

Planting Stronger Roots for Old Growth Forest Restoration

Eamon McGuigan

Macalester College '22

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Introduction

Though often shrouded in mystery and mythology, old growth forest is widely agreed upon as being beneficial to both forest ecosystems and human beings. Its favorable image has led many people to search for ways to increase the size and number of old growth forest stands in order to maximize their characteristics and benefits. This research, which involves the testing of various forest management approaches and their effects, has produced helpful quantitative data on how to best facilitate various types of old growth forest in order to maximize their beneficial outputs. However, when making my way through this research, I kept finding a deeper problem hiding beneath the quantitative research and management strategies: the need for a large-scale cultural shift in the way that we understand and interact with trees, forests, and nature as a whole. While we may continue to improve our ability to foster old growth, if we keep doing so within a limited framework, then this work will come with great expense. By reevaluating our understanding of old growth forests and our place within them, we can access a world of untapped potential that benefits not only us but the rest of the natural world as well. In this report, I will identify four major cultural issues prohibiting us from achieving this potential and provide solutions for revitalizing old growth and greater forest restoration efforts.

Background

What is Old Growth?

When considering how to best manage forests in order to achieve maximum old growth benefits and characteristics, one must first ask the question: what is old growth? Foresters have struggled historically to pinpoint a single definition, partially due to the fact that old growth forests across the world vary greatly depending on their ecosystem and the species of trees that they contain. While the Minnesota Department of Natural Resources describes old growth forests as “forests that have developed over a long period of time, essentially free from catastrophic disturbances,”¹ it also recognizes that this definition fluctuates based on each species found within the state. For

example, white spruce trees only have to reach 90 years of age to be considered old growth due to their relatively short lifespan, whereas other species such as red and white pine have to be 120 years old or have a diameter greater than 20 inches.¹ It is also important to understand that the term is used to describe a stand, or distinct area, of trees which share these characteristics, not just a single tree.

The fact that old growth forests have been free from catastrophic disturbances does not mean that these forests have been free from *any* disturbances; all forests are impacted by human interactions as well as natural phenomena such as wind and fire. When determining old growth status, the age, structure, and successional history of the forest serve as helpful indicators.¹ I have decided to summarize Thomas Spies and Jerry Franklin’s model of forest growth,² which also takes into account the important role dead trees play in forests,¹ in a chart below (Table 1).

Table 1. Forest Phases of Growth and Characteristics

Phase of Growth	Characteristics
Establishment	New trees and species begin to grow amidst the presence of dead trees
Thinning	Understory light levels increase; surviving shade-tolerant trees, shrubs, and herbaceous plants are able to grow alongside the continued establishment of new trees
Mature	Dominant live trees begin to reach their full size; other shade-tolerant species have the potential to reach intermediate canopy levels; dead tree debris is at a low point
Transition	Dominant species are now those established during redevelopment rather than immediately after the disturbance; high density of dead trees thanks to mortality of trees established after the disturbance
Shifting-Gap	Original trees are gone; growth and decay happen based on competition for light and space

Source: Spies, T. A., & Franklin, J. F. (1996)

Forest stands are typically considered to be old growth after finishing the mature stage. As Spies and Franklin also point out, the extent of these phases will vary based on species and environment, with stands often experiencing multiple phases simultaneously and, in some cases, certain phases such as the shifting-gap phase not even occurring.²

Benefits of Old Growth

One of the main advantages that old growth forest stands have over others is that they act as greater carbon sinks.³ This means that they store a lot of carbon, helping to counteract global

climate change and the impacts of carbon dioxide, a greenhouse gas. This carbon absorption and storage takes place in the forest's soil and woody biomass.⁴ Since old growth forests have not undergone many severe recent disturbances, they tend to contain a layer of debris on the forest floor which in turn helps to prevent soil erosion and degradation.⁵ Less susceptibility to erosion and degradation allows the soil to better retain carbon.² Old growth forest soil has also been found to contain more sodium and nitrate ions, which plants can utilize for growth and energy production, than younger forest soil.⁶

