

LIVING TOOLS: AN ENVIRONMENTAL HISTORY OF AFFORESTATION  
AND THE SHIFTING IMAGE OF TREES

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B.A., Washburn University, 2010

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF ARTS

Department of History  
College of Arts and Sciences

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

2013

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## Abstract

In the second half of the nineteenth century, the Timber Culture Act (1873) and the development of the field of scientific forestry shifted the social conception of trees from a cultural icon, into living technological tools. Beginning with the antebellum publications of George Perkins Marsh, who argued for the preservation and restoration of forests for the benefit of all, scientists, railroad developers, and plains settlers advocated for the cultural importance of trees as a living tool. Assured by railroad-boosters, the budding Forestry Bureau, and pro-tree legislators that rainfall would follow their planting efforts, waves of emigrants who relocated to the grasslands from the eastern forested areas planted millions of trees in an attempt to afforest the open prairies, creating traceable environmental and social changes over time. Environmental historian Elliott West asserts, “Only people have tried on a massive scale to move imagined environments out of their heads and to duplicate them in the world where others live,” and the grasslands of Kansas is one of these environments.<sup>1</sup>

This thesis argues that the scientific field of forestry developed a system of prairie tree planting (afforestation) aimed at altering the environment of the Great Plains with artificial forests and created a technological construction of the Kansas environment. The enactment of the Timber Culture Act was a watershed moment because it elevated the social conceptions of trees to that of a living tool and created the need for a national Forestry Bureau. Primary source documents reveal that the general perception held in the nineteenth century was that the natural environment and climate was malleable. The development of profit-centered tree farms furthered the idea that forests were like any other manageable crop. The changes over time in the forest cover of Kansas resulted in an altered ecology and the introduction of invasive species, but most importantly, it altered the cultural perception of how Kansas should look.

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<sup>1</sup> Elliott West, *Contested Plains: Indians Goldseekers, and the Rush to Colorado* (Lawrence: University Press of Kansas, 1998), xx.

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## **Acronyms List**

AES	Agricultural Experiment Station
ATSF	Atchison Topeka and Santa Fe Railroad
FRA	Forest Reserve Act
HA	Homestead Act
KPR	Kansas Pacific Railway
KSAC	Kansas State Agricultural College, currently named KSU
PSFP	Prairie States Forestry Project
TCA	Timber Culture Act
USDA	United States Department of Agriculture
USDF	United States Division of Forestry
USFS	United States Forestry Service
USGS	United States Geological Survey

## Acknowledgements

I began looking into this topic while studying at the Washburn University history department and need to first thank all of the professors who pushed me in the right direction and encouraged me to attend graduate school: Dr. Prasch, Dr. Wynn, Dr. Morse, Dr. Mactavish, Dr. Bearman, Dr. Wood, Dr. Goosen, and Tom Averill.

My graduate advisor and committee member, Dr. Bonnie Lynn-Sherow, enlightened me in ways I never thought possible and always helped me see the forest through the trees.

A big thank you to my entire graduate committee, Dr. Sherow, Dr. Wynn, Dr. Krysko, and Dr. Lynn-Sherow and to the entire K-State history department who helped me along the way.

I need to thank the countless Hale and Mabee librarians, faculty, archivists, and co-workers who helped me gather sources when I didn't know what to look for or where.

I could not have written this work without the wonderful and helpful staff at the Kansas State Historical Society and Archives in Topeka, KS., the Missouri History Museum Library and Research Center in St. Louis, MO., the Greenwood County Historical Society in Eureka, KS., the Nebraska State Historical Society and Nebraska University Love Library in Lincoln, NE., and the High Plains Museum in Goodland, KS.

Lastly, I need to thank my fellow undergraduate and graduate students who helped me along the way with ideas, sources, distractions, fun times, and of course beer: Katey Marshall, Elaine Appelhanz, Kim Trendel, Dr. David Vail, Daron Blake, Hannah Baker, Tim Gresham, D.J. Tiemens, Jeff Nelson, Joe Bailey, Troy Elkins, Mack Scott, Eric Dudley, Sara Swanzy, Jennifer Zoebelin, Krysti Carson Goering, Geoff Barbour, Walter Webster, Hannah Marsh, and Jennifer Churchill.



## **Dedication**

I dedicate this work to my wonderful parents and to my sister. Thank you for all the dog sitting while I was out looking for sources in far off places– your grand-dog loves you.

My family is my rock and history is my passion.

## Introduction – The Roots of Afforestation

On June 13, 1870, near the central– Kansas town of Wilson, Richard Smith Elliott hitched a plow to a pair of borrowed oxen and set out to break ground at the first Kansas Pacific Railroad (KPR) experimental farm. The oxen plodded forward at Elliott’s command and the plow splintered, destroyed by the dense virgin prairie. Later in his autobiography, Elliott remembered observing a bison that day and having an overwhelming feeling that “all of nature” was mocking him and his attempts to “improve” the Great Plains through planting trees and admitted that he was not initially prepared for farming out in the so-called “deserts” of Kansas. However, in spite of setbacks Elliott constructed a new plow, hired a team of powerful mules, and began subduing the prairie to remake it. The grasslands also served as a laboratory for climate altering experiments.<sup>1</sup>

On the surface, Elliot’s story will seem familiar to historians because tales of farming difficulties on the open prairies of Kansas are well known, but Elliott’s story is distinct in one key aspect. Elliott was preparing the soil so he could plant trees, not sustenance crops. As this thesis argues, tree planters, like Elliott, are an essential part of the environmental narrative of the American West because they used living organisms as tools of change. Euro-Americans viewed the open prairies as a harsh, foreign environment— so boosters encouraged settlers to consider the prairies as alterable environments, and to bring their eastern environment with them.<sup>2</sup> However, immigrants not only brought their seedlings, they brought their notions of trees as vitally important for resources, and trees became a cultural investment worth protecting.

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<sup>1</sup> Richard S. Elliott, *Notes Taken in Sixty Year* (St. Louis: R.P. Studley & Co., 1883), 305.

<sup>2</sup> Josiah Copley, *Kansas and the Country Beyond the Line of the Union Pacific Railway, Eastern Division* (Philadelphia: J.B. Lippencott & Co., 1867), 56.

There is continuity in the basic process of American settlement where settlers bring civilization into new environments, but when the geography and time period progressed west, so too did the role of trees in this process. Scholars have traditionally studied living organisms for their interaction with manufactured technologies, like the axe or mill, but trees, like manmade tools also interacted with their environment in ways that altered it.<sup>3</sup> For this study, trees represent a form of what historian Edmund Russell calls biotechnology or “organisms modified to supply goods or services to human beings. Biotechnologies may be produced by traditional techniques (such as methodical selection) or techniques (such as genetic engineering).”<sup>4</sup> Indeed, the landscape of the Great Plains is a composition of manmade spaces, culturally constructed by humans who shaped the land into their vision of what is natural and trees were some of the primary implements in this remaking process.

In the eighteenth and nineteenth centuries, humans assumed dominion over nature was possible because science, technology, and providence assured them it was.<sup>5</sup> This analysis offers a new interpretation on the divide between the natural world and technology. Because humans are constantly redefining their basic needs in life, the standard tool-set to achieve these goals also requires modification, which results in the adaptation of preexisting objects into new societal roles as tools.<sup>6</sup> Therefore, when a society who believed forests were an inhibitor of civilization entered a geographic area with very little trees, the axe lost its dominate role in their agricultural tool-set and was replaced by the tree. Forests and trees became the new symbol of civilization in

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<sup>3</sup> Nye emphasizes the elimination of forests with axes to create a cleared space was equated with the idea of progress and civilization. David E. Nye, *America as Second Creation: Technology and Narratives of New Beginnings* (Cambridge: MIT Press, 2003), 43-44.

<sup>4</sup> Edmund Russell, *Evolutionary History: Uniting History and Biology to Understand Life on Earth* (New York: Cambridge University Press, 2011), 132-136; 171.

<sup>5</sup> Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca: Cornell University Press, 1989), 7.

<sup>6</sup> David E. Nye, *Technology Matters: Questions to Live With* (Cambridge: MIT Press, 2006), 2-3.

the Plains, which shows that trees, like the axe, held an evolving definition. Not only did society redefine trees, but they also legislated their planting in 1873, when the federal government encouraged afforestation by enacting the Timber Culture Act (TCA).<sup>7</sup> Coupled with the creation of the Forestry Division within the Department of Agriculture to conduct research on planting techniques, trees become a legitimate multi-use tool for landscape changes, natural resources, and profit. Woven into the Plains narratives, trees helped settlers imagine an altered landscape, making the tree a technology, capable of expressing a larger system of meaning.

This analysis will trace the shifting social conceptions of trees, from an inhibitor of culture into a symbol of culture and will show how that conception of trees influenced the development of the scientific field of forestry in the United States. After the Civil War, railroad boosters and the state land grant college encouraged new citizens to plant trees and demonstrated their methods in artificial forests and instructional lectures. In addition, the timeline used within this thesis will show that the Timber Culture Act plays a fundamental role in the history of Great Plains settlement, the history of the U.S. Forest Service, and in the eventual development of shelterbelt technology and legislation.

Afforestation is an important strand in the environmental history of Kansas, because the ecological, economical, cognitive, and technical uses of trees change over time. Trees and their growing presence in Kansas influenced a shift in plains culture— people emphasized their growth rather than their removal. The shifting value of trees in the nineteenth century carries a contemporary importance in environmental studies about the changing Great Plains ecosystems and forest encroachment into grasslands today. Once tree planting gained federal support, trees

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<sup>7</sup> Originally labeled, Senate bill No. 680, The TCA was presented on February 20, 1872 by Senator Phineas W. Hitchcock of Nebraska, but the Timber Culture Act did not pass until March 1874. See *Congressional Globe*, 42<sup>nd</sup> Cong., 2d sess., 10 June 1872, pt. 5, 4464.

obtained a fundamental value in society as a living tool, supported by public policy changes.<sup>8</sup> The tree planters in the nineteenth century expressed the cultural contexts of the nation and the region by supporting the TCA and planting trees. The Timber Culture Act is a watershed moment because it changed the context of tree planting in America and enshrined trees as living technology, capable of changing a landscape like an axe or a plow.

Although environmental and agricultural historians have investigated the settlement era of Kansas—including political arguments over the territorial period and the free-state movement, the forced removal of Native Tribes and decline of the bison, and the agricultural and market revolutions—they have yet to examine the environmental, social, and technological roles trees play in the state’s history.<sup>9</sup> The narrative of human and nonhuman interaction in the grasslands over time is an environmental dialogue, one that includes natural and manufactured forces. The dialog that created the vast prairies includes soil quality, the application of fire, rainfall, grasses, trees, and human actions.

Afforestation is both an important theoretical lens and a vital term for this study because it highlights the distinction between planting trees in a prairie environment versus a non-prairie one. The Intergovernmental Panel on Climate Change (IPCC), an international climate change work-group, defines both afforestation and reforestation as the direct human-introduction or “conversion of non-forest to forest land through planting, seeding, and/or the human-induced

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<sup>8</sup> Hurst argues that public policy and laws represent basic values of an era. James Willard Hurst, *Law and the Conditions of Freedom in the Nineteenth-Century United States* (Madison: University of Wisconsin Press, 1956), 5–6.

<sup>9</sup> See Nicole Etcheson, *Bleeding Kansas: Contested Liberty in the Civil War Era* (Lawrence: University Press of Kansas, 2004); Paul Wallace Gates, *The Farmers Age: Agriculture 1815–1860* (New York: Holt, Rinehart and Winston Inc., 1960); James R. Shortridge, *Peopling the Plains: Who Settled Where in Frontier Kansas* (Lawrence: University Press of Kansas, 1995).

promotion of natural seed sources.”<sup>10</sup> How long the land has been a non-forest landscape is the only clear distinction between the usages of these two terms. The United States Environmental Protection Agency (EPA) defines afforestation as the “planting of new forests on lands that historically have not contained forests.”<sup>11</sup> However, for this historical study afforestation is best defined by Francis E. Cobb’s 1925 thesis, “A Study of Afforestation in the Great Plains Region” because it is the most exhaustive work on this subject. Cobb described afforestation as the act of planting trees in a savannah or grassland where only shrubs and marginal trees exist in valleys or near water sources.<sup>12</sup> Afforestation is a universal forestry term and is important when discussing the efforts of tree planters in plains states. It makes no difference if the planter’s goals were for climate amelioration, agricultural protective measures, or purely profit driven– the afforestation movement is continuous.

Afforestation emerged as an important force in the behavior of American only in the nineteenth century, as forest mythology from European traditions encouraged early Americans to eschew trees and forests for agricultural fields. Geographer Michael Williams pointed out that European culture traditionally viewed forests as “dark and horrible places where there were very real dangers from wild animals... The word ‘wilderness’ was almost synonymous with forest... According to the folklore and tradition of European peoples, the forests were the abode of the supernatural and the fantastic... [Forests] contained trolls, sprites, dwarfs, ogres, withes, werewolves, child-eating monsters, and demons of all descriptions... Early Christianity extolled

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<sup>10</sup> Intergovernmental Panel on Climate Change, “Maintaining or Increasing Forest Area: Afforestation/Reforestation,” Climate Change 2007: Working Group III: Mitigation of Climate Change, [http://www.ipcc.ch/publications\\_and\\_data/ar4/wg3/en/ch9s9-4-2-2.html](http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch9s9-4-2-2.html) (accessed March 13, 2013).

<sup>11</sup> Environmental Protection Agency, “Glossary of Climate Change Terms,” <http://www.epa.gov/climatechange/glossary.html#num1> (accessed March 13, 2013).

<sup>12</sup> Francis E. Cobb, “A Study of Afforestation in the Great Plains Region from its Early Settlement to the Present Time, A Thesis” (master’s thesis, Cornell University, 1925), 179.

the virtue of clearing forests.”<sup>13</sup> As a utilitarian view of forests developed in Mid-Atlantic States, it merged with these Christian ideals and a “civilized” space became one void of trees because it provided two sources of wealth— timber sales and agricultural endeavors.

As the U.S. land base shifted westward in the eighteenth and nineteenth centuries into what we now call the Midwestern states, traditional agriculture included two paramount tools— the plow and the axe. Historian David E. Nye asserts that humans narrate their place in the natural world in technological terms— tools enabled them to inhabit new places and reshape the land into familiar landscapes. A desert to Victorian-era Americans was not an arid environment per se, it was any expanse not yet converted into lush farmland. Nye asserts that technologies like the axe, the mill, canals, railroads, and irrigation works helped humans create conquered spaces out of wild places.<sup>14</sup>

Settlers in the eighteenth and early nineteenth centuries felt clearing forests, draining swamps, and damming rivers only enhanced the bounty of the earth and assisted mankind in “the biblical injunction to be fruitful and multiply.”<sup>15</sup> Once conquered, pioneers could “carve a civilization of independent farmers out of the wilderness” and narrate their own place in the natural world with providence to back them up.<sup>16</sup> Nye explains that Americans’ enthusiasm for technology and their insistence that they held domination over uncivilized environments help to validate the destruction of eastern forests, plowing the plains and irrigation attempts in arid regions of the American West.<sup>17</sup> Analyzing organic objects as technologies was not Nye’s objection, nor is it common in the study of tools and technology, but his model is extendable to

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<sup>13</sup> Michael Williams, *Americans and Their Forests: A Historical Geography* (New York: Cambridge University Press, 1989), 10.

<sup>14</sup> David E. Nye, *America as Second Creation: Technology and Narratives of New Beginnings* (Cambridge: MIT Press, 2003), 4.

<sup>15</sup> *Ibid.*, 205, 285.

<sup>16</sup> *Ibid.*, 6.

<sup>17</sup> *Ibid.*, 5.

biotechnologies like trees because like manufactured tools, trees are capable of manipulating an environment and entering national narratives, like the axe, the plow, and the mill.

When immigrants confronted the open prairies for the first time, they were quite perplexed by the landscape. In the east, one of the first steps in reconfiguring the land, or civilizing it for human use, was the wholesale removal of forests, but the Great Plains held very few forested areas. How would they civilize an area that did not require years of forest clearing? According to environmental historian Brian Drake, the Eastern-idealized landscape became a cultural paradox in the plains states and “Forests assumed the role of civilization’s agent rather than its inhibitor... [Therefore] planting trees, not felling them, became the key to making the grassland wilderness into a garden.”<sup>18</sup> The cultural perception of trees, as transformers of space elevated them into the agrarian tool-set alongside the plow and this evolving definition of trees, allows for a technological and environmental analysis of them. As the plow or the axe was to settlers in the east, trees became a tool of transformation in the prairies.<sup>19</sup> Trees allowed settlers to erase the differences between their old homelands and the new.

The open prairies of Great Plains owe their existence to the cultural tradition of Native Americans who annually burned the grasslands to maintain them. According to anthropologist Omer C. Stewart’s study of Indian influences on the environment, the prairies of Kansas were not in a virginal state when the settlement era began in the middle of the nineteenth century. Used as a horticultural tool to produce a desired ecosystem, fire was an effective landscape management practice, used to weed out undesired vegetation and promote good pastures for wild

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<sup>18</sup> Brian Allen Drake, “Waving a Bough of Challenge: Forestry on the Kansas Grasslands, 1868–1915” *Great Plains Quarterly* 23 (Winter 2003), 22.

<sup>19</sup> Nye, *America as Second Creation*, 5.



bison and large horse herds.<sup>20</sup> Stewart's research proves "that all extensive grasslands would be covered with woody vegetation were they not periodically burned over."<sup>21</sup> He emphasizes that Kansas has good soil and adequate precipitation, which allows for partial forest in open or upland areas, but only when they are protected from fire.<sup>22</sup> Because of the wholesale removal of Tribes who had manicured the plains for centuries and the influx of settlers with eastern ideals of an afforested landscape, the prairies of Kansas began to change.

Although early Kansas settlers planted trees partially because of cultural imperative, afforestation also followed several scientific theories of the era. The theory of afforestation to increase rainfall and improve the climate is rooted in one of the earliest American studies on trees written by George P. Marsh. *Man and Nature* emerged in 1864 and in it, Marsh praised trees for their ability to promote showers and equalize temperatures.<sup>23</sup> He argued that deforestation caused the soil to dry out resulting in unfavorable conditions which man could avoid.<sup>24</sup> Marsh intended the volume to serve as a warning to the damages industry had inflicted upon New England's forests and to expose the environmental destruction which was becoming a forestry industry standard. *Man and Nature* was the first study of the earth as a human habitat. He exposed the "interdependence of environmental and social relationships," and asserted that humankind was not separate from the natural world, but very much a part of it.<sup>25</sup>

*Man and Nature*, according to geographer Walter M. Kollmorgen, became the bible of tree planters and western rainmakers alike. Kollmorgen maintains that Marsh's book was utilized

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<sup>20</sup> Omer C. Stewart, *Forgotten Fires: Native Americans and the Transient Wilderness*, ed. Henry T. Lewis and M. Kat Anderson (Norman: University of Oklahoma Press, 2002), 114.

<sup>21</sup> *Ibid.*, 69.

<sup>22</sup> *Ibid.*, 154.

<sup>23</sup> His work was very popular and sold over one thousand copies within a few months. David Lowenthal, *George Perkins Marsh: Prophet of Conservation* (Seattle: University of Washington Press, 2000), 302.

<sup>24</sup> George P. Marsh, *Man and Nature; or Physical Geography as Modified by Human Action* (New York: Charles Scribner Co., 1864), 20.

<sup>25</sup> George Perkins Marsh Institute, "George Perkins Marsh: Renaissance Vermonter," Clark University. <http://www.clarku.edu/departments/marsh/about/> (accessed March 4, 2013).

to “make a frontal attack on the grasslands of the American West.”<sup>26</sup> *Man and Nature* changed how people culturally viewed forests and trees. “Whereas Marsh had emphasized the negative deleterious effects of forest clearing,” Kollmorgen writes that Marsh’s work “was scoured for anything that would emphasize the positive, beneficial effects, and his hints that reforestation might restore the land to its former fertility and productivity were seized on.”<sup>27</sup> Keep in mind, Marsh never asserted that afforesting a region would increase rainfall, but he was sure that forests received more rain annually than non-forested regions.<sup>28</sup> In fact, Marsh stated that virgin lands should remain unharmed by man for the benefit of all.<sup>29</sup>

Marsh’s 1874 edition, retitled *The Earth as Modified by Human Action*, “launched a radical reversal of American environmental attitudes,” according to biographer David Lowenthal.<sup>30</sup> Railroad construction had stripped eastern forests of trees and left vast wastelands devoid of biodiversity and some began calling for regulation after Marsh point out that man created these inhospitable surroundings. Marsh highlighted that the unwelcome changes in America’s environments were the result of humans’ lust for natural resources. Lowenthal insists that unlike most Transcendentalists who favored natural environments, Marsh favored improved forests over pristine woodlands or primeval forests.<sup>31</sup> Marsh argued throughout his work that humans were superior beings, ordained to rule over forest creatures. However, he also believed humankind should refrain from acting malicious in their domination over lesser species. Early forestry officials and promoters alike combined Marsh’s praise for a managed forests and the

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<sup>26</sup> Walter M. Kollmorgen, “The Woodsman’s Assaults on the Domain of the Cattleman,” *Annals of the Association of American Geographers* 59, no. 2 (June 1969), 219.

<sup>27</sup> Williams, *Americans and Their Forests*, 381.

<sup>28</sup> Marsh, *Man and Nature*, 196– 198.

<sup>29</sup> By virgin lands, I mean void of Euro-centered white culture. Marsh, *Man and Nature*, 27.

<sup>30</sup> Lowenthal, *George Perkins Marsh*, 303.

<sup>31</sup> Transcendentalists, like Ralph Waldo Emerson, and Henry David Thoreau, felt humans did not fully accept nature’s beauty and all that it had to offer. In order to discover what nature had to offer, they felt, you had to experience it completely in a natural state. Lowenthal, *George Perkins Marsh*, 299.

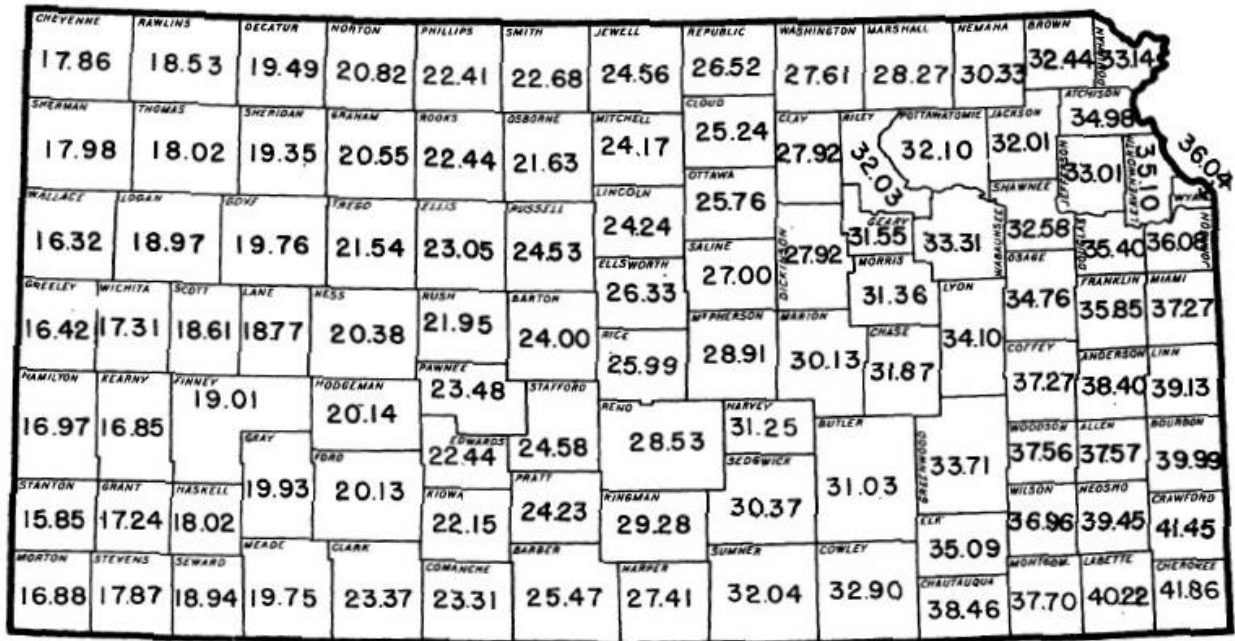
lack of timber cover on the plains to drive the tree-planting era of the 1870s and afforestation as a whole.

The historical evolution of trees from symbols of wilderness, to one of civilization, and finally their elevation into an envirotechnological tool all played out in the prairies of Kansas.<sup>32</sup> People planted trees on college campuses, on demonstrative farms, in artificial forests, in shelterbelts, around houses, and in the growing metropolises around the state. After the TCA, trees were not simply part of the natural world— they were living tools that could improve the landscape. Although the attempts to improve and create a predictable climate on a macro level did not succeed, a case study completed in 1975 found that 16% of trees planted under the TCA survived to reach the century mark.<sup>33</sup> While these trees did not change the climate and bring the rain, they did change the landscape into a product of envirotechnological construction.

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<sup>32</sup> “The “envirotech” approach challenges presumptions that technology’s influence on society, the economy, and plants and animals are predictable, deterministic, and unidirectional. Instead, envirotech scholars deny that technology and the environment are distinct and oppositional historical subjects— they seek to uncover reciprocal and interdependent relationships among the living and nonliving components of environmental and technological systems.” See Mark Finlay, “Far Beyond Tractors: Envirotech and the Intersections of Technology, Agriculture, and the Environment” *Technology and Culture* 51 (April 2010), 481.

<sup>33</sup> See McIntosh, “Use and Abuse of the Timber Culture Act”, 360–361. McIntosh investigates forty–nine Timber claims and only found living specimens of Cottonwood (*Populus balsamifer*) at three locations.



NORMAL ANNUAL PRECIPITATION OVER KANSAS  
 Computed from records covering the period 1898-1942.  
 (From monthly amounts.)

Figure 1. Precipitation Map of Kansas. Reprint from the Kansas State Board of Agriculture 67th Report, June, 1948.

One of the earliest environmental historians, James Malin, asserted that both ecology and history "may be defined as the study of organisms in all their relations, living together."<sup>34</sup> From east to west, Kansas' geographical contours rise over three thousand feet in elevation. Natural variations such as these create very different evaporation rates, temperatures, and wind velocities within the state, and produce three distinct and unequal vegetation zones. Malin described the eastern portions of the state forest as an oak-hickory-walnut combination that withers down to surround streambeds only as one heads west. By 97° west longitude, this combination of hardwoods almost entirely disappears. Malin noted the areas between 97° and 100° west longitude as visibly mixed, with vegetation that represent species of both tall and short-grasses

<sup>34</sup> Robert W. Johanssen, "James C. Malin: An Appreciation," *Kansas Historical Quarterly* 38, no. 4 (Winter, 1972): 457 to 466. Available online at <http://kshs.org/p/kansas-historical-quarterly-james-c-malin-an-appreciation/13229>.

along with trees. The 100<sup>th</sup> meridian is commonly called the dry-line and west of it only short grasses like the buffalo (*Buchloë dactyloides*) and the blue grama (*Bouteloua gracilis*) are predominant—very few trees grow there unassisted due to combined forces of fires and low rainfall. Newcomers with their Euro-Eastern-American culture were ill prepared for an environment that produced grass, not forests.<sup>35</sup>

Not only are there dramatic vegetation differences in eastern and western Kansas, but the climate is distinct as well. In the eastern third of the state, rainfall varies from 30–40 inches with the heaviest being in the southeastern corner. In central Kansas, the average amount of yearly rainfall varies from 20–25 inches and the western third receives a mere 12–20 inches of rain annually. Before the construction of major irrigation projects in the western High Plains, agriculture was largely governed by the seasonal amounts of rain, occurrence of droughts, and the rate of evaporation.<sup>36</sup> In years of strong winds and rain fall too low, agricultural efforts would fail completely.

Swinging weather patterns occur naturally in the Great Plains. The environmental pendulum swings not only between high and low rainfall but also among high and low temperatures.<sup>37</sup> These factors, according to Malin,

Operate differently upon each type of vegetation as well as upon particular species. As between trees and grass, trees may expand their coverage over a period favorable to their growth and then suffer a severe setback, or even destruction, by an extreme drought and heat or extreme cold; such weakened woody growth as may have survived may be finished off by disease or insect enemies. In addition, we know that destruction from fire caused by lightning took its toll.<sup>38</sup>

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<sup>35</sup> James C. Malin, *History and Ecology: Studies of the Grassland*, edited by Robert P. Swierenga (Lincoln: University Press of Nebraska, 1984), 6, 12.

<sup>36</sup> Snowden D. Flora, "The Climate of Kansas," *67<sup>th</sup> Report of the Kansas State Board of Agriculture* (Topeka: State Publishing House, 1948).

<sup>37</sup> Joseph B. Kincer, "The Climate of the Great Plains as a Factor in Their Utilization," *Annals of the Association of American Geographers*, 13 (June, 1923), 70.

<sup>38</sup> Malin, *History and Ecology*, 4.

