

Though born in Russia and trained in German forestry methods, Raphael Zon played a leading role in the development of scientific forestry in the United States. Among the most notable of Zon's accomplishments was his establishment of federal forest experiment stations. His support for experiment stations stemmed from a belief in the infallibility of science, an idea with important parallels in contemporary American Progressive thought. The conviction of his beliefs would prove both a blessing and a hindrance to his career.

WARRIOR OF SCIENCE

RAPHAEL ZON AND THE ORIGINS OF FOREST EXPERIMENT STATIONS

Raphael Zon was livid—and with good reason. It was 1913, and for the past eight years he had been the driving force behind the U.S. Forest Service's Bureau of Silvics. Now he had received word that he was being demoted from his position as its chief. Zon penned a blistering note to Forest Service

Chief Henry S. Graves. "I fought for certain ideals in this work at a time when they were unpopular and ridiculed," wrote Zon. "I have undergone humiliations for the sake of bringing these ideals into being. [But] during the past few years I have had the moral satisfaction of seeing my ideas of scientific organization in the Service gradually materialize and grow into its present form." Most significantly, Zon argued, he had been responsible for one of the Forest Service's signal achievements, the creation of "the experiment stations in the West . . . [which] are now building the scientific foundation upon which the future practice of American forestry is to rest."¹

At the time, Zon may well have felt that his whole future rested on the outcome of that letter to Graves. But what were these experiment stations on whose value and importance Zon was willing to stake his career? They were the centerpiece of his bold plan to codify and organize all federal forest research in the United States, a project that was the most comprehensive of its time in American forestry. To accomplish this feat, Zon had

adapted an idea that had been first tested in Germany nearly forty years earlier. But Zon's vision of organized scientific forestry was also distinctly American in character: the Russian émigré drew heavily on the ideas of contemporary American Progressive thinkers. Through his considerable intelligence and organizational skill, Zon deftly combined German and American models of forest research into a unique plan that achieved its unlikely fruition in the northern Arizona wilderness.

ROOTS IN THE BLACK FOREST

The idea of forest experiment stations—government-run facilities that conduct long-term scientific research on forest health and growth—originated in Germany as early as 1826.² However, it took forty-two years before a group of German foresters and soil scientists at a convention in Vienna actually took up the idea, appointing a five-member committee to explore the best methods for enacting a comprehensive plan of forest research. The

BY JEREMY CAMERON YOUNG

result was a system of government-run experiment stations, inaugurated in 1870 with outposts in Baden and Saxony. The program grew exponentially; within two years, six more stations were in operation throughout Germany, and the Union of German Forest Experiment Stations was set up to standardize and codify experiments conducted at the various locations.³ The network of research stations was so successful that in 1892 an international forest research organization was formed along similar lines. These early explorations of the experiment station concept were both fruitful and long lasting; the research organization, now known as the International Union of Forestry Research Organizations, or IUFRO, has some 700 member organizations in more than 100 countries.⁴

If experiment stations worked well in Germany, however, there was little reason to think they would succeed in the United States. For one thing, the German program of forest research was, as befitted the autocratic regime that sponsored it, exceedingly regimented. Gifford Pinchot, who toured Germany in 1890, found its style of forestry tinged with “too much artificial finish, too much striving for detailed perfection...to fit it for use where Forestry was young.”⁵ The difference in size between the two nations was also a daunting obstacle. Most of the original German experiment stations were affiliated with schools of forestry and staffed by professors; this model would not work in the United States, where most government forest reserves were located in remote wilderness areas far from any schools. Yet for all its differences with the budding American model, the German forestry system produced an influential exponent in the United States: Bernhard Fernow, a German immigrant who served as the federal government’s third forestry chief from 1886 to 1898.⁶

“It is not surprising,” writes historian Char Miller, “that Fernow, educated within the German forestry system, would believe that its methods were the most effective and most culturally adaptable.”⁷ His belief in applying German forest management methods to American forests extended to experiment stations. During his tenure as Division of Forestry chief, Fernow worked closely with state-run experiment stations in nine states, the first of which were chartered in California in 1887 at the urging of its state forest commissioner, Abbot Kinney.⁸ These state-run experiment stations were productive, but their scope was limited by state lines. Recognizing that the problem was not limited to state lands, Fernow himself began providing forest management plans to private forestry organizations, beginning with the Adirondack League Club in 1890.⁹ He also began initiating federally funded research projects, beginning with temporary planting stations in Minnesota and Pennsylvania.¹⁰ More notably, following a suggestion by a University of Nebraska forestry professor, Charles Edwin Bessey, Fernow chartered the Bruner plantation in Holt County, Nebraska, around 1891. Under Fernow’s supervision, this site became essentially a prototype experiment station, featuring a multiyear program of planting organized and managed by Division of Forestry directive. Fernow’s Bruner plantation differed from the later forest experiment stations only in its lack of permanent structures and in the fact that ownership was retained and day-to-day labor performed by Hudson Bruner, a private citizen.¹¹

Before he was able to make any further progress in scientific research, however, Fernow left the Division of Forestry in 1898 to direct the new four-year forestry school at Cornell University,