In addition to storing carbon, old growth forests also provide habitats for many other species of plants and animals. The conditions present, such as light availability, presence of decomposing debris, and high nitrogen concentration in the soil, cater to the needs of many types of plants and shrubs.^{5,7} Animals, as well as plants, also thrive in old growth environments. The higher presence of fruit and vegetation, thanks to these favorable conditions, is able to support a greater animal population.² Large standing or fallen dead trees, which are more common in later stages of forest development, support animals by acting as a place to nest, hide, roost, or seek refuge from extreme weather.² By virtue of their age, old growth forests often contain more animals simply because they have had more time for different species to accumulate.²

The retention of old growth forests, as well as forests in general, has great benefits for humans. Each year, ecosystem services such as wood and wood products provide around \$125 trillion to the global economy.⁸ Thriving natural environments help support related industries and employ 1.2 billion people.⁸ Each dollar invested in the restoration of degraded landscapes can generate an economic return of \$7-30.⁸

The products generated by restoration activities can also greatly benefit humans by providing them with resources for the built environment. Architects are beginning to turn to Mass Timber, a movement in building design which involves building using frameworks of large, composite wooden pieces as opposed to more fossil-fuel intensive materials. Mass Timber buildings are highly beneficial to humans and the rest of the environment because they store a greater amount of carbon than other buildings, are cheaper and faster to build, and have a high aesthetic value. For example, the seven-story, 180,000 square-foot T3 office building in Minneapolis took only 9.5 weeks to install.⁹

Challenges and Opportunities

Separation of Humans and Nature

In modern American consumer culture, trees, like other natural resources, are often seen as merely economic commodities and are therefore treated the same as other commodities. While this mindset occurs out of a desire to maximize human usage of natural resources, it ends up

being quite counterintuitive, as the forest's best interests are commonly ignored, resulting in a poorer ability to supply resources to humans. The reality is that trees are much more than just resources. They are living, functioning organisms that are much more like human beings than most people realize. Trees are, in fact, able to communicate with each other. Connected to each other through root systems and networks of mycorrhizal fungi which help to expand these systems by acting as root extensions, they are able to send nutrients and resources to each other, warn each other of potential danger, and even deplete invasive species of vital nutrients.¹⁰ Like human beings, the eldest trees within these networks are usually the ones who are the most able to share information and resources with younger generations.¹⁰ By prioritizing the protection of elder trees, forest stewards can help ensure that younger forest growth is readily-equipped with the information and nutrients it needs to thrive moving forward.

We, as humans, must be careful not to position ourselves outside of nature. This is a foundation upon which opposing ideas of humans as being nature's conquerors and saviors both rest.¹¹ When we begin to view ourselves as a part of nature, instead of simply asking what we need from forests, we also begin to ask: what do forests need from me? Research shows that a combination of tree thinning and retention of coarse woody debris helps to speed up the growth of both even and uneven-aged tree stands.^{6,12} This in turn helps out the rest of the forest, as larger canopy gaps allow for greater growth of understory vegetation and saplings and more woody debris means better soil health, decomposition rates, and microbe presence.¹³ Humans are an important part of nature, both as givers and takers. However, this means that humans are not the only ones who suffer the consequences of their actions. For one, heavy fossil fuel-burning and the resulting warming climate has created the conditions for widespread, devastating forest fires across the world. In addition, an ever-growing world population means that the built environment continues to expand, using up more land and resources. Basic survival needs are necessary; but in the process of building shelters, growing food, and other necessary activities, we must ask ourselves: what does the earth need? Building using mass timber, for example, is a reciprocal act because while wood is being used to create the building, it is also saving other resources and acting as carbon storage, benefiting the planet and helping future forests to thrive.

