvania to the environmental catastrophes they faced.

Partly as a result of Rothrock's lectures given in Philadelphia, out of general concern over the decline of the state's forests, and influenced by

their knowledge of the dire national situation gained from the work of the conservationists on the national stage, a small group of public-spirited citizens, consisting mainly of prominent women from Philadelphia, founded the Pennsylvania Forestry Association in 1886. The founders of the PFA believed that publicity, education, and new state laws and policies could alleviate the problem of the destruction of forests. Facing a public unaware, and often suspicious, of the need to care for and restore the rapidly diminishing forests, they knew that the battle would not yield quick results and were prepared for a long and strenuous campaign. The pioneer mentality, which saw the forest as a barrier to be subdued and conquered, was still the public's primary point of view.¹⁰ Most people did not believe that it was possible or necessary to conserve the forest. In an 1893 article Rothrock commented that "there was not only indifference, but actual hostility, in some quarters, to any agitation of the forestry problem. Until within a brief period even the lumbermen recognized neither utility nor sense in it."¹¹ The challenge of the PFA was to simultaneously educate the public about the dangers they faced and incite them to take action to develop solutions for conservation.¹²



FIGURE 1: "Land stripped of its best timber, then abandoned to fire. Andersons Creek, Clearfield County." Plate 10 in "Report of the [Pennsylvania] Department of Agriculture—Division of Forestry, 1895." (Photo credited to J. T. Rothrock, MD.)

The PFA launched its new journal, *Forest Leaves*, in July 1886. At first it appeared erratically, but within a few years it was published on a regular bimonthly schedule. *Forest Leaves* was intended to serve multiple purposes: helping to build the association and motivate members; providing forestry news from around the state, nation and world; and presenting current knowledge of tree species, forest science, and forest management for the interested layman. Most important, the journal served as a forum for new ideas in conservation and kept the focus on forestry issues in Pennsylvania. In the first issue, later long-time PFA president John Birkinbine wrote:

Forest Leaves is not intended to merely represent the theory of forestal culture or management; but is expected to be the organ of an association, the object of which is to collect and distribute information upon practical methods to be pursued, and commercial as well as sanitary results to be obtained by augmenting the proportion of wooded area in the State.

In the same announcement he dedicated the PFA to securing,

legislative enactments to prevent useless waste of our already reduced forests and encourage the propagation of new growth, which while benefiting the present generation will maintain Pennsylvania a goodly heritage for those who follow us.¹³

In the subsequent issues of *Forest Leaves*, the PFA struggled to find ways to become a strong force to promote forest conservation. One of these ways was to influence education.

“The Teacher and the Forest”

From the beginning, the PFA believed that influencing the education of children was one of the best ways to build a constituency that would support and promote forest conservation. In her analysis of Rothrock’s impact on the forestry movement, Rebecca Diane Swanger commented that he focused on education as he was certain it would increase support for forestry laws and create the political pressure necessary to make the laws effective.¹⁴ In a speech to the eighth annual PFA meeting in 1893, John Birkinbine said, “The

scheme of interesting the teachers of our schools offers a means of instilling love for and appreciation of the importance of forestry in the minds of those who in a few years will shape the policy of State and national governments, and this method should be vigorously pursued.”¹⁵

Many events were organized so that children could participate, such as Arbor Day tree plantings. These activities were subsequently publicized in *Forest Leaves*. For example, an 1887 report described the governor leading tree planting at the governor’s mansion and the planting of 1,745 trees by students in the York schools.¹⁶ Yet, for a long-lasting effect, teachers had to become strong supporters of forest conservation and include the conservation message in their lesson plans. Consequently, the PFA encouraged teachers by providing scientific information in the articles in *Forest Leaves* and developing forestry primers for teacher training workshops.