U.S. FOREST SERVICE PHOTO

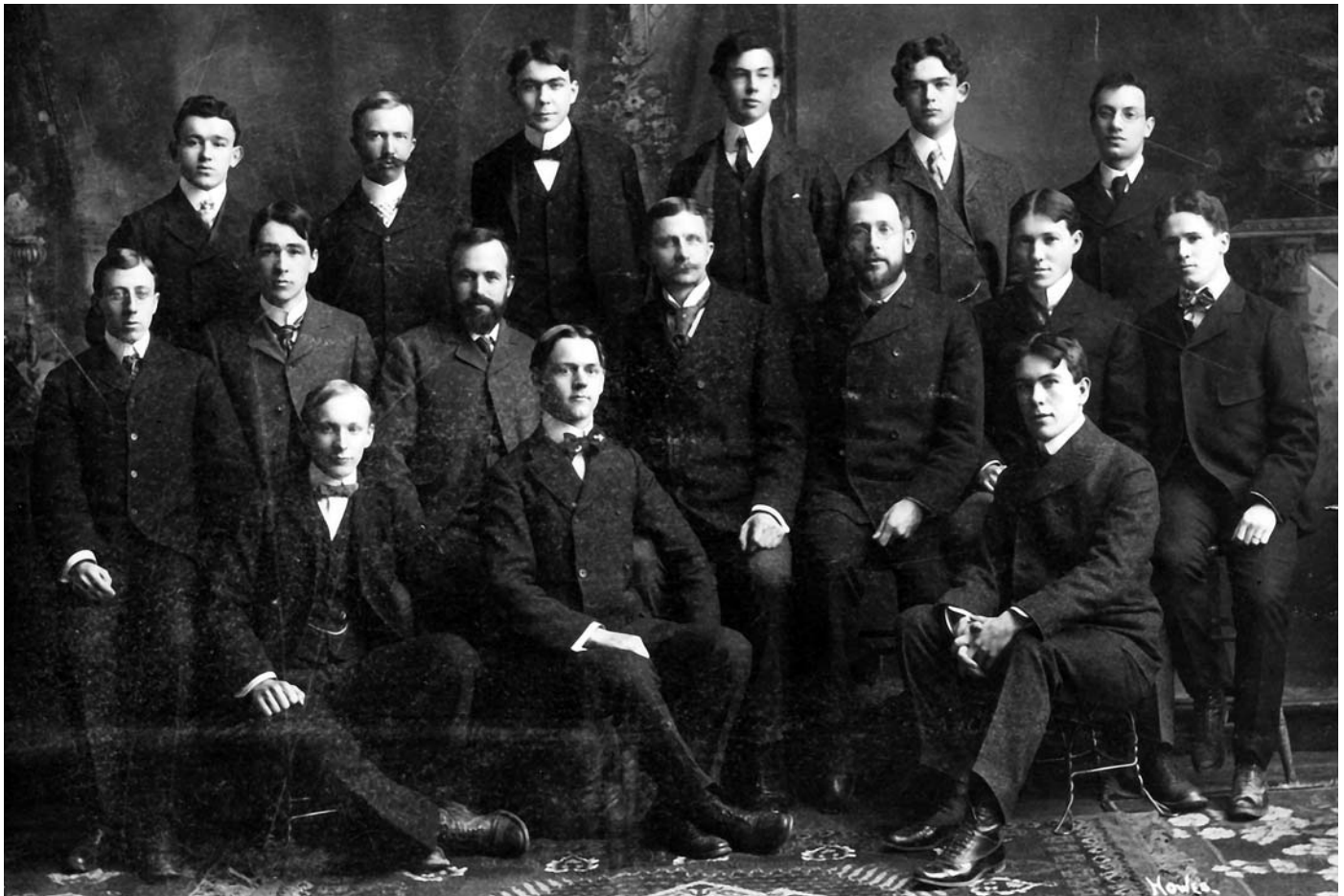
Raphael Zon, seen here in front of a map showing the proposed shelterbelt in the 1930s, was arguably the most important advocate of scientific forestry in the early Forest Service. The shelterbelt was just one of several innovative ideas Zon brought to American forestry.

the first of its kind in the United States. But his work would continue through one of his first students at Cornell—Raphael Zon, who was soon to become one of America’s most vocal advocates of scientific forestry.

LEARNING GERMAN-STYLE FORESTRY IN AMERICA

Argumentative by nature, Raphael Zon was in trouble before he ever set foot on American soil. Born in Russia in 1874 and an ardent socialist, Zon, who had coincidentally attended secondary school with future Soviet leader Vladimir Lenin, later explained that he had come to America because he “couldn’t agree with [Tsar] Nicholas II as to the right economic and social course for Russia. Since he refused to budge, I had to leave.”¹² The truth was somewhat less genteel: along with his future wife, Zon had emigrated from Russia to escape a ten-year prison sentence for labor organizing. They stopped first in Belgium and then in London, where Zon attended some college courses and made the acquaintance of a group of British radicals that included George Bernard Shaw. From there, he booked passage to New York, arriving with only nineteen cents in his pocket.¹³

Despite having previously “dabbled in comparative embryology, political economy, social science, biology, [and] philosophy,” Zon quickly gravitated toward Cornell’s new forestry school.¹⁴



Members of the Cornell forestry school in 1900. Raphael Zon is in the back row at right. Bernhard Fernow, dean of the school, is at center in the second row. Fernow and Zon's friendship began when Zon enrolled at Cornell and lasted until Fernow's death in 1923.