The ecological picture of the western two-thirds of Kansas is not the same from year to year. The living assemblages in this region have adapted to the irregular climatological patterns. Trees existed in western Kansas, but they, like vegetables, fruits, nuts and berries, naturally occurred in small quantities due to the yearly occurrence of fires. Therefore, in years on low rainfall these plant types usually failed.<sup>39</sup>

At the time of Zebulon Pike's famous 1806 explorations to chart the internal portions of the Louisiana Purchase and secure American trading rights, he entered Kansas in a low year on the climactic pendulum. The bulk of his voyage took place alongside major Kansas rivers including the Kansas, Arkansas, Republican, and the Smoky Hill rivers, where riparian forest naturally occur in Kansas.<sup>40</sup> Jared Orsi, in his environmental case study of Pike's journey across the plains, asserted that when Pike ventured into the heavily burdened environment of the open plains where competition for natural resources was a day-to-day occurrence. Instead of securing the interior of the Great Plains for American trade networks, "he became ecologically dependent of the very people and organisms he was supposed to be incorporating."<sup>41</sup> Pike's journey verified that it was dangerous to enter the vast grasslands ecosystem ill prepared.

Misleading notions that Kansas was an arid wilderness and lacked civilization entered into popular geography and literature. First, Pike compared the Kansas prairie with the African sandy deserts in his official 1808 report and then in 1821, Major Stephen Long produced one of the most important maps of the Great Plains. Long's geographical and statistical map officially—

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<sup>39</sup> Malin, *History and Ecology*, 195.

<sup>40</sup> "Riparian zones can be identified by vegetation that reflects available soil moisture, soils that experience intermittent flooding, and the direct influence of a nearby water body." Kansas Forest Service. "Kansas Forests 2005," Resource Bulletin NRS-26 <http://www.kansasforests.org/documents/rural/annualreport/20012005%205%20YR%20Report.pdf> (accessed July 23, 2012).

<sup>41</sup> Jared Orsi, "Case Study: State Making and Unmaking (And Making it Back at All): Following Zebulon Pike Across the Plains in 1806," in *The Grasslands of the United States: An Environmental History*, Nature and Human Societies Series (Santa Barbara: ABC CLIO, Inc, 2007), 167.

but erroneously—labeled the southern Great Plains the “Great American Desert.”<sup>42</sup> Just before the Civil War, a particularly alarming report from an unnamed man in Lawrence, Kansas appeared in the *New York Times* on July 16, 1860:

It is now over ten months since anything like a rain has fallen. In the Winter we had no snow -- and thus far, this Summer, we have had no dews. It is a wonder that even the trees can live. No tame grass is alive anywhere -- and the prairie grass is dry enough to burn on all but the bottomlands. Not a pound of tame hay will be cut, and there is a general fear now that nothing will be produced to sustain our stock the coming Winter.... Our true condition should be known without disguise. Our all, as a people, was the income of this year's crop. We have no other resource but the soil.<sup>43</sup>

Based upon sensational newsprint accounts, Pike’s voyage report, and Major Long’s map, the eastern population’s public perception of Kansas was not a very good one.<sup>44</sup>

Proponents of the predominant view of the Great Plains as the Great American Desert advocated loudly throughout the Northeast, but a counter myth began to form in the agrarian districts of the United States. Urged on by railroad land promoters, the prairies were rumored to be a garden, awaiting the industry of enlightened people. Geographer John Allen investigates the “Garden-Desert Continuum” on which polar images of the Great Plains traveled and discovers the prevailing image of the area was completely dependent on the “mental set of those to whom the information was transmitted,” and not the availability of accurate climatic information.<sup>45</sup>

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<sup>42</sup> Jared Orsi, “Case Study: State Making and Unmaking,” 173; David Wester, “The Southern High Plains: A History of Vegetation, 1540 to Present” (Plenary Session address, Shrubland Dynamics—Fire and Water, Lubbock, TX, August 10–12, 2004), 31; Charles R. Kutzleb, “Rain Follows the Plow: The History of an Idea” (doctoral dissertation, University of Colorado, 1968); Jared Orsi, “Case Study: State Making and Unmaking,” 172–173; With dendrochronology (or the science of dating events with the comparative study of the annual growth rings in ancient timber), it is now a fact, that at the time of Pike’s journey a severe drought was occurring. Craig Miner, *West of Wichita: Settling the High Plains of Kansas, 1865–1890* (Lawrence: University Press of Kansas, 1986), 38.

<sup>43</sup> Correspondence, “FROM KANSAS: Continued Dry Weather Dismal Prospects of the Crops,” *New York Times*, July 16, 1860.

<sup>44</sup> Thaddeus Wyatt, another citizen of Kansas in 1860 described Kansas as a place of starvation because no food would grow. See his February 4, 1860 letter available online. Kansas State Historical Society, “Starvation in Kansas Territory,” <http://kshs.org/kansapedia/starvation-in-kansas-territory/15515> (accessed January 16, 2013).

<sup>45</sup> John L. Allen, “The Garden–Desert Continuum Competing Views Of The Great Plains In The Nineteenth Century,” *Great Plains Quarterly* 5 (Fall 1985), 214.

Allen argues that neither the desert view or the garden view existed wholly— the Great Plains was stuck in a constant swing pattern, much like the climate, and the prevailing view shifted many times from 1800–1895 depending on which way the pendulum swung.<sup>46</sup>

In November 1866 and June 1867, two groups of excursionists rode on the unfinished Kansas Pacific Railroad line, known as the Union Pacific Railway- Eastern Division at the time. Both groups marveled at being able to reach the center of the nation by rail service from the East Coast with such ease. The parties consisted of newspaper reporters and dignitaries who traveled from Philadelphia, to Fort Riley by rail in 1866, and the later party to Salina by rail in 1867. Charles Godfrey Leland of Philadelphia, published a report covering the first trek, and Josiah Copley of the *Pittsburg Gazette* reported on the second. These reports became the backbone of railroad boosterism.

Both Leland and Copley display an enthusiasm for the future of Kansas and faith in the railroad technology and human ability to transform the landscape into valuable land. Leland said the “Prairies were made by Providence for railroads,” because of their flat features and deep soils.<sup>47</sup> He notes the general lack of timber supplies in the state, but reassures immigrants that tree vegetation advances easily over the plains and was sure trees increased the rain and improved the climate.<sup>48</sup> Copley describes the landscape as desert wasteland, merely awaiting the hand of enlightened industrious persons willing to “subdue and occupy such a county.”<sup>49</sup> He, like Leland, wanted to assure settlers that the general lack of trees was not a permanent situation because when civilization inhibited wild fires young trees easily spring up spontaneously.

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<sup>46</sup> Ibid.

<sup>47</sup> Charles Godfrey Leland, *The Union Pacific Railway, Eastern Division...* (Philadelphia: Ringwalt & Brown Printers, 1867), 13-14.

<sup>48</sup> Ibid., 47.

<sup>49</sup> Copley, *Kansas and the Country Beyond*, 20, 7.



Copley encouraged new residents to “plant trees quickly and plenty of them,” because productive farms needed trees.<sup>50</sup>

When they reached Fort Riley, Leland’s group stepped from the comfort of the rail cars and into wagons, declaring it the last vestige civilization in the state.<sup>51</sup> From within the “wilderness” Leland described the tribes he encountered as savage Indians who cared not for a settled life or education.<sup>52</sup> Along the planned route, Eastern-stylized towns had begun to spring up, displaying signs of vigorous enterprise and a touch of sophistication furthering the marginalization of Native Americans who were not welcomed to stay. Leland described the railway as a wondrous band of social advancement, which connected the wilds of Kansas, to the rest of the civilized world.<sup>53</sup> Copley took a more direct tone, insisting that the railroad was “the great agent and pioneer of civilization,” that would usher in a new age of refinement and social development.<sup>54</sup>

Railroads produced propaganda based on Leland and Copley’s opinions throughout the 1870s— all of which was firmly on the Garden side of the image pendulum. Allen asserted the swinging patterns influenced the United States government to create land policies “predicated on the notion that the plains were a Garden or, at least, could be made a Garden by plowing the grasses under, planting trees, or irrigating drier soils.”<sup>55</sup> Geographer Karen De Bres offers a similar description of propagandists in this period. She claims the alteration of the Desert image by promoters shifted in three steps, not wholly, as Allen contended. The first promoters were outsiders who had spent very little time in the plains and wanted to attract settlers with

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<sup>50</sup> Ibid., 56.

<sup>51</sup> Leland, *The Union Pacific Railway*, 29.

<sup>52</sup> Ibid., 27, 51-52.

<sup>53</sup> Ibid., 30.

<sup>54</sup> Copley, *Kansas and the Country Beyond*, 84.

<sup>55</sup> Allen, “The Garden–Desert Continuum,” 214.

encouraging words of hope. Next came paid employees of the railways aimed boosterism directly at the public perception and embellished a great deal of what they wrote, and only much later did accurate descriptions of the climate began to emerge.<sup>56</sup> Copley and Leland belong to the first class of promoters and Elliott is an example of the second wave.

From 1854 to 1861, thousands of immigrants flooded into the territory.<sup>57</sup> After the Homestead Act, the Morrill Land Grant Act, and the Pacific Railroads Act the forces of settlement shifted dramatically. The opportunity to claim 160 acres under the Homestead Act enticed a new class of agrarian settlers into the state with their eyes fixed upon the land. The Morrill Act provided free land to the states, which they could then sell, and create Land-Grant Universities from the proceeds. Their goal “was to improve and teach agriculture and mechanical arts... The great objective was a liberal and practical education of the people.”<sup>58</sup> The Railroad Act brought rail transportation, communication lines, and a new class of corporate property owners into Kansas. While the first act offered opportunity to individuals, the latter two acts removed millions of acres of land that would have otherwise been available to homesteaders, and not without controversy. The railroads specifically have come under historical scrutiny for their corruption.<sup>59</sup> Despite the fraud surrounding the railroads’ pursuit of profits, they became a pivotal instrumental force, like the Land-Grant Universities, in promoting the colonization of Kansas and afforestation.

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<sup>56</sup> Karen De Bres, “Come to the Champagne Air: Changing Promotional Images of the Kansas Climate, 1854–1900,” *Great Plains Quarterly* 23 (Spring 2003), 117.

<sup>57</sup> James Sherow, *The Grasslands of the United States: An Environmental History*, Nature and Human Societies (Santa Barbara: ABC–CLIO Inc., 2007), 76.

<sup>58</sup> Senate Committee on Agriculture and Forestry, *United States Senate and Landmark Agricultural Legislation, 1825–1970*, 91<sup>st</sup> Cong., 2d sess., 1970, S. Doc. 91–107, 15.

<sup>59</sup> See the most recent manuscript on the corruption of the railroad companies for further information. Richard White, *Railroaded: The Transcontinentals and the Making of Modern America* (New York: W.W. Norton, 2011).

Eager to attract settlers, the state of Kansas and the railroad promoters set out to change public opinion of the physical landscape— their goal was to turn the “desert” notion into that of a garden awaiting discovery.<sup>60</sup> The western two-thirds of the state were essentially void of not only trees but also settlements, yet this is where the majority of the public lands remained for homesteaders. Granted over eight million acres of Kansas lands, the railroad companies began marketing their lands to emigrants fervently.<sup>61</sup> Attracting new immigrants into Kansas “hinged on overcoming the many reports of adverse conditions that filtered out from the state. Promotional materials, which portrayed the Kansas climate, resources, and landscape in optimistic tones, were a common medium used to smooth the rough edges of the physical environment.”<sup>62</sup> De Bres affectionately described the men in command of this image change as “climatic spin doctors,” paid employees who aimed their writings at changing public opinions that the area was a desert.<sup>63</sup>

To alter the view of Kansas, railroad promoters proclaimed theories of increasing rainfall and other climatological fabrications and assured new residents, improvement was possible. “Rain Follows the Plow” was the first of these theories and originated in Nebraska sometime after 1870 in response to the Great American Desert image retained from Pike’s journey. Professor Samuel Aughey, a biologist, first hinted at the theory in 1873. He noted, “As civilization extends westward the fall of rain increases from year to year” in his lecture presented

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<sup>60</sup> Kansas State Historical Society, “Online Exhibits - Forces of Nature, Part 3,” <http://kshs.org/p/online-exhibits-forces-of-nature-part-3/16690> (accessed April 13, 2013).

<sup>61</sup> Paul Wallace Gates, *Fifty Million Acres: Conflicts Over Kansas Land Policy, 1854–1890* (Norman: University of Oklahoma Press, 1997), 251–253.

<sup>62</sup> De Bres, “Come to the Champagne Air,” 111–112.

<sup>63</sup> *Ibid.*, 120.

to the Nebraska state representatives.<sup>64</sup> Solidified into an actual theory in 1881, by a long-term friend of Aughey, Charles Dana Wilber, “Rain Follows the Plow” became a culturally accepted idea. Wilber asserted that the short dry buffalo grasses of western lands were easily replaceable with agricultural endeavors and the power of the plow.<sup>65</sup> Aughey and Wilber fervently believed the power of the plow could release the hidden moisture under the ground through the labor of “God’s people.” Aughey and Wilber felt the only way for “civilization” to champion over savagery was to convert the entire Great Plains into a bountiful garden.<sup>66</sup> The “Rain Follows the Plow” theory encouraged emigrants to dismiss the environment as something insignificant and easily overcome with the technology of the steel plow.

“Rain Follows the Plow” was not the lone climate altering theory utilized in the marketing of Kansas lands. Historian Kevin Sweeney explores four of the most popular climatological theories utilized in amending the cultural view of the plains in the nineteenth century and finds they were widely supported as fact. He states Euro-Americans, led by their excessive faith in technology, concocted various theories through the years in hope of transforming the dry areas of the nation into virtual gardens. The top four ideas are “‘Rain Follows the Plow,’ rainfall through afforestation, the concussion theory, and chemical [rain-making] formulas.”<sup>67</sup> These four theories encouraged white settlers to be optimistic in their endeavors despite setbacks and to have faith their efforts would succeed— resulting in a “next-

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<sup>64</sup> Samuel Aughey, “The Geology of Nebraska: A Lecture Delivered in the Representative Hall at Lincoln,” January 20, 1873 (Lincoln, 1873), 14, quoted in David M. Emmons, *Garden in the Grassland: Boomer Literature of the Central Plains* (Lincoln: University of Nebraska Press, 1971), 135.

<sup>65</sup> Charles D. Wilber, *The Great Valleys and Prairies of Nebraska and the Northwest* (Omaha: Daily Republican Printing, 1881), 67–68.

<sup>66</sup> Emmons, *Garden in the Grassland*, 139–141.

<sup>67</sup> The concussion theory involved shooting cannon charges into the atmosphere to “charge” the clouds with needed power to release the rain particles. First asserted by Napoleon, he believed that after a great battle, it always seemed to rain and he felt cannons were the key component in this phenomenon. Kevin Sweeney, “The Desiccated Plain: Comanche and Non-Indian Settler Responses to Drought in the Southern Plains, 1854–1897,” *Heritage of the Great Plains* 37, no.1 (2004), 37.

year” mentality where farmers would look towards next year in the face of failed agricultural endeavors repeatedly until their debt became unmanageable. Each of the four, rainmaking theories had its own specific tool set, but the idea of rainfall through afforestation had the only traceable history in the form of a living record and lasted for over thirty years. Land promoters heralded the Great Plains as “garden” simply awaiting human intervention and it worked.

In Chapter 1, the research will show how railroad demonstration farms and experiments at the Kansas State Agricultural College encouraged and demonstrated how new citizens of the state could reshape the landscape and narrate their own place in the world. In Chapter 2 the evidence will show how early afforestation supporter’s facilitated legislations, which fostered the first scientific studies on the ecology of the Great Plains and it will trace the Division of Forestry’s distinct policies and methods for prairie planting. Chapter 3 explores the application of developed forestry methods in an artificial forest geared at providing natural resources, which transformed the landscape but did not achieve its primary goal of natural resource production.

This study contributes to the overall discussion of forestry matters in the United States and highlights the significance of the TCA in that dialogue. It does not aim to change the narrative on the functionality of the act, but nevertheless, it illustrates a clear series of interconnected events following its passage that resulted in an altered national dialogue that centered on afforesting the Great Plains. The panacea era of tree-planting in the 1870s inspired later tree planting legislation like the Hatch Act (1887), the Forest Reserves Act (1891), the Organic Act (1897) and the Clarke–McNary Act (1924), but this narrative begins with the efforts of Richard Smith Elliott, alone in the prairies with a broken plow.

## Chapter 1 - Early Afforestation Experimentation: 1861–1873

The process of modifying the popular “desert” environmental image of Kansas to that of a place that was a virtual garden awaiting agricultural advancement took place between 1861 and 1873. The goal of attracting agrarian settlement involved many advocates, participants, and programs through the years. The players involved are as diverse as the state itself and included both human and nonhuman environmental forces. The human advocates were Richard Smith Elliott, Ferdinand V. Hayden, and Kansas State Agricultural College professor and nursery superintendent Rev. Elbridge Gale. The nonhuman advocates included heavy rain totals, virgin sod, and lush riparian forests. These three factors benefited Kansas’ image and made newcomers into the state confident in its capabilities to grow domestic grasses, grains, and trees in the future.

Attracting permanent residents into Kansas and the Great Plains was a daunting task. Historian James Sherow pointed out in his study of the complex Great Plains Geodialectic, “in order to survive, humans and other living things must adapt to constant environmental flux. Nature, however, is uninterested in human survival.”<sup>1</sup> The grassland geodialectic in Kansas is ever changing— species adapted to these fluctuations will survive the ebb and flow of rains. Humans are a part of the environmental narrative and interact with natural systems like every other species. An early Hays City resident, Martin Allen, noted to his local newspaper that if the prairie could grow such an abundance of naturally occurring plants and trees, surely it could also produce wheat and corn.<sup>2</sup> From 1869 to 1873, the population of Kansas began to swell and settlers were optimistic. The high rainfall encouraged mistaken ideas of climate amelioration

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<sup>1</sup> James E. Sherow, “Workings of the Geodialectic: High Plains Indians and Their Horses in the Region of the Arkansas River Valley, 1800–1870” *Environmental History Review* 16 (Summer 1992), 64.

<sup>2</sup> Miner, *West of Wichita*, 41.

through human intervention. With the entrance of Euro–Americans into the Great Plains region who planted trees, it quickly became one of the worlds most altered ecosystems.

The total forest cover in the state prior to settlement was estimated to be 4.5 million acres– by 1873, the state contained a still shrinking 2.5 million acres.<sup>3</sup> Environmental historian Elliott West examined human influences upon the Great Plains prior to statehood. He investigated the conflicting land practices of humans in the early nineteenth century including wagon trains just passing through, early white settlers and migrating Indian tribes. Along the popular travel routes, both grasses and timber supplies were under extreme pressure by the mid–1850s. Two major droughts hit the state in 1855 and in the early 1860s, which compounded heavy trail use pressures and resulted in major environmental destruction. Pockets of forested areas had disappeared and the riparian reserves along streams became dramatically taxed.<sup>4</sup> In the 1860s, Kansas looked like a treeless “desert” to immigrants due to the high use of resources in prior years– it was neither a virgin prairie nor a desert.

West of the 98<sup>th</sup> meridian in Kansas and Nebraska only six or seven varieties of trees naturally occurred prior to the settlement era. Major Steven H. Long noted in his exploration journals that he saw only cottonwood (*Populus deltoids*), willow (*Salix babylonica*), hackberry (*Celtis occidentalis*), box elder (*Acer negundo*), oak (no specific variety is mentioned), elm (*Ulmus Americana*), and walnut trees (*Juglans nigra*) past the 99<sup>th</sup> meridian.<sup>5</sup> In 1870 Richard Smith Elliott noted only a few walnut (*Juglans nigra*), elm, ash (*Fraxinus americana*), cottonwood, box elder, hackberry (*Celtis occidentalis*), red cedar (*Juniperus virginiana*), wild

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<sup>3</sup> For pre–settlement numbers see, Kansas Forest Service, “Kansas Forest Facts, 2008,” <http://www.kansasforests.org/rural/facts.shtml> (accessed July 24, 2012). For the 1873 numbers see, Richard Smith Elliott, “Forest Tree in Kansas” KSHS (published lecture, Farmers’ Institute, Manhattan, KS, January 21, 1873), 1.

<sup>4</sup> Elliott West, *Contested Plains: Indians Goldseekers, and the Rush to Colorado* (Lawrence: University Press of Kansas, 1998), 89–93, 230.

<sup>5</sup> Cobb, “A Study of Afforestation in the Great Plains Region”, 35–36.

plum (*Prunus Americana*), locust (*Robinia pseudoacacia*), and willow trees were growing past the dry line. According to Elliott, almost all of these were located in valleys or near the scarce water sources where they were sheltered regularly from fires.<sup>6</sup>

The grasses of western Kansas were well adapted to the environment and most varieties were capable of surviving droughts, fires, and grazing species.<sup>7</sup> Their ability to survive is due to their growth-points being located below the soil surface. Plains specialist Geoff Cunfer revealed that seeds rarely survive the grazer's snare and "in the western Great Plains, the ancient short-grass buffalo range, heavy grazing has the least impact on composition of plant species because the region has the longest history of intense grazing by native bison... [With] the removal of grazing, to which the ecosystem has been long adapted, initiated primary succession—the land begins to move toward a mixed-grass prairie, a process that involves the addition of a variety of new species."<sup>8</sup> The disappearance of buffalo grass as noted by Charles Dana Wilber and Richard Smith Elliott in the 1870s became their evidence of climate amelioration through human intervention, but in truth was merely a side effect of bison elimination and prairie fire suppression.

Prior to the elimination of the bison, Ferdinand V. Hayden traveled along the Kansas Pacific Railroad route in 1867. He noted that near Ft. Hays, there were no trees in sight but distinguished the "short nutritious grasses which... cover the surface like a mat" that attracted

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<sup>6</sup> Richard Smith Elliott, *Industrial Resources of Western Kansas and Eastern Colorado* (St. Louis: Leveion & Blythe Printers, 1871), 23–24.

<sup>7</sup> James C. Malin, *The Grasslands of North America: Prolegomena to its History* (Gloucester: Peter Smith, 1967), 123.

<sup>8</sup> Geoff Cunfer, *On the Great Plains: Agriculture and Environment* (College Station: Texas A&M University Press, 2005), 40–42.



buffalo every summer.<sup>9</sup> Hayden went on to quote Mr. Meek of the Academy of Natural Sciences as having described Kansas' climate as mild and gentle with rich soils holding very few timber reserves. Hayden felt the lack of timber was "not be regarded as presenting any serious obstacle to the settlement of the most extensive prairie districts," the so-called "deserts" of Kansas, were in his mind, capable of bearing fruit.<sup>10</sup>

Hayden, a well-respected man in the field of science, asserted humankind could easily plant new forests and mimic the ones found in the Great Plains during the Tertiary period.

Hayden's reports echoed Marsh's *Man and Nature*. In 1867 he said,

We are daily obtaining more and more evidence that these [Tertiary] forests may be restored again to a certain extent... It is believed... that the planting of ten or fifteen acres of forest-trees on each quarter-section will have the most important effect on the climate, equalizing and increasing the moisture and adding greatly to the fertility of the soil. The settlement of this country and the increase of timber have already changed for the better... so that within the last twelve or fourteen years the rain has gradually increased in quantity... I am confident that this change will continue to extend across the dry belt... as the settlements extend and the forest trees are planted in proper quantities... I propose to show that these ideas are not purely theoretical, and that the influence of trees on climate and humidity has been investigated by some of the ablest scientific men in this country and Europe... But all I wish is to show the possibility of the power of man to restore to these now treeless and almost rainless prairies.<sup>11</sup>

Historian Henry Nash Smith asserted that Hayden's theory was plausible and could "be considered an original intellectual construct. Hayden had rationalized and had given pseudo-scientific status to what had originally been but a vague poetic expression of the massive

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<sup>9</sup> General Land Office, *Final Report of the United States Geological Survey of Nebraska and Portions of the Adjacent Territories* (March 1871), by Ferdinand V. Hayden, 42<sup>nd</sup> Cong., 1<sup>st</sup> sess., House Executive Document 19 (Washington, DC, 1872), 67.

<sup>10</sup> Hayden, *Final Report of the United States Geological Survey of Nebraska*, 68–69.

<sup>11</sup> Ferdinand V. Hayden, *First, Second, and Third Annual Reports of the United States Geological Survey of the Territories for the years 1867, 1868, and 1869* (Washington DC: Government Printing Office, 1873), 14–15.

optimism of the Westward Movement.”<sup>12</sup> Ferdinand Hayden gave scientific credence to the theory that afforesting the plains could increase rainfall and improve the climate.

The completion of the western railways altered the dynamic ecological equilibrium of the bison and western short grasses forever. The giant “cows” described by Coronado and his men were thought to be more numerous than the fish in the sea, but had virtuously disappeared by the 1870s.<sup>13</sup> Although the plains were capable of supporting millions of bison and horses for centuries, the Great Plains became the home of small tree lined agrarian operations, not large cattle ranches. Historian Walter M. Kollmorgen asserts, “Cattlemen were convinced that grazing was the best and only practical form of land use,” but eastern woodsmen and their propaganda supported trees over cows.<sup>14</sup> Kollmorgen claims the most important lesson gained from the agricultural settlement of the Great Plains is that the myriad land distribution policies geared towards supporting small farmers did not cultivate success, but they did create a class of citizens dependent on the railways.

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<sup>12</sup> Henry Nash Smith, “Rain Follows the Plow: The Notion of Increased Rainfall for the Great Plains, 1844–1880,” *Huntington Library Quarterly*, 10, No. 2 (February 1947), 179.

<sup>13</sup> Tony Horwitz, *A Voyage Long and Strange: Rediscovering the New World* (New York: H. Holt & Co., 2008), 180.

<sup>14</sup> Kollmorgen, “The Woodsman’s Assaults,” 239.

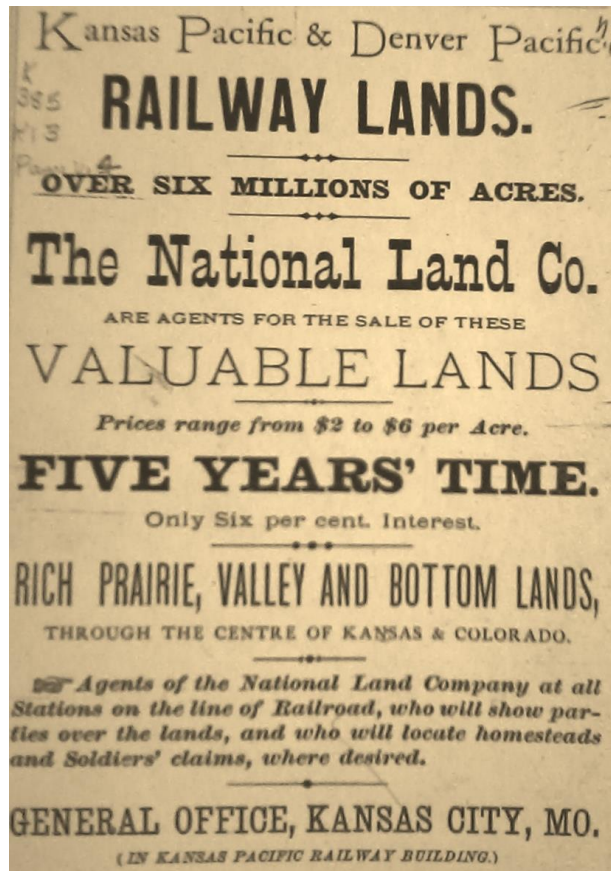


Figure 2. Kansas Pacific Railway pamphlet, circa 1867.

The largest economic force in the settlement era of Kansas (1861–1873) was the Kansas Pacific Railroad and their industrial agent Richard Smith Elliott. The railway offered free rail passes to potential land buyers and used the interaction to assure passengers that they were the best outlet for marketable agricultural products. The land holdings of the railway totaled over six million acres and land sales quickly became vitally important to the future of the railway. The construction costs were lofty and for the sake of profit margins, Kansas needed a facelift in the “public-relations” department. Free pamphlets placed in the majority of passenger cars provided glowing information on the climate, value and future productivity estimates of the railway

lands.<sup>15</sup> The KPR proclaimed in an 1867 flyer that they held “VALUABLE LANDS: prices range from \$2 to \$6 per acre, FIVE YEARS’ TIME only six per cent interest (see figure 2). RICH PRAIRE, VALLEY AND BOTTOM LANDS, through the center of Kansas and Colorado.”<sup>16</sup> The advertisement highlighted land office locations, where stations were located and how far each stop was from the Kansas/Missouri state line.

The KPR was a decisive force in attracting emigrants into Kansas. When Richard Smith Elliott reported in 1870 that many of the six million acres held by the Kansas Pacific Railroad were underrated in economic value and that the soil held great possibilities if utilized properly, he talked himself into a job.<sup>17</sup> According to historian David M. Emmons, Elliott’s scheme to combat the desert theory with his tree theory would be his chance to confirm man’s destiny and “dominion over nature.”<sup>18</sup> After becoming an Industrial Agent, Elliott entered Kansas and began his research on climate amelioration through afforestation.

Born in 1817, Richard Smith Elliott grew up in the Juniata River valley of Pennsylvania. The quiet basin was his playground. He had many adventures in the surrounding mountains fishing, climbing, and reading every book he could get his hands on. He developed a sense of appreciation for trees and natural settings at a very young age. When Elliott was nine years old he came in contact with his first civil engineer on a canal building project near his family’s farm. The canal, opposed at first by the residents of Lewistown, brought financial returns that helped their community grow. The canal connected the valley to larger markets and brought positive financial returns. The profession of civil engineering and the idea of harnessing natural forces for

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<sup>15</sup> David M. Emmons, “Richard Smith Elliott, Kansas Promoter” *Kansas Historical Quarterly* vol. 36, no 4 (Winter 1970): 390–401.

<sup>16</sup> Kansas Pacific Railway pamphlet, *Kansas Pacific & Denver Pacific Railway Lands* (Lawrence, KS 1867), Kansas State Historical Society, Topeka, Kansas. (hereafter cited as KSHS).

<sup>17</sup> Elliott, *Notes*, 300.