PFA’s efforts in this regard were complicated by the fact that education and the teaching profession were not as organized and regulated in the nineteenth century as they are today. The idea of universal public education did not become law in Pennsylvania until the 1834 Free School Act.¹⁷ Salaries for teachers were often very low, especially in rural areas. After 1854 county supervisors charged with hiring and certifying teachers controlled the schools.¹⁸ Hiring and retaining quality teachers was a challenge throughout the nineteenth century since few of the teachers had much formal education beyond elementary school. Almost none of them had a high school education or a diploma, especially in rural areas, as there were not many high schools around. As a result, teachers were trained by attendance at annual county-led teachers’ institutes or by attending and graduating from teaching colleges or “normal schools.” Even so, state certification of teachers was not made mandatory until 1921.¹⁹

At its February 1892 meeting, the PFA board learned that the State Superintendent of Public Instruction had agreed to distribute the organization’s forestry primers to the superintendents of the state normal schools. They would also be sent to all the public school principals. The brief essays in the primers packed a strong message promoting forest conservation.²⁰ In the first primer, “The Teacher and the Forest,” Herbert Welsh described how the loss of forest resources affected everyone.²¹ Although settlers needed to clear the forests in the past, “it is not now the *Forest*, but the wanton, unregulated wasting of the Forest, which is our menace.”²² The underlying message of the primer was that while it was the duty of the state to enact laws based on science, legislators would not act until their constituents demanded that they

do so. Welsh said that teachers could help create public support for forest conservation by their efforts in public schools. They could help students understand that the results of forest destruction would be the impoverishment of the state. The primer appealed to teachers to inspire their students to the cause of forestry.

Rothrock himself wrote the second and third primers, which shared a common theme of linking specific examples of wasted resources to outdated public policies. "Wasted Resources" described problems with the fence law of 1700, which mandated that farmers must erect around their farms "a fence high enough and strong enough to prevent horses and cattle from escaping." Even though the legislature repealed the law in 1889, Rothrock observed that farmers were still wasting wood by building high wooden fences, even when they had to bring in wood from a long distance. He discussed better ways to protect cattle that would not waste timber, such as bringing feed to the animals, enclosures, using hedges, hiring a herdsman, or using wire fences.²³ Though this may seem like an esoteric issue, it demonstrated a new way of thinking about using and conserving resources that was echoed in the third primer, "Remove the Tax from Timber Land." Rothrock argued that property taxes should not be charged on forest lands because of the public benefits provided by forests such as groundwater recharge, flood protection, and fresh air. Instead, landowners should be taxed only when they harvest timber, not through all the years the forest is growing. He believed that this measure would encourage owners to keep their land in forests rather than cut them as quickly as possible with no thought to regenerating them.²⁴

In addition to providing teacher training materials, the PFA launched another effort to inspire teachers by announcing in the August 1894 issue of *Forest Leaves* an essay contest for public schoolteachers in Pennsylvania that would, "awaken an interest in forestry among those who are educating the rising generation, by having them investigate the subject." With entries focused on the theme, "The Practical Influence of Forests to the Surface of the Country," PFA officials hoped the contest would "encourage the study of and interest in tree growth, and none should be deterred from entering the contest because of modesty or diffidence." The PFA also anticipated that essays would be published in the entrants' local newspapers. In order to maximize the publicity, a circular announcing the contest, the rules, and the prizes of \$50 and \$25 was sent to all the school districts and newspapers in the state. The PFA encouraged all teachers to get involved. To promote essays that would be of greatest interest to the public, the announcement indicated that

“a concise, well-thought-out essay will be as apt to win a prize for its practical features as a composition of greater length, abounding in elaborate phraseology or presenting rhetorical perfection.” In a way, this mirrored Rothrock’s own style in his numerous articles in *Forest Leaves*, which, while still formal, was direct, to the point, and informative.²⁵

About 2,000 copies of the announcement were sent out.²⁶ By October 1894 the PFA office had received copies of ninety-three newspapers from forty-one counties that had published the announcement. Twenty-three of the papers added their editorial voices to encourage teachers to enter. In the end, twenty-one essays were received from fifteen different counties. The results were announced in the June 1895 *Forest Leaves*.²⁷ According to an editorial, the results of the judging were very close. Consequently, the PFA decided to award three first-place prizes of \$25 each and publish each of the winners