Designed by Fernow, the Cornell curriculum was based on "the most advanced German ideas in forestry education."¹⁵ Fernow and his fellow German-born forestry instructor Filibert Roth "emphasized economics and the long-term profitability of forestry over silviculture," but they also taught their students that more scientific data were needed in order to achieve these goals.¹⁶ Zon brought a more worldly perspective to his training in the forest than many of his classmates possessed. "Nature is a book open for all," he enthused in his diary, but "it takes... a very experienced man to explain it."¹⁷ He developed a particularly close relationship with Fernow, whom he described as "more than a teacher of forestry; ... [he was] a leader of life."¹⁸ Theirs remained a close friendship until Fernow's death in 1923.

Upon his graduation from Cornell in 1901, Zon secured employment at the federal Bureau of Forestry under Fernow's successor, the dynamic Gifford Pinchot. Zon was well suited for the job and was highly valued by his superiors, including Pinchot, with whom he soon struck up a lifelong friendship.¹⁹ "[Zon's] encyclopaedic knowledge of facts both in the literature of forestry and the woods," Pinchot later wrote approvingly, "is preeminent."²⁰ But Zon quickly became restless. He felt that the organized German methods of forest science he had learned from Fernow were being improperly implemented, or even ignored, by the bureau. Despite the relatively low level of his position—in 1904 he was still only a "forest assistant"—Zon confidently set out to refashion the practice of American federal forestry literally

from the ground up.²¹ The man whose friends admitted that "his ability to criticize searchingly" was "sometimes a bit overwhelming," who had fearlessly organized against the Tsar, was now prepared to campaign just as fearlessly for the brand of forest science in which he believed.²²

REMAKING AMERICAN FORESTRY

In a 1904 memorandum to Chief Pinchot, Zon assessed the state of forest research at the time: "The need for silvical [scientific forestry] data upon which one can rely in making his practical recommendations," he wrote, "is felt by every member of the Bureau.... In the present state of our scattered silvical knowledge there cannot be any continuity in our silvical work."²³ The solution, Zon argued, was a Section of Silvics with wide administrative independence that would serve as "the source of information for all field men regarding the silvical data on hand."²⁴ Pinchot agreed. He created the section in 1906 and placed Zon in charge the following year.²⁵

By then Zon was already thinking along new lines. It was not enough simply to organize whatever data the Forest Service (as the Bureau of Forestry was renamed in 1905) happened to produce, Zon wrote (along with Treadwell Cleveland) in a 1906 memorandum; the "desultory scientific efforts of the Forest Service" were unlikely to produce much useful research.²⁶ Nor were state-run or locally administered experiment stations, such as the Bruner