<sup>18</sup> Emmons, “Richard Smith Elliott,” 392.

human needs intrigued Elliott. The human manipulation of his childhood landscape for industrial progress would have a lifelong influence on Elliott's life.<sup>19</sup>

Educated formally until the age of thirteen, Elliott worked happily on the family farm until he was sixteen and received a copy of Benjamin Franklin's autobiography. This book encouraged him to yearn for more out of life and become a self-made man. It was at this point he felt "the fever of ambition began to pulsate," inside him and he proclaimed, "I must be a printer to achieve distinction!"<sup>20</sup> With the help of his father (the former owner of the *Lewistown Gazette*), Elliott became the proud owner of his very own newspaper and editor at large by the young age of eighteen. His operation was a small weekly edition unlike Horace Greeley's *New York Tribune* and other daily newspapers that appeared in larger metropolitan areas. Late in 1836, a competing publication entered Lewistown, resulting in a major loss of patrons for Elliott's one-man operation. He asserted later in his autobiography that he was bored with journalism at this point in his life and shutting down his "archaic" printing machine that could not compete seemed like the best thing to do. He ventured out of Pennsylvania for the first time via a large riverboat and landed in Louisville Kentucky. Having no other employment prospects in his new city, he turned to his printing and writing skills again and quickly acquired a printer's assistant position. Elliott spent his weekends happily wandering around the outskirts of the town "enjoy[ing] the unwritten music of Nature."<sup>21</sup>

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<sup>19</sup> Elliott, *Notes*, 2, 14–17, 41.

<sup>20</sup> Elliott, *Notes*, 56–58.

<sup>21</sup> Elliott, *Notes*, 71, 81.

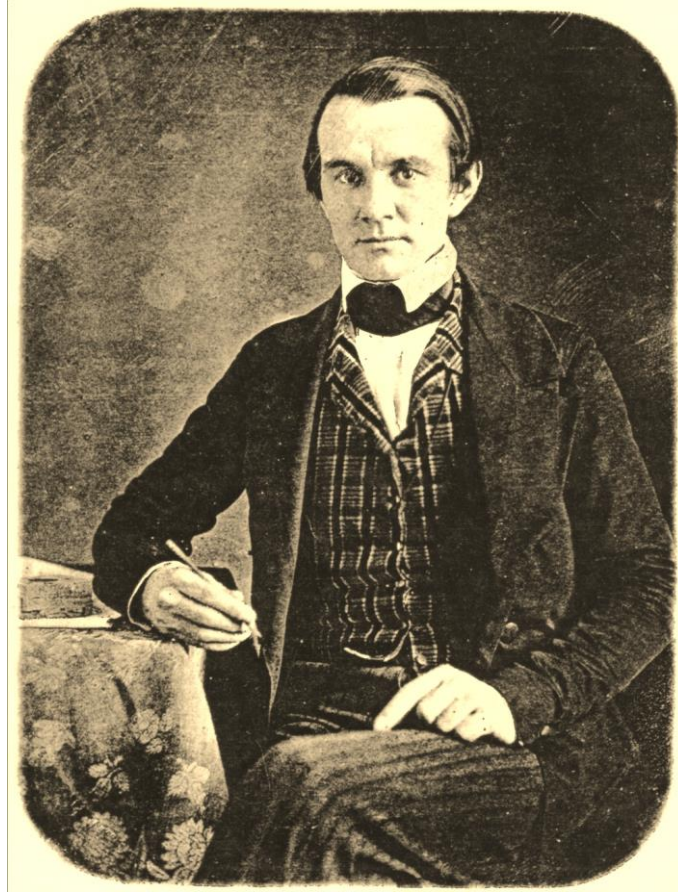


Figure 3. Richard Smith Elliott, circa 1840s. Courtesy of Phillip Elliott.

While in Louisville, Elliott experienced his first itch to move to the American West. He saw many tempting steamboats in the harbor broadcasting “*Heading for St. Louis,*” the “*Future Great City of the West*” and he sat dreaming of the adventures he could have in Missouri. Alas, he was penniless and decided to head home to Pennsylvania.<sup>22</sup> He dabbled in agriculture, newspaper editing once more and then became an attorney at law, but no profession suited his ambitions or desires to reach the West. While in Harrisburg, Elliott worked for the politically charged Harrisburg *Intelligencer*. The *Intelligencer*, unlike other eastern presses, boldly lobbied for President John Tyler despite Tyler’s differences with the Whig party. This “against the grain”

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<sup>22</sup> Mark L. Gardner and Marc Simmons, eds., *The Mexican War Correspondence of Richard Smith Elliott* (Norman: University of Oklahoma Press, 1997), 4–6.

trajectory resulted in the repeal of the newspaper's state printing contract by the upset Whig officials promptly after the election.

The *Intelligencer* folded under the Whig political pressures and Elliott was again penniless and unemployed. His Tyler campaign affiliations came in handy in 1843 and he secured a government position while visiting in Washington. Elliott's appointment with the Indian Agency at the Pottawatomie, Ottawa, and Chippewa Nation's federal reservation in the Iowa Territory afforded him the first opportunity to move west. The twenty-six year old Richard Smith Elliott landed in the energetic city of St. Louis that year and his wife, Elizabeth Dowing Elliott, set up their household in St. Louis.<sup>23</sup> He enjoyed traveling back and forth from Council Bluffs to St. Louis and back on various trains, boats, and barges— Elliott loved to travel.

Elliott remained with the Indian Agency through the spring of 1845 despite his growing dissatisfaction with the treatment of the tribes.<sup>24</sup> Back in St. Louis and unemployed, he again turned towards the law for employment. A lack of paying customers drove him to join the Laclede Mounted Rangers and he headed off to the War with Mexico. First Lieutenant Richard Smith Elliott saw Kansas for the first time in 1846 on the Rangers expedition from Fort Leavenworth to Bent's Fort in Colorado. The Rangers traveled on the well-beaten Santa Fe Trail and Elliott in his *Notes* described the trip not as a march towards war, but “more like a pleasure jaunt.”<sup>25</sup> He recalls the numerous bison and his joy in chasing one down on his horse. Because of his journalistic past, Elliott was in charge of documenting the entire trip. Elliott later wrote in his autobiography that he detailed all major events, battles, and even the “strange” customs of Spanish speaking people during his service, but alas the journal was lost and only his later

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<sup>23</sup> Gardner, *The Mexican War Correspondence*, 4–6.

<sup>24</sup> “He wrote in his autobiography of his dissatisfaction with the government's lack of ‘common sense’ in its handling of his charges as well as its disregard for [the tribes] rights.” Gardner *The Mexican War Correspondence*, 6.

<sup>25</sup> Elliott, *Notes*, 223.

recollections exist for study. In June 1857, his year of required duty was up and he longed to go home. He joined up with a wagon train traveling north on the Santa Fe Trail and was back in St. Louis within 30 days.<sup>26</sup>

Throughout his life, Elliott witnessed the extension of the railroad network westward out of Pennsylvania. After moving to St. Louis, he observed firsthand the web of rails that continued outwards into the Great Plains, a place of wonder for him. Western settlements dramatically increased after the Civil War and Elliott kept himself informed on all the reports coming from the area. Upon reading glowing testimonies from the Utah Territory, centered on the climbing water levels of the Great Salt Lake, which credited the moisture increase to Mormon agricultural efforts, Elliott became intrigued with the climate of the Great Plains. He received a copy of Marsh's *Man and Nature* in this same period and it profoundly affected him. Elliott endorsed the idea that farming and tree planting together modified the climate but he also recognized that human actions hurt as much as helped.<sup>27</sup> After reading *Man and Nature* Elliott fully fixed his eyes on the newly opened Kansas prairies and dreamed of repealing the "desert" theory.

Elliott's career in climate amelioration and boosterism began in 1870. He held a limited firsthand knowledge of the climate of western Kansas— other than his short time on the Santa Fe Trail and his readings on the topic, he had not been in the state for an extended period. Although he failed to understand the Great Plains, his publishing knowledge and his zealous belief in in humanity's ability to improve natural systems encouraged him to publish his first thesis on the prairie entitled *Climate of the Plains* in February of 1870. After reading the civil engineers' reports on lands held by the Kansas Pacific Railroad beyond Fort Riley, he became certain the

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<sup>26</sup> Elliott, *Notes*, 214– 229. Unfortunately, the aforementioned journal of his trip was lost. See, Gardner, *The Mexican War Correspondence*, 5–9.

<sup>27</sup> Elliott, *Notes*, 299–300, 310.



company had underrated their lands in their assessment. His new personal goal was to correct this error for the benefit of all.<sup>28</sup>

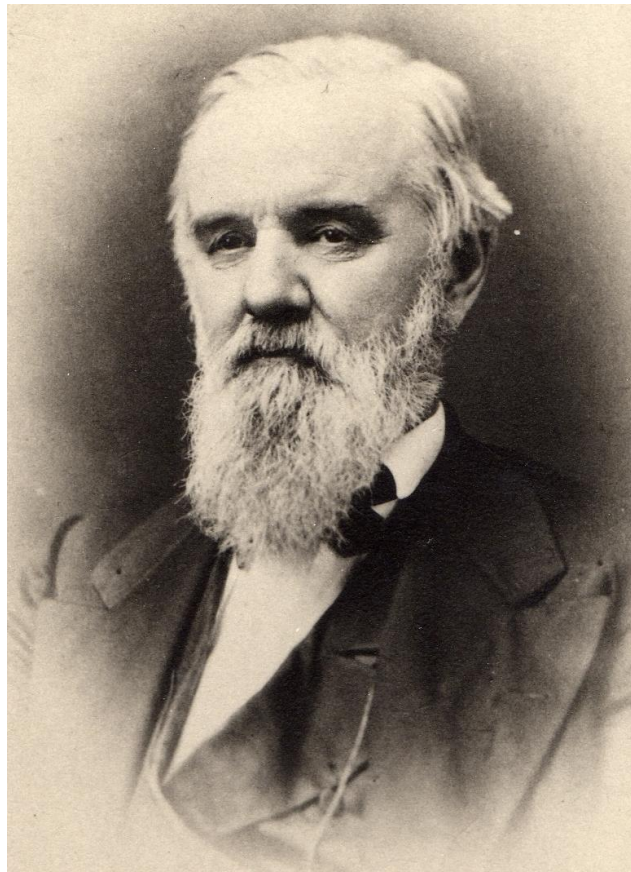


Figure 4. Richard Smith Elliott, circa 1880s. Courtesy of Phillip Elliott

In *Climate of the Plains* Elliott asserted, “As a rule, the plains are not sterile; they are only, comparatively speaking, arid... It is worthwhile [to the railway] to inquire whether there is not a better supply of moisture than has been believed [in the past].”<sup>29</sup> His theory involved the widespread planting of trees combined with the plowing of the prairie sod up to two feet deep for the facilitation of rain absorption and evaporation, thus resulting in increased rainfall totals. His thesis not only challenged the contemporary belief that the plains of Kansas were desert like but

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<sup>28</sup> As noted by Elliott, *Notes*, 300–301, 304.

<sup>29</sup> Elliott, *Notes*, 300.

also confronted the railway to prove it false through a series of experimental farms. He referenced fruitful studies completed in France, Russia, and Germany, where artificial forests, grasses and grains were successful in temperate zones comparable to Kansas and the climate ameliorated. With the completion of the railroad through the Great Plains, Elliott noted that the necessary supplies to begin a similar experiment would be easy. Above all, he asserted the tests should be modest and without irrigation to display what an ordinary settler could accomplish on virgin lands.<sup>30</sup>

Nothing enthralled Elliott more than his passion to prove humans could perfect the climate. In early 1870, he wrote to the Commissioner of Agriculture, Horace Capron, and presented him with a copy of *Climate of the Plains*. In his correspondence, he also inquired if the USDA would be interested in granting him a few acres in order to test his theory on tree growth in the Kansas.<sup>31</sup> Due to Elliott's continuous search for appropriate experimentation space in Kansas, it is evident that the USDA was not quite ready for researching in the Great Prairie.

Elliott became an employee of the KPR not long after publishing *Climate of the Plains*. Thanks in part to Elliott's letterpress books we know that he was exchanging correspondence with KPR president John D Perry, quite regularly from February through early April of 1870. In a memo dated March 24, he wrote of his hopes that Perry would soon secure him as a salaried agent. He wrote of his desire to become the first person to plant trees in their western lands. Elliott attained his dreams and on April 13, 1870, he noted to a colleague that he was departing on the 15<sup>th</sup> "to plant some trees on the dry Plains."<sup>32</sup> Elliott, a methodical man who wrote

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<sup>30</sup> Elliott, *Notes*, 300–304, 310.

<sup>31</sup> Elliott to Horace Capron, March 7, 1870, vol. 3, Richard Smith Elliott Papers.

<sup>32</sup> Elliott, various letters, vol. 3, Richard Smith Elliott Papers.

numerous daily letters proudly ordered new correspondence stock with “Kansas Pacific Railway Company” embossed on the crown prior to his venture.



Figure 5. Elm Lodge, Elliott's home near Kirkwood, Missouri. Courtesy of Phillip Elliott.

Elliott departed from his family’s home in Kirkwood, Missouri, at the age of 53 and headed into Kansas. He left his farm in the confident hands of his youngest son eighteen year old Reginald. Elliott’s job description with the KPR included four key duties and he was eager to accomplish them. The first key task was to lead an investigation of railways lands “for the production of Trees and Plants” in order to present the soil’s capabilities to possible land buyers. Second and most important to this story was the responsibility of overseeing experimental “plantations of forest [resources] in Kansas... for the future uses of the railway.” Third, Elliott had to compile information on reliable water resources. Finally, he needed “To aid in diffusing reliable data in regard to the *actual resources* of the plains, and their *adaptation* to economical

uses.”<sup>33</sup> Therefore, his obligations included research, experimentation, examination, and an environmental evaluation of Kansas. However, he produced a wealth of material based on his assumptions, theories, and hopes rather than facts alone.

The first tree planting and agricultural experiment stations established by the KPR were located in three locations: Wilson (Wilson’s Creek), located on the 98<sup>th</sup> meridian. Ellis, located on the 100<sup>th</sup> meridian, and Wallace (Pond Creek), near the 102<sup>nd</sup> meridian.<sup>34</sup> Elliott’s position as the Industrial Agent required him to use his skills in the fields of geology, botany, farming, meteorology, horticulture, and philosophy in order to conduct his highly anticipated experiments. Elliott’s instructions were simple—advertise the Kansas Pacific Railroad lands whether or not the farms were successful. Although his farming assistants held their doubts about growing anything in the “treeless waste” after their first plow shattered in the soil, Elliott had an overwhelming sense of accomplishment simply because he was trying.<sup>35</sup>

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<sup>33</sup> Elliott’s loose letterhead with job duties and new address found in, vol. 3, Richard Smith Elliott Papers.

<sup>34</sup> I will use the current place names for the locations of the three KPR farms. The City of Wilson was first called Wilson’s Creek, then Bosland for only short time according to Elliott’s various notes and correspondence. Ellis is occasionally referred to as Hays but very rarely and therefore will not be called that in this paper. Wallace is the current city name for Pond Creek and Elliott uses both names interchangeably. One source indicates six stations were planned for Elliott to oversee, but no other references to the other three surfaced. See Elliott to Horace Capron, June 23, 1870, vol. 2, Richard Smith Elliott Papers.

<sup>35</sup> Elliott, *Notes*, 304.



Figure 6. Wilson, Kansas in the 1870s. *West of Wichita* (40).

On June 15, 1870, Elliott penned a note and sent it off to newspapers throughout Kansas announcing his climate ideas and his intention to prove them out west. He began his letter to the *Kansas Farmer* by noting that it was pouring down rain at Hays and surely, the desert theory could not be correct because the storm had forced him inside with its might. He continued by describing “the immense region... [as] yet to be subdued to the uses of man.”<sup>36</sup> He wholeheartedly encouraged all residents in the state to plant trees for an ameliorated climate. He was almost giddy about the beginning of his experimental farms and invited all “civilized” people to move to “the now treeless waste” and establish farms and plant trees to aid in the process of subduing the open prairie.<sup>37</sup> His actions encouraged residents to envision the grasslands as an untapped resource and he encouraged a profound transformation of space through afforestation.

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<sup>36</sup> Richard S. Elliott, “New Feature of a Great Enterprise,” *Kansas Farmer*, June 15, 1870.

<sup>37</sup> Elliott, “New Feature of a Great Enterprise,” *Kansas Farmer*, June 15, 1870.

Prior to Elliott entering the plains, the only reliable accounts of the weather conditions were a few scattered rainfall reports gathered near Fort Hays that were later compiled into a unified record by the Agricultural Experiment Station in the 1940s. According to this precipitation record, 1870 was a good year for Elliott to begin his experiments— almost twenty inches of rain fell that year. For comparison, in 1868 a mere fifteen and a half inches fell.<sup>38</sup> Thanks in part to the environmental pendulum explained earlier, the rainfall totals just happened to be increasing in these years. In 1871, an even more encouraging twenty-three inches of rainfall helped convince Elliott his work was proving beneficial for the state.

Although Elliott was only in Kansas a short seven months during his first year as the Industrial Agent for the railroad, he did not waste any time in initiating his ground-breaking experiments. At the Pond Creek station, he and his crew managed to break up nine acres by September and sowed wheat, rye and barley (all three of unknown varieties). The Ellis station was smaller and used primarily to plant annual and perennial seeds provided by the USDA. Elliott planted both European and American varieties of wheat, barley, rye, grass, Lucerne (alfalfa), and clover. The Wilson station was the only experimental farm planted in grasses, grains, and trees in 1870 due to the late start. Here Elliott planted wheat, rye and barley (all three of unknown varieties again), along with the European timothy-grass (*Phleum pratense*) and Lucerne (alfalfa). The varieties of trees he first experimented with were bur oak (*Quercus macrocarpa*), pecan (*Carya illinoensis*), chestnut (*Castanea dentate*), peach (*Prunus persica*) and the imported ailanthus (*Ailanthus altissima*) from Asia.<sup>39</sup> Elliott also planted an Osage orange (*Maclura pomifera*) grove but did not note at which station. Due to the known usefulness

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<sup>38</sup> A.B. Cardwell and Snowden D. Flora, *Kansas Weather and Climate*, Kansa State Agricultural College Experiment Station Bulletin #302. (Topeka: State publisher, March 1910), 71.

<sup>39</sup> Elliott to John D. Perry, November 30, 1870, vol. 1, Richard Smith Elliott Papers.

for creating living fences, or hedges, it is likely Osage was planted at all three experimental farms.<sup>40</sup>

In September of 1870, Elliott penned a new work with a familiar name. He submitted his second major work, *Climate of Kansas* to the Smithsonian Institute. The director, Joseph Henry accepted it and published the work as part of his year-end Report, in the “Meteorology” section. In it, Elliott described the clouds, winds, and rains in western Kansas as “peculiar” because they tended to change direction and temperature on a whim.<sup>41</sup> When the winds would shift from warm to cool or vice-versa storm clouds would form and produce rain. He noted that columns of dust would rise to the sky in whirlwinds when he was working the land and as a result, within days it would rain—thus he felt there was a true connecting between agriculture to the weather. He assured the reader, “that climate change [was] taking place.” He felt the rainfall modifications were due to three things— the spread of agriculture settlements, the extension of the railroad and the electrical influences of telegraph lines.<sup>42</sup> Whether it was the actions of plowing the land for agriculture, planting trees or technological innovation, Elliott, like so many other nineteenth century Americans, was certain that technology helped humans improve the environment.<sup>43</sup>

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<sup>40</sup> Elliott to Col. Hawkins, November 4, 1870, vol. 1, Richard Smith Elliott Papers.

<sup>41</sup> Richard S. Elliott, “Climate of Kansas,” in *The Annual Report of the Board of Regents of the Smithsonian Institution* (Washington: Government Printing Office, 1871), 472.

<sup>42</sup> Elliott, “Climate of Kansas,” 472–474.

<sup>43</sup> Nye, *America as Second Creation*, 285.



Figure 7. The Kansas Pacific Railroad Experimental Farm at Wilson, circa 1870s. *West of Wichita* (47).

The young KPR farms displayed good results by November and Elliott immediately began spreading the good news. In the year-end wrap-up letter to KPR President John D. Perry, Elliott held no doubt of success, reported all that all the grasses and grains sown prior to November sprouted, and were looking vigorous. He reported that most of the trees planted at Wilson were not sprouting yet, but the Osage orange lots planted earlier were growing quite well. He claims boldly to Perry that, “Forests can be established in all parts of the plains, even without irrigation,” and suggests “the most rapid grow[ing trees]” should be planted first when immigrants settle in western lands to protect the slower growing varieties.<sup>44</sup> The early results proved positive and his list of tree suggestions for prospective land purchasers were well received by Perry, who on September 1, 1870, witnessed the completion of the railroad in Denver.<sup>45</sup> The Kansas Pacific Railroad now stretched 638 miles from Kansas City to Denver and

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<sup>44</sup> Elliott to John D. Perry, November 30, 1870, vol. 1, Richard Smith Elliott Papers.

<sup>45</sup> Daniel Webster Wilder, *The Annals of Kansas: 1541–1885* (Topeka: State Publishing House, 1886), 523.



the rail traffic was increasing daily.<sup>46</sup> Elliott impressed the railway officials but pushed himself to get the results to the people by beginning a whirlwind of publishing and conference attending.

Elliott and Kansas State Agricultural College's nursery superintendent and horticulture department instructor, Reverend Elbridge A. Gale, became acquainted in 1870. Their relationship provided Elliott a valuable research resource and an outlet for his publications. Kansas State Agricultural College became the first operational land-grant college in the United States under the Morrill Act of 1862 and immediately established itself as a valuable resource for agricultural information. Gale, a former Baptist minister, came to Kansas in 1864, served on the Board of Regents until 1871, then joined the University faculty first as a Department of Horticulture instructor and later became a full professor until his retirement in 1878.<sup>47</sup> Gale developed forty acres of his land into a young commercial tree nursery and like Elliott, Gale felt the agricultural development of Kansas involved the use of trees.

In 1868, Gale suggested to the Board of Regents a series of on and off campus lectures to disseminate the most current test-field agricultural information to the public. The first Farmers' Institute was held on November 11<sup>th</sup> of that year at the Riley County Hall in Manhattan. Among the various topics, Gale lectured on 'Forest Tree Culture' and instructed the audience on the economic value of planting timber for both farm use and as windbreak rows to protect young crops from wind damage. The *Kansas Farmer* dedicated a good deal of their print space to report on the Institute and to advertise the next event that would be off campus in the city of Wabaunsee.<sup>48</sup> In 1869, Professor Kelsey of the KSAC Horticulture department lectured on the use of living hedges for fencing and the propagation of forest timber in general at the second

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<sup>46</sup> Kansas Pacific Railway pamphlet, "Kansas Pacific & Denver Pacific Railway Lands."

<sup>47</sup> Kansas State University, "Wood Carvings of Chester E. Peters," Kansas State University, <http://www.k-state.edu/chetpeters/about/carvings/> (accessed December 18, 2012.).

<sup>48</sup> Ralf O. Graham, ed., *The Kansas Cooperative Extension Service: Extending the University to the People 1914–1989* (Manhattan: Kansas State University, 1991), 1:10–13.

annual Farmers Institute, which was now a two-day event.<sup>49</sup> The Farmers Institute became a very popular winter occurrence in Kansas and was evidence that the populace craved scholarly views on Great Plains agriculture techniques.

Elliott and Gale began exchanging tree samples for experimentation in 1870 as well. They discussed the different species each was experimenting with and their mutual dream of a state sponsored nursery to help disseminate locally grown trees to farmers. KSAC purchased forty acres from Gale in 1871 and he expected to make it a commercial endeavor as soon as possible. In Gale's 1871 "Report of Superintendent of the Nursery of the Kansas State Agricultural College", he noted that the college had over forty thousand fruit trees on the main campus that they were already for sale to the public. Gale hoped the Regents would approve his plan for an experimental forest and the construction of a permanent forest to decorate the campus. Gale wanted to beautify the campus with various tree species but felt, "the College [should] fix immediately upon some plan of improvement which shall give a symmetry and unity to the College grounds."<sup>50</sup> Gale accomplished his vision and today the KSU campus is home to over 100 different species of trees, spread across the 664-acre main campus, with many of them dating back to the 1870s.<sup>51</sup>

In a letter to Elliott dated November 23, 1871, Gale officially invited Elliott to participate in the third annual Farmers Institute, a four day event that year, that would be held the next January in Manhattan. The crowded event hosted lectures by entomologists, veterinary scientists, representatives from Fort Riley, horticulturalists, botanists, and the assistant editor of the *Kansas*

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<sup>49</sup> Ibid., 14.

<sup>50</sup> Elbridge A. Gale, "Report of the Superintendent of the Nursery of the Kansas State Agricultural College," in *Annual Report of the Regents, Officers and Teachers of the Kansas State Agricultural College* (Topeka: State Printing House, 1872), 29–30.

<sup>51</sup> Kansas State University, "Campus Tree Walk," Kansas State University, <http://www.riley.ksu.edu/DesktopModules/ViewDocument.aspx?DocumentID=2818> (accessed December 18, 2012).

*Farmer*, Aaron G. Chase. Chase called upon the University to hold the event bi-annually, so that more farmers could hear the lectures.<sup>52</sup> Richard Smith Elliott's lecture, later revised and printed as a pamphlet, included a list of twenty-two species he suggested. Elliott's list was,

adopted by the Farmers' Institute, at Manhattan... though not embracing all that might be worthy of trial, is yet broad enough for present uses...: 1.Ailanthus, 2.Ash, 3.Box Elder, 4.Catalpa, 5.Cedar, 6.Chestnut, 7.Coffee Bean, 8.Cottonwood, 9.Elm, 10.Hackberry, 11.Hickory, 12.European Larch, 13.Linden or Basswood, 14.Locust (Black and Honey), 15.Maple, 16.Oaks, 17.Osage Orange, 18.Pines, 19.Poplar, 20.Tulip Tree, 21.Walnut (Black and White), 22.Willow.<sup>53</sup>

Fourteen of the twenty-two suggested species were native to the state.

Gale contributed to Elliott's next publication, *Forest Trees for Kansas* and like Elliott, Gale was in full support of climate change through afforestation. Gale urged the readers to pursue forest like conditions to obtain two goals: "The first is timber; not low, spreading shrubs. The second is a modified condition of the soil and the atmosphere. Both objects can be obtained by thick planting."<sup>54</sup> Gale acknowledges the lack of credible information available to farmers on forest culture in dry soil conditions and calls, this time publicly, for a State run nursery to provide the populace with varieties more suited to succeed. Gale, like Elliott earnestly encourages every "frontier settler" to plant trees on their lands to improve the climate.<sup>55</sup> Both men wanted the public to view trees as living tools, capable of ameliorating the climate and the lack of natural supplies.

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<sup>52</sup> Graham, *Kansas Cooperative Extension Service*, 1:15.

<sup>53</sup> Richard Smith Elliott, *Forest Trees for Kansas: A Series of Letters* (Lawrence: Kansas Pacific Railway, 1872), 3.

<sup>54</sup> Elliott, *Forest Trees for Kansas*, 5.

<sup>55</sup> *Ibid.*



Figure 8. Elbridge Gale, unknown year. *A History of the Horticulture Department* (6).

Gale became an influential force in the effort to attract agrarian settlement to Kansas and encouraged everyone to plant trees. With his guidance the Farmers' Institute became the first extension-like work in the state, aimed at disseminating knowledge to agriculturalists forty-six years prior to the Smith–Lever Act. The events drew in the presidents of the Iowa Agricultural College and Ohio's Agriculture College, who came to speak at and observe the benefits of Farmers Institutes in the next few years.<sup>56</sup> KSAC and other Morrill Land Grant colleges helped lay the foundation for a “workable system of teaching,” later referred to as extension work.<sup>57</sup> The growth and popularity of the Farmers' Institutes demonstrates three things: 1) the desire for

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<sup>56</sup> Chuck Marr, *A History of the Horticulture Department at Kansas State University 1870-2012*, Kansas State University, <http://www.hfrr.ksu.edu/doc3506.ashx> (accessed April 5, 2013).

<sup>57</sup> D. W. Working, “The Relation Between the Agricultural College Libraries and the Extension Work of the Country as Developing Under the Smith–Lever Act.” *Bulletin of the American Library Association* 9, no. 4, Papers and Proceedings of the Thirty–Seventh Annual Meeting of the American Library Association (July 1915), 153.

information and guidance in refined agricultural techniques geared to the state's specific climate, 2) the willingness of the University to share this information free of charge and 3) that the idea of climate improvement through afforestation had ascended learned institutions.

At the three KPR experimental farms, Elliott continued to plant trees to test the virility of the different combinations of crops and grains to maximize his test results.<sup>58</sup> Elliott did all he could to disperse reports on drought resistant plants and trees. He reached the general public through zealous newsprint publications and with KPR land flyers that were strewn across the nation.<sup>59</sup> The three KPR farms took a beating from the weather in 1872 and 1873, but Elliott regarded the farms successful. All three, to Elliott, were "a full demonstration of all we have claimed for that region, if not more."<sup>60</sup> He urged Kansans of all ages to collect and use local supplies naturally found throughout the state's riparian groves. He also supported a few non-native tree species like the catalpa and the ailanthus and planted them in multiple locations. He suggested children be taught how to collect these seeds stating, "even children can aid" in the tasks of afforesting Kansas.<sup>61</sup> Without irrigation, Elliott's crops were far from award winning harvests, but his faith in Kansas' ability to produce kept him sustained.