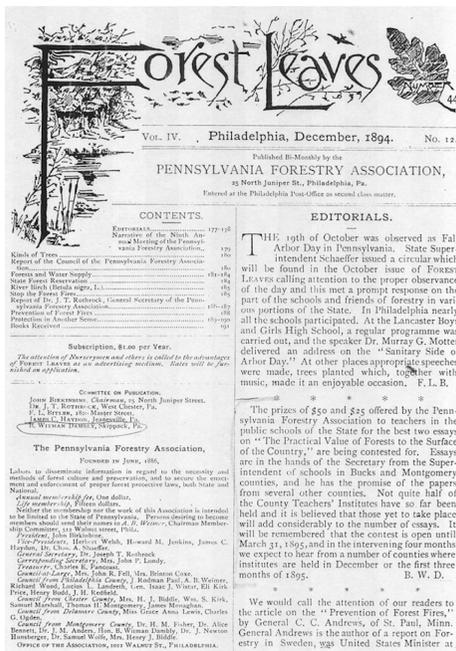


FIGURE 2: Cover of the December 1894 edition of *Forest Leaves* with an update on the Pennsylvania Forestry Association’s essay contest for public school teachers. (Image courtesy of the Pennsylvania State University—Mont Alto Library.)

in *Forest Leaves*. The winners were: Mr. F. H. Hain of Wernersville (Berks County), Mr. Walter Lefferts of North Wales (Montgomery County), and Miss Mary F. Weber of Jeffersonville (Montgomery County).²⁸ The names of the other writers were published as honorable mentions. The PFA congratulated the teachers of Pennsylvania and the ability shown in the essays. They regretted that the “exchequer of the Association forbids more of a recompense than a subscription to FOREST LEAVES for a year, which has been assumed by the Council for each contestant.” In a curious comment the article goes on: “Our criticism is that each of the selected essays have greater prolixity than is generally acceptable for the average reader.” Wordiness among educators, apparently, is not a new phenomenon.²⁹

The Influence of George Perkins Marsh on the Essays

By the early 1890s, the forest conservation movement had developed to the point where there had been several important conferences and calls to action by some national leaders. Historian Donald Pisani has shown that the fear of a possible oncoming wood famine motivated many people in the era after the Civil War. But these fears had yet to be translated into a plan for how to manage forest resources or an understanding that forests could be regenerated, principles that would only begin to develop later in the decade and during the Progressive Era. Instead, the prevailing belief at the time was that “under ‘normal’ conditions, the environment was humid and wooded; grasslands and deserts were ‘abnormal.’”³⁰ Consequently the essays talk about how and why the forests were being destroyed, and dwell on the terrible consequences to society. The most important reference the winning essays used was George Perkins Marsh’s *Man and Nature*, which was widely known and available at this time. Marsh’s book was originally published in 1864 and reprinted four times before a second American edition came out in 1874 after Marsh oversaw a new Italian translation. A posthumous third edition came out in 1885 and was reprinted in 1898 and 1907.³¹ While we do not know which edition the essay writers used, as none of the essays cited the sources of their information, there is no doubt that each consulted Marsh’s work in the preparation of their essays.

George Perkins Marsh (1801–82) was born and raised in Vermont. He tried but was not very successful at several careers, including lawyer, newspaper editor, sheep farmer, mill owner, lecturer, politician, and businessman.

He studied linguistics and mastered twenty languages. He wrote a book on the origin of the English language and was considered the foremost Scandinavian scholar in North America. He served in Congress from 1843 to 1849, where he helped found and guide the Smithsonian Institution. He served as U.S. minister to Turkey for five years, when he traveled extensively through the Middle East and witnessed firsthand the problems of deforestation. He also served as the U.S. minister to the new United Kingdom of Italy during the last twenty-one years of his life, where he completed his greatest work, *Man and Nature*.³²

The winning forestry essays based their arguments on the environmental benefits from preserving and increasing the extent of forests in the landscape. All three of the essays covered similar, interrelated points, citing examples often drawn from *Man and Nature* to show that the forests improved the local climate by possibly increasing rainfall, moderating temperatures, increasing atmospheric humidity, and by “freshening the air” through the photosynthesis cycle. Hain described the trees of the forests as “an infinite number of lightning rods” that could attract rain. The trees “may therefore frequently be the immediate occasion of showers by conducting to the earth the electric fluid of the clouds, and inducing the non-electric state which precedes the discharge of the rain.”³³