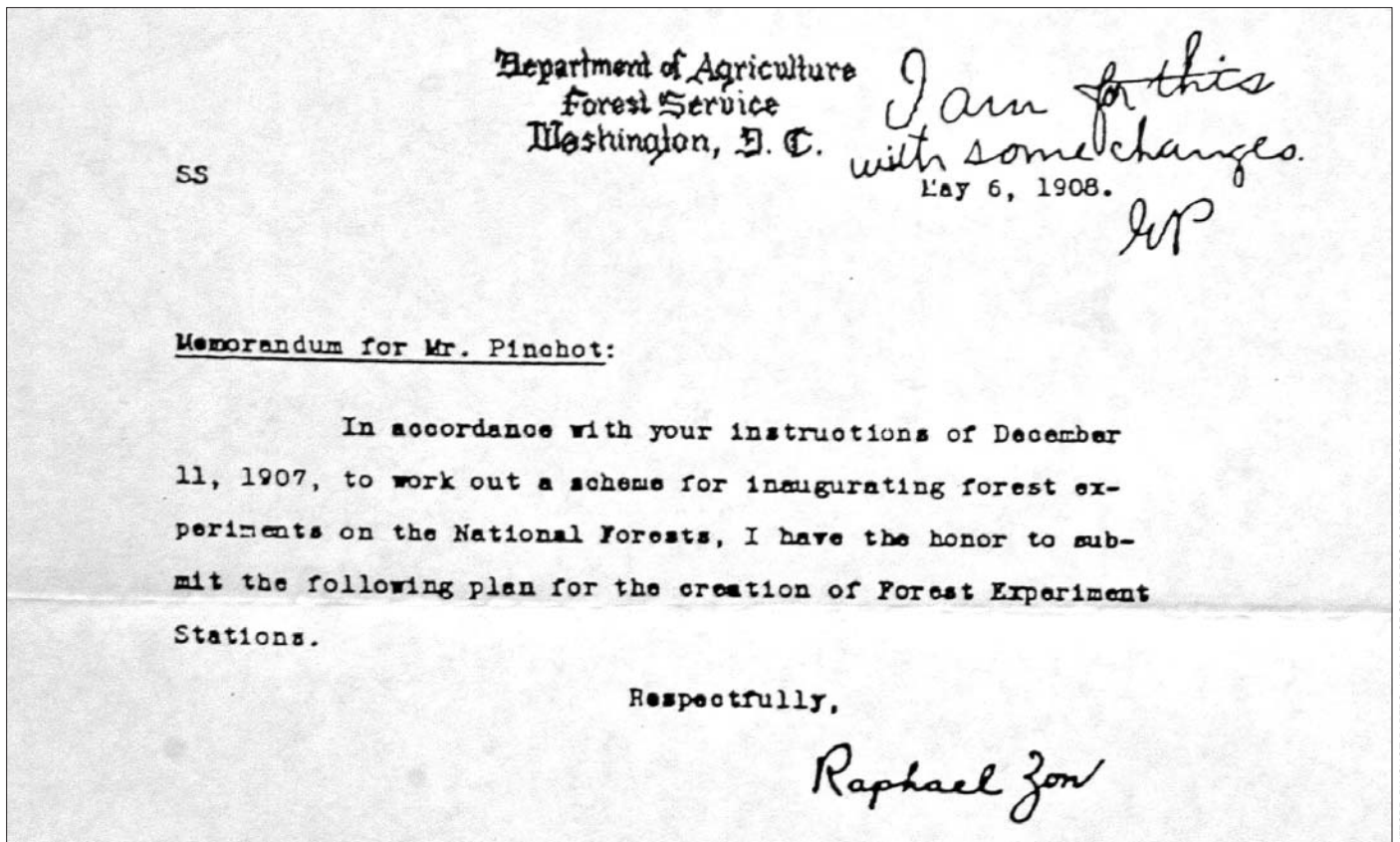
plantation or Kinney's projects in California, adequate for solving forestry problems of a national scope, though Zon later wrote that "there should always...be the closest possible cooperation" between the Forest Service and these groups.²⁷ Instead, the money being spent on haphazard experiments should be "diverted into one channel and spent for carrying on a series of systematic, well-thought-out investigations under one head."²⁸ How should these scientific explorations be organized? Perhaps recalling Fernow's teachings from his Cornell days, Zon suggested a model that was new to the United States but had long been a staple of German forest science: "This experimental work is best to be carried on thru permanent forest experiment stations."²⁹

Though he would not personally observe a working German forest experiment station until the end of 1908, Zon saw at once how the German system could be adapted for American use.³⁰ Whereas the Germans had placed stations in nearly every state, the Forest Service need build only one for each of its six administrative regions, selecting a "typical reserve where the desired experiments may be carried on, and the results applied to the whole region." And whereas German stations were staffed chiefly by forestry professors, the United States could make do with "the best m[e]n the Forest Service can afford to get within its ranks."³¹ Zon had resolved the two most serious problems with experiment stations as far as their adaptation to American forests was concerned; it remained only for the Forest Service to adopt his ideas. On his copy of the Zon-Cleveland memorandum, Pinchot scrawled an encouraging message: "I have

read this with great interest—Pls let me see the detailed plan."

Zon produced a twenty-three page memorandum titled "Plan for Creating Forest Experiment Stations" in May 1908, five months after receiving Pinchot's request. With characteristic fervor, Zon pronounced it "manifestly the duty of the federal Forest Service to take the lead in the research work of forestry." The purpose of the experiment stations, he wrote, "is to carry on, on areas segregated from the usual business enterprises, experiments and studies leading to a *full and exact knowledge of American silviculture*, to the *most economic utilization of the products of the forest*, and to a *fuller appreciation of the indirect benefits of the forest*." These stations, like their German counterparts, would be essentially permanent, allowing "for experiments requiring a number of years, and for the maintenance of model forests typical of the silvicultural region." Looking beyond their importance in research, Zon envisioned a broad public role for the experiment stations, which would not only provide much-needed technical data but also "furnish the most valuable, instructive and convincing object lessons for the public in general."³²

On the cover of his copy of the plan, Pinchot wrote, "I am for this, with some changes." Despite his official circumspection, however, Pinchot did not have to be convinced of the importance of Zon's proposal. "I had seen forest experiment stations abroad," he later explained, "and I knew their value."³³ When Pinchot authorized the creation of experiment stations, Zon was able to establish the first one only three months later. Given that quick turnaround, it is safe to assume that the two men had been



When Raphael Zon submitted his "Plan for Creating Forest Experiment Stations," Chief Gifford Pinchot responded with a hand-written message on the cover page. This copy, found in Gifford Pinchot's personal papers at the Library of Congress, had a typed note at the bottom that reads, "This little memorandum was a potent factor in National Forest history, for it was in reality the Magna Charta creating Forest Experiment Stations." It is not known who wrote it.

GIFFORD PINCHOT PAPERS, LIBRARY OF CONGRESS, COURTESY OF GERALD WILLIAMS



Gustav Adolph "Gus" Pearson was the founding director of the Fort Valley Experiment Station and served there from 1908 until his retirement in 1944. He is seen here giving a lecture in 1909 to students of the forest ranger school, which was held at Fort Valley intermittently from 1909 to the outbreak of World War II.

discussing the proposal off the record. In all, it had taken Zon only four years to secure official backing for his vision of transplanting German-style experiment stations to the United States. Now it was time for the final step: the construction of the very first American federal forest experiment station.