Reciprocity is by no means a new concept; it has been deeply ingrained within the culture and practices of Indigenous peoples throughout human history. Most of the American forestry management practiced today is descended from practices introduced by European colonizers. These practices, birthed from fear of a new land and a desire to commodify the natural environment on a mass scale, differed greatly from indigenous forest management techniques, which focused on the immediate wellbeing of both forests and humans.¹⁰ Indigenous nations understood that because humans are a part of nature, reciprocity is greatly beneficial to humans as well. For example, forest management for the sake of providing habitats to animals in turn increases local animal populations and therefore food supply. In a strange karmic cycle, the way we treat our forests dictates the way in which our forests treat us. Today, there is more forest area

on the reservation managed by the Menominee Tribal Enterprises than there was in 1854 when the tribe was relocated to the area, despite them having harvested over twice the current amount of existing trees since.¹⁴ Their Forest Management Plan combines cultural and silvicultural knowledge in order to realize the full potential of the forest.¹⁴ Renowned environmentalist Aldo Leopold proposed an ethic for land usage which “changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it” as he recognized that “in human history...the conqueror role is eventually self-defeating.”¹⁵ A cultural shift in forest management from emphasis on human needs to forest needs would, given the laws of reciprocity, come not as a detriment to human resource needs but as a benefit, and it would help to ease guilty consciences about environmental exploitation in the process.

However, such a cultural shift would require something that our modern world lacks greatly: patience. In a culture obsessed with speed and efficiency, we must understand that what is most efficient is not always what is most immediate. It takes time to receive all of the benefits of reciprocity, time which may span across generations. This especially applies to old growth, which, as previously mentioned, takes longer than the average human lifespan to develop. However, in the meantime, those willing to make sacrifices for the good of our forests will be able to experience the joys of living in greater harmony with nature and will be able to greatly appreciate that which needs to be taken.

Lack of Trust in Natural Processes

One common phenomenon greatly hindering forest growth is a lack of trust in natural processes. Part of this can be attributed to polarizing understandings of various organisms and natural events. In reality, nothing in nature is wholly “good” or “bad,” and we must be skeptical of labeling things as such. Many “harmful” organisms or events actually have important contributions to make which end up being overlooked. In 1987, Dr. Hugh Wilson of New Zealand began to transform what was then degraded and abandoned old farmland on Banks Peninsula into what is now a thriving forest full of native tree species and wildlife. At the time, neighbors were highly opposed to his plans because the land was covered in gorse, a harmful weed which they did not want spreading to their land. However, Wilson was able to use the gorse as a nursery crop to shade and protect the native trees until they overtook the gorse, after which they depleted it of sunlight and killed it. Instead of resisting the gorse, which locals were constantly trying to cut and burn, he saw its inherent value and was able to utilize it in order to restore natural balance to the land.¹⁶ Forests need “destructive” natural forces such as fires, insects, and diseases.¹⁷ Fire releases nutrients stored in forest floor debris, helps certain species reproduce, and opens up space for sunlight to help new growth.¹⁷ Insects release nutrients stored in the trees and help break down sick and aging trees.¹⁷ Finally, disease helps to eliminate trees that are sick or too old and break down dead plant material.¹⁷

In re-evaluating this lack of trust in nature, it is important for us to understand that natural processes can be helpful to humans too; we don't always need to be in complete control in order to achieve favorable results. For example, biologists are turning to the concept of rewilding, where ecosystems are restored through the reintroduction of species which have influence across multiple trophic levels.¹⁸ Just as the reintroduction of wolves into Yellowstone National Park completely reshaped the park's landscape,¹⁹ so too can the introduction and reintroduction of certain species play a vital role in the revitalization of other landscapes, including America's forests. Restoring old growth forest extends beyond direct human interaction with trees to human interaction with the entire forest ecosystem *and* to interactions between non-human species within the forest. As previously mentioned, trees' mycorrhizal networks allow mother trees to deplete resources from trees that are stunting forest growth; in other words, these organisms have their own awareness of what is truly harmful to their growth and the success of the ecosystem. Humans have the potential to be catalysts for change, to introduce and reintroduce necessary changes to these landscapes which will help our forests to thrive and better perform. This shouldn't diminish the work that forests are constantly doing, but rather support it. In other words, we don't always have to be doing something in order to create change, we just have to create the space for change to happen.