While the notion that trees attract rain was later disproven, forests certainly improve the fertility of soils through the action of roots and by creating a duff layer. The essays argued that forests would improve soil fertility by the deposition and decay of layers of foliage. The actions of tree roots were also important. These effects were seen to extend beyond the boundary of forests into nearby agricultural fields. Hain wrote that foliage from forest trees, as well as mosses, lichens, and animal droppings, were direct fertilizers of the soil. They could sustain several years of crops after a forest was removed, even when the soils were poor. He argued that the foliage alone cannot sustain the forest, but needs input from other plants and animal sources to supply nitrogen. Hain obviously did not know about nitrogen fixation or the nitrogen cycle. He believed that trees could bring up minerals through their roots to use, which were then returned to the soil through dropped foliage. He also quoted Danish botanist and forester Christian Theodor Vaupell about how carbonic acid in rain dissolves minerals in the soil.³⁴ As a result, Hain argued that forests next to farm fields, especially those on slopes, could actually increase the fertility of the soils for agriculture.

The essays all asserted that forests played a major role in ameliorating the actions of winds. Whether as single-line windbreaks or in blocks of forested

areas, trees helped preserve soil fertility and moisture for agriculture and plant growth. Mary Weber quoted statistics from the Weather Bureau indicating that a wind speed of 15 miles per hour increases evaporation 4.9 times over calm air. From the same source she reported that at a wind speed of 25 mph, the rate of evaporation will be 6.1 times greater than calm air at 50 percent humidity, thus proving the value of forests in slowing down the wind. Marsh also discussed the windbreak effect of forests in the section "Trees as a Shelter to Ground to the Leeward." He included numerous examples from France, Italy, and Switzerland to support his arguments.³⁵

Each of the essays emphasized strongly the role of forests in conserving soil resources and preventing flooding, or freshets as they were then called, especially in the headwaters of rivers or in high elevations. For example, Hain discussed the role of forests in preventing soil erosion on hillsides and stressed that without forests there would be alternating periods of flooding and droughts. He quoted French agricultural chemist J. B. Boussingault about a spring at the foot of a mountain on Ascension Island that diminished as the mountain was deforested and returned when trees were replanted.³⁶ Once again using Marsh as an unnamed source, Hain mentioned the importance of stabilizing sand dunes with trees, repeating an example from southwestern France where plantations of the maritime pine were said to have reclaimed 4,000 square miles of land. He also highlighted significant land loss in the lower part of the Wisconsin River from drifting sands that ruined fields and gardens. Hain affirmed that lines of windbreaks would stop the problem, a position consistent with Marsh, who devoted an entire chapter to the subject of fixing sand dunes.³⁷

Hain noted that forests provided homes and nesting sites for birds that eat the insects that would damage farm crops. He gave an example of a lone apple tree in the forest that is not damaged by borers because birds can eat all the insects, while trees in an orchard away from the forest cannot be reached by the birds. Hain quoted directly from Marsh about the fact that locust hordes do not occur in areas with forests or occur only after the destruction of the forest. He gave the example of the increase in locusts in Asia Minor and Cyrene that became destructive only when the forests were felled. The grasshoppers in North America were also seen as developing into destructive locusts when they have large areas bare of forests. This is from Marsh's section on "Small Forest Plants and Vitality of Seeds."³⁸

On the other hand, the positive role of trees and parks, in addition to the conservation of the forests, was a prime motivation in the forest conservation

movement, and was frequently discussed in *Forest Leaves*. Consequently, PFA officials were undoubtedly pleased to see the teachers' essays focus on the role of parks. Weber asserted the value of large urban parks. The trees "establish air currents that bring fresher air to the ground."³⁹ Their shade could reduce temperatures. They purified the drainage from streets by absorbing decomposing animal wastes (horse manure) and reduced dust and the resulting bacteria in the air. Similarly, the role of forests in preventing the spread of disease was frequently mentioned in the early issues of *Forest Leaves*, a topic that also appeared in the three essays. In Germany and India belts of trees were said to ward off cholera, while Lefferts described an area near Rome, in a pine-producing region, that became unhealthy after the trees were cut down to eliminate the hiding places of thieves. Similarly, Hain wrote that trees in swampy areas could prevent malaria and disease. He gave the example of the heavily forested swamps of Virginia and the Carolinas that are healthful, "even to the white man," while Italy, with a similar climate but largely deforested, was not. As usual, both of these examples came directly from Marsh's "Trees as a Protection against Malaria."⁴⁰