In 1871, Elliott's *Industrial Resources of Western Kansas and Eastern Colorado* publication became widely disseminated in Washington thanks to Professor Ferdinand V. Hayden of the United States Geological Survey (USGS). Hayden placed Elliott's report in his *Explorations in Colorado* and from there it was reprinted widely, reaching an incredibly broad

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<sup>58</sup> Wilmon H. Droze, "Changing the Plains Environment: The Afforestation of the Trans-Mississippi West," *Agricultural History* 51, no 1 (January 1977), 11.

<sup>59</sup> For an example, see the Kansas Pacific Railway pamphlet, *Emigrants Guide to the Kansas Pacific Railway Lands* (Lawrence, KS 1871), KSHS, Topeka, Kansas. [http://www.kansasmemory.org/item/display.php?item\\_id=209729&f=00084096](http://www.kansasmemory.org/item/display.php?item_id=209729&f=00084096) (accessed December 13, 2012).

<sup>60</sup> Elliott, *Notes*, 321.

<sup>61</sup> Richard Smith Elliott, "Forest Trees in Kansas" (lecture, Farmers' Institute of the Kansas State Agricultural College, Manhattan, Ks., January 21, 1873).

audience. Elliott pointed out that settlers should not get discouraged with the slow growth of trees for building supplies or fencing material, because the state contained ample amounts of accessible and sturdy limestone.<sup>62</sup> Elliott urged the readers to ride the KPR through the Great Plains—once there they could note the Western portions of Kansas was neither devoid of vegetation, water, fertile soils and with the exception of the “scarcity of trees” they could witness that the state was not a desert at all but a “paradise” with promise.<sup>63</sup> He boldly claims that:

It is certain that rains have increased; this increase has coincided with the increase of settlements [and] railroads... If influenced by these, the change of climate will go on... [and] may be[come] permanent... Hence, it may be said that all the acts of man in this vast region have tended to produce conditions on the earth’s surface ameliorative of the climate... The appalling deterioration of large portions of the earth’s surface, through the acts of man in destroying the forests, justifies the trust that the culture of taller herbage and trees in a region heretofore covered mainly by short grasses may have a converse effect... A few acres at intervals across the plains, or only a few clumps of trees growing without irrigation, will be a demonstration more effective than theory... In this great work in the United States ought to lead, either by forests planted at the cost of the treasury, or by subsidies to individuals, or companies. It is a work worthy of the age, and of the nation.<sup>64</sup>

Passengers riding on the KPR could observe Elliott’s farms from the train windows or get out and tour them when the trains stopped for services. Settlers and travelers faced a new West, unlike anything they read about, one almost devoid of naturally growing tree stands. No longer were the bison the dominant feature—humans now ruled the area. Grace Greenwood traveled through the state on the KPR in 1873 and wrote about Elliott’s farms in an editorial printed later in the *New York Times*. She noted the line of cultivation was surging westward, “in a mad haste of conquest” in the form of new settlements.<sup>65</sup> When she reached Ellis County, she noted:

The experimental farms and nurseries of the [K.P.R.co.] far out on the plains seem to be doing admirably, and show some surprising results of cultivation

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<sup>62</sup> Elliott, *Industrial Resources*, 11.

<sup>63</sup> *Ibid.*, 12–13.

<sup>64</sup> Elliott, *Industrial Resources*, 22–25.

<sup>65</sup> Grace Greenwood, “Colorado Notes,” *The New York Times*, August 17, 1874.

without irrigation. ‘If such things are done in the dry wood, what will be done in the green’ . . . the grand tramp of the herded bison, the thrilling howl of the wolf, and the cheerful whoop of the savage have died away before the impertinent scream of the locomotive . . . and it [cries] to all the impoverished, crowded toilers of the Old World, ‘Come over and cultivate us! Come out of your narrow alleys, your wretched garrets, your noisome slums! ... We will give you your first real house’ . . . . Hearing this great voice of the waiting and Promised Land, it seemed no longer dreary or dazzlingly desolate. In this region rainfalls are almost certain to follow cultivation.<sup>66</sup>

She sounds educated on the topic quite well, but a hidden influence may be missing the reader cannot imply without background knowledge. The KPR placed Elliott’s promotional flyers on all of their trains and in every station. One wonders how much of Miss Greenwood’s report was influenced by Elliott’s own words and publications. Why did she write this praising editorial? Did the fields actually resemble a success? Greenwoods cry for impoverished Europeans to come and cultivate the plains echo’s Elliott’s body of work, which means her view of the farms was flowered by his boosterism.

Elliott lectured at the fifth annual Farmers’ Institute held in Manhattan in the first months of 1873. His “Forest Trees in Kansas” speech explained to the attendees that local demand outweighed supply and in the future, an artificial forest could provide economic gain in times of necessity in addition to climate benefits. He encouraged rapid growing species like the catalpa and ailanthus, or the locally obtainable Locust or Walnut, if the planter would be utilizing the stand for economic gains. Elliott also instructed the crowd on the proper planting methods he utilized, suggesting two-three year old saplings over seedlings, but urged any tree planted four by four feet apart should do well if looked after.<sup>67</sup> Elliott revealed to the crowd that there was a “bill pending in Congress to grant a homestead at the end of three years to anyone,” having more

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<sup>66</sup> Ibid.

<sup>67</sup> Elliott, “Forest Trees in Kansas,” 5.

than 10 acres planted in timber no more than twelve feet apart. He gave the crowd an inside, but incorrect look into the details of a possible forthcoming act to encourage tree growth. He understood the bill as timber encouragement on new and existing homesteads, when in reality it would only apply to new land-claims beginning in 1874.<sup>68</sup> The idea that a timber-planting act could soon afford them federal aid for afforestation surely pleased the crowd.

Elliott began interacting with the senator in charge of the Timber bill, Phineas W. Hitchcock of Nebraska, in the fall of 1872. Elliott wrote to Hitchcock in August when he first learned of the bill and offered his knowledge of the Kansas plains. “Those who take part in encouraging tree growth in this area,” Elliott wrote to the senator, “will be entitled to enduring fame.”<sup>69</sup> Hitchcock quickly wrote back and inquired into the validity of Elliott’s earlier publications and Elliott assured him he had “little or nothing to take back or nullify.”<sup>70</sup> Elliott stood firmly with his Baconian beliefs that man held the power to overcome “mother nature’s harshness” with science.

Elliott believed the bill Senator Hitchcock was proposing would not work in Kansas, normal agriculturalist could plow and plant forty acres of trees in the virgin sod within the first year. Yet he did acknowledge it as a step in the right direction. Elliott wrote to the Kansas congressional representatives, assuring them that “very few men will take this risk of planting and cultivating [forty] acres of trees for ten years, in order to get [160] acres,” when they could build a shack and get the same amount of acreage through the homestead law. He suggested an amendment, reducing the acreage, but if the congressional representatives wanted to see an

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<sup>68</sup> Elliott continuously wrote to Commissioner of the General Land Office, Mr. Willis Drummond in 1873 arguing in favor of the bill being applicable to existing homesteads, which Drummond could mandate as the commissioner if the bill passed without the provision. See, Elliott to W. Drummond, October 4 & 17, 1873, vol. 7, Richard Smith Elliott Papers.

<sup>69</sup> Elliott to Phineas W. Hitchcock, August 5, 1872, vol. 5, Richard Smith Elliott Papers.

<sup>70</sup> Elliott to Phineas W. Hitchcock, August 30, 1872, vol. 5, Richard Smith Elliott Papers.



increased population but urged them to vote in favor of it no matter what.<sup>71</sup> He knew people could plant grains, grasses and trees in the open prairies, but recalled his equipment difficulties which

Meanwhile, the KPR farms suffered in 1873 from a lack of rain and surge of grasshoppers. In August, Elliott wrote to a fellow Industrial Agent requesting seedlings to begin replanting his fields. He described the pests as the “Locusts of Egypt” and referred his coworker to the Bible if he was unsure of what they were.<sup>72</sup> The hoppers, Elliott reported, ate all of the seedlings planted that year, newly sprouting seeds, and had left very few of the two or three year old transplanted trees alive.<sup>73</sup> Elliott’s sense of accomplishment was unabated by the insects and he had confidence in the soil and climate of Kansas that encouraged him to replant grasses, grains, and trees.

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<sup>71</sup> Elliott to Kansas State Representatives in Washington, Undated, 1873 vol. 7, Richard Smith Elliott Papers.

<sup>72</sup> Elliott to B.R. Keim, August 30, 1873 vol. 7, Richard Smith Elliott Papers.

<sup>73</sup> Elliott to O.P. Wiggins, October 18, 1873 vol. 7, Richard Smith Elliott Papers.



Figure 9. “Grangers Versus Hoppers,” Henry Worrall, circa 1874-75. Courtesy of the Kansas State Historical Society.

In 1874, the rains returned in the spring, but to Elliott’s disbelief, shortly after Miss Greenwood’s visit, so did the grasshoppers and then scorching heat waves baked the tortured seedlings. The experimental farms were devastated completely in July. The railway pulled Elliott’s funding and abandoned the project entirely. Elliott’s attempt to dispel the desert theory, assist the KPR in selling their western lands, and prove trees and crops west of the 100<sup>th</sup> meridian would grow was mostly a success. The railroad effectively sold all of their lands in Ellis County, near one of Elliott’s farms, by 1875.<sup>74</sup> However, Elliott and the railway’s attempts to hold dominion over the plains environment were not successful. The pest invasion of 1874 demonstrated to Elliott that the “insect life is a more serious impediment to attempts in cultivation on the plains, without irrigation, than summer heat or drought, or winter

<sup>74</sup> James L. Forsythe, “Environmental Considerations in the Settlement of Ellis County, Kansas,” *Agricultural History* 51, no 1 (Jan. 1977), 39.

temperature.”<sup>75</sup> He recognized that environmental limits could defeat agricultural efforts, just not in the way he had supposed.

Elliott’s avid promotions on the malleable climate of Kansas gained national attention and promoted afforestation so well that no one questioned the theory for more than twenty years.<sup>76</sup> His agricultural studies had many weaknesses and setbacks in their four short years, but he began a new era in prairie experimentation— one that championed the wealth of trees and encouraged their propagation. Following in his footsteps new foresters working for the Atchison, Topeka, and Santa Fe, the State of Kansas and the Department of Forestry established forestry test stations in western Kansas. Elliott’s perception perspectives on human interference in ecological systems along with the KPR publications influenced an entire generation to plant trees on the Kansas prairies.<sup>77</sup>

The Kansas Pacific Railroad, their industrial agent Richard Smith Elliott, and the Kansas State Agricultural College were driving forces in modifying the popular environmental image of Kansas and elevating trees into the standard agricultural instruments. Elliott contributed to the 1873 State Board of Agriculture Annual Report, and explained how unlike in the east, Kansas was not fully forested, which allowed the farmer to begin plowing immediately and choose what areas to afforest. He argued the supposed scarcity of timber did not hinder settlement— it helped it by relieving the settler of years of hewing out areas for farming. The tool set of Kansas

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<sup>75</sup> Elliott to Frederick Watts, March 15, 1875 vol. 7, Richard Smith Elliott Papers.

<sup>76</sup> Emmons, *Garden in the Grassland*, 146.

<sup>77</sup> An example of this is Maximilian Kern’s book entitled *Forest Tree Culture on Kansas: An Argument in Favor of a More General Cultivation of Useful Forest Trees Upon the Prairie Farms of Kansas, Printed for the Kansas Pacific Railroad* (Kansas City: Ramsey, Millett & Hudson Printers, 1879).

included the plow, trees, limestone, and in Elliott's words, "one of the great highways of the continent," the KPR.<sup>78</sup>

New railways followed in the wake of the KPR and they too established experimental timber farms. In a letter to one such forester, Mr. S. T. Kelsey of the Atchison, Topeka, and Santa Fe railway, Elliott unceremoniously passed the torch of timber experimentation in Kansas. Elliott wrote Kelsey from his home in Kirkwood Missouri and said, "I know that your own experience allows you to do justice to my disasters."<sup>79</sup> The ATSF farms' focus was similar to the KPR farms but did not encounter the same setbacks as Elliott. Planted intensely for four years, Kelsey's farm, although abandoned by 1879 had 24,000 living specimens remaining.<sup>80</sup> Elliott's farms may not have out produced Kelsey's, but it is certain that without Elliott's knowledge and publications, the ATSF farms could not have been so successful. All of the varieties of trees growing in 1879 except one were suggested by Elliott in his 1871 *Forest Trees for Kansas* publication as the best for growing in semi-arid plains Kansas.

The success of these early tree farms encouraged other railways to begin growing supply forests with purely economic goals of producing a supply of lumber in the plains. In 1877 the Missouri, Fort Scott & Gulf Railroad began planting thousands of catalpa trees on a private tree plantation, the first of its kind. Railroads in the nineteenth century, centered on supply and demand, thought it might be cheaper to grow their own tie supplies on the plains rather than ship them from the East. Afforestation now held cultural, societal, and economical importance. Historian Brian Drake agrees that "forestry became a kind of social cure-all that would

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78 Richard Smith Elliott, "The Plains," in The Report of the State Board of Agriculture (Topeka: State Printing Works, 1874), 254.

79 Elliott to S. T. Kelsey, October 3, 1874 vol. 7, Richard Smith Elliott Papers.

80 C.P. Baker, "Forestry in the Northwest," in *Executive Documents of the State of Minnesota for the year of 1886* (St. Paul: Pioneer Press Co., 1887), 4:396–397.

simultaneously bring the rains, tame the land, raise the cultural level of the populace, and make everyone rich, all at the same time.”<sup>81</sup>

When Elliott left Kansas in the fall of 1874 there was a federal law in place that encouraged the propagation of trees, but there was no federal system of timber management or Division of Forestry yet. Franklin B Hough wrote *On the Duty of Governments in the Preservation of Forests* in 1873 and in it, he echoed Marsh like so many other foresters in this period, stating that it would soon become necessary for America to regulate their forests and create a permanent system of reserves. He felt forests, like roads and bridges, required human management through a similar system of protection, repair, and preservation.<sup>82</sup> Hough, like Elliott felt the Great Plains could someday contain a great amount of forest cover.

Elliott’s pro-tree publications and boosterism, spread throughout the Great Plains by the KPR, encouraged research on their benefits by local, state, and federal foresters.<sup>83</sup> Historian David M. Emmons described Elliott as the unsung “instigator of the [tree-planting] boom” because he promoted afforestation so well and no one questioned the theory for almost thirty years.<sup>84</sup> Emmons firmly situated in the Frederick Jackson Turner frontier thesis school, equated Elliott’s work as providing a “safety valve” for the overpopulated east.<sup>85</sup> However, Emmons’

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<sup>81</sup> Drake, “Waving a Bough of Challenge: Forestry on the Kansas Grasslands, 1868–1915,” 23

<sup>82</sup> Franklin B. Hough, *On the Duty of Governments in the Preservation of Forests* (Salem: Salem Press, 1873), 6.

<sup>83</sup> Elliott went on to invent and patent a hydraulic dredging machine to widen the mouth of the Mississippi river, he invested unsuccessfully in a South Dakota gold mine, then he retired a man of meager possessions living on his Mexican War service pension. Richard died quietly in his Kirkwood Missouri home at the age of 73. His grave went unmarked for 116 years, but in 2006 his great–great–great grandson Phillip W. Elliott raised funds to restore the family plot and provide Richard with a grand headstone, complete with a poem dedicated to Elliott’s loving wife, Elizabeth. Gardner, *The Mexican War Correspondence*, 12–14; Phillip W. Elliott, email message to author, June 27, 2012.

<sup>84</sup> Emmons, “Richard Smith Elliott, Kansas Promoter,” 401.

<sup>85</sup> Frederick Jackson Turner saw the American West as “free land” awaiting the expansion of poor, landless Euro-American settlers who would bring democracy with them. The safety valve thesis is the assertion that the frontier was a place of opportunity and escape from overcrowded cities. The “new western historians,” like Richard White and Patricia Nelson Limerick, have rejected the concept of an empty “frontier,” and choose to emphasize instead the highly developed civilizations that already existed in the West. See Patricia Nelson Limerick “What on Earth Is the

view is too simplistic and erroneous. Elliott did promote the KPR but also helped change the popular notion of the western plains as hospitable. *Kansas Magazine* identified his comprehensive reforms in 1947 article that named Elliot the “Tree Apostle” of the Kansas who left a permanent mark on the state’s environment. The magazine piece explained that in addition to his work in horticulture, he encouraged the use of shelterbelts that would help protect Kansas and the High Plains.<sup>86</sup> Elliott’s endeavors on the western plains of Kansas created a lasting legacy in the field of scientific forestry and windrow technology development.

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New Western History.” in *Does the Frontier Experience Make America Exceptional?*, edited by Richard Etulain, 108-113 (Boston: Bedford/ St. Martin’s, 1999).

<sup>86</sup> Edwin W. Mills, “The Tree Apostle of Kansas,” *Kansas Magazine* (1947), 77.

## Chapter 2 - Legislating Afforestation 1873–1891

*We are standing in the very gateway of one of the widest and most promising fields of physiogeographical experiments and observations which can be found anywhere in the wide world. We are to realize that through the earnest prosecution of Sylvaculture for this region, it may be made the home of millions of happy agriculturists, thereby adding untold treasures to the wealth of the nation. ~ Elbridge A. Gale*<sup>1</sup>

It is no secret that the Timber Culture Act (TCA) of 1873, instead of successfully afforesting the Great Plains with trees, led to the speculation, fraud, and thievery of western lands. Nevertheless, some tree claims were successful and left behind living records.<sup>2</sup> Historian Richard White calls the legislation of 1873 a land system failure while Paul Wallace Gates described it as a mere variation of the Homestead Act (HA).<sup>3</sup> There are many scholarly works on the use and abuse of the land-grant acts of the nineteenth century: the HA, the Morrill Land Grant Act, the Pacific Railroads Act, and The Desert Land Act of 1877. So why is the TCA ignored if it is a variation of these types of acts? If Gates and White are correct in their analysis, the TCA would have lengthily studies by now, but because the Act is associated with rainmaking theories, it is overlooked in historical studies.

The TCA provided settlers with 160 acres, but it was more than that. The TCA was a watershed moment in American history— it elevated trees from an obstacle to overcome to a technological device in the agriculturalist tool-set. The Act did more than simply encourage tree growth— it facilitated some of the first scientific studies on the ecology of the Great Plains and helped develop the field of forestry in America. Trees became culturally important in 1873, their

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<sup>1</sup> Elbridge A. Gale, "Forest Tree Culture," *Transactions*, Kansas State Horticultural Society (Topeka: State Printing House, 1873), 13.

<sup>2</sup> Approved, March 3, 1873 the Timber Culture Act was amended in 1874, 1878, and repealed in 1891. All amendments are taken into account for this study. For the Act and the amendments see Douglas A. Hedin, "The Timber Culture Acts: 1873 – 1891," Minnesota Legal History Project, <http://www.minnesotalegalhistoryproject.org/assets/Timber%20Culture%20Acts.pdf> (accessed January 7, 2013); Fred Shannon, *The Farmers Last Frontier: Agriculture, 1860–1897* (New York: Farrar and Rinehart, 1945), 58.

<sup>3</sup> Richard White, *It's Your Misfortune and None of My Own: A New History of the American West* (Norman: University of Oklahoma Press, 1991), 150–153; Gates, *Fifty Million Acres*, 238.

planting was legislatively encouraged by the federal government, and trees emerge in this era as a primary tool to remake ones environment. Geographer Michael Williams stated, “The act was a legal and administrative expression of the prevailing sentiment of the country.”<sup>4</sup> That sentiment included an implied value of timber resources and wove trees into the narrative of prairie settlement, which helped elevate trees into a living tool capable of reshaping the land into a familiar landscape.<sup>5</sup>

Timber claims were easier to defraud simply because the Act did not require residency, and because unlike a homestead, the title (or proof) was easier to obtain, and settlers could commuted for a cash sale within five years.<sup>6</sup> Historian Jim McKee contended cattlemen utilized the TCA to add 160 acres to their holdings, due to the long certification period trees needed to grow.<sup>7</sup> After the thirteen-year period, fraudulent claim owners would simply not “bother to apply for certification... In effect they would have thirteen years of tax-free, rent-free land use.”<sup>8</sup> McKee said the public responded to the free land, just not always to the rules dictating those land grants, which lead to very few forested areas.

Western history, land policies, and the federal management of land are widely studied topics, yet the TCA is more often than not, only briefly observed, and usually as a failure. There are no forests in Kansas today and very few in Nebraska, but by looking past the fraud which

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<sup>4</sup> Williams, *Americans and Their Forests*, 384.

<sup>5</sup> Nye, *America as Second Creation*, 5.

<sup>6</sup> Proving up or Proof is “The final step in perfecting title to land entered under the government land laws. Although requirements varied, the settler was required to prove that he had complied with the legal requirements in order to receive title to his claim.” Commutation is a “cash payment in lieu of residency for the full term provided under the Homestead Act. If the settler did not wish to wait the required number of years, he could “commute” or purchase his claim with cash, military bounty warrants, or agricultural college scrip.” See Nebraska State Historical Society, “U.S. Government Land Laws in Nebraska, 1854–1904,” [http://www.nebraskahistory.org/lib-arch/services/reference/la\\_pubs/landlaw7.htm](http://www.nebraskahistory.org/lib-arch/services/reference/la_pubs/landlaw7.htm) (accessed August 11, 2012).

<sup>7</sup> In order to own the land, claimants would have to file for the Final Certificate, which is “a document issued by the land office after the claimant had completed all requirements to make final proof on a tract of land. The final certificate was sent to the General Land Office in Washington, D.C., which then issued a patent.” Ibid.

<sup>8</sup> Jim McKee, “The Timber Culture Act: A Good Idea, A dismal Failure,” Lincoln (Nebraska) Journal Star, [http://journalstar.com/news/local/article\\_ef8e6df2-b6df-57d7-81f7-9050db8c7fb8.html](http://journalstar.com/news/local/article_ef8e6df2-b6df-57d7-81f7-9050db8c7fb8.html) (accessed August 11, 2011).



surrounded the policy, a clear trajectory in the pro-tree conversation which centered on climate amelioration is evident. Afforestation began with Marsh's *Man and Nature* and culminated with the TCA—trees were elevated into a national conversation for the first time in 1873.

Afforestation boosterism and the TCA are lumped into the rainmaking theories that arose in the 1870s, but the bill is also a western land-law and a key part of the history of the U.S. Forestry Service. Because of the association with debunked theories like “Rain Follows the Plow”, the concussion theory, and the dryfarming doctrine, the TCA and afforestation go overlooked in some histories of the USFS.<sup>9</sup> The 1870s were the peak years of rainmaking theories, but also when the United States hired the first national forester, Franklin B. Hough.

The investigation of the TCA is most effective through an environmental history lens because humans and nonhumans exist in the same environment. Robert Gardner, an environmental scientist, details the history and development of the Nebraska National Forest and provides an excellent example of tree planting legislation research. He explains how the technological construction of an environment eliminates the boundary between the natural and artifice, leaving natural systems in a modified state. The TCA, according to Gardner, marked the beginning of the attempts to engineer the environment with trees functioning as technology.<sup>10</sup> Gardner claimed the failure of the individual tree-planting efforts encouraged with the TCA marks the beginning of the national effort focused on tree planting in the prairies, but this thesis shows that afforestation was important enough to pursue under federal auspices with the enacting of the TCA, not with its repeal.

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<sup>9</sup> For one scholarly example that fails to mention the Timber Culture Act or afforestation see, Nancy Langston, *Forest Dreams, Forest Nightmares: The Paradox of Old Growth in the Inland West* (Seattle: University of Washington Press, 1995).

<sup>10</sup> Robert Gardner, “Constructing a Technological Forest: Nature, Culture and Tree-Planting in the Nebraska Sand Hills” *Environmental History* 14 (April, 2009), 280.

Gardner's research shows that repercussions from the first generation of American foresters and public land policy creators who were certain that the Great Plains were forested in the Tertiary Period led to a long standing notion that the grasslands were in need of restoration through reforestation.<sup>11</sup> Gardner unfortunately retained the term "reforestation" throughout the work instead of adjusting his word choice to describe the plantings as afforestation.<sup>12</sup> Gardner's work explained how the early moral authority set on restoring the nonhuman systems failed until in his case, Charles Bessey of the University of Nebraska and Bernhard E. Fernow of the Forestry Division geared their experiments towards the natural environment.<sup>13</sup> Bessey, like KSAC's Elbridge Gale, was in constant contact with national foresters, but unlike Gale, Bessey was able to convince his government to establish a state-run nursery to provide forest supplies. Bessey's unique understanding of grassland's ecological complexity helped his nursery and the Nebraska National Forest become a success by utilizing drought resistant conifers and by encouraging a diverse ecosystem.<sup>14</sup>

With the help of the Forestry Division, Nebraska was able to create the first successful artificial forest that is still in existence today. It draws thousands of visitors yearly.<sup>15</sup> What Gardner's study lacks is an investigation into private afforestation attempts prior to and following the TCA. As this study aims to show, these attempts helped direct the trajectory of forestry studies at the state and national level in many ways. His focus on federal forestry uniformity leads him to overlook attempts to create artificial forests prior to the Hatch Act,

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<sup>11</sup> Ibid.

<sup>12</sup> Cobb, "A Study of Afforestation in the Great Plains," 179.

<sup>13</sup> Gardner, "Constructing a Technological Forest," 281.

<sup>14</sup> Ibid., 281-291; Gardner said, "By pursuing the complexity promoted by Bessey, Fernow, and the other ideological founders of the forest, they realized the holistic influence of a forest ecosystem... The Sand Hills foresters succeeded in part because they failed to reforest the entire grasslands. Had their grander ambitions been realized, the area might be the object of a prairie restoration project," Ibid, 293.

<sup>15</sup> Ibid.

which figure 10 shows were plentiful in Kansas before 1887. The TCA may have failed at encouraging individuals to afforest the land, but it did “heighten public awareness of and involvement of the government in forest issues.”<sup>16</sup>

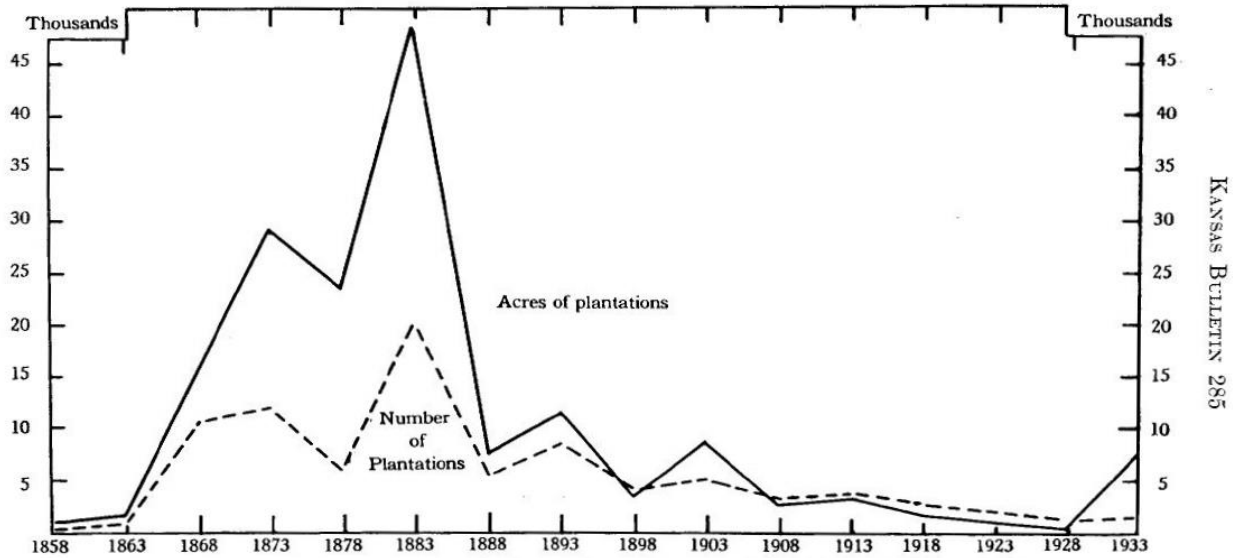


FIG. 1.—Progress of forest planting showing number and acreage of plantations by five-year periods.

Figure 10. Artificial forest numbers in Kansas. *Agricultural Experiment Station Bulletin #285* (8).

Not every quarter section of land claimed under the TCA was a failure or a fraud.<sup>17</sup> The Act encouraged experimentation. Settlers began planting trees alongside their homesteads and their fields with confidence, because the law altered the social conception of the open prairie as an environment in need of repair.<sup>18</sup> Wilmon H. Droze asserted, “Tree planters learned much about the proper spacing of trees for wind break protection, the species which were best suited for a given locality and the post-planting care and cultivation. In brief, one might regard the timber claims as many regionally placed laboratories which produced a mass of uncoordinated

<sup>16</sup> Williams, *Americans and Their Forests*, 385.

<sup>17</sup> A section of land is “a primary unit of the U.S. system of land surveys, consisting of a one square mile tract containing 640 acres,” therefore a quarter section of land is 160 acres. Nebraska State Historical Society, “U.S. Government Land Laws.”

<sup>18</sup> Drake, “Waving a Bough of Challenge,” 20.

data about tree planting in the subhumid prairie-plains region.”<sup>19</sup> Whether or not they believed the rainfall would increase after afforesting the plains, settlers felt treelessness was a temporary condition.