Zon recognized that "the decision [of where to place a station] must rest more on the question of accessibility than on any other point."³⁴ In particular, the stations "should be located as closely as possible to those of the Forest Supervisor, and should also be readily accessible to the forest."³⁵ These and other considerations led Zon to locate the first federal experiment station in remote Fort Valley, Arizona, in a wooded glade situated nine miles from the Flagstaff headquarters of the Coconino National Forest.³⁶ Accordingly, on August 8, 1908, Zon found himself astride a mule, accompanied by the national forest supervisor's assistant, Willard Drake, and by a lanky Swede named Gustav Adolf Pearson. "Gus" Pearson was a former student of Bruner plantation founder Charles Edwin Bessey at the University of Nebraska and had been tapped as the experiment station's first director.³⁷ The three men, Pearson later recalled, suddenly found themselves amid "a beautiful stand of ponderosa pine. 'Here,' said Zon, 'we shall plant the tree of research.'"³⁸

Behind Zon's lofty rhetoric lay steely determination. Zon and

Pearson quickly laid out a demanding research schedule for the Coconino Experiment Station (renamed in 1911 the Fort Valley Experiment Station): light, soil and moisture surveys; tree and stand studies; reproduction, forest cover, and weather observations; and "the building up of small model forests."³⁹ Though the network of Forest Service experiment stations had expanded by 1915 to twelve locations—double the number of sites Zon had originally suggested—Zon continued to regard the Fort Valley Experiment Station as the linchpin of his program of scientific forest investigation. He made annual inspections of the Fort Valley outpost seven of the eight years between 1908 and 1915, and he visited the site more often and for longer periods than he did any other station.⁴⁰

Today, the fourteen buildings that once formed America's first federal forest experiment station still sit just off Highway 180 in northern Arizona, a forgotten monument to Zon's passion for scientific forestry. Thanks to efforts by the Forest Service's Rocky Mountain Research Station and committed volunteers—whose labors landed the site a spot on the National Register of Historic Places in 2001—four of the structures have been fully restored, and more such endeavors are planned in the near future. Nevertheless, much of the station continues to deteriorate, and more funding is needed to restore this critical and neglected part of America's forestry heritage.⁴¹



U.S. FOREST SERVICE PHOTO 14062

The Fort Valley Experiment Station in 1912, with the San Francisco Peaks in the background. Station director Gus Pearson built the cabin on the right as his office and residence in 1909. Known as the Pearson House, it is one of a handful of buildings now on the National Register of Historic Places.