From Forestry Education to Conservation Legislation

According to cultural historian T. Gregory Garvey, George Perkins Marsh believed that humanity was separate from and had a destructive effect on nature. Yet once people were aware of the damage, Marsh believed it could be mitigated through a "government-led alliance between scientists, who would work to discover the structure of ecosystems, and civic-minded public servants, who would use that knowledge to regulate resources to advance public interests."⁴¹ Marsh himself did not provide detailed solutions to the forestry problem. He believed that private forest owners and the government had to be motivated by a concern for the effects of deforestation on future generations. He also believed that the rapid rate of change in American life, what he called the "instability of American life," that favored the felling of forests for development would have to change.⁴² Indeed, Marsh's call to action had its most immediate impact on the creation of New York's Adirondack and Catskill Forest Preserves, an action deemed vital to the commercial interests of New York City that combined state ownership of land with the voluntary conservation practices of wealthy sportsmen.⁴³

Writing as he did in the 1860s, long before the political upheaval of the Progressive Era, Marsh himself did not provide detailed solutions to the forestry problem. However, Char Miller points out that Franklin B. Hough, an advocate of forest conservation in the 1870s who later became the first chief of the Division of Forestry in the Department of Agriculture, was one of several prominent early conservationists inspired largely by Marsh's work. Miller wrote: "Marsh proposed the adoption of a conservation land management policy to be administered through a paternal form of government reminiscent of France and Germany, the leaders in European forestry."⁴⁴ While conservation innovators in the 1870s struggled to bring European concepts of land management and conservation advocated by Marsh to the very different cultural and political environment of the United States, they set the stage for the later success of Gifford Pinchot and other Progressive Era foresters on the national level.⁴⁵

The three winners of the *Forest Leaves* essay contest, too, struggled to translate their arguments on behalf of forest conservations into a workable framework for public policy. The essay topic did not require a discussion of conclusions, but it would only make sense to end an essay with a call for action to conserve forest resources. Walter Lefferts said very little about what needed to be done. He merely hoped that the time will come soon when "all will cooperate in the preservation of our forests and realize in their fullest the words spoken so long ago that 'the tree is the life of man.'"⁴⁶ Mary Weber briefly concluded that the forests were an "indispensable basis of material prosperity," and therefore the management of the forests was a matter of public interest.⁴⁷ However, as with Marsh, her muse, the actual mechanism for translating this abstract interest into a practical conservation program was not spelled out.

On the other hand, F. H. Hain expressed more ideas about what should be done and explicitly linked cultural values to legislative action. He concluded that the American continent was so vast that people were not yet ready to believe the forests could be exterminated. People saw forests as valuable only so far as they supplied materials. Since the public believed the forests could not be exhausted, they were as yet unconcerned. Hain argued that if nothing was done, the continent could become a desert. He believed man had the power to make the earth uninhabitable. He also believed that learned men, philosophers, and legislators should do more to encourage the protection of the forests. Hain called for immediate legislation in all the states to preserve a certain ratio of forests to agricultural land, an argument also made in *Man*

and Nature.⁴⁸ He insisted that the government should get involved in forestry because forests take so long to develop that individuals would not see much benefit from doing it. Private forest owners did, however, have a civic obligation to do what they could to conserve the forests.