Misconception of Nature as Incomplete

When we are always looking to the future, we lose track of what is happening right now. The misconception that nature is incomplete and will somehow become complete or satisfactory in the future is detrimental to actual, tangible growth occurring in the present. While goals and deadlines can help to inspire and facilitate changes in environmental behavior, when miswritten or misinterpreted they can end up leading to performative action. Goals and standards written with vague language and little substance relating to their actual implementation do little to actually generate positive change.²⁰ Forest restoration requires standards with a "consistent, serious, [and] rigorous approach to accountability" and a credible third-party evaluation process²⁰ in order to ensure that the involved parties are actually dedicated to the wellbeing of our forests and not just their own public image. By shifting focus from the future into the present, forest stewards will be able to reevaluate their priorities to better meet the immediate needs of the forest. In many regions of the world, restoration of old-growth forest ecosystems will not be possible if these at-risk areas are not first conserved and protected.²⁰ Protection of these regions will prepare them for future restoration by means of natural regeneration as well as preserve local peoples' values and traditions.²⁰

One factor generating these feelings of inadequacy and bias within forest management is the use of loaded terminology. Since old growth forest is commonly viewed as beneficial due to its favorable characteristics, it has gained other nicknames such as "virgin growth" which imply a special, untouched purity. These terms are very misleading; as previously mentioned, "old

growth” forests could have still experienced human and natural disturbances, in spite of their old age. Biases against younger, “developing” growth can lead to feelings of impatience and a desire to control and speed up natural processes which happen at a slow, steady pace. Younger growth has its own purpose and functions; it can provide animals with shelter or resources and help facilitate the growth of other trees. Without younger growth, there would be no old growth.

Trees are constantly participating in active cycles of life within forests, and these cycles often span across long periods of time. For example, in British Columbia trees are hypothesized to spend centuries metabolizing nitrogen absorbed through roots from decaying salmon carcasses left by bears on forest river banks. The nitrogen promotes the growth of thriving forests, which in turn better shade and nurture the rivers, thus increasing the productivity of salmon populations and restarting the cycle.¹⁰ Cycles like this help to illustrate two key ideas: that natural ecosystems are complete and ever-functioning systems, and that natural change takes time. The process of developing old growth requires, above all, patience. In order to maximize the benefits of old growth forests, we have to accept and work with the natural cycles of these forests, even if it means that we will not live to see the full benefits of all of our work. Nature is not incomplete; it is alive, functioning, and moving at its own pace. By reducing our energy spent focusing on the future, we can meet our forests where they are at and make sure that they have everything they need now for their development journey.

Shift Away from Local Needs and Knowledge

As the modern world continues to develop, it can be easier and easier for people to forget the magnitude of importance that forests once had, and still have, to the lives of people across the planet. Our interactions with forests are not random; rather, they are dictated by the social, economic, cultural, and spiritual values of different communities.²⁰ While many of these needs come from widespread areas, with timber and lumber being shipped across the U.S. to be converted into products such as buildings, furniture, and paper; for many other people in the U.S. and across the globe, forests have much more immediate significance for their survival, wellbeing, and spiritual and cultural practices. This is important to remember when interacting with forests outside of your native region, even (and especially) when the interaction carries the positive intention of restoration or revitalization. Restoration efforts must include input from local communities with free, prior, and informed consent so that local customs and values are respected and benefits are experienced on a local scale.²⁰ Free, prior, and informed consent (FPIC) “allows indigenous peoples to grant or withdraw consent for a project at any stage [and] includes the right to determine what type of process of participation, consultation, and decision-making is appropriate.”²¹ Those whose livelihood is most deeply-intertwined with the state of local forests often have the forests’ best interest at heart and thus should not only be respected as fellow humans but also as fellow forestry experts, even if their customs do not align with typical western practices. Local groups and individuals “can help prioritize distribution of

restoration actions across the landscape, set project goals (including desired level of recovery), contribute knowledge about ecological conditions and successional patterns to improve development of reference models, and engage in participatory monitoring. Additionally, stakeholders can provide political and financial support for long-term project sustainability, as well as moderating conflicts or disagreements that may arise.”²² Promoting inclusivity within forest management will make available the breadth of information and support which already exists in our world today.