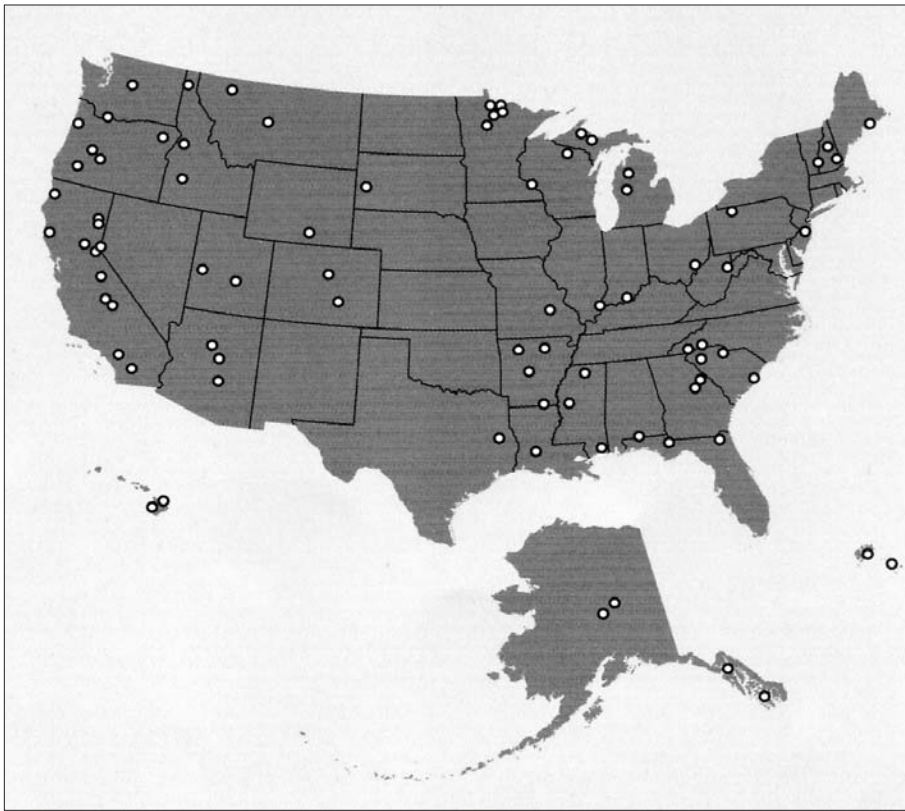
EXPERIMENT STATIONS AND PROGRESSIVE THOUGHT

“Conservation, above all, was a scientific movement,” writes historian Samuel P. Hays, “and its role in history arises from the implications of science and technology in modern society.”⁴² Zon fit the mold of those conservation leaders who, according to Hays, “displayed that deep sense of hope which pervaded all those at the turn of the century for whom science and technology were revealing visions of an abundant future.”⁴³ For Zon, the concept of experiment stations was more than simply a research tool; it was a symbol of the importance of scientific inquiry in forest administration. The experiment stations, he wrote in 1917, “must lay the foundation for the practice of forestry in the whole United States.”⁴⁴ Accordingly, the experiment station idea formed a critical part of his intellectual philosophy. “Our goal is to develop our knowledge of American silviculture so as to enable us to safeguard and perpetuate our forests for all the needs of our country.”⁴⁵

Zon’s belief in scientific research had much in common with Progressive philosophy in the United States. Many Progressive intellectuals, including Herbert Croly, John Dewey, and Walter Lippmann, saw science as the way to discover “truth” in a democratic nation.⁴⁶ Lippmann, a young journalist employed by the *New Republic* magazine, came closest to capturing Zon’s veneration of scientific research as a prime intellectual virtue.⁴⁷

Lippmann wrote in 1914 that “democracy in politics is the twin-brother of scientific thinking. . . . As absolutism falls, science arises. It is self-government. For when the impulse which overthrows kings and priests and unquestioned creeds becomes self-conscious we call it science.”⁴⁸ Zon concurred, writing three years later that scientists were “men who kept pointing to . . . the guiding star.”⁴⁹ Like Lippmann, Zon believed that “the fountain from which all our enthusiasm must spring is in the desire to make scientific work the means of bettering life in all its aspects.”⁵⁰

If Zon shared with Lippmann a reverent view of science, he also drew heavily on the conservationist ideals of his boss, Gifford Pinchot. Historian Peter List has expressed Pinchot’s views on land use in three principles: “First and foremost, the wise human use and development of land resources; second, the preservation and protection of those resources for future human generations; and third, the democratic allocation of the resources to the American public.”⁵¹ Pinchot viewed the forest from the perspective of human needs, not as an entity unto itself: “The object of practical forestry,” he wrote, “is precisely to make the forest render its best service to man in such a way as to increase rather than to diminish its usefulness in the future.”⁵² Zon’s thinking followed similar lines: “We do not need to bother about whether the problems which we are studying are fundamental or not,” he wrote; “they are fundamental so long as they serve to better human life.”⁵³



Experimental forests and ranges are found in all nine Forest Service regions of the United States. It was Raphael Zon's vision that helped bring this system to fruition.

Zon's ideas about land use and science were strongly similar to those of Lippmann and Pinchot. But where he differed markedly with these men was in his view of the scientist's role in policymaking. Here, the experiment stations formed the basis of Zon's most original intellectual turn. The Progressives viewed regulatory agencies such as the Forest Service, according to historian James Kloppenberg, as "the political arm of science. Using the techniques of scientific analysis, administrators would report to the people through their representatives, who would evaluate all the available options and then instruct the bureaucracy to execute the public will." This idea prescribed a limited role for the scientists who actually conducted the research. For instance, Kloppenberg reports that Walter Lippmann believed government experts "should only advise and that the people, through their representatives or through initiatives and referenda, should make policy decisions."⁵⁴ The Progressives wanted to make absolutely certain that scientific administrators did not actually decide policy; such actions coming from unelected bureaucrats would be in their view both antidemocratic and dangerous.⁵⁵

Zon held a different view, one that stemmed from his own dual identity as both a technical forester and an intellectual. Scientific work was for him synonymous with "living in a higher plane of ideas," and he did not share Progressive fears that scientists could not handle the burdens of policymaking. Indeed, he saw no reason why someone as widely read and intelligent as he was should not have the last word on forest policy rather than defer to the bureaucrats who ran the Forest Service.⁵⁶ In language that would have horrified many of his Progressive contemporaries, Zon dubbed his small cadre of experiment station directors "a small army of warriors of science" and spoke fondly of

their "spirit of crusade for these technical ideals of the forester."⁵⁷ Zon's belief that his training entitled him to provide not merely suggestions but unchallenged directives for American forest policy led, not surprisingly, to fierce conflict with nearly all the Forest Service chiefs under whom he served after Pinchot was fired in 1910, and it was a major reason for Henry Graves's attempt to demote Zon in 1913. However, it also provided Zon with a confidence that contributed to his remarkable ability to guide every aspect of the implementation process for experiment stations and to sweep aside all obstacles in his path.