The early artificial forest plantings conducted by the railways, KSAC, and the USDA in Kansas were important in maintaining an interest in forestry matters and this importance is reflected in the TCA.<sup>20</sup> The shifting images of trees in this era led to their elevation into the farmers tool-set, alongside the plow and the axe, but they also were becoming a central topic in a web of natural and cultural discussions due to their usefulness.<sup>21</sup> As the debates over the “timber-bill” were taking place in Washington, Nebraskan, J. Sterling Morton established Arbor Day on April 10, 1872, and the holiday gained an immediate following.<sup>22</sup> Morton was not alone in his arboreal passions, many Nebraskans, like their neighbors to the south in Kansas, were concerned with the lack of tree cover.

On January 18, 1871, Phineas W. Hitchcock was elected to the senate from the state of Nebraska. The following day in the *Omaha Tribune* he was described as a man whose “character is without a stain, and his political record, as an [o]fficial and a straight-out Republican, without a blemish; and, as his election shows, he is one of the most popular men, among all parties in the state.” Hitchcock immigrated to the Territory in 1857 amongst the waves of abolitionists from New York and became one of the earliest representatives of the Republican Party in Nebraska. During the Civil War, he was appointed to the office of the U.S. Marshal by President Lincoln

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<sup>19</sup> Wilmon H. Droze, *Trees, Prairies, and People: A History of Tree Planting in the Plains States* (Denton: Texas Women’s University, 1977), 29.

<sup>20</sup> Cobb, “A Study of Afforestation in the Great Plains Region,” 68.

<sup>21</sup> Nye, *America as Second Creation*, 5.

<sup>22</sup> Williams, *Americans and Their Forests*, 382–83.

and in 1864 he became a Congressional delegate for the Nebraska Territory. After statehood, he dabbled in publishing, real estate, and practiced law.<sup>23</sup>

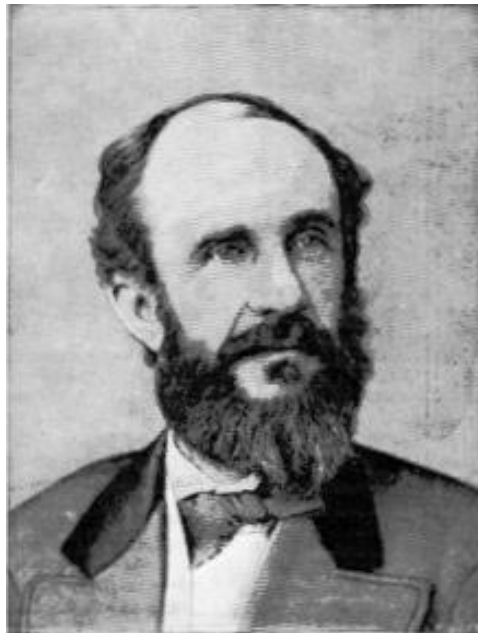


Figure 11. Phineas W. Hitchcock, 1888. Courtesy of the *Omaha Illustrated*.

From 1867–1869 Hitchcock served as the surveyor general of Nebraska and Iowa and became quite familiar with both the land law’s intricacies and the layout of Nebraska and its neighboring states.<sup>24</sup> Nebraska, like Kansas, lacked dense forested tracts with the exception of riparian waterway timber. It was no surprise to Hitchcock when Ferdinand Hayden reported in 1872,

The entire area of the State of Nebraska belongs to what is called the plain or prairie country of the West...No coal-beds [can] be found more than from 12–30 inches in thickness. In a country which is so destitute of timber... the subject of tree-planting in Nebraska cannot be too strongly impressed upon the settlers... No labor or expense should be spared and no delay permitted in this direction. Not

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<sup>23</sup> “Nebraska’s New Republican Senator, Hon. Phineas W. Hitchcock,” 5, col. 3 *The New York Times*, January 24, 1871.

<sup>24</sup> Biographical Directory of the U.S. Congress, “Phineas Warren Hitchcock,” Congressional Archives, <http://bioguide.congress.gov/scripts/biodisplay.pl?index=H000648> (accessed January 12, 2013).

many years will elapse before fine forests of young timber will cover much of this fertile region... [and] influence... the climate and the soil.<sup>25</sup>

Natural resources were on Hitchcock's mind when he entered in the Washington political arena in the 1870s.

As a junior senator, Hitchcock had to circulate his bill widely throughout Washington, to drum up support for what he called at the time, "An Act to Encourage the Growth of Timber on Western Prairies (S. No. 680)." Willis Drummond, commissioner of the General Land office, supported the bill and requested his letter be printed and submitted to the full Senate in June. We know from Richard Smith Elliott's letterpress books that forestry-minded scholars were discussing the bill across the nation. Elliott wrote the junior senator from Nebraska requesting a draft the legislation in progress on August 5, 1872, after hearing about the bill from Senator John Scott of Pennsylvania.<sup>26</sup>

The second reading of Senate Bill No. 680 came up for debate on June 10, 1872. Senator Hitchcock outlined the original bill to the chamber:

It provides that any person who shall plant, protect, and keep in a healthy growing condition for five years, one hundred and twenty acres of timber, the trees therein not being more than eight feet apart each way, on any quarter section of any of the public lands of the United States, shall be entitled to a patent for the whole quarter section at the expiration of the five years, on making proof of such fact by not less than two credible witnesses; but only one quarter in any section is to be thus granted.<sup>27</sup>

Then he went over the amendments suggested to him and included by the Committee on Public Lands. The Committee encouraged the acreage amount required be lowered to a mere forty acres (after Richard Smith Elliott's repeated letters to Willis Drummond insisting that 120 was too much for agriculturalists to handle within the allotted time period) and the spacing of the trees

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<sup>25</sup> Hayden, *Final Report of the United States Geological Survey of Nebraska*, 5.

<sup>26</sup> Elliott to P. Hitchcock, August 5, 1872, vol. 5, Richard Smith Elliott Papers.

<sup>27</sup> Elliott to Willis Drummond, September 30 & October 17, 1873, vol. 7, Richard Smith Elliott Papers.; *Congressional Globe*, 42nd Cong., 2d sess., June 10, 1872, pt. 5: 4463.

should be increased from eight feet apart, to twelve.<sup>28</sup> The debate opened to the full floor and Senator Harlan of Iowa called for another amendment asking for an amendment to reduce the allotted time-period prior proof to ten years. Next Senator Sherman of Ohio questioned the bills reduced amount of acreage, calling it too generous if not “very liberal.”<sup>29</sup> Senator Hitchcock quipped back stating that forty acres were ample to timber the “treeless plains” in the West and then consented on the extended time-period “preferring that the bill should pass, even with this amendment... rather than it should fail entirely.”<sup>30</sup>

After a unanimous vote on the amendments, Senator Alcorn of Mississippi stood up and proposed one more amendment. Alcorn wanted to add in a restriction on current landowners in the west from filing timber-claims. He felt the bill should be reserved for the “poor of the country” and if amended so would result in a protection “against monopolies” whom he thought would claim all they could under the current law and fail to plant even a single tree.<sup>31</sup> Hitchcock rose and announced,

The Senator from Mississippi totally misapprehends the object and intention of this bill. The object is to encourage and develop a growth of timber on the treeless plains west of the Mississippi River. It will take capital, it will take money to plant, cultivate, and protect forty acres of timber, of trees twelve feet apart for ten years, as the bill now provides. A man without capital can get his land now without any money and without price under the homestead law. The object of this bill is to encourage the growth of timber, not merely for the value of the timber itself, but for its influence upon the climate. If the Senator [from Mississippi] had had any actual experience on the treeless plains----<sup>32</sup>

And just like that, Senator Alcorn interrupted Hitchcock and stated he had plenty of experience in this matter, but would respectfully withdraw his amendment because he wanted to see the Great Plains settled with agriculturalist.

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<sup>28</sup> Ibid., 4464.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

Senator P. Hitchcock took back control of the floor and stated, “The object of this bill is to encourage the growth of timber, not merely for the benefit of the soil, not merely for the value of the timber itself, but for its influences upon the climate.”<sup>33</sup> His last statement on the bill officially enshrined the afforestation ideas of George Perkins Marsh, Joseph Wilson, Ferdinand V. Hayden, and Richard Smith Elliott into the TCA forever.<sup>34</sup> The bill itself said nothing concerning the supposed benefits of trees upon the climate, but Hitchcock’s words forever followed the bill. The TCA only outlined the requirements a settler would need to undertake to gain the title to a quarter section of land: 1) apply for a claim at the nearest lands office, 2) fulfill the physical requirements of approximately 12,000 living trees, and 3) provide proof they had completed step two.<sup>35</sup> The TCA was supposed to alleviate the fear of forest exhaustion expressed by Marsh and decimate the last remaining notions of a Great American Desert with the myth of the Garden of the West.<sup>36</sup>

The TCA came before the Senate for the final time on March 3, 1873 and with “two thirds voting in favor thereof, the bill was passed” by both houses.<sup>37</sup> The next year, an amendment passed, requiring “claimants to meet the same age and citizenship qualifications as the pre-emption and homestead acts.”<sup>38</sup> Hitchcock’s bill became the highest expression of the afforestation effort to cover the plains in trees. Cobb noted that public thought became focused

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<sup>33</sup> C. Barron McIntosh, “Use and Abuse of the Timber Culture Act” *Annals of the Association of American Geographers* 65, no. 3 (September 1975), 349.

<sup>34</sup> David M. Emmons, “Theories of Increased Rainfall and the Timber Culture Act of 1873,” *Forest History* 15, no. 2 (October 1971), 13.

<sup>35</sup> Droze, *Trees, Prairies, and People*, 24.

<sup>36</sup> For Marsh information see David A. Clary *Timber and the Forest Service* (Lawrence: University Press of Lawrence, 1986), 1–2; For the desert/garden notion see Williams, *Americans and Their Forests*, 379–380 and John L. Allen, “The Garden–Desert Continuum,” 214–215.

<sup>37</sup> *Congressional Globe*, 43rd Cong., 3rd sess., March 3, 1873, pt., 3; 2111.

<sup>38</sup> Nebraska State Historical Society, “U.S. Government Land Laws in Nebraska, 1854–1904.”



on tree planting in the plains because of the Act, “as it never would have been in any other way,” and the idea that it was of no use is “an erroneous idea.”<sup>39</sup>

Trees began taking advantage of the new opportunities afforded them by Euro-American settlers who encouraged their growth. Environmental historian Julie Courtwright examined the history of grassland settlement and the culturally driven suppression of fires. She explained that Euro-Americans not only brought with them their love of trees, but also their cultural perceptions of fire.<sup>40</sup> Courtwright, like Stewart, asserts that fire is “a critical part of the environmental history of the region,” and when applied, prevented trees from encroaching into native prairies.<sup>41</sup> Euro-American settlers, who favored trees over grasslands demonized prairie fires and began suppressing them at every turn.

Although fire was an important horticultural tool for the plains Indians, in a white civilized world, fire had no place.<sup>42</sup> Indian inhabitants understood the connection between healthy spring grasses, which successfully lured the grazing herds in to their hunting ranges, but, “to the new settlers, who included trees as part of the ‘new and improved’ vision of the Great Plains, the possibility of cultivating growth by eliminating prairie fires was tempting.”<sup>43</sup> Humans held a sense of power over the landscape by eliminating fires, which was a part of the Native American tool-set for centuries, in favor of growing trees, to recreate their eastern-stylized landscapes.<sup>44</sup> The naturally growing riparian forests in Kansas responded to these two new cultural factors brought into the state and expanded rapidly up onto the open prairies.

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<sup>39</sup> Cobb, “A Study of Afforestation in the Great Plains Region,” 62, 58.

<sup>40</sup> Julie Courtwright, *Prairie Fire: A Great Plains History* (Lawrence: University Press of Kansas, 2011), 25.

<sup>41</sup> Courtwright, *Prairie Fire*, 3.

<sup>42</sup> *Ibid.*, 60.

<sup>43</sup> *Ibid.*, 85.

<sup>44</sup> Stewart, *Forgotten Fires*, 63.

From 1873–1878 the TCA did not transform the climate in the Great Plains, but the climate did transform the law. Drought struck the growing season of 1874 in central-Kansas resulting in less than a half inch of rain in Manhattan for both July and August.<sup>45</sup> In these same months, what Richard Smith Elliott called the “Locusts of Egypt” returned to Kansas as well. Louis Watson described the swarm of *Melanopolus spretus* as a blizzard when he observed it near Ellis, due to the way the swarm blew in and covered everything in sight.<sup>46</sup> “The hoppers ate holes in girls’ dresses, ate all the crops, and then stripped the leaves from the trees.”<sup>47</sup> The drought, insects and “the inability of settlers to care for 40 acres of saplings in a region unsuited to their growth convinced Congress to reduce the required planting to 10 acres in 1878,” and add in an exception for devastation due to insect invasion.<sup>48</sup>

It was plainly obvious to Elbridge Gale in 1875 that settlers would need instructions and specialized help in order for their Timber Claim plantings to be successful because even the KSAC campus plantings were failing. In a letter to the State Board of Agriculture, Gale described that “the people to the west of us [here in Manhattan] are very much discouraged... [they] will fail for want of knowledge and care.”<sup>49</sup> Just two years prior, Gale had set out hundreds of Norway spruce, Scotch pine, Austrian pine, white spruce, pitch pine, pinion pine, yellow birch, Norway maple, English elm, Norway maple, sugar maple, sycamore, sweet-gum, Irish juniper, and thousands of ailanthus, catalpa, white ash, green ash, and red ash around the

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<sup>45</sup> Kansas State Agricultural College, *First Annual Report of the Kansas Experimental Station, 1888* (Topeka: Crane Publishing, 1889), 115.

<sup>46</sup> As quoted by Miner, *West of Wichita*, 52.

<sup>47</sup> *Ibid.*, 53.

<sup>48</sup> White, *It's Your Misfortune and None of My Own*, 151; Douglas A. Hedin, “The Timber Culture Acts: 1873 – 1891.”

<sup>49</sup> Elbridge Gale to Alfred Gray, October 16, 1875, Horticulture Records, “Letter Book 1871–1889” Box 4, University Archives and Special Collections, Kansas State University, Manhattan, Ks.

campus for both permanent placement and nursery stock.<sup>50</sup> Settlers needed knowledgeable help to raise trees and it would come from the foresters.

The impulse for a system of scientifically managed artificial forests began with George Perkins Marsh's writings in 1864 and America's first forester, Franklin B. Hough who initiated the official federal study on prairie tree planting in 1873. Marsh's writings, according to historian David A. Clary, directly led to a school of thought that believed the best type of forest were regulated forests. To Marsh, the best forests were multi-use forests, capable of serving the needs of various interests. If private resources were ever exhausted, a series of national forests could ward off a "timber-famine" if preserved in time.<sup>51</sup> Nancy Langston agreed with Clary. She considered Marsh one of the "first scientific reformers" to warn of an approaching timber-famine and suggest that the blind extraction of forests without concern for the environmental or future economic repercussions was flawed system.<sup>52</sup>

Historians Clary and Langston both correctly traced the initiation of scientific forestry to ward off a "timber-famine" to George Perkins Marsh, but they failed to credit America's first expert on forestry, Franklin B. Hough. Hough, a self-taught man, initiated the first federal forestry manifesto calling for the regulation of forests scientifically in 1873. According to Langston, "Scientific forestry, later known as sustainable-yield forestry, required regulated forests, so that the annual net growth could be harvested each year... forever without depleting the growing stock."<sup>53</sup> Hough's firm beliefs in the idea of climate amelioration through afforestation ushers him into the former class of pseudoscientific professionals like Samuel

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<sup>50</sup> Gale ordered all these seeds in March of 1872 from two providers. Gale to Robert Douglas & Sons, March 11, 1872, and Gale to F. H. Phoenix Esquire, March 12, 1872, "Letter Book 1871-1889" Box 4, Horticulture Collection.

<sup>51</sup> Clary, *Timber and the Forest Service*, 1-2.

<sup>52</sup> Langston, *Forest Dreams, Forest Nightmares*, 101-102.

<sup>53</sup> *Ibid.*, 103.

Aughey, Charles Dana Wilber, and Richard Smith Elliott but this study reveals he actually bridged the gap between the two classes of researchers— scientific and non-scientific.

Hough grew up in upstate New York and developed a love of the outdoors at a young age. He studied medicine at the Cleveland Medical College and served as a surgeon with the 97<sup>th</sup> New York Regiment in the Civil War. Throughout his life, Hough devoted himself to the study of botany, mineralogy, meteorology, history, and forestry— like his namesake Benjamin Franklin, Hough cherished self-advancement and reading.<sup>54</sup> Some of his first publications were histories of his home county and state, leading to his appointment as the superintendent of the New York Census for 1855 and 1865, and of the United States Census for 1870.<sup>55</sup> His firsthand knowledge on the forests of New York led him to urge their protection from overuse in the 1860s, but when his fellow public officials ignored his advice, he shifted his conservation efforts toward Washington. “He was determined to gather and disseminate accurate data which would awaken the public to a realization of the necessity for a definite program to conserve its forest wealth.”<sup>56</sup>

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<sup>54</sup> A. Ekirch Jr, “Franklin B, Hough: First Citizen of the Adirondacks,” *Environmental Review* 7, no. 3(Autumn 1983), 272.

<sup>55</sup> *Ibid.*

<sup>56</sup> Edna L. Jacobsen, “Franklin B. Hough, A Pioneer in Scientific Forestry in America,” *New York History* 15, no. 3 (July 1934), 315. 311–325.

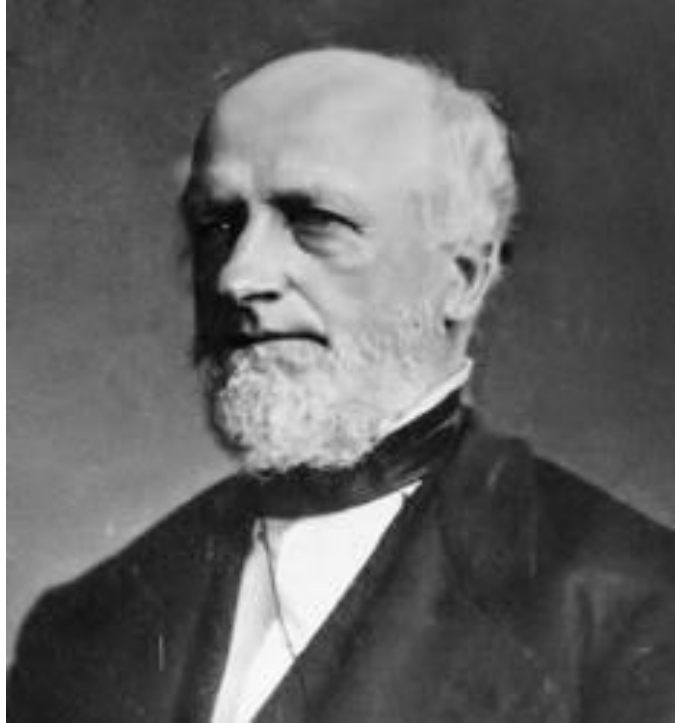


Figure 12. Franklin B. Hough, unknown year. Courtesy of the Forest History Society.

As a member of the American Association for the Advancement of Science, Hough had the opportunity to present his thesis on American forestry during the August 1873 meeting held in Portland, Maine. Hough's *On the Duty of Governments in the Preservation of Forests* echoed Marsh throughout and included warnings of forest destruction, overuse, and deforestation's negative effect on the climate. To Hough, nature needed regulated. He asserted that forests, like roads and bridges, needed management through a similar system of protection and repairs for the public utility in perpetuity.<sup>57</sup> The importance of protecting existing forests and promoting tree growth in the plains, Hough asserted, was for their significant influence upon the climate and landscape.

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<sup>57</sup> Hough, *On the Duty of Governments*, 6.

The supposed treeless plains were in the spotlight in 1873. Hough's speech transpired a mere five months after the forty-third Congress enacted the TCA and sixteen months after Yellowstone became the first National Park— the preservation and restoration of the environment were hot topics. Hough, like Hayden and Elliott, was convinced the central plains of America were forested in the past and through the acts of man alone had become deforested through overcutting and fire. He purported in *On the Duty of Governments* that trees “once clothed the surface [of the Great Plains], and sheltered it from the sun and winds,” but when they vanished, “the desert approached,” and crept over the vast region.<sup>58</sup> Hough fashioned a list of suggestions, which entailed the legislation, protection, and encouragement of tree plantings on public and private lands. He also suggested the federal government should advocate shelterbelt-planting laws forcing railways to afforest their lines of traffic.<sup>59</sup> Above all he called for further studies and highlighted the fact the United States did not have a school of forestry of its own, forcing forestry majors to study in Europe.

Hough's proposal that the federal government take immediate action on the forestry situation in the country impressed the American Association for the Advancement of Sciences and they in turn petitioned Congress to fund a national forester. Three years later, Congress approved the position and a measure allocating \$2,000 for the job.<sup>60</sup> Hough was appointed by the Department of Agriculture to be the first federal forestry agent on August 30, 1876.<sup>61</sup> The creation of his position was a turning point in the history of the United States because it helped create what we now know as the U.S. Forest Service.

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<sup>58</sup> Hough warned that desertification could happen anywhere deforestation occurred; *Ibid.*, 1.

<sup>59</sup> *Ibid.*, 7.

<sup>60</sup> Jacobsen, “Franklin B. Hough,” 321.

<sup>61</sup> Forest History Society, The Forest Service— Chiefs, “Franklin B. Hough,” <http://www.foresthistory.org/ASPNET/People/Hough/Hough.aspx> (accessed January 16, 2013).

The afforestation movement changed in 1876 when forestry matters became a science. The benefits of trees, once publicized by Marsh and broadcasted by Elliott and Gale, were statistically investigated by Hough and the Department of Agriculture. His responsibilities required a detailed inquiry into the “annual amount of consumption, importation, and exportation of timber and other forest products; the probable study of future wants; the means best adapted to the preservation and renewal of forests; the influence of forests upon climate” and an investigation into what measures other nations have applied to their forests for comparison.<sup>62</sup> Hough’s duties included more than forestry investigating, research, and writing reports on the nation’s timber supply– he would be studying the possibility of climate amelioration through afforestation.

Hough began his new career with a tour of the West. He wanted to gain first-hand the facts “concerning the forest situation” or lack thereof in the prairie and mountain states.<sup>63</sup> He surveyed lumbermen, land commissioners, and railroad commissioners along with the best natural scientists of the day. Hough wanted his work to be appealing for economists, agriculturalists, foresters, lumbermen, legislators, and the business world. Statistical information and reports on lumber use flooded the Department of Agriculture while he was out surveying the nation’s forests. “His route carried him as far west as Salt Lake City, where he visited Brigham Young's famous plantation of locust trees. He looked into salt factories and sawmills, talked with foresters employed by railroad companies, and with editors of lumbering periodicals. The enormous mass of data thus assembled formed the basis of his first Report, which was submitted to Congress early in 1878.”<sup>64</sup>

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<sup>62</sup> Franklin B. Hough, *Report upon Forestry*, U.S. Department of Agriculture (Washington, DC: Government Printing Office, 1878), 3.

<sup>63</sup> Jacobsen, “Franklin B. Hough,” 321.

<sup>64</sup> *Ibid.*

The first *Report upon Forestry* was a lengthy document, but reduced to only 650 pages due to publishing constraints.<sup>65</sup> Hough investigated the nation's forest cover, timber value, forest destruction, and other issues facing each of the thirty-eight states and territories. Although he could not travel abroad, he communicated extensively with foreign forestry officials to provide examples of research on the restoration of forests and legal measures adopted to encourage and protect timber overseas.<sup>66</sup> He pointed out the strikingly different approach in America from the European model he praised because not one single state in America held land in reserve for future forestry use.

Hough advocated in his report that “we must at least for the present, depend upon the owners of the soil to plant [trees].”<sup>67</sup> Hough understood property owners would require education, supplies, and possibly some persuading to preserve or grow new forests. The European types of foresters, according to Hough, were not suitable for American forestry positions because of the strikingly different land-tenure system. In an effort to motivate afforestation and reforestation, Hough appealed to property owners' pocketbooks. The profits of a planted forest, he said, were uncertain but by judging from the past increases, “they will be greatly advanced by the time the timber planted comes to maturity for sale... [and will] attract the attention of financiers as a safe and profitable subject for management.”<sup>68</sup>

Hough reported directly to the Commissioner of Agriculture, William G. Le Duc, the man in charge of policy making and legislation related to farming and agriculture.<sup>69</sup> Le Duc described the *Report* as statistically valuable, the content as accurate and Hough's effort as

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<sup>65</sup> 25,000 copies were printed and distributed to both Congress and the Department of Agriculture. Ibid., 321–322.

<sup>66</sup> Ibid., 301–384.

<sup>67</sup> Ibid., 26.

<sup>68</sup> Ibid., 27.

<sup>69</sup> “President Hayes appoints William to be the U.S. Commissioner of Agriculture.” Dakota County Historical Society, “La Duc Image Gallery,” DCHS, <http://www.dakotahistory.org/LeDuc/gallery.asp> [accessed April 11, 2010].



exhaustive.<sup>70</sup> Hough made sure to include many instructions on proper forestry techniques, hoping it would educate and begin a movement of informed advocates of forestry. He formulated suggestive regulations on forestry matters that state and local governments could easily implement and called for the addition on the field of silviculture in all American universities.<sup>71</sup>

Scientific testing on climate conditions in and around forests had begun in Europe ten or so years before his first Report and Hough felt U.S. experiments would make a good comparison one day.<sup>72</sup> Hough uses over one-hundred pages to maintain that the “Connection between forests and climate” was a quantifiable study and detailed foreign and domestic examples of tests and results. He detailed encouraging data on the increase of atmospheric moisture in the form of humidity, equalized temperatures in and around afforested woodlots, the maintenance of natural springs, and the retardation of erosion as proof that trees had environmental importance. Using numerous graphs and charts the chapter sent a confident message that forests, natural and artificial, had a climatic beneficial influence on an environment and that deforestation resulted in the exact opposite.

Climatic benefits were not his sole concern— Hough also investigated shelterbelts and windbreaks. Hough chose to reprint Manhattan Kansas resident Washington Marlatt’s research presented to the State Horticultural Society in 1875 in support of timber-belts for the protection of agricultural endeavors. Marlatt urged the use of shelter trees to residents of plains states in order to protect “farm crops, the orchard, the stock-range, and the home and its surroundings”

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<sup>70</sup> Hough, *Report Upon Forestry*, 4.

<sup>71</sup> Silviculture is defined as “the growing and cultivation of trees.” Hough, *Report Upon Forestry*, 197–199, 613–632.

<sup>72</sup> Hough, *Report Upon Forestry*, 221.

from damaging winds.<sup>73</sup> He encouraged the use of “native-forest trees, rather than any” foreign varieties whose ability to survive in the Kansas soils was untested.<sup>74</sup>

Hough discussed the experimental farms conducted by various railroads around the country, but stated that no forestry study so far attempted was both comprehensive and 100 percent trustworthy. He described Richard Smith Elliott’s KPR farms as “but a rude experiment,” noting that, “the results prove nothing . . . the trial was not continued long enough to fairly determine their actual or comparative merits.”<sup>75</sup> Hough felt another effort to propagate trees on the prairie would reap better or at least different results on climate change. In Hough’s mind, Elliott’s farms were only uncompleted, not failures, so he was optimistic about a second test. Hough stated, no “experiments have been made [in America] to show by actual measurement, by degrees and quantities the differences that exist in the rainfall” after the planting of trees, but indicates a desire to try.<sup>76</sup> Although no quantifiable tests existed, he alluded to Kansas, Nebraska, and Missouri inhabitants, who assured him that rainfall had increased in recent years.<sup>77</sup>

In 1882, Hough produced another *Report upon Forestry*, which claimed tree planting to be of the highest importance to national welfare. He claimed, “It is no longer a theory, but a fact demonstrated by long and numerous observations, that the present of woodlands tends to equalize and moderate the vicissitudes of the climate, but it is idle to expect this from a single grove of woodland upon the prairie.”<sup>78</sup> Looking at the whole picture, he concluded that it was no longer possible for the Department of Agriculture to rely exclusively on individual initiative to

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<sup>73</sup> Ibid., 276–77.

<sup>74</sup> Ibid., 277.

<sup>75</sup> Ibid., 119–120.

<sup>76</sup> Ibid., 286.

<sup>77</sup> Ibid., 291.

<sup>78</sup> Franklin B. Hough, *Report upon Forestry* 1882, Department of Agriculture (Washington, DC: Government Printing Office, 1882), 24.

promote the forestry movement efficiently. Amended twice, the TCA required less than forty acres of forest plantings yet, was still producing inadequate results for foresters to study. He suggested a cooperative effort between the federal government and states' agricultural universities to record meteorological data.<sup>79</sup> Hough felt it was in the interest of both parties to shared results. Above all, he wanted to test his interpretation of Marsh's theory that trees could increase rainfall. His goal was to produce direct comparative observations to juxtapose with the, seemingly positive, European test results.<sup>80</sup>

Hough realized early on that the public would need some convincing to sacrifice good agricultural land for the planting of trees. In 1878, he recommended tax breaks and rewards to the states for tree planting.<sup>81</sup> In the 1882 *Report*, he claimed the fair-market price for lumber should be explained to the public, not the technical and science information about the climate. He wrote that Americans were full of "liberty and independence" and would not be willingly let the federal government impose tree-planting quotas on their homesteads.<sup>82</sup> Lumber prices were increasing yearly, and Hough still felt the possibility of profits would persuade residents to plant trees. He explained how readily available supplies would be needed, giving a sense of urgency to the proposed experiment– the government's fields could serve as a local nursery, increasing the rate of successful transplants and incidentally prove that afforestation would better the climate.

Hough never saw his plans put into action because in 1883 the Commissioner of Agriculture, George B. Loring, replaced Hough with Nathaniel H. Egleston due to a personal disagreement. Hough remained with the division as a forestry agent for two years following his

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<sup>79</sup> Hough, *Report upon Forestry* 1882, 48–49.