While the significance of the PFA's essay contest itself in fostering a forestry ethic among teachers and their students cannot, of course, be fully demonstrated, it is clear that the group's conservation promotion efforts in education and in other areas did have a major effect in the commonwealth. By the late 1890s, Pennsylvania began purchasing land for state forests and has continued acquiring properties for conservation under various programs up to the present. The state forest system now has over 2.2 million acres and there are 120 state parks totaling 300,000 acres. State game lands, often adjacent to the state forests, cover 1.4 million acres.⁴⁹ The resources enjoy overwhelming public support and are heavily used by local residents and tourists. At the same time, the importance of teachers in influencing students is still widely recognized today in a large numbers of areas. Indeed, the exact role of teachers is a large, and sometimes controversial, part of the public policy discussion of the future of education. In just one example, the Envirothon program for high school students, where teams compete in field testing in the areas of land use, aquatic ecology, forestry, wildlife, and environmental issues, is popular throughout the state and has led many students to choose an environmental career.⁵⁰ Seen in this light, the PFA's forestry primers were an early attempt to incorporate environmental awareness in the professional education of teachers.

The PFA's essay contest for teachers was a shrewd attempt to reach a constituency that could have a strong impact on influencing public opinion toward forest conservation, both at that time and for the future. The winning essays were essentially research reports that relied on the best overall reference source environmental degradation at the time: George Perkins Marsh's *Man and Nature*. Marsh was the first American author to explicitly demonstrate that human actions could influence the environment, and that humanity had a moral responsibility toward stewardship of natural resources. The essays help us understand the transition from Marsh's call to action to the busy period of conservation shown by Pinchot's Progressive Era work. In the ten years after the essays were published in *Forest Leaves*, Pennsylvania created an extensive state forest system with an active forest-management system, began a program to end dangerous forest wildfires, and was well on its way to reclaiming its historic forest cover. The creation of resources

like the forestry primers and the promotion of the forestry essay contest for teachers may have played a significant role in influencing the public to support these actions.

NOTES

I would like to thank Susan Rimby for her insightful comments on an earlier draft of this essay.

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15. John Birkinbine, "Address of Mr. John Birkinbine," *Forest Leaves* 4, no. 7 (February 1894): 100–103.
16. Linehan, "Strategies for Forestry Success," 226.
17. Mark F. Fritz, "The State Normal Schools: Teaching Teachers and Others," *Pennsylvania Heritage* 11, no. 4 (1985): 4–9.