Zon never altered his opinions on scientific forestry: "He holds we were exactly right in our position toward forestry in the early days," recorded Pinchot in 1936.⁵⁸ But if Zon himself did not change, the tenor of American politics did. Politicians of the 1910s and 1920s had little interest in encouraging federal forest science, and Zon's outspoken intensity won him few friends among Forest Service bureaucrats after Pinchot's firing. Although Zon did survive the demotion attempt of 1913 and was even promoted the following year to chief of the Office of Forest Investigations, his philoso-

phy of scientific management became increasingly marginalized within the agency.⁵⁹ In 1923, a frustrated Zon decamped for the new Lake States Experiment Station in Minnesota, never to return to Washington. But Zon was not idle or quiet during the remaining two decades before his retirement. As editor-in-chief of the *Journal of Forestry* from 1923 to 1928, he used his editorials to address both immediate and perpetual forestry problems. His research on shelterbelts had national implications and thrust him into the middle of controversial efforts to mitigate the Dust Bowl of the 1930s and turn the Great Plains back into usable farmland.⁶⁰ However, he would never again regain the sort of broad institutional control over American forestry he had possessed under Pinchot.⁶¹

WARRIOR OF SCIENCE

In many ways, Raphael Zon was an improbable champion of organized Forest Service research. Because he was arrogant, cantankerous, always in trouble, and hard to like, Zon had the full support of his superiors only during the nine years in which he worked for Pinchot. Yet in that brief span of time, Zon adeptly merged German forestry traditions with Progressive ideals to lay the groundwork for the system of federal forest research that persists in the Forest Service to the present day. It was Zon who dreamed of a Forest Service that would not simply administer the nation's forest resources but actually use the techniques of science to conserve and reinvigorate America's forests for future generations. It was Zon who championed the importance of scientific forestry and who drew up a plan to systematically implement it throughout the United States. Most importantly, it was

Zon who personally oversaw the experiment station program until it could bear its own weight and establish itself as the predominant method of research in the Forest Service.

From its cradle in Fort Valley, Forest Service research has come a long way. Whenever a forest scientist conducts a study, writes a paper, or implements a strategy to better manage forest resources, he or she continues the work Zon envisioned for the Forest Service a century ago. Zon himself, an eternal optimist, was confident that the “tree of research” he had planted would continue to flower no matter what administrative hardships researchers faced. “If [a] storm comes it will bend low to the ground,” he wrote, “but with the pliancy and vigor of youth it will soon straighten out again and shoot forward with the first fine day.”⁶² All across America, in Forest Service research stations from Maine to Alaska, researchers today are proving Zon correct. □

Jeremy Young is a doctoral student in history at Indiana University. His research focuses on the role of charismatic movements in creating social change during the American Progressive Era. He would like to thank Susan Olberding for her kind assistance with the research and preparation of this paper.

NOTES

1. Raphael Zon to Henry S. Graves, April 1913, Box 2, Raphael Zon Papers, Minnesota Historical Society, St. Paul, MN, quoted in Norman J. Schmaltz, “Raphael Zon: Forest Researcher,” *Journal of Forest History* 24:1 (January 1980): 28–29.
2. Samuel Trask Dana, “Experiment Stations on the National Forests,” *Proceedings of the Society of American Foresters* IV:I (1909): 23.
3. Franz Heske, *German Forestry* (New Haven, CT: Yale University Press, 1938), 208.
4. *Ibid.*, 209.
5. Gifford Pinchot, *Breaking New Ground* (New York: Harcourt, Brace, and Co., 1947; commemorative ed. Washington, DC: Island Press, 1998), 17.
6. Andrew Denny Rodgers III, *Bernhard Eduard Fernow: A Study of North American Forestry* (Princeton, NJ: Princeton University Press, 1951; Durham, NC: Forest History Society, 1991), xi.
7. Char Miller, *Ground Work: Conservation in American Culture* (Durham, NC: Forest History Society, 2007), 29–30. Born in 1851 in Prussia, Bernhard Fernow trained there in forestry and law before immigrating to the United States in 1876.
8. Rodgers, *Fernow*, 95, 165.
9. James G. Lewis, *The Forest Service and the Greatest Good: A Centennial History* (Durham, NC: Forest History Society, 2005), 17.
10. Rodgers, *Fernow*, 165.
11. Similar collaborative efforts would continue in later years but would largely be eclipsed in importance by the federal system of experiment stations. *Ibid.*, 164.
12. Schmaltz, “Forest Researcher,” 25; Zon to American Forestry Association, 1930, quoted in Earle H. Clapp, “Zon,” *American Forests* 62:12 (December 1956): 6.
13. Clapp, “Zon,” 6; Schmaltz, “Forest Researcher,” 25.
14. Quoted in Clapp, “Zon,” 6.
15. Miller, *Ground Work*, 37.
16. James G. Lewis, “Raphael Zon & Forestry’s First School of Hard Knocks,” *Journal of Forestry* 98 (November 2000): 14–15.
17. Quoted in *ibid.*, 15.
18. Zon to Bernhard Fernow, August 15, 1919, Bernhard E. Fernow Papers, Cornell University; quoted in Harold K. Steen, *The U.S. Forest*