<sup>80</sup> Hough explained that the European researchers report to the public yearly and in some cases monthly on their results and findings. *Ibid.*, 56.

<sup>81</sup> Hough, *Report Upon Forestry* 1878, 197–199.

<sup>82</sup> *Ibid.*, 58.

demotion until his death in 1885.<sup>83</sup> Lacking in professional training, Eggleston “had precisely as much scientific training in forestry as had Hough—none.”<sup>84</sup>

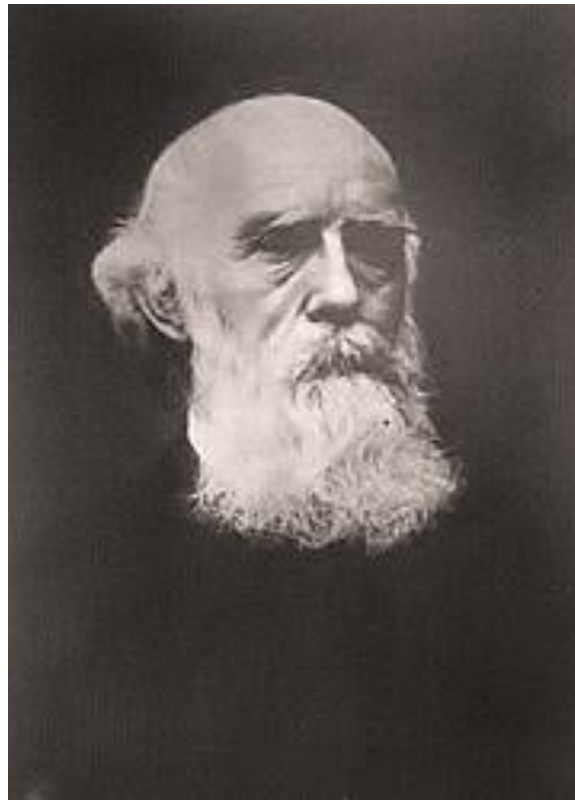


Figure 13. Nathaniel H. Eggleston, unknown year. Courtesy of the Forest History Society.

Eggleston distributed circulars throughout what he called the “Plains States” (the Dakotas, Illinois, Iowa, Kansas, Minnesota, and Nebraska) to survey their forest supply or lack thereof in 1883.<sup>85</sup> He received numerous reports and summaries from the six states and compiled them in his 1884 *Report*. Ellis County, the former location of Richard Smith Elliott’s chief experimental farm, reported twenty varieties of trees successfully growing there. The presence of Osage orange, catalpa, ailanthus, mulberry, and ash trees in that region are evidence that some of

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<sup>83</sup> Forest History Society, *The Forest Service—Chiefs*, “Franklin B. Hough.”

<sup>84</sup> Char Miller, “Amateur Hour: Nathaniel H. Eggleston and Professional Forestry in Post–Civil War America,” *Forest History Today* (Spring/Fall 2005), 22.

<sup>85</sup> Nathaniel H. Eggleston, *Report on Forestry 1884*, U.S. Department of Agriculture (Washington D.C.: Government Printing Office, 1884), 416.

Elliott's work survived.<sup>86</sup> Not every county could declare successful tree growth. Many describe difficulties that hindered forest cover, including persistent dry weather, hot winds, and a general lack of knowledge in the area on proper care in silviculture.<sup>87</sup> It is obvious that Hough's effort to spread forestry instruction had not yet reached western Kansas. Egleston used Kansans' lack of knowledge, like Hough did, to recommend a federal experimental agriculture station in Kansas: "such a station west of the Missouri River would in a few years settle many vexed questions, and give intelligent direction to the labors of the forester in the region which needs him most."<sup>88</sup>

Although Egleston did not directly quote *Man and Nature*, the undertone of his *Report* echoed Marsh, Elliott, and Hough ever so slightly because he supported climate amelioration through afforestation. Egleston furthered the cause of tree planting and experimental farms and clearly held interest in testing the theory scientifically. He brought national attention again to the fact that no environmental data was available to compare with European test results. Record keeping on rainfall totals had begun to take on a new importance in Kansas—there would be no followers of rainmaking theories without results showing rain had increased. Egleston's ideal experimental farm would serve both as a greenhouse, producing local supplies, and as a test site, monitoring rainfall totals closely.<sup>89</sup>

Egleston felt growing trees on a large scale was beneficial not only for atmospheric reasons, but also in economic terms. In his *Handbook of Tree-Planting or, Why to Plant, Where to Plant, What to Plant, How to Plant* (1884) Egleston set out to instruct prairie dwellers on how to cultivate trees en masse. Above all, he insists planters must recognize trees as living organisms with biological needs imperative to their survival—proper forestry care not only could

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<sup>86</sup> Ibid., 56.

<sup>87</sup> Ibid., 55–72.

<sup>88</sup> Ibid., 116.

<sup>89</sup> Ibid.

ensure the plants success, but societies as well.<sup>90</sup> He, like Hough, combined scientific and popular thought together and felt afforesting the plains would improve them. Each chapter is cleverly named using “wh-question’s” (why, where, what, who, and how) followed by the verb, to-plant and then sets out to answer the question to the reader.

The “Why to Plant” according to Egleston was to provide fuel to ensure future supply, for trees’ protective qualities around agricultural fields, and for their “intimate connection with [the] climate.”<sup>91</sup> He described trees as the prerequisite for man’s existence because of the vital oxygen they provide. To Egleston, artificial forests were not mere warehouses to hold future supplies—they were the harbingers of balance and could possibly check the effects of human’s destructive footprint on the landscape.

The “Where to Plant” recommendation by the Division of Forestry head, was the area of “exposed plains beyond the Mississippi [River]” since it was “almost a first necessity of life there” due to the severe north winds known to damage agricultural fields.<sup>92</sup> Egleston continued a firm faith in using Tertiary period forests as evidence that trees could grow in Great Plains wherever man planted them. The Division of Forestry was not interested in funding afforestation efforts in this era. Like his predecessor, Egleston suggested that the private railway companies, as consumers of millions of trees per year and owners of millions of acres perfect for shelterbelts should initiate prairie testing. Success could reap major economic rewards. “By so doing, they could not only promote their own interests and the comfort of travel, but would also be doing

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<sup>90</sup> Nathaniel H. Egleston, *Handbook of Tree-Planting or, Why to Plant, Where to Plant, What to Plant, How to Plant* 1884 (New York: D. Appleton and Co., 1900), 14, 84.

<sup>91</sup> *Ibid.*, 11–12.

<sup>92</sup> *Ibid.*, 22.

their part to secure for the region through which they pass those ameliorating climatic influences and those beneficial effects upon agriculture which forests are adapted to produce.”<sup>93</sup>

The “What to Plant” section of the publication encouraged planters to use native trees, because they were sure to succeed. Egleston’s list of 1884 and Elliott’s list of 1872 are very similar and both contain the *Catalpa Speciosa* or hardy catalpa.<sup>94</sup> Egleston described the tree as a durable yet decorative species that grew rapidly and therefore was becoming the favored tree of the railroad companies for ties. The catalpa, as reported by the USDF, was “to be one of the most valuable” species because when planted it grew quickly in artificial forests and it promised to bring quick capital gains.<sup>95</sup> The Atchison Topeka and Santa Fe, the KPR, and the Missouri River, Fort Scott and Gulf Railroad companies had all established experimental forestry plantations in Kansas and as of 1878 all were still growing successfully except the KPR fields.<sup>96</sup>

The “How to Plant” section of the book highlighted the fact that there are major differences between planting a few trees for decoration and planting them on a large scale. Shelterbelts and timber-claims according to Egleston should be planted using seedlings and fenced for protection if possible. He recommended the plantings to be close together in the beginning, then transplanted to a width of twelve to twenty inches for the best development. Wider planting suggestions like those found in “the Timber Culture Act of congress was found, in practice, to be defective, because it allowed trees to be planted at a distance of twelve feet from each other.”<sup>97</sup> Egleston’s book is one of the first federally produced tree planting manuals

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<sup>93</sup> The comfort of travel refers to the suggestion of shelterbelts, which in theory would alleviate travelers from having to deal with time-consuming snow blockages while riding the train in the winter months. *Ibid.*, 44–45.

<sup>94</sup> See the content from footnote 96 for Elliott’s list.

<sup>95</sup> Egleston, *Handbook of Tree-Planting*, 73–74.

<sup>96</sup> Hough, *Report Upon Forestry* 1878, 118–120.

<sup>97</sup> Egleston, *Handbook of Tree-Planting*, 111.

aimed at the cultivator of large-scale tree plantations for profit and in support of climate amelioration through afforestation.

Egleston's tenure within the division was unstable from the start, according to historian Char Miller, due to the manner of his appointment and his lack of forestry training. A professional forester, Bernhard Eduard Fernow, replaced Egleston in 1886.<sup>98</sup> The transition from self-taught, forestry-minded Transcendentalists to a class of European educated foresters holding credentials illuminates the larger transition in the division to scientific forestry. Fernow, a Prussian academy trained forester, worked to shift the emphasis of the Division of Forestry from mere tree planting to forest management. Fernow saw "ecologically sound forests" as technologically sound forests because forests managed within their natural limits were capable of serving all societal needs.<sup>99</sup> "Forest management has two objectives according to Fernow: "1- To produce and reproduce certain useful material. 2- To sustain or possibly improve certain advantageous natural conditions."<sup>100</sup> Even though it was becoming a highly questioned theory, Fernow defended the idea of climate alteration on a large scale through afforestation.

The TCA essentially created thousands of uncontrolled tree-growing laboratories strewn across the Midwest, but the amount of uncoordinated data that emerged was of no real use to a wider audience. Bernhard E. Fernow envisioned his Forestry Division as a cadre of experts in both practical and experimental forestry. He wanted to guide foresters in afforestation techniques and reforestation methods and he hoped to develop sustainable-yield forests for a continuous supply, but he needed to back up his suggestions with systematic studies and quantifiable data. Yet, without federal forestry stations to conduct research, he could not hope to avoid disastrous

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<sup>98</sup> Char Miller, "Amateur Hour: Nathaniel H. Egleston and Professional Forestry," 22.

<sup>99</sup> Gardner, "Constructing a Technological Forest," 280.

<sup>100</sup> Bernhard E. Fernow, *What is Forestry?*, U.S. Department of Agriculture (Washington D.C.: Government Printing Office, 1891), 11.



disturbances. Fernow understood forest ecology was nothing to take lightly— one wrong suggestion could produce calamitous results due to the interconnectedness in a forest ecosystem.<sup>101</sup>

Shifts were taking place in the fields of scientific thought in the late nineteenth century and it was on its way to becoming a fully secular discipline. One of the proponents of scientific land use was John Wesley Powell. He became one of the earliest experts on land use past the 100<sup>th</sup> meridian while conducting surveys for the United States Geological Service in the American West. In his *Report on Arid Lands*, he asserted that eastern styles of land distribution and history of corporate owned resources needed alteration when settlement stretched beyond the dry-line. Low rainfall numbers and semi-arid environments made agricultural endeavors for profits on small parcels of land impossible without irrigation of some kind. Powell asserted that the HA, TCA, and the later Desert Land Act were inconsistent with natural limits and only prepared property owners for failure.<sup>102</sup>

J. W. Powell's call for a more utilitarian based use of western lands fell on deaf ears in Kansas because of opportune high rainfall years which were peaking in 1878. The wheat harvest of 1877 and 1878 were bumper crops, resulting in a yield of over twenty bushels per acre in Ellis County. By 1880, the dominant view of the plains was that the soil was prime agricultural lands.<sup>103</sup> Land office records in Hays City from 1876 to 1879 reveal that 504,380 acres were claimed under the HA and 439,721 acres claimed using the TCA: "Good crops meant more land sales and more prairies broken for farms."<sup>104</sup> Powell rejected theories of increased rainfall in his

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<sup>101</sup> Ibid., 141.

<sup>102</sup> Donald Worster. *A River Running West: The Life of John Wesley Powell* (New York: Oxford University Press, 2001), 342–362.

<sup>103</sup> Allen, "The Garden–Desert Continuum," 214–215.

<sup>104</sup> Miner, *West of Wichita*, 121.

*Report on Arid Lands*, but because his ideas were opposite of popular notions of providence, his proposals to reserve arid lands for pastoral purposes was disregarded.<sup>105</sup>

Powell's attempt to withdraw lands deemed too arid for agriculture out of the hands of the Public Land Commission helped influence a new generation of prairie experimenters and boosters in support of agricultural efforts west of the 100<sup>th</sup> meridian. In a pro "Rain-Follows-the-Plow" address to the Nebraska State Horticultural Society in 1880, Samuel Aughey and Charles Dana Wilber presented their views on "Agriculture Beyond the 100<sup>th</sup> Meridian." Aughey and Wilber asserted that only some of the lands past the dry line were lacking in water and even those that do, still possess top-quality soils capable of raising crops. They felt upon research, "that the moisture and rainfall is gradually increasing from east to west," and viewing the 100<sup>th</sup> Meridian as a boundary beyond which grain crops cannot be grown was an erroneous proposition.<sup>106</sup> The two pseudoscientists claimed with every new settler, new springs would emerge from the ground and the rainfall would increase. Although Aughey and Wilber do not mention Powell's report or his land reform ideas, it is clear they were aiming this work at those in an agreement with Powell.

Although experimentation on the pseudoscientific theory "Rain Follows the Plow" and afforestation had yet to be completed, virtually the whole population accepted them without clear elaboration.<sup>107</sup> Fernow as Chief Forester had no national forests to manage, but held an enormous amount of control on forestry ideals in America. His utilitarian outlook on forestry, like Powell's on the West as a whole was multifaceted: he looked at forests like a scientist, yet with an eye for

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<sup>105</sup> Kutzleb, "Rain Follows the Plow," 82–86.

<sup>106</sup> Samuel Aughey and Charles D. Wilber, *Agriculture Beyond the 100<sup>th</sup> Meridian* (Lincoln: State Printer, 1880), 4–5.

<sup>107</sup> Kutzleb, "Rain Follows the Plow," 110..

efficiency and future supply.<sup>108</sup> An efficient forest was a regulated forest, but lumber “was not the only value of a forest”– he urged that forests held many indirect values as well.<sup>109</sup>

Nevertheless, without forestry research programs, Fernow could not scientifically prove or disprove any alleged qualities trees may have possessed.

Generally held as truths by all levels of society on the plains, the theories of increased rainfall became quite popular. One University of Kansas professor, F. H. Snow, claimed in 1883 Kansas lands could prove rainmaking theories because the settlement of Kanas was slow and in clear stages of advancement. Snow wrote that “Here certainly, if human agency could anywhere affect climate... [and] settlement ever increase rainfall, will such an increase be most unmistakable. That such increase has actually taken place, I believe to be established beyond a doubt.”<sup>110</sup> Similar to the public movement aimed at disproving the desert theory thirty years prior, the fervent belief plows and trees could assist humans’ dominion over natural systems.

Daniel Webster Wilder, author of *The Annals of Kansas* (1885) reported in 1887 that he had successfully altered the climate of 200,000 acres simply by planting trees. *The Industrialist* reported that Wilder’s “dry, sunbaked land, cracked and fissured high prairie,” was ameliorated “into moist and shaded woodland, the home of birds and cattle, and the parents of millions of brooks and creeks.” Wilder declared that “in a fair stand up fight we have whipped the climate and driven it howling from the field,” and with “the same enterprise and gallant spirit that drove the ruffian, guerilla, and the town-burner from Kansas will also speedily abolish the storm fiend – his natural and brutal ally.”<sup>111</sup> Wilder and Snow both attribute the change in climate as a scientific fact, which helped the idea spread. The testimonies offered by individuals in this era

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<sup>108</sup> Langston, *Forest Dreams, Forest Nightmares*, 104–105.

<sup>109</sup> *Ibid.*, 107.

<sup>110</sup> F. H. Snow, “Is the Rainfall of Kansas Increasing,” *Transactions of the Kansas Academy of Science* 1883–84 (Topeka: State Publishing House, 1885), 102.

<sup>111</sup> Daniel W. Wilder, “Timber to the Front,” *The Industrialist*, February 26, 1887.

were similar to the publications of immigration societies, railroad agents, and land agents in the settlement era (1854–1880), but their striking metaphors and use of evidence gave them an aura of “scientific” substantiation.

Although land-grant colleges did what they could to disseminate information concerning forestry and agricultural sciences, their small model farms and meager finances could not spread valuable data to the masses.

By the early 1880s, enough states were struggling with the need for institutionalizing agricultural research that sentiment for a concerted national approach was revived. It was Seaman A. Knapp, a professor at Iowa State College, who authored a proposal... to Congress. This bill called for an agricultural experiment station in each state to be funded out of the national treasury. During the next five years, this bill was revised a number of times until 1886 when the concept found favorability in the House agriculture committee then chaired by Rep. William H. Hatch of Missouri. The Hatch Act was signed into law by President Grover Cleveland on March 2, 1887. Each land-grant college was initially given \$15,000 annually to support its experiment station... The Hatch Act provided continuing investment in agricultural science and technology.<sup>112</sup>

With this infusion of funds and maintenance of the connection to the Department of Agriculture through the Division of Forestry, KSAC began its first experimental farm in the spring of 1888.

The first Hatch Act experimental station in Kansas was located in Manhattan on the campus of KSAC. Professor E. M. Shelton, professor of Practical Agriculture from 1874–1889, was elected to be the director of the experimental farm. Shelton had at his disposal a total of 315 acres to experiment with, 100 acres from the lands of the old Bluemont College farm, 155 acres on the current campus, and an additional 60 acres of virgin prairie purchased in 1886.<sup>113</sup> In the

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<sup>112</sup> David G. Morrison, “History of the Hatch Act of 1887,” *Louisiana Agriculture Magazine* 55, no. 2 (Spring, 2012), <http://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2012/Spring/History-of-the-Hatch-Act-of-1887.htm> (accessed December 12, 2012).

<sup>113</sup> Leland E. Call, “Agricultural Research at Kansas State Agricultural College (KSU) Before Enactment of the Hatch Act (1887),” *Kansas State Agricultural College Experiment Station Bulletin* 441 (Manhattan: Kansas State University, 1961), 13

first year, he prepared the land and moved the department across campus and the university constructed the first building dedicated solely for the Department of Horticulture and added three greenhouses.

Professor Shelton had been experimenting in horticulture on the campus for many years but the tests were previously limited to fruit and orchard matters, forest tree and shelterbelt trials, and work with ornamental shrubs and flowers.<sup>114</sup> The University as a whole “had become an agency to which the people looked increasingly for help,” and was well prepared to initiate an official experimental farm when the Hatch Act was passed in 1887.<sup>115</sup> In 1888, the Board of Regents adopted a list of research goals and resolutions which dictated space for the study of crop rotation, grasses and other forage growth experiments, feed crop digestibility, chemical analysis of soils and waters, fertilizer studies, common and uncommon trees, shrubs and fruits, plant diseases and cures, entomology, and a variety of farm animal testing.<sup>116</sup>

The first Agricultural Experiment Station (AES) Annual Report was printed in April 1888, and promised to the people of Kansas at least four publications per year. Shelton announced to the farmers of the state, that they could accept the experimentation as scientific fact and urged them not to ignore the results, no matter how foreign they seemed.<sup>117</sup> He welcomed correspondence or inquiries on horticulture, agriculture, and all related sciences from everyone. In closing he reminded readers that all of “the Bulletins and Annual Reports of the Station are, on application, sent free to residents of the State. Address all correspondence, inquiries for bulletins, samples, etc., to Director of Experiment Station, Manhattan, Kansas.”<sup>118</sup>

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<sup>114</sup> Ibid., 26.

<sup>115</sup> Ibid., 39.

<sup>116</sup> E. M. Shelton, “Organization, Equipment, and Aims,” *Kansa State Agricultural College Experiment Station Bulletin* 1 (Manhattan: Kansas State Agricultural College, April 1888), 4–6.

<sup>117</sup> Ibid., 7.

<sup>118</sup> Ibid.



Figure 14. Kansas State Agricultural College tree plantings, circa 1880s, Courtesy of the KSU Archives and Special Collections.

The diverse set of departments participating in the research at the AES led to a mixed variety of topics to publish in their bulletins, all of which could apply to a farmer at one point or another.<sup>119</sup> The tenth bulletin was entitled “Notes on Conifers for Kansas Planters” and gave suggestions on planting, transplanting, and pruning, and contained a detailed list of species previously planted and studied at the University. The new station director, Professor E.A. Popenoe, claimed “the favorite conifer with the Kansas planter is still the Red cedar (*Juniperus*

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<sup>119</sup> John D. Walters, *Columbian History of Kansas State Agricultural College: Located at Manhattan, Kansas* (Topeka: Hamilton Printing Co., 1893), 53.

*virginiana*),” which is native to the state and very hardy.<sup>120</sup> Kansas State Agricultural College’s focus on suggesting conifers for prairie planting was in line with the Forestry Division. Bernhard E. Fernow believed that conifers, particularly pines, were perfect for use in the prairie states for crop and home protection, but a forest intended for commercial use, should consist of a mix of varieties.<sup>121</sup> Conifers, unlike deciduous trees, retain their foliage year round, but deciduous trees grow faster and have harder density woods.

Professor Charles Bessey of the University of Nebraska began conducting experiments in the Sand Hills with conifers in the 1880s. As a co-author of the experiment station section of the Hatch Act, Bessey became a trusted advisor to the Department of Agriculture and especially to the Forestry Division as a whole. His experimentation in the Sand Hills of Western Nebraska led to a wealth of information on conifer use in arid, sandy soils. Bessey’s prairie experiment near the end of 1892 contained over nine thousand trees.<sup>122</sup> The constructed forest in Nebraska was a success because Bessey analyzed and learned from the natural complexities in other forest ecosystems and attempted to recreate them.<sup>123</sup> Scientific tree planters, like their predecessors, considered their work reforestation, not afforestation, as they should have. They spoke in terms of natural repair, not the alteration of a natural environment.

The urging of trees’ atmospheric and climatic benefits died down in the 1880s, but the discussions did not disappear entirely— they evolved and became more scientific. One of these conversations took place in the *Journal of Science* in November 1888. Professor Fernow, educated in Europe, was well versed in research conducted there on forests and their influences

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<sup>120</sup> E.A. Popenoe, S.C. Mason, and F.A. Marlatt, “Notes on Conifers for Kansas Planters” *Kansas State Agricultural College Experiment Station Bulletin* 10 (Manhattan: Kansas State Agricultural College, May 1890), 5.

<sup>121</sup> Droze, *Trees, Prairies, and People*, 37–38; Bernhard Eduard Fernow, *Report upon Forestry Investigations 1877–1898*, U.S. Department of Agriculture (Washington, DC: Government Printing Office, 1899), 23.

<sup>122</sup> Gardner, “Constructing a Technological Forest,” 281–283.

<sup>123</sup> *Ibid.*, 293.

on climate and rainfall. He presented some of this European research to the Philosophical Society of Washington and felt at that time sufficient evidence on climate modifications was lacking in both America and Europe.<sup>124</sup> Therefore, he continued the old adage that further research was required on the topic, research his department could do, if only they had their own forests.



Figure 15. Bernhard E. Fernow, unknown year, Courtesy of the Forest History Society.

Henry Gannett of the Department of the Interior replied to Fernow's presentation and pointed out that Fernow neither denied the claims nor supported them and as the Division's headman, he needed to do one or the other. Gannett then produced a mound of rainfall data collected from across the United States with accompanying mathematical equations that proved

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<sup>124</sup> Bernhard Fernow, Henry Gannett, "The Influence of Forests on the Quantity and Frequency of Rainfall" *Journal of Science* 12, no. 303 (November 23, 1888), 242.



the rain was not increasing in any state where tree planting had taken place on a large scale.<sup>125</sup> He felt the idea of afforesting the plains for increased rain was merely a false popular notion. He maintained that forests do improve temperature and moisture conditions, but asserted these results were only on a micro level. Gannett suggested planting trees not for climate amelioration, but in hedgerows to “serve mechanically as windbreaks.”<sup>126</sup>

The Gannett–Fernow debate is a perfect example of the two sides of afforestation. One side contended it could improve the climate– the other felt the climate ideas were complete fabrications, trees were only capable of improving conditions on a micro scale, and more importantly, they contained the possibilities of economic profits. Great Plains agriculturalists were realizing the climate was mercurial. Rainfall did not come when they wanted it to, it was unequally distributed, and early frosts could ruin everything even if adequate rainfall did fall. The AES reported in 1890 on the blunt climatological variances witnessed in two years on the University’s agricultural test fields. During the prime growing months of May, June, and July the Manhattan farm recorded 17.85 inches of rain in 1889, but in those same months in 1890, only 6.54inches fell on the campus test fields.<sup>127</sup> The superintendent of the farm, C.C. Georgeson explains that the choosing of which crops to grow was made even more “complicated in Kansas by the uncertainty of the rainfall.”<sup>128</sup>

Although Fernow retained faith in altering the climate and hoped to prove scientifically climate amelioration through afforestation worked, the public had become less enamored with the notion. Kansas in the 1880s was mostly free of droughts and grasshopper invasions and that increased the number of timber claims but looking around the state no one saw forests growing.

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<sup>125</sup> Ibid., 243–244.

<sup>126</sup> Ibid., 244.

<sup>127</sup> C.C. Georgeson, H.M. Cottrell and W. Shelton, “Experiments with Forage Plants,” *Kansa State Agricultural College Experiment Station Bulletin* 18 (Manhattan: Kansas State Agricultural College, May 1890), 176.

<sup>128</sup> Ibid., 175.

On March 18<sup>th</sup>, 1890, during congressional debates on H. R. 7254, or “a Bill to Repeal the Timber–Culture Laws, and for Other Purposes,” Mr. Peters, the Kansas Representative testified that while the TCA had “resulted in great benefit” for his state, it also was heavily used by speculators.<sup>129</sup> He understood that “Westernern States [were] largely interested in the question of the growth of timber. I know in my own state the growth of timber has affected [sic] the climate favorable... [but] in the face of all the benefit that has resulted from the timber-culture law, a large number of persons have obtained possession of 160 acres of land each under that law who have never made any effort to comply with the law of good faith.”<sup>130</sup>

Mr. Payson, the persistent representative from Illinois, reminded his fellow congressional representatives that “Legislation repealing the timber-culture [had] been recommended year after year by the Interior Department,” and that the March session would mark the fourth reading of H.R. 7254.<sup>131</sup> Payson believed that the “bill under its practical operation [was] only a system of land grabbing.”<sup>132</sup> Mr. Holman from Indiana suggested that the Committee on Public Lands should develop a public policy to preserve and protect the remaining Federal lands holding extensive tracts of forests if the repeal up for vote was successful.<sup>133</sup> After hours of debating on the bill, it was clear not everyone in the chambers could agree on what to do with the bill and to Payson’s dismay, it was accepted pending further revisions and review.

Congress repealed the Timber Culture Act on March 3, 1891, but not before the addition of a secret rider, later known as the Forest Reserve Act.<sup>134</sup> The rider empowered the president to “from time to time, set apart and reserve [land] in any State or territory having public lands

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<sup>129</sup> *Congressional Globe*, 51st Cong., 1<sup>st</sup> sess., March 18, 1890, pt. 11: 2352.

<sup>130</sup> *Ibid.*, 2353.

<sup>131</sup> *Ibid.*, 2350.

<sup>132</sup> *Ibid.*, 2351.

<sup>133</sup> *Ibid.*

<sup>134</sup> Williams, *Americans and Their Forests*, 410.

bearing forests... wholly or in part covered with timber or undergrowth, whether of commercial value or not, as public reservations.”<sup>135</sup> Michael Williams credits the passing of the bill with the secret rider to the impulsive Representative, Mr. Payson who “steam-rolled [sic] it through a distracted and inattentive House... [Resulting in] a peculiar combination of chance circumstances,” that favored the bill heavily, but “whatever the reason, few people realized the full implications of the measure.”<sup>136</sup> The repeal of the TCA, thus like its enactment, elevated trees into the national conversation. Because of the FRA, 47 million acres of trees were preserved for future use in federal preserves over the next ten years.<sup>137</sup>

Many manuscripts on the federal system of forest management begin their investigations with the Hatch Act or the FRA when the political debates were largely over and the public debates between preservationists and conservationists began. This monograph proves that the national conversation that centered on tree propagation and preservation actually begins thirty years prior with the enactment of the TCA and the encouragement of afforestation in the plains. The division in the afforestation movement between the pro-climate amelioration boosters and the science based researchers and foresters, is quite similar to the feud that developed after the turn of the twentieth century between the preservationist John Muir and the conservationist Gifford Pinchot. Climate boosters, like the preservationists, aimed their activities toward protective goals and the science-based foresters, like the conservationists, directed their actions toward the scientific management of resources.

The chapter of rainmakers and climate ameliorative tree planters ended in the devastating droughts of the 1890s, when the true character of the climate pendulum in the western plains

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<sup>135</sup> *An Act to Repeal Timber–Culture Laws, and for Other Purposes*, Public Act, 162, U.S. Statutes at Large 26 (March 3, 1891): 1103.

<sup>136</sup> Williams, *Americans and Their Forests*, 410–411.