18. Harold C. Wisor, "A History of Teacher Education at Lock Haven State College, Lock Haven, Pennsylvania, 1870–1960," D.Ed. diss., Pennsylvania State University, 1966, 13.
19. Elizabeth Tyler Bugaighis, "Liberating Potential: Women and the Pennsylvania State Normal Schools, 1890–1930," PhD diss., Pennsylvania State University, 2000, 102.
20. Henry M. Fisher, Acting Secretary, "Pennsylvania Forestry Association," *Forest Leaves* 3, no. 8 (1892): 116.
21. Herbert Welsh, 1851–1941, born to a wealthy Philadelphia family, was a political reformer and advocate of Indian rights. He was one of the founders of the PFA. In later years he published a book, *The New Gentlemen of the Road*, chronicling a hike from Philadelphia to New Hampshire.
22. Herbert Welsh, "The Teacher and the Forest, Primer No. 1," *Forest Leaves* 3, no. 8 (1892): 115–16.
23. J. T. Rothrock, "Wasted Resources, Primer Series, No. 2." *Forest Leaves* 3, no. 8 (1892): 118–19.
24. J. T. Rothrock, "Remove the Tax from Timber Land," *Forest Leaves* 3, no. 11 (1893): 152–53. Exempting forest land from property taxes never became accepted in Pennsylvania. The current Pennsylvania Clean and Green law does permit forest and farm landowners to have their properties taxed at a lower, current-use rate rather than current market value. Many other states have similar property tax reduction programs. Although not all eligible landowners take advantage of the program for a variety of reasons, it does make a valuable contribution to conservation.
25. John Birkinbine and Joseph T. Rothrock, "Prize Essays Upon Forestry," *Forest Leaves* 4, no. 10 (1894): 147.
26. B. W. Dambly to J. T. Rothrock, July 17, 1894. John William Lerner, ed., *The Papers of Joseph Trimble Rothrock, M.D.* (Wilmington, DE: Scholarly Resources, 2001), ser. 3, 3:414.
27. "Prize Essays," *Forest Leaves* 5, no. 3 (1895): 34.
28. Hain's name was misspelled Hahn in the second installment of his essay. The essay was published in three issues of *Forest Leaves*: F. H. Hain, "The Practical Value of Forests to the Surface of the Country. Part 1," *Forest Leaves* 5, no. 5 (1895): 74–77; "The Practical Value of Forests to the Surface of the Country. Part 2," 5, no. 9 (1896): 139–40; "The Practical Value of Forests to the Surface of the Country. Part 3," *Forest Leaves* 5, no. 10 (1896): 154–56. Walter Lefferts, "The Practical Value of Forests to the Surface of the Country," *Forest Leaves* 5, no. 4 (1895): 58–62. Mary F. Weber, "The Practical Influence of Forestry on the Surface of Our Country," *Forest Leaves* 5, no. 3 (1895): 41–44.
29. "Prize Essays," *Forest Leaves* 5, no. 3 (1895): 34.
30. Donald J. Pisani, "Forests and Conservation, 1865–1890," *Journal of American History*, 72, no. 2 (September 1985): 340–59.
31. David Lowenthal, "Introduction," in Marsh, *Man and Nature*, xxxv. The book was translated also into numerous foreign languages.
32. David Lowenthal, *George Perkins Marsh, Prophet of Conservation* (Seattle: University of Washington Press, 2003), 605.
33. Marsh, *Man and Nature*, 123. In reality, forests do not attract rain. Marsh spent considerable time exploring the role of forests in attracting or promoting rainfall. He concluded that the evidence did not support that forests attract rain; that is, the mean annual rainfall was no different whether or not an area was forested. He believed that forests could have a local effect. He also believed that the interaction of climate and forests was exceedingly complex and not fully understood.
34. The quotation clearly comes from Marsh's discussion of the importance of retaining leaves, twigs, and branches in the forest to retain soil fertility. See Marsh, *Man and Nature*, 275. According to a

footnote on page 32, Vaupell studied forest succession and the relationship between trees and the soil in the bogs of Denmark.

35. Ibid., 130–34.
36. Marsh used Boussingault extensively as a source and this quote comes from his section on “The Influence of the Forest on the Flow of Springs.” Ibid., 178.
37. Ibid., 382–436. The long-term implications of this faulty connection between deforestation and desert expansion in the Mediterranean region is explored in Diana K. Davis, *Resurrecting the Granary of Rome: Environmental History and French Colonial Expansion in North Africa* (Athens: Ohio University Press, 2007), esp. 63–64.
38. Marsh, *Man and Nature*, 249–50.
39. Weber, “The Practical Influence of Forestry,” 43.
40. Marsh, *Man and Nature*, 136.
41. T. Gregory Garvey, “The Civic Intent of George Perkins Marsh’s Anthropocentric Environmentalism,” *New England Quarterly* 82, no. 1 (2009): 80–111.
42. Marsh, *Man and Nature*, 278–80.
43. Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2001), 13–15; David Stradling, *Making Mountains: New York City and the Catskills* (Seattle: University of Washington Press, 2007), 117.
44. Miller, “The Pivotal Decade,” 8.
45. Indeed, Pinchot himself received a copy of *Man and Nature* as a gift from his younger brother for his twenty-first birthday. Char Miller, *Gifford Pinchot and the Making of Modern Environmentalism* (Washington, DC: Island Press, 2004), 56.
46. Lefferts, “Practical Value of Forests,” 62.
47. Weber, “Practical Influence of Forestry,” 44.
48. Marsh, *Man and Nature*, 278–80.
49. “The Department of Conservation and Natural Resources,” http://www.dcnr.state.pa.us/ucmprd1/groups/public/documents/document/dcnr_009786.pdf; “Hunting in Pennsylvania—Where to Go,” http://www.portal.state.pa.us/portal/server.pt/community/hunting/11348/where_to_hunt?qid=88651993&rank=.
50. “Pennsylvania Envirothon,” <http://www.envirothonpa.org/>.