However, in order to achieve this potential in the U.S., we must work to debunk myths which have harmed our country’s forest management for centuries. Firstly, when European colonial settlers first arrived in America, they believed they had discovered vast quantities of “pristine wilderness,” or nature untouched by humans. In reality, much of this land was being actively managed by various indigenous populations who used methods such as controlled burns to cultivate prairie and forest growth.²³ Controlled burning, along with other indigenous land management practices, has been historically excluded from the practices of the U.S. Forest Service.²⁴ As uncontrolled fires rage across our nation, much of the public perception of forest fires remains negative. By overcoming notions of indigenous practices as being “primitive” or “alternative,” those within the realm of western science will be able to unlock a new world of scientific information and action (to learn more from Indigenous environmental experts, see “Other Resources for Further Reading”).

In a world obsessed with looking to the future and pooling our energy and resources into new innovations and technology that could “save” our planet, the truth is that a breadth of knowledge and technology necessary to living sustainably already exists. Although it has become lost within mainstream American culture, reciprocity has been practiced for as long as humans have existed and continues to be practiced today. By tuning more deeply into the already-existing practices and behaviors of human beings and trees alike, we can begin to develop a deep trust in nature, recognize our own place within it, play a contributing role, and receive the resulting benefits.

Conclusion

While studying human effects on tree patterns and behaviors is vital to helping our forests achieve their full potential as old growth, so too is examining our cultural understandings and behaviors surrounding forests and nature in general. When doing so, we begin to see that cultural phenomena such as the separation of humans and nature, a lack of trust in natural processes, misconceptions of nature as being incomplete, and delocalization of action/knowledge threaten our ability to act our part within these natural cycles. In order to break free of these behavioral patterns and improve our relationships with forests, the following steps are necessary:

1. *Localize restoration efforts.* This includes the involvement of local groups and their understanding of their surrounding environment, as well as applying knowledge of various tree species/behaviors in order to act on a case-by-case basis.
2. *Practice reciprocity.* Giving back to nature not only helps to remove guilt about taking but also allows us to take more in the future. The more we give, the more we will receive.
3. *Practice patience.* Nature does not rush; it knows what it needs and how to get it, but does not work on a human schedule. Resistance to these cycles may bring immediate benefits but is detrimental in the long run and will lessen benefits over time.
4. *Learn from the past and prepare for the future, but do so in the present.* Events threatening the state of our natural environment, such as global warming, will not be saved in the future but in the present. Indigenous peoples have been practicing reciprocity in America since long before European colonial settlers arrived. Knowledge of how to live in harmony with nature already exists; we just have to pay attention. Paying attention to fellow humans and our forests will provide us with the information and tools we need to live sustainably and enjoy the benefits that old growth forests can provide us with.

Old growth forests are important because they provide beneficial services to the rest of nature, including human beings. However, this should not diminish the importance of younger growth, which also provides great benefits. Attempting to maximize the benefits of old growth by resisting natural cycles and processes will never yield greater benefits than when helping to catalyze, facilitate, and maximize the potential of these processes. Rather than asking how we can take the most from our forests, we should ask how we can give the most, and from there we will be able to realize the true potential of our forests.

The cultural roadblocks mentioned in this report are not only inhibiting old growth development; they are negatively affecting all of nature. While old growth served as a case study for this piece, the lessons and solutions provided can be applied to all environmental restoration and regeneration work, as well as to everyday interaction with nature. I hope that by prompting others to reconsider the foundation of their fundamental relationship with the environment, this writing will inspire them to help create a world with greater natural abundance.

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Other Resources for Further Reading

1. Robin Wall Kimmerer: *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*. <https://milkweed.org/book/braiding-sweetgrass>
2. Winona LaDuke: *All Our Relations: Native Struggles for Land and Life*. https://www.goodreads.com/book/show/183893.All_Our_Relations
3. Dina Gilio-Whitaker: *As Long as Grass Grows: The Indigenous Fight for Environmental Justice, from Colonization to Standing Rock*. <http://www.beacon.org/As-Long-as-Grass-Grows-P1445.aspx>
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