<sup>137</sup> *Ibid.*, 411.

fluctuated to its extreme limits.<sup>138</sup> The population gains Kansas realized in the 1880s were lost in the 1890s and millions of acres reverted to the public land pool. Western counties saw a 27 percent reduction of population and a farm failure rate of 37 percent from 1890–1900.<sup>139</sup> The State Horticultural Society and the State Board of Agriculture ended their support of plowing and planting trees for climate improvement and geared their actions at “supplying agricultural information and left the promotions of Kansas to others.”<sup>140</sup>

Afforestation continued in Kansas after the repeal of the TCA but with very different goals in mind: adaption and revenue. Certain species were required for shelterbelts, commercial plantations, and others for fuel wood and decorative uses. Field demonstrations and experimentation in forestry matters outside of the Great Plains focused on lumber supply and the rational use of supplies. Eventually in 1896, the Division cooperated with the existing agricultural experimental stations in the Great Plains and a collective effort arose to overcome the trials of prairie planting. Experimental forestry farms in Kansas did not diminish in the 1890s, they increased. Based on science, afforestation henceforth developed into a technological system, repeatable by entrepreneurs and agriculturalists alike. The days of Richard Smith Elliott’s approach, haphazardly testing species without irrigation or cultivation, had disappeared forever.

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<sup>138</sup> Williams, *Americans and Their Forests*, 386; Cobb, “A Study of Afforestation in the Great Plains Region,” 228.

<sup>139</sup> Gary D. Libecap and Zeynep Kocabiyik Hansen, “Rain Follows the Plow and Dryfarming Doctrine: The Climate Information Problem and Homestead Failure in the Upper Great Plains, 1890–1925,” *The Journal of Economic History* 62, no.1 (March, 2002), 95.

<sup>140</sup> De Bres, “Come to the Champagne Air,” 123.

## Chapter 3 - Artificial Forests in Kansas

*The meaning of a tool is inseparable from the stories that surround it.* David E. Nye<sup>1</sup>

The first *Bulletin* issued by the Forestry Division was entitled “Report on the Relation of Railroads to Forest Supplies and Forestry.” The Report highlighted the relationship of railway construction, which benefited the country, to forest depletion, which was detrimental. Bernhard Fernow opened the publication with a declaration that “it can be fairly estimated that to build our present railroad system more than 100 million acres, or one-fifth of our present forest area, were stripped during the last fifty years, and [over] the next fifty will very likely call for more than double that amount.”<sup>2</sup> At first, the subject of the *Bulletin* may not seem like a suitable topic of investigation for the Division’s first informative publication, but because the nation’s foresters were concerned with an impending “timber-famine,” they felt a sense of duty to preach forest preservation and even afforestation to the largest commercial consumers of forest supplies.

In order to continue high usage rates, the Division needed to manage the agricultural, environmental, and technological relationship between human and non-humans. The *Bulletin* warned consumers of forest supplies that the “popular delusion of the inexhaustible forest wealth of America” was indeed just that, a delusion.<sup>3</sup> The creation of railways through the Great Plains required the shipment of timber supplies from great distances, compounding the costs of construction significantly— one mile of track required 2,640 ties. The unlimited harvesting of eastern forests over generations, supplied western railroad construction, took a toll on forests, never the less, because of the sure profits, wood suppliers willingly depleted privately owned

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<sup>1</sup> David E. Nye, *Technology Matters: Questions to Live With* (Cambridge: MIT Press, 2006), 3.

<sup>2</sup> Bernhard E. Fernow, “Report on the Relation of Railroads to Forest Supplies and Forestry,” *Department of Agriculture, Forestry Division Bulletin 1* (Washington: Government Printing Office, 1887), 7.

<sup>3</sup> *Ibid.*, 14.

natural resources. Fernow steered the Division of Forestry towards the idea that a supply of managed forests was fundamental for the survival of civilization. However, since 85% of the forest cover in the nation at the turn of the century was private, their solution was a recommendation to both the railways and private citizens to create artificial forests to ensure supplies.<sup>4</sup>

The reporting agent for the Division in the Great Plains was Maximilian Kern, a former employee of the Kansas Pacific Railroad. His portion of the bulletin contained references to Elliott's experimental endeavors, but never refers to Elliott directly.<sup>5</sup> Kern asserted that the railway discontinued their efforts, not because of the grasshoppers, but due to an assumption that the local populace would maintain of the artificial forests. However, since the forests failed, Kern asserted they were improperly cared for, or ignored entirely.<sup>6</sup> Fernow and the Division wanted to assure landowners that growing trees was still a profitable adventure because not only ties required, but also telegraph poles, bridge building materials, and trestle supports. Plains resident were encouraged to join the "timely enterprise" and supply the demand and future supplies.<sup>7</sup> The only questioned that remained was, what type of tree could grow fast and straight enough to be utilized like a cash crop?

The catalpa tree was previously tested and planted by Elliott and Gale and proved to grow well in Kansas. When E. E. Barney published two pamphlets on the species in 1877 and 1878, they resulted in a new impetus to investigate the catalpa's potential. Barney, a plant proselytizer, felt the catalpa was the answer to the timber supply shortage on the plains. He asserted, "the catalpa wood was the ideal solution to this problem because it was extremely

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<sup>4</sup> Clary, *Timber and the Forest Service*, 7-9; Fernow, "Report on the Relation of Railroads," 22-23.

<sup>5</sup> Kern described the fields as being in the former Great American Desert and asserted the director's goal was to prove that grasses, grains and trees could survive past the 100th meridian. *Ibid.*

<sup>6</sup> Fernow, "Report on the Relation of Railroads," 23.

<sup>7</sup> *Ibid.*

resistant to decay... grew incredibly fast and was not particular about what type of soil it required.”<sup>8</sup> Barney, in his enthusiasm, even offered to ship anyone 2500 seeds for a mere fifty cents. In his 1878 pamphlet, he reported on two farmers in Indiana that testified of catalpa fence posts that were in the ground for over twenty years as being sound enough to dig up and move to another place without any signs of decay.<sup>9</sup>

Importantly, Barney also specified the differences between the two most known varieties, which were difficult to decipher in the first few years of a seedlings life. Only the hardy variety, *Catalpa speciosa*, grows well in the plains. The softer variety *Catalpa bignonioides* blooms three weeks earlier, only grows to medium heights, and was not suited for northern environments. The hardy variety according to Barney, “will shoot up a straight, vigorous stalk,” and was not sensitive to frost. He quotes abundant witnesses from Kansas and their testimony in favor of the *Catalpa speciosa* or hardy variety.<sup>10</sup> It is unknown which variety Elliott planted at the Wilson KPR experimental farm, but he was confident enough in the species to include it in a box of seedlings and seeds he sent to his son Reginald. Richard instructed his son, who was in charge of the Kirkwood, Missouri farmstead, to plant the catalpas around the farm in rows of living hedges.<sup>11</sup>

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<sup>8</sup> Peter Del Tredici, “The Great Catalpa Craze,” *Arnoldia* 46, no. 2 (Spring 1986), 5.

<sup>9</sup> E. E. Barney, “Additional Facts and Information in Relation to the Catalpa Tree,” (a paper read before the National Agricultural Congress at New Haven, Connecticut August 27, 1878), 7.

<sup>10</sup> *Ibid.*, 10.

<sup>11</sup> Elliott to Reginald H. Elliott, March 12, 1871, vol. 3, Richard Smith Elliott Papers.



Figure 16. Hardy Catalpa (*Catalpa Speciosa*). Courtesy of the Nebraska Forest Service.

John Aston Warder wrote on the species in 1881 and shortly humored the theory that it was native to Japan and transplanted to the U.S. Nevertheless, in the end he ruled it a native species due to early reports of southern Native American tribes utilizing the tree for centuries prior to white settlement.<sup>12</sup> The hardy catalpa was supposedly “introduced by... nurserymen throughout Ohio, and Illinois, Kentucky, Missouri, and Iowa” in the 1820s but almost all of these

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<sup>12</sup> John Aston Warder, *The Western Catalpa*, printed for the American Agricultural Association (Washington: Government Printing House, 1881), 88.



later died and therefore were obviously the softer catalpa.<sup>13</sup> In the 1880s scientific forestry fashion, Mr. Barney offered exact planting and cultivating instructions in his publications on the *Catalpa speciosa*. Warder and Barney's publications helped shape the social construction of tree use in the Great Plains, as not only an economic tool but also one for farm and home protection.

Entrepreneurs and agriculturalists prior to the 1880s believed trees could help bring civilization into the open prairies, increase the rain, and recreate eastern-stylized landscapes. When these ideas combined with the legislative encouragement, the social evolution of trees as a living tool gained legitimacy. From the moment the Timber Culture Act became law, forestry became a major field of study and by the mid-1880s, that field was fully matured and named the Division of Forestry. The unique requirements of prairie planting compelled a regional specialization, which helped refined the study of trees and their uses.

In 1885, the hardy catalpa was the second most recommended tree for prairie planting by the State Horticultural Society, because the tree could thrive in any soil and grew very quickly. The society claimed the non-native catalpa came in second, only to the native Black Walnut in versatility.<sup>14</sup> The question remains how did a tree native to the Mississippi River basin wind up being widely planted throughout the plains states for railroad ties? The Division of Forestry focused on an "efficiency-conscious" approach to forestry research, wanted to help the railroads in future construction and maintenance supplies, but left it to other forestry minded men like E. E. Barney to discover a tree capable of growing quickly and hard enough to be utilized at ties and bridge material. In this era, "thousands of tests were carried out on the strength and durability of timbers... and on every aspect of 'timber-physics' and 'material-research'," which

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<sup>13</sup> H. F. Roberts, "The Hardy Catalpa," *Kansas State Agricultural College Experiment Station Bulletin 108* (Manhattan: Kansas State Agricultural College, April 1902), 100.

<sup>14</sup> J.W. Byram, "Durability of Forest Trees," in *Sixth Annual Report on Kansas Forestry*. Kansas State Horticultural Society (Topeka: State Publishing House, 1886), 48.

included tests on native and exotic varieties.<sup>15</sup> When Barney declared in 1878 that catalpa ties could deflect three times as much rail pressure as the more expensive ash or oak ties before breaking, the panacea era of planting and research on the *Catalpa speciosa* began.<sup>16</sup>

Within one year of Barney's educational yet propaganda-filled pamphlets, the first of a series of catalpa tree plantations appeared in Crawford County, Kansas. The Farlington Forest was owned and operated by the Kansas City, Fort Scott and Gulf Railroad for future tie supplies. It was not a private operation like Fernow and Kern urged but still an important step towards demonstrating what a sustained yield forest would look like.<sup>17</sup> The artificial forest was an entire section, 640 acres, of hardy catalpa and ailanthus trees planted on virgin prairie sod between 1877 and 1882. Planted four feet by four feet apart, just as Barney indicated, the forest held over 2,000 trees per acre.<sup>18</sup> The State Horticultural Society inspected the forest in 1885 and a section of six-year-old catalpa trees measuring eight inches in diameter on average and was healthy.<sup>19</sup> Many of these test fields were railroad owned or federally bankrolled, but the first private artificial catalpa forest, Catalpa Knob, owned and operated by Mr. George Merrick Munger.

George M. Munger, a former laundry tycoon from Chicago, moved to Greenwood County, Kansas, on July 4, 1885.<sup>20</sup> Unlike Elliott's, Munger's immigration to the state was not influenced by the afforestation movement, but by economic motivations and a desire to find a climate where his wife could find relief from her rheumatism. Chicago in the mid nineteenth-century was home to what William Cronon calls, "the largest and most important lumber

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<sup>15</sup> Williams, *Americans and Their Forests*, 351.

<sup>16</sup> Barney, "Additional Facts and Information in Relation to the Catalpa Tree," 9.

<sup>17</sup> Fernow insisted that a thinned, trimmed, and managed forest could be an economic forest for great profits. Langston, *Forest Dreams, Forest Nightmares*, 108.

<sup>18</sup> Del Tredici, "The Great Catalpa Craze," 5.

<sup>19</sup> G. C. Brackett, "The Farlington Forests," in *Sixth Annual Report on Kansas Forestry*. Kansas State Horticultural Society (Topeka: State Publishing House, 1886), 44.

<sup>20</sup> On July 4, 1888, George noted it was the third anniversary of their entry into Kansas. George M. Munger, July 4, 1888, entry, Vol. 1, George M. Munger Diaries collections, University Archives and Special Collections, Kansas State University, Manhattan, Ks.

operat[ions] between the Appalachians and the Sierra Nevada's... By 1880, the city's lumber merchants jointly controlled an estimated capitol of over \$80 million [dollars].<sup>21</sup> That capital was solely moved in and out of the city on the extensive rail network that connected with all the major and minor railroads like a web reaching all four corners of the nation. By 1880 over one million board feet of white pine was passing in and out of Chicago to provide the treeless prairies with supplies.<sup>22</sup> The effect of intensive logging on the surrounding hinterlands was detrimental and the white pine forests of the north began to disappear.



**George Merrick Munger wearing his skull cap which he wore to keep his bald head warm, even inside. Picture taken in 1893.**

Figure 17. George M. Munger, circa 1893. *The History of Greenwood County, Kansas* Vol. 2. (55).

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<sup>21</sup> William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton & Company, 1991), 173.

<sup>22</sup> *Ibid.*, 181.

On August 14, 1874, the *Daily Inter Ocean*, a popular business newspaper in Chicago, reported that lumber shipments were no longer be billed by board count– they were now billed by weight. The rate change altered the fee system dramatically and greatly increased the costs of sending materials to the far off prairies. Munger, being an affluent executive who surely read this newspaper, began dreaming of curtailing the lumber and railroad men’s profits by growing trees where people needed them, in Kansas.<sup>23</sup>

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<sup>23</sup> Born on January 17, 1839 in upstate New York, George M. Munger was his family’s first-born son. Munger’s family was ardently abolitionists, leading George to serve early in the Civil War for the Union. His family had a history of military service in the Revolutionary War, War of 1812, and later his son-in-law and all three of his grandsons served in the Great War. Jenifer Duncan, *Frontier Spirit: The Brave Women of the Klondike* (Toronto: Doubleday, 2003), 146–147; Munger joined the 6th Ohio Regiment, nicknamed the Guthrie Grays in April of 1861 on a short three month infantry enlistment. Ohio Genealogical Society, “Ohio Civil War Roster,” Civil War Soldiers and Sailors System (CWSS), National Park Service [http://www.ogs.org/research/results\\_ohcwss.php](http://www.ogs.org/research/results_ohcwss.php) (accessed February 17, 2013); Afterwards he joined the 85th New York State Volunteers and served from October of 1861 to April 1863. New York State Division of Military and Naval Affairs, “Roster of the 85<sup>th</sup> New York Infantry Regiment” [http://dmna.ny.gov/historic/reghist/civil/rosters/Infantry/85th\\_Infantry\\_CW\\_Roster.pdf](http://dmna.ny.gov/historic/reghist/civil/rosters/Infantry/85th_Infantry_CW_Roster.pdf) (accessed February 17, 2013); Munger’s daughter Martha Munger Purdy Black ,divulges in her memoirs that George, a 39 year old veteran was introduced to her teenage mother, Susan (Susie) B. Owens, while recuperating from his battle wounds in Cincinnati, Ohio. Martha calls it the Battle of the Seven Pines, while George M. Munger noted it as the Battle of Fair Oaks that took place in May of 1862. Munger, May 31, 1889, entry, Vol. 2, George M. Munger Diaries; Owens was the daughter of a wealthy slave owning plantation man and displeased her parents greatly by marrying a Yankee man and relocating to Chicago. Duncan, *Frontier Spirit*, 146.

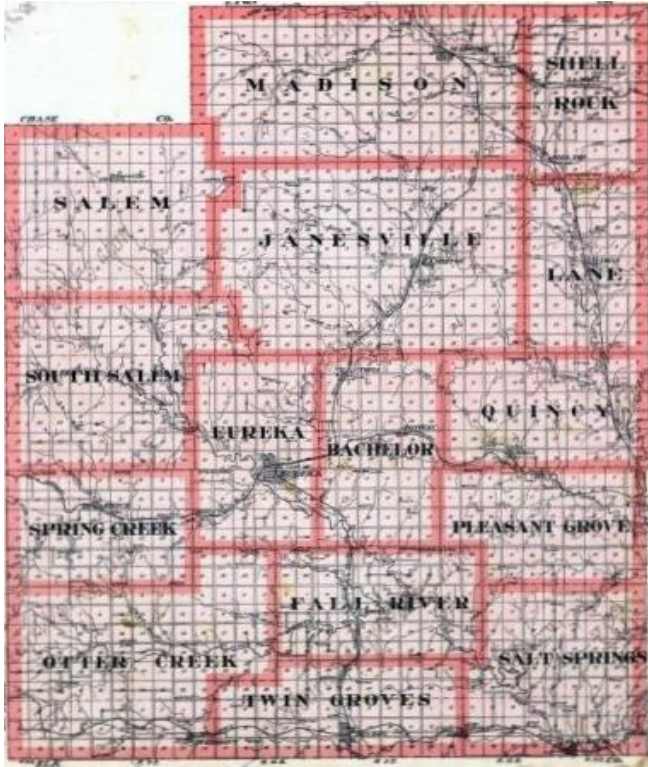


Figure 18. Map of Greenwood County, circa 1922. *The Standard Atlas of Greenwood County*.

Destroyed in the Great Chicago fire of 1871, Munger lost both his professional laundry service and home in one day. He and his family persevered through the tragedy as best they could and eventually rebuilt their lives and their social status.<sup>24</sup> Munger Laundry Co. was the first laundry service to re-open after the Great Fire and found millions of customers in need.<sup>25</sup> The company's innovative "Improved Ironing-Machine" patented in 1876, Munger and his business partner, John C. Mackey began expanding the company rapidly.<sup>26</sup> Although Munger

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<sup>24</sup> Some of Martha's first memories were of the fateful Great Chicago Fire that burned over two thousand acres from October 8–12, 1871; it destroyed all of family's homes and businesses. Duncan, *Frontier Spirit*, 147; By October 20th the extended Munger family was set up in one of the thousands of temporary shelters the city provided. "Scenes in Chicago," Concord, NH *Independent Statesman*, October 20, 1871; The Munger's went from a large home on Van Buren Avenue to a shanty constructed on Wapense Avenue; the road was nicknamed "Poverty Flats." Duncan, *Frontier Spirit*, 147.

<sup>25</sup> "He Wants the Toga: Laundry Man Munger Would Be a United States Senator," *Atchison Daily Globe*, November 5, 1896.

<sup>26</sup> John C. Mackey and George M. Munger received Patent number 177,341 for their "Improvements in Ironing-Machine" from the U. S. Patent Office on May 16, 1876.

was later only marginally involved with the laundry business, his brother Pliny Fisk Munger retained the majority ownership and called when he needed advice from time to time. Together the brothers expanded the business and eventually had seventy-two chain stores nationwide.<sup>27</sup> Although Munger was not an agriculturalist, his business past helped him understand the value of an investment.

After selling much of his laundry stock to his sibling, the meticulous Munger purchased sixteen-hundred acres in Greenwood County Kansas in 1885. He named the location Catalpa Knob, contracted the construction of a large rural Victorian home, and began his tree plantation on the virgin prairie— eventually planting millions of trees.<sup>28</sup> His wife and children joined him in Kansas on January 3, 1886 and it was a quiet reunion. Munger noted in his daily journal but as always the weather took top billing to all other occurrences— “Storm continues all day... A rainy day Sunday for Susie’s first on the farm.”<sup>29</sup> Within that first year Munger and his hired men planted over three thousand catalpa trees, 1,300 Ben Davis apple trees, one hundred peach trees and various other fruits and vegetables and all were growing successfully.<sup>30</sup>

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<http://www.google.com/patents?hl=en&lr=&vid=USPAT177341&id=D6IVAAAEB&oi=fnd&dq=Munger+Ironing+machine&printsec=abstract#v=onepage&q=Munger%20Ironing%20machine&f=false> (accessed January 5, 2013).

<sup>27</sup> Suzann Ledbetter, *Shady Ladies: Nineteen Surprising and Rebellious American Women* (New York: Forge Book, 2006), 55.

<sup>28</sup> Helen Bradford, “The Man Who Planted Trees” *The History of Greenwood County, Kansas* Vol. 2 (Emporia: Jostens Publishing, 1990), 55.

<sup>29</sup> George M. Munger, January 3, 1886, entry, Vol. 1, *George M. Munger Diaries*.

<sup>30</sup> Bradford, “The Man Who Planted Trees,” 56.





Figure 19. Munger's house, staff quarters in the left rear, circa 1922. *The History of Greenwood County, Kansas* Vol. 2. (56).

The farm Munger created was typical of agricultural endeavors in the rural United States after the Civil War— purchased with a mortgage, it produced a mixture of grass, grains, fruit, garden, and forest products in a year-round production cycle and it housed a variety of livestock animals for use and for sale. Influenced heavily by scientific agriculture information from the Land-Grant University, his farm relied on their publications and journals to solve problems and eradicate pests. Munger's plantation was a progressive farm that relied on the power of laborers and technology to maximize profits and efficiency. He participated in agricultural and horticultural societies and participated in one or more experiments with dry farming and irrigation system, which altered the natural landscape dramatically. Because of Catalpa Knob's location, Munger relied heavily on the supplies brought in on the railroad (ATSF).<sup>31</sup>

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<sup>31</sup> See all of Paul Wallace Gates, *The Farmers Age: Agriculture 1815–1860* (New York: Holt, Rinehart and Winston Inc., 1960).

Munger's business dreams led him to Greenwood County for timber profit but first he had to learn how to align his goals with the reality of life out on the prairie. During the first months Munger was in Greenwood County, he had many interactions with the unpredictable Kansas environment. On November 3, 1885, the day he began his plantation journals, a wildfire was raging to the north of his property. At 9pm, he awoke all the farm hands and they raced to the north fence lines to create fireguards and backfires to arrest the flames— the dangerous work was finished around 2am. Munger and his hired men planted 3,400 walnut seeds two days later after the threat of fire disappeared. He set out for Chicago to purchase a small herd of cattle at the end of the month to guarantee winter meat supplies. After returning with his new stock, a blizzard set in on December 4, and halted all work on the future tree plantation.<sup>32</sup>

The forty-six year old retired laundryman understood the value of a long-term investment. Munger focused his early agricultural efforts on projects that would pay off later, yet they were no less important than the daily chores he sent George Jr. out to do every day. The Catalpa Knob plantation consisted of two 640-acre sections and one-half section of 320 acres titled in Susie's name. Section 23 consisted of mostly upland prairie with the north corner dipping into Bachelor Creek. Susie's half section contained a small spring that flowed towards the Fall River south of Eureka City, but section 26 contained no water source except natural springs that would pop up in high rain years. Munger later wrote that he knew after his first season of experimenting on the prairie that the non-afforested portions of his land would require irrigation to be profitable adventures.<sup>33</sup>

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<sup>32</sup> Munger, November 3, 4, 10, 28, December 4, 1885, entry, Vol. 1, George M. Munger Diaries.

<sup>33</sup> In the 1890s, he irrigated his garden and orchard lots only, the catalpa could survive on little water. George M. Munger, "Irrigating a Five-Hundred Acre Orchard" report given at the *Kansas State Board of Agriculture 24<sup>th</sup> Annual Meeting January 9* (Topeka: State Publishing House, 1895), 66–67.



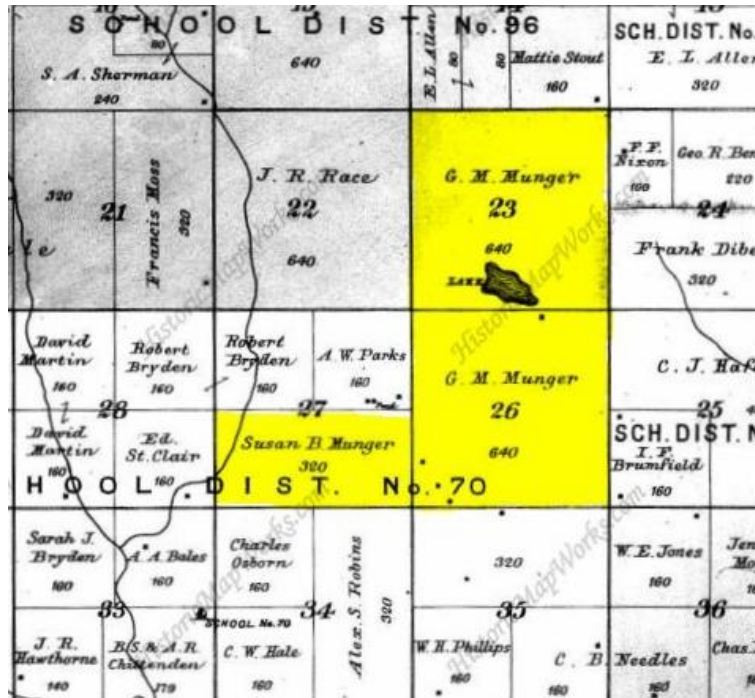


Figure 20. Catalpa Knob, Greenwood County, Eureka Township, circa 1903. *Plat Book of Greenwood County*.

After the family’s first blizzard experience, Munger began recording the daily temperature thrice daily along with other meteorological data. On the 47<sup>th</sup> anniversary of his birth, George met with a plummeting thermometer and suffering cattle. He sadly noted in his journal, “The first heifer dropped on the farm... last night unexpectedly... and froze to death... I am more than ever determined not to go into another winter without adequate shelter for my animals.”<sup>34</sup> Within sixty days he began some of his largest farm construction projects— included building an ice house and filling it with sixty tons of ice. Munger has his hired hands dig a stock pond and a house cistern for future water supply, construct pigpens, a chicken coup, and a smokehouse for meat. Most importantly, Munger began lining out his fields and turning over sod on every frost-free day that came his way.<sup>35</sup>

<sup>34</sup> Munger, January 17, 1886, entry, Vol. 1, George M. Munger Diaries.

<sup>35</sup> Munger, January, February and March, entries, Vol. 1, George M. Munger Diaries.

On the days he was not supervising or assisting his cadre of workers, he was planning his garden, grass, feed, orchard, and forest tree lots and ordering seeds and seedlings. By March 20 he had eighty acres of oats plowed, planted, and harrowed and much of the forest lot ready for its first plantings. Although he had lined much of the forest lot with walnut and hickory seeds, the real work began on Thursday April 1 1886. His journal marked the occasion with a giant heading with double underlining and read, “ARBOR DAY.” He wrote that it was, “a raw chilly day. Wind N.E. all day... 6 men planting catalpas on orchard lot being hindered some on account of getting started late but got out about 2500.”<sup>36</sup> Even though his afforestation work was just beginning, he gave one of his employees, Mr. Parks, around six hundred catalpa seedlings to plant on his own place.<sup>37</sup> Not only is Munger’s commitment to his community evident in the generous act, but it also demonstrates his conviction to distribute the *Catalpa speciosa* throughout Greenwood County.

In April 1886 alone, Munger afforested his surroundings with four mulberry trees on the North side of his house as a windbreak, thousands of catalpa seedlings in the forest plots, and 1343 Ben Davis apple trees, five-hundred peach trees, seven cherry trees, thirteen crab-apple trees, and six quince trees in his orchard.<sup>38</sup> By the middle of May, the nursery rows of walnut trees he planted in November were sprouting and looking healthy. Planting seedlings was expensive, so Munger laid out a nursery lot where his hired hands would spend almost a week sowing thousands of catalpa seeds for the planting the following spring. His 135 acres of oats “for the first time [were] looking strong... [the] corn [was] looking fine,” as were the orchard

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<sup>36</sup> Munger, April 1, 1886, entry, Vol. 1, George M. Munger Diaries.

<sup>37</sup> George gave Mr. Parks 100 on April 1<sup>st</sup> and 500 more on April 10, 1886, entries, Vol. 1, George M. Munger Diaries.

<sup>38</sup> April 1–30, 1886 entries. Vol. 1, George M. Munger Diaries.

trees and catalpas.<sup>39</sup> Munger's commercial forest was growing before his very eyes and he could not have been happier.

Whether it was planning fields, hiring skilled farm hands, or hunting down chicken-pilfering coyotes, Munger was in control of his surroundings— or so he thought. That May George noted in his journal that it was “DRY, DRY, DRY.” He was halting all plowing on account of the drought— he called all the hired hands out of the fields and set them straight out to deepen the house cistern and the stock ponds in an attempt to find the water table.<sup>40</sup> From May 17, to June 2, Catalpa Knob saw only one rainy day and on July 24, Munger dejectedly wrote that all one-hundred and thirty-five acres of his oat crop was “a dead loss as well as... the garden stuff,” but the catalpa trees were thriving.<sup>41</sup> He did not allow the mercurial weather patterns to diminish his goal and by August 16, a series of “splendid rains” had most of his surviving plants growing again. The first “killing frost” made its appearance on October 2 but George Sr. was busy enjoying a visit from his parents, Lyman and Martha who came down from Illinois.<sup>42</sup>

Munger had three surviving children living with him and Susie at Catalpa Knob until the fall of 1886. Nineteen-year-old Martha, his oldest daughter, accompanied her grandparents when they returned to Chicago in order to “study typewriting and stenography.”<sup>43</sup> George Jr. was fifteen years old that winter. He mostly worked around the farm and attended the county school just to the north of the plantation when he was not in town horsing around with his friends. Isabella, or Bella as she was known around the farm, was the apple of her father's eye— he wrote

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<sup>39</sup> Munger, May 17, 1886, entries, Vol. 1, George M. Munger Diaries.

<sup>40</sup> Munger, May 25–27, 1886, entries, Vol. 1, George M. Munger Diaries.

<sup>41</sup> Munger, May 17, 25, July 2, 24, 1886, entries, Vol. 1, George M. Munger Diaries.

<sup>42</sup> Munger, September 17, October 2, 1886, entries, Vol. 1, George M. Munger Diaries.