- Service: A History* (Seattle: University of Washington Press, 1976), 46.
19. Zon would later help Pinchot prepare and write his memoirs.
 20. Quoted in Edward Richards, “Raphael Zon—The Man,” *Journal of Forestry* 24:8 (December 1926): 855. Pinchot, too, had some background with German forestry, having studied in Europe with Sir Dietrich Brandis, so he was perhaps especially receptive to Zon’s ideas. Like others in the Roosevelt administration, Pinchot had also been influenced by the sustainable-yield ideas of Irish conservationist Horace Plunkett. See Lewis, *Forest Service*, 28; and Daniel T. Rodgers, *Atlantic Crossings: Social Politics in a Progressive Age* (Cambridge, MA: The Belknap Press of Harvard University Press, 1998), 331–32.
 21. W. B. Greeley, “A Quarter Century’s Achievement,” *Journal of Forestry* 24:8 (December 1926): 847.
 22. Richards, “Raphael Zon—The Man,” 851.
 23. Raphael Zon, “Plan for the Development of Silvical Investigation in the Bureau of Forestry” (1904), 1–2, National Archives and Records Administration, College Park, MD (NARA-CP), RG 95, PI-18/Entry 115, Box 186.
 24. *Ibid.*, 3.
 25. Greeley, “A Quarter Century’s Achievement,” 847.
 26. Raphael Zon and Treadwell Cleveland, Jr., “The Concentration of Scientific Work in the Forest Service” (December 13, 1906), 1, NARA-CP, RG 95, PI-18/Entry 115, Box 189.
 27. Raphael Zon, “The Part of Public, Academic, and Private Organizations in the Promotion of Forest Research” (December 2, 1920), 8, NARA-CP, RG 95, PI-18/Entry 115, Box 186.
 28. Zon and Cleveland, “Scientific Work in the Forest Service,” 1.
 29. *Ibid.*, 2.
 30. William G. Robbins, *American Forestry: A History of National, State, and Private Cooperation* (Lincoln: University of Nebraska Press, 1985), 17; Harold T. Pinkett, *Gifford Pinchot: Private and Public Forester* (Urbana: University of Illinois Press, 1970), 92–93; Rodgers, *Fernow*, 410.
 31. Zon and Cleveland, “Scientific Work in the Forest Service,” 2.
 32. Raphael Zon, “Plan for Creating Forest Experiment Stations” (May 6, 1908), unnumbered prefatory page, NARA-CP, RG 95, PI-18/Entry 115, Box 189, 2–4.
 33. Pinchot, *Breaking New Ground*, 309.
 34. Zon, “Plan for Creating Forest Experiment Stations,” 14.
 35. *Ibid.*, 15.
 36. Local lumberman Timothy Riordan, a friend of Pinchot’s, had offered a nearby plot of land to the Bureau of Forestry in 1902. Zon’s assistant, Samuel Trask Dana, had canvassed the area in advance of Zon’s arrival, and Coconino National Forest Supervisor Frank C. W. Pooler suggested the exact site. See Susan Deaver Olberding, “Fort Valley: The Beginnings of Forest Research,” *Forest History Today* (Spring 2000): 9–10; T. A. Riordan to Pinchot, July 28, 1903; Northern Arizona University Cline Library, AL&T Collection, MS 47, Box 361, Letterbook 585; *Coconino Sun*, August 7, 1908, 5.
 37. Rodgers, *Fernow*, 412.
 38. Gustav Pearson, “The Oldest Forest Experiment Station” (Tucson: n.p., 1936, USFS Fort Valley Experimental Forest Station Archives, Flagstaff, AZ).
 39. Dana, “Experiment Stations on the National Forests,” 25–28; G. A. Pearson, “A Preliminary Plan for Experiments to Be Carried On by the Fort Valley Forest Experiment Station,” 1–9, NARA-CP, RG 95, PI-18/Entry 115, Research Compilation File, Box 190. The station also operated the nation’s first school for forest rangers from 1909 to 1910.
 40. “Inspection of Experiment Stations by Raphael Zon and S. T. Dana,” January 17, 1916, NARA-CP, RG 95, PI-18/Entry 115, Box 189.
 41. Olberding, “Fort Valley,” 15.
 42. Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890–1920* (Cambridge, MA: Harvard University Press, 1959), 2.

43. Ibid., 2–3.
44. Raphael Zon, “Our Goal,” speech delivered at University Club dinner, Washington, DC, March 2, 1917, 16, NARA-CP, RG 95, PI-18/Entry 115, Box 186.
45. Ibid., 6.
46. James T. Kloppenberg, *Uncertain Victory: Social Democracy and Progressivism in European and American Thought, 1870–1920* (New York: Oxford University Press, 1986), 384.
47. Kloppenberg, *Uncertain Victory*, 319–20.
48. Walter Lippmann, *Drift and Mastery: An Attempt to Diagnose the Current Unrest* (Mitchell Kennerley, 1914; rev. ed., Madison: University of Wisconsin Press, 1985), 151.
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54. Kloppenberg, *Uncertain Victory*, 386.
55. Ibid., 384–86.
56. Zon, “Our Goal,” 12.
57. Ibid., 1, 5.
58. Gifford Pinchot, *The Conservation Diaries of Gifford Pinchot*, ed. Harold K. Steen (Durham, NC: Forest History Society, 2001), 209.
59. Schmaltz, “Forest Researcher,” 29. Zon’s appointment did not completely mollify him. The appointment of Earle Clapp in 1915 as his superior in the newly created Branch of Research angered Zon.
60. Ibid., 30, 33–34.
61. Steen, *Forest Service*, 218–19.
62. Zon, “Our Goal,” 1–2.

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