<sup>43</sup> Munger, October 15, 1886, entries, Vol. 1, George M. Munger Diaries.

about her the most in his journals noting she always “seem[ed] happy as a clam.”<sup>44</sup> While Susie was in Chicago nursing an ill Martha back to health in January 1887, Munger decided to throw Bella a slumber party to raise everyone’s spirits. The six young children must have been a handful for him, but Munger in his polite way allowed the young ones to stay up past 10PM to play “parlor games, then sent to bed” promptly afterwards.<sup>45</sup> The next day he again noted how joyful it was to have so many children around the farm, but by the third day, George was back to hauling hay, water, and coal to keep the plantation in operation.

In 1887, Munger made plans for enlarging not only the forest and grain lots, but also his orchard and garden areas. He spent days on end at his desk planning the additional economic endeavors and “toast[ing] his shins” by the fire deep in thought.<sup>46</sup> After ordering his seeds for the year, Munger had his farmhands breaking more sod and moving the catalpa seedlings from the nursery lot to the forest lots. February 28<sup>th</sup> –April 15<sup>th</sup> Munger and his team transplanted 136,501 catalpa seedlings grown on site from seed. Yet in the middle of all that work, he also took time to note on March 14 that the wildflowers of the prairie were in full bloom. He planted pear, plum, peach, and cherry trees in the orchard that year along with “shade, ornamental and nut bearing [trees] in [the] lawn” of the house.<sup>47</sup>

Munger was a man willing to take chances and experiment with new flora. In the spring of 1887, he planted hundreds of watermelons and the gamble paid off– by July and August he was carting tons of melons to Eureka at a time to sell.<sup>48</sup> That fall Catalpa Knob hired hands were

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<sup>44</sup> His children are always present in his writings as well as his wife. He always noted when the day was a birthday, anniversary, or other date of remembrance; for example on October 9, 1887 he wrote, “Anniversary of Chicago Fire.” Munger, January 4, 1885, October 9, 1887, entries, Vol. 1, George M. Munger Diaries.

<sup>45</sup> Munger, January 15, 1887, entry, Vol. 1, George M. Munger Diaries.

<sup>46</sup> Munger, January 1, 1887, entry, Vol. 1, George M. Munger Diaries.

<sup>47</sup> Munger, March 25, 1887, entry, Vol. 1, George M. Munger Diaries.

<sup>48</sup> He gives no indication of the profit, but indicates there was one. Munger, July 21, and August 10, 1887, entries, Vol. 1, George M. Munger Diaries.

back to planting and set out an additional 177,000 purchased catalpa seedlings. At times, the hired men were also required to record Munger's meteorological data while he was away in Chicago.<sup>49</sup> Being a meticulous and progressive man, Munger constantly tested new technologies on his plantation and kept up with the various trade journals and agriculture periodicals in search of new things with which to experiment. In August he contracted the construction of his first windmill, was thrilled when his two copies of the "official Atlas of Kansas 1887" came in the mail, and began recording the barometric pressure more often. Then in October, he purchased a "tree-digger" device designed to aid in transplanting seedlings and the perfect example of how the afforestation movement influenced technological innovation and invention in America.<sup>50</sup> Because the invention ensured the proper movement of trees from one place to another, it represents Munger's interest in protecting his living investments in every way.

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<sup>49</sup> Munger, November 16, 1887, entry, Vol. 1, George M. Munger Diaries.

<sup>50</sup> Munger, August 8, and October 19, 1887, entries, Vol. 1, George M. Munger Diaries.

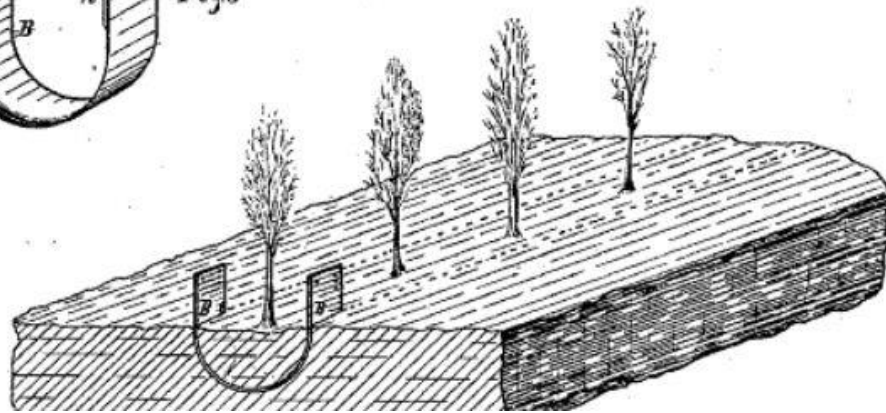
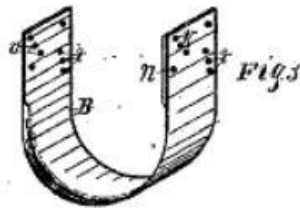
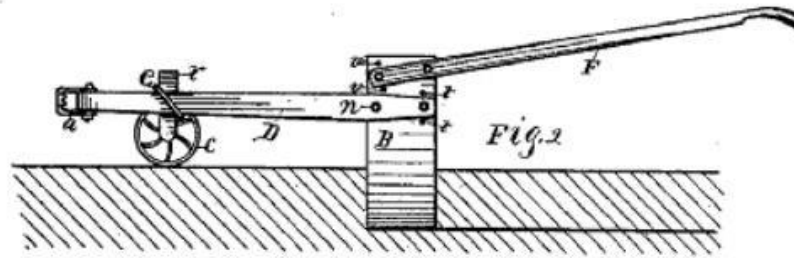


Figure 21. "Tree-Digger" patented by Leonard G. Bragg (No. 275,575), April 10, 1883.

The catalpa lots consumed most of Munger's labor costs, but because the tree plantation was a mixed farming operation, the team was also busy with daily chores— planting and harvesting grains, hoeing, plowing, and weeding the garden, and the men had to harrow all the fields weekly.<sup>51</sup> After the catalpa trees began growing, a completely new set of chores fell into the hands of Munger's hired men. Catalpas require heavy maintenance to grow straight and blemish-free trunks— Munger refers to this chore as "catalpa nursery and lot management" in his

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<sup>51</sup> He paid an average of \$25.00 per month to each skilled laborer which included boarding and meals, but for women he hired he paid an average of \$18.00 a month. Munger, December 15, 1888, October 11, 1891, entries, Vol. 2, George M. Munger Diaries; Munger didn't know, but harrowing actually dries out fields by increasing evaporation. Alberta Agriculture and Rural Development, "Soil and Moisture Conservation Equipment: Harrows and Packers," [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/eng8290](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/eng8290) (accessed February 20, 2013).

journals.<sup>52</sup> According to a 1902 experiment station bulletin, the catalpa, even in close 4x4 plantings, “differs from other forest-trees in that its dead limbs are not readily dropped but are retained... during which the growing trunk gradually encloses their bases, making knots, and affording to fungi points of access into the trunk. In order to insure clean, smooth trunks, therefore, systematic pruning of the trees is necessary.”<sup>53</sup> Munger’s adherence to the maintenance requirements of the *Catalpa speciosa* is evidence that he understood the fast-growing tree to be commercially valuable for railroad ties as planned.

In the spring of 1888, Munger added another two thousand Ben Davis apple trees to his orchard lot on the plantation, planted catalpa seed in the nursery lot again, and added hundreds of beef cattle to his holdings.<sup>54</sup> Because the bulk of his land was dedicated to the long-term investment afforestation project, he had to try to make immediate profits by utilizing almost all of his sixteen-hundred acre holdings with various other improvements. Year after year, he bought and sold pigs along with his catalpa seedlings to maintain a farm income. In an effort to protect his investments, he utilized trees as windbreaks around his home and fields. Munger planted cedar trees around his large house, catalpa trees around the orchards, and walnuts around the nursery lots— trees were both protective tools and economic tools on his plantation.<sup>55</sup>

The farm production in 1889 included minor additions to his orchard and the reaping of Catalpa Knobs first peach crop and apple harvest. Overjoyed by the size and taste of the peaches, George “picked a lot of [the] best peaches and boxed to ship to the old folks [his parents] in the morning.”<sup>56</sup> His small orchard of Missouri pippin apple trees planted in 1886 were producing

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<sup>52</sup> Munger, August 10, 1887, entry, Vol. 1, George M. Munger Diaries.

<sup>53</sup> Roberts, “The Hardy Catalpa,” 111.

<sup>54</sup> Munger, March 26, April 6, 13, 1888, entries, Vol. 1, George M. Munger Diaries; Bradford, “The Man Who Planted Trees,” 56.

<sup>55</sup> Munger, April 25, 30, May 4, 1888, entries, Vol. 1, George M. Munger Diaries.

<sup>56</sup> Munger, July 8, 1889, entry, Vol. 2, George M. Munger Diaries.

fruit near the end of September and although it was a small harvest, Munger was pleased.<sup>57</sup> The Catalpa Knob farm worked in cycles through the next few years reaping crops, repairing fences, harvesting grains and tending the stock animals. The catalpa trees were growing nicely and only required moderate cultivation and management from time to time, so Munger initiated an irrigation project that drastically increased the labor needs. By 1894, he was employing over twenty men per day in the summer months. Munger established his own brickyard to make clay irrigation pipes for his waterworks project and built his own blacksmith shop that employed a full time man year-round to maintain his growing stock of draft horses.<sup>58</sup> His plantation was in full working order and was becoming an economic generator for the county.

Although his farm duties kept him busy, Munger was keen to the happenings in the business world and the politics that surrounded it.<sup>59</sup> Munger was an agriculturalist, not a politician. He had far better economic returns than political ones while in the state. His highest appointment achieved was one term on the Kansas State Agricultural College Board of Regents from 1897–1901. The Regents position afforded him access to forestry, agricultural, and

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<sup>57</sup> Munger, September 27, 1889, entry, Vol. 2, George M. Munger Diaries.

<sup>58</sup> Munger, June 30, 1894, entry, Vol. 4, George M. Munger Diaries.

<sup>59</sup> The Pullman Strike or “Boycott” as Munger called it was raging in Chicago in June 1894 as a result of the firing of over a thousand Pullman rail yard employees. Ensuing labor strikes halted many rail services and even sparked up sympathy strikes in other states. Munger noted on June 30th 1894 that the strike was “just taking effect [in Kansas] so that several of the principal railroad systems of the county are unable to man their trains... Business of all kinds throughout the country is dead and stagnation prevails.” Munger, June 30, 1894, entry, Vol. 4, George M. Munger Diaries; Eleven days later Munger received word from his brother Orett in Chicago, recommending Munger shut down his irrigation projects due to the strike’s negative effect on their business interests pretty hard, but Munger disregarded the advice and kept up the construction. Munger, July 11, 1894, entry, Vol. 4, George M. Munger Diaries. Munger’s impetus to continue the improvement of his ranch is a symptomatic of what may have led him to run for political office in the fall of 1894. The combination of high corporate profits, unfavorable agricultural conditions/drought and unregulated railroad freight prices irritated Munger and he officially switched to the Populist or Peoples party that year. His campaign for a seat in the State House began on the twenty-third anniversary of the third day of the Great Chicago fire, October 12, 1894. Munger noted only a few minor political engagements that he attended in his sixty-day campaign; nowhere does he name his opponent or why he lost, only that he did. Munger, October 12, 13, 29, November 5, 6, 1894, entries, Vol. 4, George M. Munger Diaries; He noted near the end of 1895 that his interests in political matters remained piqued because to him the “complete control” of the market by corporations who held their best interests above the “interests of the people” was unacceptable. Indeed he did run for political office again but had an unsuccessful bid for the governor’s office on the Populist ticket. Indeed he did run for political office again but had an unsuccessful bid for the governor’s office on the Populist ticket. Munger, January 31, 1895, entry, Vol. 4, George M. Munger Diaries.



horticultural experts and allowed him the chance to socialize with the upper echelons of the Socialist party members in Kansas. Munger made many friends and associates with his political adventures making Catalpa Knob the social destination of Greenwood County.

Munger's catalpa seedlings planted in 1886 and 1887 matured by 1897 and were ready for harvesting. The plantation's hired men chopped and sharpened fence-posts for two days and Munger noted in his journal on November 22, that the "first cutting [was up] for sale."<sup>60</sup> He neglected to jot down the profits per post he received in his journal due to either excitement or disappointment, which way we may never know, but his plantation's first tree harvest was underway. The catalpa trees were not large enough for railroad ties as intended, but Munger successfully created a source of lumber in the plains and was in the process of curtailing the Chicago lumbermen in a small way. Upon inspection it was found that "on account of the distance from natural forests [sic]," fence posts like Munger's, were highly valued."<sup>61</sup>

In 1900 his association with KSAC paid off when the superintendent of tree planting in the Forestry Division, William Hall, and three University assistants showed up to survey his catalpa forests and the orchards. The men found his forests "in straight rows," and reported they were "spaced accurately 4 by 4 feet," but the entire plantation was not growing equally.<sup>62</sup> Portions of the forest showed wind damage from the wind and other portions appeared stunted by poor soil quality, but overall it was in good quality. The largest posts were nine inches in diameter and could fetch ten cents per pole, the smaller being only worth five cents per pole. Hall and his crew estimated Munger's post profits would be over \$167 per acre.<sup>63</sup>

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<sup>60</sup> Munger, November 22, 1897, entry, Vol. 4-2, George M. Munger Diaries.

<sup>61</sup> William L. Hall, "The Hardy Catalpa," *U.S. Department of Agriculture Bureau of Forestry Bulletin No. 37* (Washington: Government Printing Office, 1902), 12.

<sup>62</sup> Hall, "The Hardy Catalpa," 9.

<sup>63</sup> William L. Hall, "The Hardy Catalpa," 12.



Figure 22. Catalpa trees and one of Munger's grandson's, circa 1900. Forestry Bureau *Bulletin* #37(9).

Catalpa Knob comprised one-hundred and sixty acres containing approximately 377,000 catalpa trees and if the estimates given by Hall were correct we can suppose that Munger eventually made \$26,720 off his fourteen-year investment. With his farm producing and hopes high for continued returns, Munger must have been elated when his farm appeared in the Forestry Divisions *Bulletin* #37. The Ben Davis apple orchards contained 7,799 trees and produced two railroad cars of marketable product yearly that sold at an average fifty cents per bushel.<sup>64</sup> In 1901 the corn crop was selling at seventy-eighty cents per bushel, oats were selling at sixty cents and the hay supply was selling at \$4.50 per ton.<sup>65</sup> That his trees were becoming fence posts, not railroad ties, probably mattered very little to Munger because either way, they

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<sup>64</sup> Bradford, "The Man Who Planted Trees," 57.

<sup>65</sup> Munger, November 22, 1901, entry, Vol. 6, George M. Munger Diaries.

were producing a profit and helping to alleviate the national fears of a timber-famine. Munger's endeavor to afforest his land and create an economic forest was a conservation success.

Belle Munger married the farms supervisor, Ed P. Riggle in October 1903. The service took place on Catalpa Knob and was officiated by Riggle's uncle Reverend Riggle and "a conservable number of guests were assembled to witness the ceremony."<sup>66</sup> Munger took the time to give all family members wanting one, a tour of the plantation— it was a packed house event. With Susie's rheumatism worsening even after spent the years in and out of different hospitals seeking treatment, Munger decided to lease the plantation to the new Mr. and Mrs. Riggle and sell them all the stock, tools, and implements. Although Munger had a "few reservations," the paperwork was signed and completed on December 21, 1903, and just like that the Munger farm became the Riggle farm.<sup>67</sup>

Munger's journal continued in Riggle's writing for the next ten months, then ceased all together. Riggle decided to lease out portions of land that he could not manage with the minimized staff on hand. In 1908, Munger moved the ill Susie to Los Angeles California and one year later, sold Catalpa Knob to a Mr. Edwards. Edwards continued farming the land and selling apples but it is unknown if he continued managing the catalpa lots specifically for business or personal-use alone. The son of John Rockley, supervisor of the Edwards ranch, recalled many years later "late one Fourth of July night we were awakened – the Munger house was afire," the fire, reportedly started by a roman candle.<sup>68</sup> Although it is unknown what year exactly the fire occurred, it happened sometime after 1917 and occurred precisely on the anniversary of the Munger's arrival into the state— July 4.

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<sup>66</sup> Munger, October 7, 1903, entry, Vol. 7, George M. Munger Diaries

<sup>67</sup> Munger, December 24, 1903, entry, Vol. 7, George M. Munger Diaries.

<sup>68</sup> Mr. Rockley's first name does not appear in the source. "Samuel Rockley Family," *The History of Greenwood County, Kansas* Vol. 1 (Emporia: Jostens Publishing, 1990), 318.

Munger's participation in the extractive economy lasted for twenty-three years, but instead of leaving the landscape bare of natural resources, he swathed the land in trees. The afforestation of an area alters the landscape, but more importantly, it upholds the social conception of what a civilized landscape is. The middle of Greenwood County to this day contains numerous catalpa, mulberry, pear, Osage orange, and hickory trees that exist because of Munger's plantings, which have become part of the scenery.<sup>69</sup> When Major Osborne Cross en route to the West coast from Fort Leavenworth crossed the prairies of eastern and western Kansas in 1849, he noted that the Kansas landscape held fewer trees. He described the entire countryside as, "an endless prairie country... very beautiful at first sight, but [it] becomes tiresome beyond description after the novelty has worn off... [He saw] nothing from day to day but the broad canopy of heaven above, and the greensward below."<sup>70</sup> Kansas could claim a growing amount of forests after the turn of the century, because of tree planters like Munger.

When George M. Munger passed away on October 29, 1919, at his home in Los Angeles, he died having never produced a single railroad tie from his catalpa forest. Survived by his wife Susie, Munger died at the age of 84. His obituary noted that after leaving Kansas he traveled to the Alaskan Yukon Territory and took an excursion to South America to witness the construction of the Suez Canal.<sup>71</sup> However, Munger's obituary does not state that his farm's orchards and forests were once called "the Wonder of Eastern Kansas," since his trees became part of the technological and environmentally constructed landscape.<sup>72</sup> Munger's successful production of a single species forest from within the Great Plains demonstrates that the system of tree planting suggested by the Forestry Division worked.

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<sup>69</sup> I drove around the exterior of Munger's 1600 acres and thousands of trees still grow there today.

<sup>70</sup> As Quoted by Malin, *The Grasslands of North America*, " 110.

<sup>71</sup> "Geo. Munger," *Eureka Herald*, November 13, 1919.

<sup>72</sup> "He Wants the Toga: Laundry Man Munger Would Be a United States Senator," *Atchison Daily Globe*, November 5, 1896.

## Conclusion – Altered Landscapes and Afforestation

*The struggle for existence between prairie and forest is a bitter one.* Albert Dickens, the first Kansas State Forester, 1910.<sup>1</sup>

Celebrated loudly in the nineteenth century, science and technological advances allowed humans to gain further control over natural resources. Labeled as the “wonderful century,” most inventors in the era believed that technology for harnessing environmental forces was “one of the most critical gauges of human achievement.”<sup>2</sup> When rainmaking theories emerged in the Great Plains and heralded as truths, the proponents advanced that agrarians could not only subdue the soil with plows, but that they could also control the weather by planting trees. On the social evolution scale, which was prominent in the mid-nineteenth century, only savages were subject to the every whim of the natural world. Therefore, Euro-American settlers felt more advanced and capable of civilizing the open prairies.<sup>3</sup> However, the pseudoscientific ideas centered on plowing and planting trees actually drove men of science towards the evidence they needed to disprove the hypotheses and led them in to see, that they were simply a part of the natural environment, not in control of it. From 1870–1900, thousands of non-native species naturalized themselves into the Great Plains landscape and this change over time resulted in an altered ecosystem and a culturally perceived landscape of perfectly plowed fields, lined with trees.

The Timber Culture Act was first in a series of pro-tree legislations that reflected the changing relationships between human and nonhuman characters. The TCA created a need for reliable information on proper forestry methods to establish successful timber-claim tree lots

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<sup>1</sup> Albert Dickens, “Report of the State Forester,” in *Kansa State Agricultural College Experiment Station Bulletin* 165 (Manhattan: Kansas State Agricultural College, March 1910), 302.

<sup>2</sup> Adas, *Machines as the Measure of Men*, 214.

<sup>3</sup> *Ibid.*, 215.

because afforesting the prairies was very different from reforesting eastern environments. The early dissemination of agricultural information and planting techniques grew into a science-based system known now as the Extension Services, which people still rely on for proper planting techniques today.<sup>4</sup> The TCA influenced people to experiment with native and non-native species in order to find varieties that could survive on open prairies, leading to successful plantings and the afforestation of the environment. Moreover, the TCA led to the creation of the U.S. Forest Service, which established a set of beliefs based on the conservation of timber consumption in their model of forest maintenance, which maintains the National Forest and collaborates with private forest owners to avoid environmental destruction.

Forestry historians like Wilmon Droze, Nancy Langston, and Michael Williams all credit the various leaders of the Division of Forestry for establishing experimental stations throughout the Plains, that led to the development of shelterbelt technology and the eventual view of trees as living tools, but this is a reductionist and incorrect approach to the forestry timeline.<sup>5</sup> The enactment of the TCA directly leads to later tree planting experimentation and therefore is one of the main impetuses behind final conservation successes. The TCA did not create the Forestry Division or professional foresters directly, but the bill did stimulate the need for experimentation and ultimately ended the idea of an afforested Great Plains. Foresters today now understand the environmental limits of the Great Plains and use trees as living tools in a more sustainable fashion, which demonstrates the continual evolving ideas of technology to include biotechnologies.

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<sup>4</sup> See the K-State Research and Extension program online, <http://www.ksre.k-state.edu/> (accessed April 25, 2013).

<sup>5</sup> Droze, *Trees, Prairies, and People*, 31; Langston, *Forest Dreams, Forest Nightmares*, 104–105; Williams, *Americans and Their Forests*, 416–417.

This study has traced the shifting images of trees in the American West and shows how immigrants from eastern states help create the social conception of the Great Plains environment as a place in need of forests. This study has shown that the TCA is the watershed moment when trees become elevated into the national conversation for the first time. When the Division of Forestry became the Forest Service in 1905, the ties between agricultural studies and forestry matters ended. Nevertheless, the agricultural origins of the USFS are not invalid or inconsequential when discussing the history of American forestry.

The Forest Service's prairie afforestation attempts continued unabated in the twentieth century and owing to the wealth of information on what not to do, subsequent results had positive results. The 1924 Clarke–McNary Act was in effect, an updated TCA. Unlike the TCA, the 1924 legislation provided clear information to agriculturalists on how, why, and where to plant trees and was aimed at protection, not natural resource production. The Clark–McNary Act combined state and federal efforts to ensure the dissemination of the information and provide seedlings for the construction of shelterbelts, not forests. The funds became available quickly to establish two-state sponsored nurseries in Kansas and they were operational in just a few short years. By 1926, the nurseries were distributing over twenty-two million trees annually for shelterbelt construction around the state.<sup>6</sup>

When the Dust Bowl ravaged the Great Plains in the 1930s, the winds carried away millions of pounds of top soil out of Kansas and highlighted how prairie environments were sensitive ecosystems. The persistent droughts, poor soil management, and the subsequent wind erosion led President Roosevelt to authorize millions of dollars of drought relief funds to plant a shelterbelt through the Great Plains stretching from Canada to Texas. The goals of the Prairie

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<sup>6</sup> Thomas R. Wessel, "Prologue to the Shelterbelt, 1870 to 1934," *Journal of the West* 6, no 1–4(1967), 128.

States Forestry Project were to tame the western winds and arrest the damaging effects it had on soil conditions. The project came under fire by the media due to the amount of funds allocated during an era of high government spending, but it began in the spring of 1935 despite the opposition.<sup>7</sup> The first PSFP projects in Kansas began near Pratt, Kansas, located in Stafford County on Mrs. Mamie Fay's farm. By 1940, the trees were thriving.



Figure 23. The First Shelterbelt in Kansas being cultivated to reduce weed growth in 1936, Stafford County. Courtesy of the Kansas State Historical Society.

When the project was defunded in 1942, the total number of trees planted in Kansas was 39,864, 221. The shelterbelt covered 44,483 acres of land on 5,960 different farms utilizing and consisted of mostly cottonwood, Chinese elm, oak, pine, and Osage orange trees.<sup>8</sup> By 1939, sixty-five percent of the seedlings planted in the prior four years were surviving and had grown

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<sup>7</sup> E. L. Perry, "History of the Prairie State Forestry Project," *USDA Forest Service* (June 18, 1942).

<sup>8</sup> *Ibid.*



nearly twenty feet tall.<sup>9</sup> The shelterbelt project was a success. People began lining their fields and farms with trees to create a more pleasant environment and prevent topsoil erosion, reduce wind chills and blowing snow. The living fences proved to reduce crop damage and increase yields from fields, making them very popular to agriculturalist. The trend continues today and all throughout the state, fields remain lined with living tools. In 2004, the Kansas Forest Service published “Windbreaks for Kansas” and it is strikingly similar in tone and instructions to the original PSFP publications, which shows continuity in the application of trees as a living tool.<sup>10</sup>



Figure 24. Shelterbelt Picnic, 1940, Stafford County. Courtesy of the Kansas State Historical Society.

<sup>9</sup> “Seven and a Half Million Trees Will be Planted in Kansas in 1939,” *Topeka Daily Capital*, August 7, 1938.

<sup>10</sup> Kansas Forest Service, “Windbreaks for Kansas,” *Kansas State University AES and Cooperative Extension Service* (Manhattan: Kansas State University, May 2004), 1–5.



Figure 25 View of the Picnic tables, 1940, Stafford County. Courtesy of the Kansas State Historical Society

Trees continue to have an evolving definition and conceptualization in a Plains culture. One of these new social conceptions of trees as a living tool is the harnessing of their complex natural processes for the removal of toxins from soil or water— phytoremediation. According to the Kansas Extension Service, “Phytoremediation, more broadly referred to as phytotechnology, uses vegetation to contain, sequester, remove, or degrade inorganic contaminants in soil, sediment, surface water, and groundwater.”<sup>11</sup> Trees are capable of removing pollution in areas where traditional decontamination is too risky, or if the physical removal of the contaminant cannot take place. The process is lengthy, but cost effective and extremely useful in areas with

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<sup>11</sup> Ganga M. Hettiarachchi et al., “Phytoremediation: Protecting the Environment with Plants,” *Kansas State University AES and Cooperative Extension Service* (August, 2012), 1.

low to moderate pollution.<sup>12</sup> Phytoremediation tree planting is not a theory to increase the rain, but it is a form of afforestation when performed in a semi-arid plains environment.

Why is the term afforestation utilized widely in biochemical, ecological, and conservation journals but rarely used in historical studies involving the development of the Forest Service, land laws, or in current Forest Service publications? Perhaps, it is easier to avoid the fact that the social construction of our environment does not make ecological sense. On the other hand, perhaps it is because afforestation is synonymous with the TCA and society does not want to remember failures.

The theory of climate amelioration through afforestation encouraged the propagation of trees in the Great Plains. Despite the perception that the plains were treeless, they were not. The environmental dialogue between nineteenth-century settlers poised with a shovel in one hand and a tree seedling in the other and the grasslands that surrounded them arose from upbringings where forests naturally occur. When Elliott began his railroad boosterism test fields in 1870, he had no idea he would be helping maintain an interest in forestry matters on the plains of Kansas for the next thirty years. Because of the number of fervent pro-tree publications from him and from other railway promoters, trees became cultural living tools and supported by all levels of society.

The impetus behind climate amelioration theories and the act of planting trees are two very different things. Afforestation is not a historical theory disproven by scientists— it is a vital term whenever discussing the planting of any woody shrub or tree in a savanna like environment. Railroads afforested their lands to demonstrate a rainmaking theory. University researchers afforested their campuses to demonstrate what species would grow on an open prairie. Settlers

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<sup>12</sup> Hettiarachchi et al., “Phytoremediation: Protecting the Environment with Plants,” 7.

afforested their Timber Claims to acquire free land. Agriculturalists afforested their land for economic returns and for personal supplies. However, they all afforested a non-forest environment— all driven by different motives but utilized trees as envirotechnological tools.

Today there are roughly 5.2 million acres of forests in Kansas, an increase of over 3.9 million acres from the first inventory of forests that took place in 1936. The Kansas Forest Service in 2013 reported that the “increase in forestland has occurred primarily in uplands and from woody encroachment into grasslands.”<sup>13</sup> The top ten tree species in the state today include cottonwood, hackberry, green ash, American elm, Osage orange, black walnut, bur oak, mulberry, American sycamore, and honey locust. Kansas also has 289,577 acres of living windbreaks that stretch a total length of 43,436 miles, “enough to cross the state east to west almost 100 times.”<sup>14</sup> These windbreaks surround roughly 1.2 million acres: 59 percent of them protect fields, 28 percent protect farmsteads, and homes and 12 percent protect livestock areas. Twenty-percent of the state’s windbreaks contain trees that are less than 25 years old, 59 percent of the trees are 25 to 50 years, and 21 percent of them are older than 50 years.<sup>15</sup>

When it was finally a culturally accepted notion that trees could not improve rainfall chances in dryer areas, trees did not revert to their status of natural curiosities. Imaginative humans, determined to discover the inherent wealth of trees by utilizing the newest scientific research found species adaptable to the plains environment and then developed a vocabulary centered on tree planting for protective and economic means. The expansion of forest cover in Kansas is a result of the changing interactions between humans and nonhumans based on an envirotechnological construction of the environment where trees are living tools. When Marsh

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<sup>13</sup> Kansas Forest Service, “Forests in Kansas,” <http://www.kansasforests.org/about/forestsinkansas.shtml> (accessed February 20, 2013).

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

identified human beings as agents of change in their environment, he initiated a series of cultural and social changes that manifested in pro-tree human actions.

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